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ANALES DE L'UNIVÉRSITÉ DE CRAIOVA

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ANALES DE L'UNIVÉRSITÉ DE CRAIOVA

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WORKING GROUP 1: PLANT CULTIVATION AND ANIMAL GROWING TECHNOLOGIES

ANA- MARIA BÂRZU - The influence of some technological factors on seed quantity in perennial seed fodder grasses …… 10
EVA BUCUREAN - The influence of the soil, sowing time and sowing thickness upon the sunflower production for the pedo-climatic conditions of Oradea region ……. 16
EVA BUCUREAN – The influence of the chemical fertilizers with nitrogen, phosphorus and potassium upon the production of autmn barley …….. 22
I. CHEREJI - Research regarding the knoledge of the genetic patrimony concept in poultry breeding ……. 28
I. CHEREJI - Analysis of food consumption of the „lohmann brown" hen hybrid kept in modified B.P. 3S ……. 33
M. COLĂ, FLORICA COLĂ, C. GĂVAN - Capacity reproductive Holstein cows of its kind – imported fiesland, dependingon the country of origin …….. 36
M. COLĂ, FLORICA COLĂ, C. GĂVAN - Effect on vitamin a breeding pig …… 42
EMILIA CONSTANTINESCU, DORINA BONEA, VIORICA URECHEAN, L.OLARU - The influence of the climatic conditions on the comparative crop of sunflower genome at ARDS Simnic …….. 49
E. CONSTANTINESCU, C. ROSCULETE, E. PETRESCU - Alfalfa new varieties with high nutrition feed value, created at INCDA Fundulea ……. 57
A. CROITORU, M. MILUȚ - Researches concerning red clover (Trifolium pratense) technology, cultivated in the hill area of Oltenia ……. 62
MILICA DIMA - Investigatory results concerning the azote, phosphorus and potassium fertilization to cultivated peanuts on the psamosoils from South of Oltenia ……. 66
MARIA DINU, P.SĂVESCU, PELAGHIA CHILOM - The morphological's changes determinated by ecological foliar fertilisers across the cucumber crop in to greenhouses …… 74
MARIA DINU, P.SĂVESCU, I.PINTILIE - The biochemical and yield studies at any yellow melon cultivars which are obtained in to unheated greenhouses ……. 77
I. DRAGHICI - The influence of the epoch of harvest about the yield and biomass quality to the sweet sorghum cultivated on the sabulous soils from the Oltenia South …….. 82
C. GĂVAN, M. COLĂ, V. MOTORGA, BUTURA CONSTANTA - Effects of subacute ruminal acidosis on free choice inteke of sodium bicarbonate in lacting dairy cows ……. 91
C. GĂVAN, V. MOTORGA, CLAUDIA PĂTRU, M. COLĂ - Gravity separation of fat content of row bovine milk …… 94
I. GEAMĂN, GH. MARINESCU, A. ALEXANDRI, MINODORA TUDOSE, FULVIA FLORICA VLAD, C. GUTUE, DOINA VĂRGĂLUI, V. MIRON, EMILIA VASILE, IONELA DOBRIN, VASILICA LUCHIAN - Researches concerning the elaboration of a technology with low pollution degree to control the pathogen agents and pests at the field cucumbers culture …….. 97
ADRIANA HANC-STOIAN, A. MOISUC - Study concerning the behavior during summer of some turf mixturesin the condition of western Romania ……. 104
MONICA HĂRMĂNESCU, A. MOISUC -The construction of pls-leverage model for determination of total crude protein content in forages from a permanent pasture (Grădinari; Caras-Severin) using Nir spectroscopy ……. 108
MONICA HĂRMĂNESCU, A. MOISUC - The influence of NPK and sheep manure fertilization on the total crude protein content in forages harvested at the beginning of spring (2008) from a permanent pasture (Grădinari; Caras-Severin …….. 115
GH. MATEI, E.PETRESCU, N.VILAU, C. ROŞCULETE -Research regarding the influence of mineral fertilization to the yield on soybean cultivated in the pedoclimatical conditions from SCDA Caracal …… 121
GH. MATEI, G. PĂUNESCU, M. NICOLESCU, ILEANA COJOCARU - The influence of the crop rotation and long term fertilization at SCDA Simnic Craiova to the soil's natural fertility …… 128
GH. MARINESCU, I. GEAMĂN, A. ALEXANDRI, MINODORA TUDOSE, FLORICA FULVIA VLAD, C. GUTUE, V. MIRON, DOINA VĂRGĂLUI, EMILIA VASILE, IONELA DOBRIN, VASILICA LUCHIAN - Researches concerning the elaboration of a technology with low pollution degree to control the pathogen agents, pests and weeds at the field tomatoes culture.....135
GH. MARINESCU, I. GEAMĂN, A. ALEXANDRI, MINODORA TUDOSE, DOINA VĂRGĂLUI, VALENTIN MIRON, FULVIA FLORICA VLAD, C. GUTUE, EMILIA VASILE, IONELA DOBRIN, VASILICA LUCHIAN - Researches concerning the elaboration of a technology with low pollution degree to control the pathogen agents, pests and weeds at the garden beans culture …….....143
GHEORGHITA MANDRILA, I. OLTEANU, DANIELA DOLORIS CICHI, M. SEICULESCU, DORIN CONSTANTIN COSTEA – The basic ampelographic descriptors for some native vineyard

varieties …… 149
CRISTINA MARIA MAERESCU - Research regarding the nutrition of sheep depending on age and production in the North-West of Romania …….. 155
CRISTINA MARIA MAERESCU - Aspects regarding the physicochemical and microbiological characteristics of sheep's milk cottage cheese ……. 159
D. MIERLIȚĂ - The effect of acidifying feed or drinking water on the digestive microflora and on the bioproductive performances of Broiler chickens …… 165
D. MIERLIȚĂ - Research concerning the bioefficiency of using organic acids in piglets' feeding .. 173
A. MIHAI, M. NICOLESCU, B. NICOLAE –The management of the cereals and technical crops mechanization ……. 179
M. MILUȚ, A. CROITORU - Influence of the exploitation way and vegetation regrowth length on the temporary meadows yield …….. 192
OFELIA MULLER, GABRIELA PĂUNESCU, MIRELA PARASCHIVU - The research regarding wheat germination and 1000 kernels weight influence to winter wheat yield in ards Simnic area field conditions …… 196
M. NICOLAE, ELENA NICOLAE, A. DULUGEAC - Phases of vine's increase and development in view of the elaboration the viticulture fenocalendar. method experimental ……. 200
L. OLARU, GABRIELA PĂUNESCU, ONCICĂ FRAGA - The research regarding the behaviour of a KWS winter wheat set in ecological conditions from Oltenia central area …… 203
L. OLARU, GABRIELA PĂUNESCU, ONCICĂ FRAGA - The seeding delay influence to winter wheat morphological and physiological characters in ards simnic area field conditions …… 206
MIRELA PARASCHIVU, GABRIELA PĂUNESCU, CLAUDIA TUȚĂ - Identification research regarding wheat "Alternative" type sources in Oltenia central area conditions …… 211
GABRIELA PĂUNESCU, G. PĂUNESCU, L. OLARU - The fertilizing influence to a winter wheat set yields in different environmental conditions to ards Simnic area …… 215
GABRIELA PĂUNESCU NICOLETA BOGHICI, L. OLARU - The establishment of drought resistance selection criteria proceeding from a winter wheat set correlations in Oltenia central area conditions …….. 220
E. PETRESCU, C. ROŞCULETE, C. V. POPESCU E. CONSTANTINESCU, FLORICA VILĂU – Research regarding the influence of fertilization on wheat production and quality ……. 225
I.A. PRIOTEASA, MARILENA ALINA PRIOTEASA, D. IANCU, O. PANIȚĂ- Researchs on the influence of pinching and thinning out on the production of Virginia tobacco, on the conditions soil and clime Mîrşani – Dolj 229
C. ROŞCULETE, E. PETRESCU, N. VILĂU, GH. MATEI, C. V. POPESCU - The influence of long term fertilization on maize yield and quality ……. 233
P. SĂVESCU, MARIA DINU - Researches regarding the changes of the oxidative status of grapefruits juice after sweetening task …….. 237
P. SĂVESCU, MARIA DINU - Researches regarding the changes of the oxidative status of lemon juice after sweetening task …… 241
CAMELIA ŞTEFAN - The productivity of some foreign alfalfa varieties under the influence of organic fertilizers and biostimulators in Western Romania ……. 245
M. ŞTEFAN – Field results of several wheat varieties in function of the fertilizer background on the reddish preluvosoil from the Central Oltenia …….. 253
M. ŞTEFAN, G. MORAR, V. RADU, AUROLA MITRACHE – The influence of short crop rotation on the wheat yield cropped on typical chernozem from the southern part of Oltenia ……. 257
MARIA TOADER, GH. V. ROMAN - Research regarding the influence of crop density on grain yields and yield quality at Chenopodium quinoa species in the central part of Romanian Plain …. 260
FLORINA ULEANU, ADRIANA STREINU, TIȚA IOAN - Research concerning improved methods of obtaining the seedling with influence on growth and development of tomatoes ……. 267
M. VLADU, V. BĂCILĂ, M.V. BOROŞTEANU - Studies concerning relation between slaughtering weight and grading carcases classified in „europ" system at pigs with different provenance …… 271
M. VLADU, V. BĂCILĂ, M.V. BOROŞTEANU - Comparative studies concerning the artificial insemination at the taurine effective from Oltenia ……. 277

WORKING GROUP 2: SOIL SCIENCES

LIANA MARIA ALDA, D. MANEA, ISIDORA RADULOV, SIMONA NIȚĂ - On the impact of herbicide applications on weeding degree and yield in winter wheat……..... 283
S. ALDA, A. LĂZUREANU, G. CÂRCIU, DANIELA NICOLETA BĂLUȚĂ - On the impact of herbicides and differentiated fertilisers on yield in two winter wheat cultivars adapted to western Romania ……. 289
ANTON IULIA, DANA DANIELA, DORNEANU A., MIHALACHE DANIELA, BIREESCU

GEANINA, OPRICA IOANA – The effect of liquid fertilizers applied on bell-pepper in the protected space …… 296
NICOLE LIVIA ATUDOSIEI, MARIA MANIU, FLOAREA NICOLAE, CAMELIA GAVRILESCU, I. NICOLAE, M. NICOLAE - The importance of the integrated crops control methods in the sustainable soil management …….. 300
NICOLETA BALABAN, IOANA PĂNOIU, E. GEORGESCU - Aspects concerning morphological, physical and chemical characterization of the gleyic hyposalic chernozems from Viziru Plane 307
MIHAELA BĂLAN - The evolution of certain agro-chemical values within certain experiments with corn, natural lawn and seeded lawn from the Experimental Center Preajba Gorj, in the second and third year of experimenting …… 311
C. BECHERESCU, M. DOBRE, D. DASCALU, M. SUSINSKI, P. LĂZEANU - The optimisation of the nutrient doses with several crops in function of the soil supply ……. 315
AURICA BOROZAN, FLORINA RADU, V. GHERMAN, NICOLETA FILIMON, GH. ŞTEFANIC - The effects of sulfonylurea, amidosulfuron and tifensulfuron on saccharose activity from soil ……..... 319
C. BUZATU, D. VASILE - The research regarding the main properties of the psamosoils from the region of Poiana Mare 323
G. CÂRCIU, A. LĂZUREANU, S. ALDA, LIANA MARIA ALDA - Research concerning the nitrate and nitrite contamination level in beetroots, cucumbers, celery, radish, and green onion ……. 329
COJOCARU ILEANA, DINCĂ DANIELA - Advanced oxidation processes (AOP) …… 335
DANA DANIELA, F. OANCEA, I. SECELEANU, DANIELA RĂDUCU, A. VRÂNCEANU, VALENTINA COTEŢ, IULIA ANTON, P. IGNAT, CARMEN LUPU, LILIANA AURORA ŞTEFAN, F.CHIŢORAN - Some aspects concerning the recommendations for mineral fertilizaton to winter wheat crop in the SC Agrotehnic SRL Păuleşti experimental plot …… 341
DANA DANIELA, DANIELA RĂDUCU, DANIELA MIHALACHE, IULIA ANTON, LETIŢIA ANGHELESCU, ADRIANA GRIGORE, M. EFTENE, ANA MARIA DODOCIOIU, R. MOCANU, E. FILICHE, GH. PURNAVEL - Foliar fertilization an efficient method for reduction of nutrients losses in the environment …… 345
ANA MARIA DODOCIOIU. R. MOCANU, M. SUSINSKI - The ecological buildup of the sterile dumps from district Mehedinti ……. 350
DANIELA LIANA DUDĂU, I. STANCA, I R. SARBU - The heavily modified water bodies designation for Jiu River …….. 353
SORINA DUMITRU, IRINA CALCIU, C. SIMOTA, M. DUMITRU, M. EFTENE – Soil data used as input in the nutrient management plan at a farm level …….. 359
P. FAZAKAS, ANIŞOARA IENCIU, L. SZABO – Study regarding the irrigation technics used at strawberry culture in conditions of Lovrin - Gottlob – Timiş…… …… 365
E. FILICHE, GH. PURNAVEL, G. PETROVICI, D. DANA, D. RADUCU, M.L. EFTENE, A.M. DODOCIOIU, R. MOCANU - Researches concerning the nutrients lost on slope agricultural land as a result of soil erosion …… 368
FLORINA GRECU, D.VASILE, C. POPESCU - Researches on the establishing the yielding capacity of the preluvosoils from the hilly zone of Oltenia by soil evaluation work …….. 375
E. L. GRIGORE, I. PANOIU, S. UDRESCU - Comparasion of simulation models that estimate erosion and soil physical properties related to soil water dynamics ……..... 380
S. IANCU, C. POPESCU, MARILENA-ALINA PRIOTEASA , D. IANCU - The influence of the soil works and mineral fertilization on the weeds level of the agriculture crop from D.S. Craiova, Tâmbureşti Center …… ……. 385
S. IANCU, I. A. PRIOTEASA, A. CIOBANU A., D. IANCU - Investigations concerning the chemical control of the weeding level from the tobacco crop on the sandy soils from the left side of Jiu River ……. 389
PRIOTEASA I. A., IANCU S., PRIOTEASA MARILENA-ALINA, PĂNIŢĂ O. – Research on the state of maturity of Virginia tobacco leaves when harvesting on different levels of fertilization, the production,on the conditions soil and clime Marsani – Dolj …… 393
A. LĂZUREANU, S. ALDA, G. CÂRCIU, GHEORGHINA LENUŢA POPOVICIU - On the evolution of the main quality indicators in two winter wheat cultivars adapted to Western Romania …….. 396
MĂDĂLINA MARIAN - Analysis of the situation of soil erosion in a hydrographic sub-basin …… 405
D. I. MARIN, T. RUSU - The effect of non-conventional tillage upon the edaphic component of the agricultural ecosystem …… 416
V.MAZĂRE - The production capacity of the agricultural fields located on the east side of Timis County …… 420
M. MIHALACHE, L. ILIE, D.I. MARIN - Research regarding the influence of irrigation on soils properties located in South part of Romania …… 423
LIDIA MISHEVA - Regularities for distribution of plutonium isotopes around NPP “Kozloduy” and

"Rodopa" Mountain ……. 428
R. MOCANU, ANA MARIA DODOCIOIU, DANIELA DANA, IULIA ANTON, E. FILICHE, GH. PURNAVEL - Cost action 869 - mitigation options for nutrients reduction in surface water and ground waters ……. 435
MONICA NEBLEA, MONICA FLEANCU, CRISTINA CRISTESCU, FLORINA ULEANU – Researches concerning biological weed control by the ecological technologies 438
I. NICOLA, LELIOARA NICOLA - Sandy soil tillage for cropping Zea mays everta Perla 625 pop corn crop ……. 442
I. NICOLA, LELIOARA NICOLA - Pop corn crop Zea mays everta Perlat 625 as a benefit source ……. 446
MARIAN NICOLAE, ELENA NICOLAE, ADRIAN DULUGEAC - Phases of vine's increase and d evelopment in view of the elaboration the viticulture fenocalendar. Method experimental …….. 451
IOANA PANOIU, S. UDRESCU, C. SIMOTA - The romanian experience in the implementation of european regulations regarding the manure management …… 454
MIRELA PARASCHIVU, GABRIEL PĂUNESCU, M. PARASCHIVU - Conservation agriculture – the multi-advantage technology 459
ANDREEA ADRIANA (UZUN) PETCOV, ANDREIA BOTOS, MIHAELA CORNEANU, GALLIA BUTNARU, A. LAZUREANU - Studies on the environmental hazards in drinking water evaluation from Caras Severin district by A*llium sativum* l. …… 465
C.V. POPESCU, C. BORA, C. POPESCU, E. PETRESCU - Research concerning the crop conversion coefficients of the class a pan evaporation into water consumption at the bean crop ……. 472
C.V. POPESCU, C. BORA, C.A. ROŞCULETE - Research concerning the potential evapotranspiration estimate using the Thornthwaite equation and the bean crop correction coefficients …….. 476
GH. PURNAVEL, E. FILICHE, G. PETROVICI, D. DANA, D. RADUCU, A.M. DODOCIOIU, R. MOCANU - The effect of structure and crop rotation under the erosion on the slope arable lend …….. 480
DANIELA RĂDUCU, C. CRĂCIUN, DANIELA DANA, DANIELA MIHALACHE, AMELIA ANGHEL, A. VRÂNCEANU - Some micromorphological and mineralogical characteristics of the chernozem from Caracal …… 486
ELENA ROŞCULETE, R. MOCANU, C. ROSCULETE, ANA MARIA DODOCIOIU - The influence of several nitrogen doses on constant phosphorus background over the the corn yield in irrigation condition and different tillage 492
VIORICA ROŞU, R. MOCANU, C. BECHERESCU - Aspects on the causes of the pH variations on a reddish preluvosoil under the influence of chemical fertilizers …… 499
T. RUSU, P. GUS, ILEANA BOGDAN, PAULA IOANA MORARU, A. POP - Influence of soil usage and soil tillage system on soil properties …….. 502
I. SECELEANU, CR. PALTINEANU, V. MOCANU, S. DUMITRU, V. COTET - Variability of some soil properties related to soil conservation for a swell-shrink soil from Southern Romania …….. 508
I. STANCA, DANIELA LIANA DUDAU, I. R. SARBU - The integrated monitoring of Jiu River – The principles and ways to made …… 515
M. SUSINSKI, R. MOCANU, ANA MARIA DODOCIOIU, P. LĂZEANU - The influence of surface mining from Husnicioara on the environment ……. 520
N. ŞARPE, Ş. POIENARU - The remanent effect of the Merlin duo and Gardorprim Plus Gold 500 SC herbicides applied to sunflower crops…… 525
N. ŞARPE, M. MASCHIO, Ş. POIENARU - New results regarding the no-tillage system applied to winter barley cultivated in the flood plain of the Danube River …… 531
ADINA SANDA ŞERBAN - Nitrates vulnerable zones in Jiu River basin …… 537
N. VILĂU, FLORICA VILĂU, C. ROŞCULETE, E. PETRESCU - The influence of the fertilization on the growth and production elements in the wheat crop under the climatic conditions ……. 543

SECȚIUNEA 1: TEHNOLOGII DE CULTURA PLANTELOR ŞI CREŞTEREA ANIMALELOR

Fitotehnie, Cultura pajiştilor şi a plantelor furajere, Legumicultură, Pomicultură, Viticultură şi Vinificație, Arhitectura peisajului şi amenajarea spațiilor verzi, Zootehnie

SECTION 1: PLANT CULTIVATION AND ANIMAL GROWING TECHNOLOGIES

Phytotechny, Grass and Fodder Plants Cultivation, Vegetable Cultivation, Fruit Tree Cultivation, Grape Vine Cultivation and Wine Technology, Urban Landscape Architecture and the Arrangement of the Green Urban Spaces, Animal Growing Technology

Chairperson: Professor Gh. VALENTIN ROMAN, PhD
Co-Chairperson: Reader COLĂ MUGUREL, PhD.
Moderators: Professor NICOLESCU MIHAI, PhD.
Senior Researcher PĂUNESCU GABRIELA, PhD.

INFLUENȚA UNOR FACTORI TEHNOLOGICI ASUPRA CANTITĂȚII DE SEMINȚE LA GRAMINEE FURAJERE PERENE
THE INFLUENCE OF SOME TECHNOLOGICAL FACTORS ON SEED QUANTITY IN PERENNIAL SEED FODDER GRASSES

Ana-Maria Bârzu

Key Words: perennial fodder grasses, seed production, crop management, sowing distance

ABSTRACT

Perennial grasses are wide spread in the permanent grasslands, the area occupied by these species is around 25% of the land. The pastureland biomass is a cheap fodder to obtain, but the pastures don't have uniform production. This is why is important to have new and better and highly productive grass varieties. Researches on grass seed production are always needed for that matter.

The purpose of this experiment is to study the crop management measures used in grass seed production, in the moldavian sylvosteppe, such as: the influence of row distances, the grass species on seed yield, as well as the interaction between the two factors.

INTRODUCTION

Perennial grasses represent an important source of fodder for ruminants, forming the base component of permanent pastures; their area is by twice higher than the arable fields in the entire world, summing up 3 billion ha (about 25% of the area of Earth) **(Varga P**. et al**., 1998).**

Because of the great weight of perennial grass species in the structure of pastures and the fact that the vegetal production obtained is the cheapest fodder for animal breeding, it is important to restore degraded pastures or to set up high productive temporary pastures. These goals cannot be reached without a quality seed material. Therefore, the investigations on seed production have an important place in the scientific elaboration of new performing technologies for obtaining the seed material. Seed

production in perennial grasses from pastures should be one of the most important concerns of agriculture, in order to improve permanent pastures, to use new fields and to increase the areas of temporary pastures, which need greater seed quantities. Without achieving a high quality seed production of the best perennial fodder varieties and species, no progress is found in fodder production and animal breeding **(Kellner** et al., **1973; Kellner, 1980; Varga** et al**., 1976).**

The investigations conducted by **Kellner E.; 1972, Popovici D**. et al**., 1978; Breazu I., 1980** pointed out the significant role of seed quality, necessary to setting up temporary pastures and improving the permanent ones.

MATERIALS AND METHODS

The paper shows data on the study of some technological links applied in seed crops, in certain perennial grass species cultivated in the Moldavian forest steppe, such as the influence of sowing distance between rows on seed production, of species on seed production and the interaction between the two studied factors on yield. In order to achieve the proposed objectives, a trial was set up in split plots of type **2x3 in four replicates**, on a field belonging to the Didactic Farm of Ezăreni, Iaşi County.

The experimental factors are the following:

Factor A – sowing distance with two graduations

a1= 25 cm between rows;

a2= 50 cm between rows

Factor B – perennial grass species with three graduations

b1= *Festuca pratensis*- Transilvan variety (registered in 1988, semi late, with a good resistance at wintering and diseases, and a yield capacity of 800-1000 kg/ha of seed);

b2= *Festuca arundinacea*- Brio variety (registered in 1992, with a good resistance at leaf diseases, drought and wintering and a yield capacity of 900- 1000 kg/ha of seed);

b3= *Bromus inermis* - Doina variety (registered in 1995, with a very good resistance at leaf diseases, drought and wintering).

Within the experiment, sowing was done in the summer of 2006, on a cambic chernozem, with mean humus content, weakly supplied with phosphorus and potassium, which was fertilized in autumn with P_{100}, K_{50} and 30 t/ha manure, and in summer, before sowing, for seedbed preparation, N_{200} and vinasse - 5 t/ha were administered.

Sowing was done by hand on the 20-th of August 2006, using as biological material three perennial grass species with the following seed quantities: 15 kg/ha for *Festuca pratensis*, 15 kg/ha *Festuca arundinacea* and 16 kg/ha for *Bromus inermis*, at the distance of 25 cm between rows, and for the distance of 50 cm between rows, we have used 7 kg/ha for *Festuca pratensis*, 7 kg/ha for *Festuca arundinacea* and 8 kg/ha for *Bromus inermis.*

Among the technological links for seed production in perennial grasses, harvesting is of great importance. Harvesting was done when seed moisture reached 30-32%.

Harvesting was done by means of sickle, the harvested area being of 4 m^2 in four replicates. Harvesting of *Festuca pratensis* species was done in June 21, *Bromus inermis,*in July 2 and of species *Festuca arundinacea* in June 30.

In the crop year 2007-2008, the mean annual temperature was of 10,3 ^{0}C, being registered a positive deviation of 1,3 ^{o}C compared to the multiannual mean. The lowest temperature was of -1,1°C, registered in December (with a deviation of 0,8 ^{o}C compared to the multiannual mean) and the highest temperature, of 22,2°C, was registered in August.

During the vegetation period, in the crop year 2007-2008, temperature was of 9,1 ^{o}C with a deviation of 1,3 ^{o}C compared to the multiannual mean.

The rainfalls during the crop year 2007-2008 have registered positive deviations in all the months, compared to the multiannual mean , being a normal climatic year, the amounts of rainfalls favoring the evolution of crops. The sum of annual rainfalls was of

803,4 mm, with a positive deviation of 326,4 mm, and the rainfalls during the vegetation period were by 318 mm higher than the multiannual ones. The highest amount of rainfall was registered in July, of 164,2 mm (with a deviation of 95 mm) and the lowest one, in February 2008, of 5,6 mm (with a negative deviation of -23,3 mm). The relative air humidity was of 80,9 %, by 10,5 % higher than the normal of 70,4 %. During the vegetation period, air relative humidity was higher than the normal one by 10,9 %.

RESULTS AND DISCUSSION

1. RESULTS CONCERNING THE INFLUENCE OF SPECIES ON SEED YIELD

Among all the three studied species (*Festuca pratensis, Festuca arundinacea, Bromus inermis)*, the most productive one was *Festuca arundinacea*. *Bromus inermis,* represented by Doina Variety, which was the control, because this species is well adapted to the conditions of the forest steppe zone from Moldavia, obtaining a yield of 1193,8 kg/ha (table 1, fig. 1).

Table 1

Influence of species on seed production

Species	Variety	Yield		Difference/ Control	Significance
		kg/ha	%		
Bromus inermis	Doina	**1193,8**	**100,0**	**Control**	
Festuca pratensis	Transilvan	743,1	62,25	-450,7	00
Festuca arundinacea	Brio	1336,9	111,99	143,1	

LSD 5%= 229.9 kg/ha
LSD 1%= 322.7 kg/ha
LSD 0.1 = 455.6 kg/ha

Festuca pratensis has obtained a yield of 743,1 kg/ha, with a difference of 450,7 kg/ha, compared to the control (fig 1), while *Festuca arundinacea* has obtained a yield of 1336,9 kg/ha, with a difference of 143,1 kg/ha, as compared to the yield obtained by *Bromus inermis,* which represents a yield increase of almost 12%.

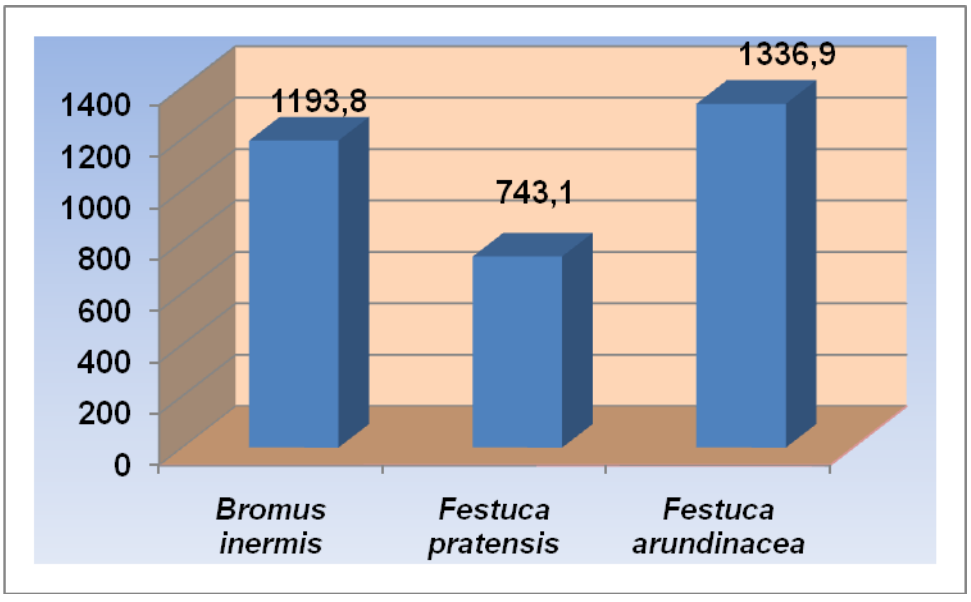

Fig. 1 Variation of production according to species

2. RESULTS CONCERNING THE EFFECT OF THE DISTANCE BETWEEN ROWS ON SEED YIELD

As concerns the influence of sowing distance between rows in the crop year 2007-2008, the highest yields were obtained at the distance of 50 cm between rows in all the studied species (*Festuca pratensis, Festuca arundinacea* şi *Bromus inermis*), due to the higher nutrition area, better tillering and to the greater number of generative shoots (table 2, fig.2).

Table 2

Influence of the distance between rows on seed yield

Distance between rows (cm)	Yield		Difference/control	Significance
	Kg/ ha	%		
25	**981,6**	**100,0**	**Control**	
50	1200,8	122,33	219,2	x

LSD 5% = 215.9 kg/ha
LSD 1% = 396.4 kg/ha
LSD 0.1%= 878.4 kg/ha

The seed yield at the distance of 50 cm between rows was of 1200,8 kg/ha, with a difference of 219,2 kg/ha compared to the control, which represents a yield increase of 22,33 % against the variant sown at the distance of 25 cm between rows, when a yield of 981,6 kg/ha was obtained.

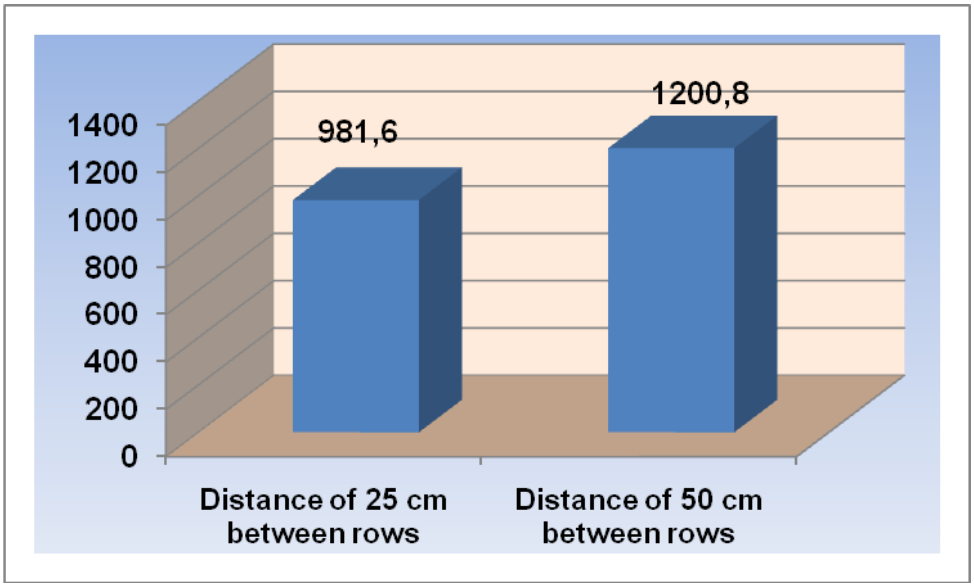

Fig. 2 Yield variation according to sowing distance between rows

3. INFLUENCE OF INTERACTION BETWEEN THE STUDIED FACTORS ON YIELD

As concerns the interaction between species and sowing distance between rows, the results obtained in the second experimental year pointed out the yield obtained by *Festuca arundinacea* (tab. 3, fig. 3).

Bromus inermis, represented by Doina Variety (control), gave yields of 1320,8 kg/ha at the distance of 50 cm between rows, with a yield difference of 254,1 kg/ha, greater than sowing at 25 cm between rows, where a yield of 1066,7 kg/ha was obtained.

Festuca pratensis, Transilvan Variety, has obtained, at the sowing distance of 25 cm between rows, a yield of 777,2 kg/ha, while at the sowing distance of 50 cm between rows, a yield of 709,0 kg/ha was obtained, with a yield increase of 66,47 % to the control.

Table 3

Influence of interaction between studied factors on yield

Species	Variety	Distance between rows (cm)	Yield		Difference /control	Significance
			(kg/ha)	%		
Festuca arundinacea	Brio	25	1101,0	103,22	34,3	
		50	1572,7	147,44	506,0	x
Bromus inermis	Doina	**25**	**1066,7**	**100,00**	**Control**	
		50	1320,8	123,82	254,1	
Festuca pratensis	Transilvan	25	777,2	72,86	-289,5	
		50	709,0	66,47	-357,7	0

LSD 5% = 337,0 kg/ha
LSD 1% = 518,5 kg/ha
LSD 0,1%= 887,2 kg/ha

Distinctively significant yield differences were found in case of *Festuca arundinacea* species, Brio Variety, at the variant sown at 25 cm between rows (1101,0 kg/ha), while at the sowing distance of 50 cm between rows, a yield of 1572,7 kg/ha was obtained, higher by 47,44 % than the yield obtained by the control.

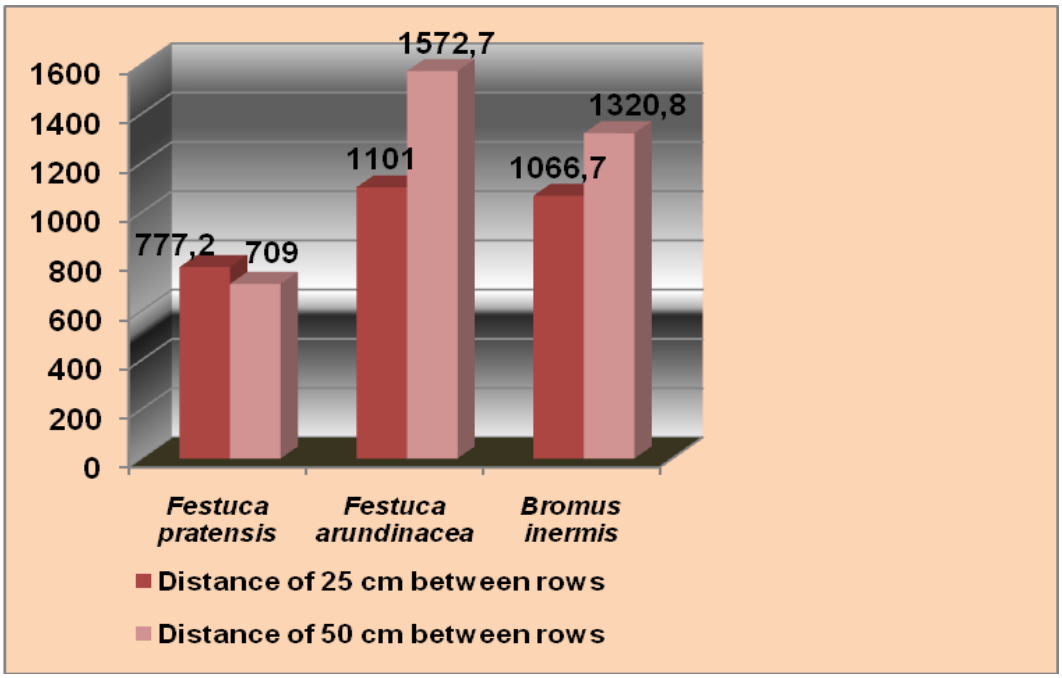

Fig. 3 Variation of yields according to species and sowing distance between rows

CONCLUSIONS

After determining the influence of the species on seed yield, obtained in the last experimental year, we found out that among the three studied species (*Festuca pratensis, Festuca arundinacea, Bromus inermis)*, the most productive one proved to be *Festuca arundinacea,* obtaining a yield of 1336,9 kg/ha, higher by 143,1 kg/ha than the control (*Bromus inermis*).

Festuca pratensis has got a yield of 743,1 kg/ha, with a deference of 450,7 kg/ha to the control.

The seed yield at the distance of 50 cm between rows was of 1200,8 kg/ha, with a yield increase of 22,33% to the control, which obtained a yield of 981,6 kg/ha.

As concerns the interaction between species and sowing distance between rows , the obtained results pointed out the yield obtained by *Festuca arundinacea* species, which is of 1572,7 kg/ha at the distance between rows of 50 cm , with a distinctively significant yield difference to the control of 506 kg/ha.

At *Festuca pratensis* species, at the distance of 25 cm between rows, a yield of 777,2 kg/ha was obtained and at the distance of 50 cm between rows, a yield of 709 kg/ha was obtained.

At *Bromus inermis* (control), at the variant sown at 25 cm between rows, a yield of 1066,7 kg/ha was obtained, while at the sowing distance of 50 cm between rows, a yield of 1320,8 kg/ha was obtained, higher by 23,82 % than the yield obtained by the control.

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INFLUENȚA SOIOULUI, A EPOCII ŞI A DESIMII DE SEMĂNAT ASUPRA PRODUCȚIEI DE FLOAREA SOARELUI ÎN CONDIȚIILE PEDOCLIMATICE ALE ZONEI ORADEA

THE INFLUENCE OF THE SOIL, SOWING TIME AND SOWING THICKNESS UPON THE SUNFLOWER PRODUCTION FOR THE PEDO-CLIMATIC CONDITIONS OF ORADEA REGION

Bucurean Eva

Key words: sunflower, variety, sowing time, sowing thickness, pedo – climatic conditions, region, production

ABSTRACT

În această lucrare s-a studiat influența soiului, a epocii şi a desimii de semănat asupra producției de floarea soarelui, în condițiile pedoclimatice specifice zonei Oradea.

Marea diversitate de hibrizi şi soiuri de floarea soarelui, existente în cultură impune alegerea şi cultivarea pe scară largă numai acelora care răspund cel mai bine condițiilor pedoclimatice specifice unei zone.

Soiurile şi hibrizii de floarea soarelui create în țară se caracterizează printr–un potențial productiv ridicat, dar pentru zona Oradea, se impune alegerea şi răspândirea în cultură doar acelora care corespund cel mai bine condițiilor pedoclimatice specifice acestei zone.

Acest lucru are repercusiuni finale deosebit de importante asupra acestei culturi, soiul sau hibridul cel mai favorabil, influențând decisiv eficiența economică a culturii, pe lângă celelalte elemente de tehnologie care se cer a fi aplicate la parametri optimi.

This work studied the influence of the soil, sowing time and thickness upon the sunflower production for the pedo - climatic conditions of Oradea region.

The great variety of sunflower hibrids and varieties cultivated demands the choosing and growing on a large scale the specific conditions on a certain geographical region.

Sunflower varieties and hybrids created in our country are characterized by a highly – productive potential, but for Oradea region there should be chosen and spread for growing only the ones which better suit the specific pedo – climatic conditions.

This thing has important final consequential effects upon this culture, the most favourable variety and hybrid decisively influencing the economical efficiency of the culture, alongside the other technological elements which should be applied at the most favourable parameters.

INTRODUCTION

The sunflower is the most important world – wide cultivated oil producing plant, as well as in Romania. On the world – wide level, the sunflower is the second of the oil – bearing plants.

The sunflower oil, having very good alimentary qualities, is used on a large scale, either directly for people's food, or for preparing the tins and artificial butter. The inferior categories are used for making soap.

After oil extraction, the grats and pomace remain, which mean an important protein source for animal feeding and raw material for extracting food protein concentrate used for preparing certain types of salami and sausages and dairy products.

The ground hulls can be used as ingredient for the ruminants food easily absorbing the molasses. The fodder dregs can also be obtained from the hulls.

The things left after harvesting, as a single piece or as flower, are used for feeding the animals, having the nutritions value similar to the medium quality hay.

The sunflower ia a valuable fodder plant, especially for silo and one of the most appreciated melliferous plants.

MATERIAL AND METHOD

The experiment which studied the influence of the variety, thickness and sowing time upon the production obtained took place at SCDA Oradea. The forerunner plant was the autumn barley.

In order to establish the influence of the variety, sowing time and thickness upon the production, a three – factored experiment was drawn, laid in accordance with the lot method subdivided by three factors on four repetitions. The three factors have the following grading:

A factor – sowing time
- a1 – 1st April
- a2 – 10th April
- a3 – 20th April

B factor – varieties used
- b1 – Alex
- b2 – 549 Giant

C factor – sowing thickness
- c1 – 30.000 plants/ha
- c2 – 40.000 plants/ha
- c3 – 60.000 plants/ha

RESULTS AND DISCUSSIONS

The production data obtained in the experimental year 2007 are presented in Table 1 and 6 .

Tables 1 and 6 show us that the best thickness in interaction with time and variety is of 50.000 plants per hectare, producing an average of 25,41 g/ha, with an increasing of 1,55 q/ha as confronted to the thickness of 30.000 plants/ha of the witness. It can also be noticed that for Alex, thickness growing from 30.000 plants/ha to 50.000 plants/ha, there comes a production increase of up to 2,82 q/ha, confronted to the 549 Giant variety of only 1,12q/ha. If we consider the production difference at the thickness in interaction with the sowing time, at Alex hybrid the production increase at 50.000 plants/ha, confronted to 30.000plants/ha and during the second time confronted to the first time, the production increase is of 4,48 q/ha and for the 549 Giant variety of only 2,34 q/ha.

The increase production tendency at thickness of 60.000 plants/ha is smaller, but it doesn't go under the limit at the 60.000 plants/ha thickness. This way, while for the thickness of 40.000 plants/ha the production increase is about 1,04 q/ha and 4,4%, for the 60.000plants/ha thickness the increase production is of about 1,40 q/ha and 5,8%, confronted to the production obtained at the 30.000 plants/ha thickness.

Table 4, dealing with the thickness influence at the sunflower culture, proves that the 50.000 plants/ha thickness gives the highest increase of 1,55 q/ha, and from Table 6, it can be seen that 549 Giant variety has a higher production decrease at 50.000 plants/ha thickness, that of the Alex's hybrid, which has a lesser decrease proving that the hybrids bear in a better way the thickness.

As concerns the best sowing time, as it comes from Table 6 data, is 10th April, when there is a production increase of 9% for Alex and 0,4% for 549 Giant confronted to the first of April time. Twentieth of April time registers a production increase of 1% for 549 Giant variety and 6% for Alex hybrid confronted with the first of April time.

The production increase in interaction with the two factors, thickness and time, at Alex hybrid is 2,24 q/ha and for the 549 Giant is of 1,33 q/ha.

Identical conclusions can be seen in Table 2, which regard the time influence upon the second time (10th April) brings an average of production 1,80 q/ha confronted with the first time (first April), and the third time only 0,89 q/ha, this meaning that after 10th of April, the sunflower production tendency is decreasing.

For these conditions it can be noticed that the production results shown in Tables 2 and 6 prove that both 549 Giant and Alex hybrid have better production in case the sowing took place on the tenth of April the middle time.

Table 1

The influence obtained in the thickness, time and variety experiment in 2007(q/ha)

Time	Variety	Thickness	Repetition I	Repetition II	Repetition III	Repetition IV	Total variant
First 1.IV (a1)	Gigant variety 549 (b1)	c1 =30.000	22,50	22,80	21,60	23,10	90,00
		c2 = 40.000	22,84	22,00	24,00	24,00	92,84
		c3 = 50.000	24,00	22,40	23,00	25,00	94,40
		c4 = 60.000	23,25	22,50	24,00	24,00	93,75
	Total		92,59	89,70	92,60	96,10	370,99
	Alex hybrid (b2)	c1 = 30.000	23,10	22,85	23,25	23,70	92,90
		c2 = 40.000	24,40	24,00	24,10	25,40	97,90
		c3= 50.000	25,12	25,00	26,25	26,50	102,87
		c4 = 60.000	25,50	25,50	25,50	25,80	102,30
	Total		98,12	97,35	99,10	101,40	395,87
Second 10.IV (a2)	Gigant variety 549 (b1)	c1 = 30.000	23,70	23,40	23,16	24,60	94,86
		c2 = 40.000	25,00	24,00	25,00	24,88	98,88
		c3 = 50.000	24,50	24,37	25,00	25,50	99,37
		c4 = 60.000	24,60	24,00	25,05	25,50	99,15
	Total		97,80	95,77	98,21	100,48	392,26
	Alex hybrid (b2)	c1 = 30.000	25,20	24,75	25,50	26,25	101,70
		c2 = 40.000	27,00	26,80	27,60	28,00	109,40
		c3 = 50.000	27,50	26,00	28,80	28,50	110,80
		c4 = 60.000	27,00	27,00	27,75	28,20	109,95
	Total		106,70	104,55	109,65	110,95	431,85
Third 20.IV (a3)	Gigant variety 549 (b1)	c1 = 30.000	23,10	22,50	23,52	24,00	93,12
		c2 = 40.000	23,20	22,80	23,50	24,00	93,50
		c3 = 50.000	23,00	22,75	23,25	25,00	94,00
		c4 = 60.000	22,80	22,80	24,00	25,35	94,95
	Total		92,10	90,85	94,27	98,35	375,57
	Alex hybrid (b2)	c1 = 30.000	24,75	24,75	25,20	25,50	100,20
		c2 = 40.000	26,40	25,50	26,00	24,00	104,90
		c3 = 50.000	26,50	27,50	26,00	28,50	108,50
		c4 = 60.000	27,00	25,80	25,80	27,60	106,20
	Total		104,65	103,55	103,00	108,60	419,80
	Total repetitions		591,96	581,77	596,83	615,88	2386.44

Table 2

The influence of the sowing time upon the sunflower production in 2007

Factors	Specification	Production	Production difference	Significance
a2 - a1	824,0/32 - 766,7/32	25,76 - 23,96	1,80	xxx
a3 - a1	755,1/32 - 766,7/32	24,85 - 23,96	0,89	xxx

a3 - a2	795,1/32 - 824,0/32	24,85 - 25,76	-0,91	000

DL 5% = 0,25 q/ha; DL 1% = 0,37 q/ha; DL 0,1% = 0,59 q/ha

Table 3

The influence of the variety upon the sunflower production in 2007

Factors	Specification	Production	Production difference	Significance
b2 – b1	1247,2/48 – 1138,6/48	25,99- 23,72	2,27	xxx

DL 5% 0,16 q/ha; DL 1% = 0,23 q/ha; DL 0,1% = 0,34 q/ha

Table 4

The influence of the thickness upon the sunflower production in 2007

Factors	Specification	Production	Production difference	Significance
c2 – c1	597,4/24 - 572,5/24	24,90 - 23,86	1,04	xxx
c3 – c1	609,8/24 - 572,5/24	25,41 - 23,86	1,55	xxx
c4 – c1	606,1/24 - 572,5/24	25,25 - 23,85	1,40	xxx
c3 – c2	609,8/24 - 597,4/24	25,42 – 24,90	0,52	xxx
c4 – c2	606,1/24 - 597,4/24	25,25 – 24,90	0,35	xx
c4 – c3	606,1/24 - 609,8/24	25,25 – 25,42	-0,17	-

DL 5% = 0,22 q/ha DL 1% = 0,30 q/ha DL 0,1% = 0,38 q/h

Table 5

The influence of the three elements, time, variety and thickness upon the sunflower production in 2007

Time	Variety	Thickness Thousand plants/ha	Production		Production differences		Significance
			q/ha	%	q/ha	%	
First 1.IV (a1)	Gigant variety 549 (b1)	c1 30	22,50	100	-	-	-
		c2 40	23,20	103	0,70	3	xxx
		c3 50	23,60	105	1,10	5	xxx
		c4 60	23,42	103	0,92	3	xxx
	Alex hybrid (b2)	c1 30	23,20	100	-	-	-
		c2 40	24,47	105	1,27	5	xxx
		c3 50	25,70	111	2,50	11	xxx
		c4 60	25,57	110	2,37	10	xxx
Second 10.IV (a2)	Gigant variety 549 (b1)	c1 30	23,72	100	.	-	
		c2 40	24,72	104	1,00	4	xxx
		c3 50	24,85	105	1,13	5	xxx
		c4 60	24,77	104	1,05	4	xxx
	Alex hybrid (b2)	c1 30	25,40	100	-	-	-
		c2 40	27,35	108	1,95	8	xxx
		c3 50	27,70	109	2,30	9	xxx
		c4 60	27,47	108	2,07	8	xxx
Third 20.IV (a3)	Gigant variety 549 (b1)	c1 30	23,27	100	-	-	-
		c2 40	23,37	101	0,10	1	-
		c3 50	23,47	101	0,20	1	-
		c4 60	23,72	102	0,45	2	-
	Alex	c1 30	25,0	100	-	-	-

	hybrid (b2)	c2 40	27,47	110	2,45	10	xxx
		c3 50	27,12	108	2,10	8	xxx
		c4 60	26,55	106	1,53	6	xxx

Time	Variety	Thickness	
DL 5%	0,26 q/ha	0,16 q/ha	0,22 q/ha
DL 1%	0,37 q/ha	0,23 q/ha	0,30 q/ha
DL 0,1%	0,59 q/ha	0,34 q/ha	0,38 q/ha

Table 6

The influence of the sowing time, thickness and variety upon the sunflower yield (2007)

Thickness thousand plants/ha	First time		Second time		Third time		Average thickness		Dif.	Significance
	Gigant variety 549	Alex hibrid	Gigant variety 549	Alex hibrid	Gigant variety 549	Alex hibrid	q/ha	%		
30.000	22,50	23,22	23,72	25,42	23,28	25,05	23,86	100	-	-
40.000	23,21	24,48	24,72	27,35	23,38	26,24	24,90	104,4	1,04	xxx
50.000	23,60	25,72	24,87	27,70	23,50	27,13	25,41	106,5	1,55	xxx
60.000	23,44	25,58	24,78	27,48	23,73	26,55	25,26	105,8	1,40	xxx
Average time										
q/ha	23,19	24,75	24,52	26,99	23,47	26,24	-	-	-	-
%	100	100	106,7	109,0	101,0	106,0	-	-	-	-
Difference q/ha	-	-	1,33	2,24	0,28	1,49	-	-	-	-
Significance	-	-	xxx	xxx	xx	xxx	-	-	-	-
Average time			-	-	-	-	-	-	-	-
q/ha	23,72	25,99	-	-	-	-	-	-	-	-
%	100	109,.6	-	-	-	-	-	-	-	-
Difference q/ha	-	2,27	-	-	-	.	-	-	-	-
Significance	-	xxx	-	-	-	-	-	-	-	-

	Time	Variety	Thickness
DL 5%	0,25 q/ha	0,16 q/ha	0,22 q/ha
DL 1%	0,37 q/ha	0,23 q/ha	0,30 q/ha
DL 0,1%	0,59 q/ha	0,34 q/ha	0,38 q/ha

CONCLUSIONS

The researches and observations carried during 2007 let us draw the following conclusions:

- For the pedo – climatic conditions of Oradea region the most favourable sunflower sowing time is around 10th of April. After this day, the production begins decreasing.
- For the varieties, delaying the sowing time later than the most favourable period (10th of April) means lower productions than those of the sunflower hybrids.
- The best thickness both for the sunflower and hybrids is of 50.000 plants/ha, when the largest production is assured.
- For the Alex hybrid, the raising of the thickness more than 50.000 plants/ha brings to moderate lowering production and for the 549 Giant the raising of the thickness of the plants more than 50.000 brings lower productions.
- Hybrids cultivation is more advantageous compared to the sunflower varieties because they are more productive, resistant to diseases, obtaining higher production increases.

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INFLUENȚA ÎNGRĂȚĂMINTELOR CHIMICE CU AZOT, FOSFOR ŞI POTASIU ASUPRA PRODUCȚIEI LA ORZUL DE TOAMNĂ

THE INFLUENCE OF THE CHEMICAL FERTILIZERS WITH NITROGEN, PHOSPHORUS AND POTASSIUM UPON THE PRODUCTION OF AUTUMN BARLEY

Bucurean Eva

Keywords: autumn barley, chemical fertilizers, ammonium nitrate, superphosphate, potassic salt, production, witness, variety, types.

ABSTRACT

În această lucrare s-a studiat, influeța îngrşămintelor chimice cu azot, fosfor şi potasiu asupra producției la orzul de toamnă

În această experiență s-a urmărit influența îngrăşămintelor chimice cu azot şi fosfor aplicate împreună în diferite doze, cât şi în prezența potasiului.

This work studied the influence of the chemical fertilizers with nitrogen, phosphorus and potassium upon the production of autumn barley between 2005 and 2007.

The experiment with chemical fertilizers studied the influence of the fertilizers applied both with variable doses of nitrogen and phosphorus and with potassium.

INTRODUCTION

The autumn barley is very useful for a lot of fields: people's food, fodder for animals and industry.

Barley is sometimes used as purifying cereal in the places where wheat and rye don't grow.

As food for people it is sometimes used as coffee substitute, pearl barley, in beer starch, dextrime, glucose and alcoholic extract industry.

As food for animals the barley is used as grains, green fodder, hay and compact annual vegetables (green peas and vetch) it forms the winter fodder, especially foe the cows raised for mille.

For the irrigated region in our country, as well as for the other places, the barley is the main forerunner for successive cultures.

MATERIAL AND METHOD

The experiment with chemical fertilizers studied the influence of the fertilizers with N and P, applied both in variable doses as well as in the presence of the k as follows:

1. without fertilizer
2. P64 N32
3. P64 N64
4. P64 N96
5. N96 P32
6. N96 P96
7. N96 P96 K40
8. N96 P64 K40
9. N96 P64 K40
10. N96 – applied in spring

As fertilizers there were used: ammonium nitrate, superphosphate and potassic salt.

The fertilizer was applied in autumn, at the same time with the preparing of the ground, except the last variant for which the fertilizer was applied in spring

The experiments were placed at CCDA Oradea, using the linear method of four repetitions, the harvested surface of a lot being of 18 m^2.

The witness used during the experiment was variety number 1 and in this case chemical fertilizers were not used.

For the experiments carried between 2005 and 2007 the variety used was Dana autumn barley.

The quantities of fertilizers used for each variant were as follow :

1. with no fertilizers
2. superphosphate 400 kg/ha
   ammonium nitrate 100 kg/ha
3. superphosphate 400 kg/ha
   ammonium nitrate 200 kg/ha
4. superphosphate 400 kg/ha
   ammonium nitrate 300 kg/ha
5. ammonium nitrate 300 kg/ha
   superphosphate 200 kg/ha
6. ammonium nitrate 300 kg/ha
   superphosphate 400 kg/ha
7. ammonium nitrate 300 kg/ha
   superphosphate 600 kg/ha
   potassic salt 100 kg/ha
8. ammonium nitrate 300 kg/ha
   superphosphate 400 kg/ha
   potassic salt 100 kg/ha
9. ammonium nitrate 200 kg/ha
   superphosphate 400 kg/ha
   potassic salt 100 kg/ha
10. ammonium nitrate 300 kg/ha applied in spring

RESULTS AND DISCUSSIONS

In order to consider the influence of the autumn barley, there should be taken into account some nourishing characteristics. Being different from the other autumn cereals, characterized by a shorter period of vegetation and by a less developed radicle system and a weaker solubility strength, the autumn barley has a shorter time for gathering the nourishing substances.

The results regarding the grain production in the experiment with chemical fertilizer at the autumn barley are presented in Table nr.1.

It can be noticed that the grain production varied in 2005, between 2531 kg/ha for the variant without fertilizing and 4856 kg/ha for the variant with nitrogen and phosphorus applied together with nitrogen N96 P64 k40, obtaining a production increase of 91,8% compared to the variant without fertilizers, that is 2325 kg/ha of grain. The same way, in 2006 for the same variant the highest production increase in coparison with the variant without fertilizers, that is 80,9% or 2167 kg/ha grain, and in 2007 the highest increase was obtained fr the variant N96 P96 K40, 67,6% more than the variant without fertilizers, that is 5702 kg/ha which represents an increase of 2290 kg/ha grain.

In fact, it can be noticed that all the types which used fertilizers obtained very high increases in coparison with the one without fertilizers, the differences between these increases being relatively low.

This way, if we analyse the data presented in Table 2, for the experimenting years, it can be seen that production differences between the witness – variant without fertilizers and the variants which used chemical fertilizers in different quantities varied as follows: between 1687 kg/ha and 2325 kg/ha in 2005 – the variants P64 N32 and N96 P64 K40, between 1812 kg/ha and 2176 kg/ha in 2006 the variants N96 P96 and N96 P64 K40; between 1189 kg/ha and 2299 kg/ha in 2007 the variants P64 N64 and N96 P96 K40.

For an average of three years, the differences varied between 1642 kg/ha for the P 64 N 32 variant and 2167 kg/ha for N96 P 64 K 40 variant, so the one which uses the largest quantity of nitrogen and moderate closes of phosphorus and potassium proves the best results, Table 2.

It is a remarkable fact that the type which used only nitrogen fertilizer in spring gave a production increase of 1892 kg/ha, that is 65,9% more than the type without fertilizers and only 10% less then the type which had the highest production increase.

The increase production between the types fertilized with different closes of chemical fertilizer grew up to 525 kg/ha, that is 18,2%.

If we take into consideration the fact that the smallest production difference between the type which was not fertilized and the ones which used fertilizers was of 1642 kg/ha , that is 57,1%, we can draw the following conclusion: during the 3- years experiment in those circumstances, the use of chemical fertilizers for the autumn barley prove positive effects upon the production growth, very significant increases being obtained.

The variants which received nitrogen N 96, in the presence of potassium K 40, produced 5024 kg/ha and 5041 kg/ha grain; the variant which used a smaller quantity of nitrogen N 64, in the presence of the same potassium quantity, the production decreased by 6,7% , obtaining 4828 kg/ha grain. Increasing the phosphorus dose, from P64 , to P96 in the presence of potassium didn’t bring any production increase at all, so this was, the element which contributed to the production increase of 213 kg/ha proved to be the quantity of nitrogen which was added, N32.

The potassium positively influenced the production for the three variants where the nitrogen and phosphorus were added .Even if the growth is not spectacular, it is significant. While the N 96 P96 type produced 4715 kg/ha grain, the variants which had potassium applied produced on increase of 309, 326 and 133 kg/ha grain , that is 10,7%, 12,15 and 4,5% more than the production of the witness – variant.

It can also be noticed that there is a difference among the types with different quantities of phosphorus applied for the same quantity of nitrogen, N96 p96, N96 P64, N96 P32, the highest increase being for the variant where the N:P proportion was 3:1 ant that is 66,5% while for the variant which presented the N:P proportion of 3:2 and 3:3 the increase is 62,3% and 64,1% higher.

It can be seen that the element which brought to a production increase was the development of a better N:P proportion, which was 3:1 during the experimental conditions.

Table 1

The influence of the chemical fertilizers upon the grain production for the autumn barley between 2005–2007

Year	Variant	Absolute production (kg/ha)	Relative production (%)	Difference (kg/ha)	Significance
2005	Not fertilized	2531	100,0	Witness	-
	P64 N32	4218	166,7	1687	xxx
	P64 N64	4293	169,6	1762	xxx
	P64 N96	4606	182,0	2075	xxx
	N96 P32	4500	177,0	1969	xxx
	N96 P96	4562	180,2	2031	xxx
	N96 P96 K40	4635	183,1	2049	xxx
	N96 P64 K40	4856	191,8	2325	xxx
	N64 P64 K40	4356	172,1	1825	xxx
	N 96 - applied in spring	4468	176,5	1937	xxx
	DL 5% = 371 kg/ha DL 1% = 491 kg/ha DL 0,1% = 667 kg/ha				
2006	Not fertilized	2688	100,0	Control	-
	P64 N32	4688	174,4	2000	xxx
	P64 N64	4676	173,9	1988	xxx
	P64 N96	4529	168,4	1841	xxx
	N96 P32	4658	173,2	1970	xxx
	N96 P96	4500	167,4	1812	xxx
	N96 P96 K40	4735	176,1	2047	xxx
	N96 P64 K40	4864	180,9	2176	xxx
	N64 P64 K40	4805	179,7	2117	
	N 96 - applied in spring	4680	174,1	1992	xxx
	DL 5% = 397 kg/ha DL 1% = 539 kg/ha DL 0,1% = 793 kg/ha				
2007	Not fertilised	3403	100,0	witness	-
	P64 N32	4642	136,4	1239	xxx
	P64 N64	4592	135,0	1189	xxx
	P64 N96	4845	142,3	1642	xxx
	N96 P32	5202	152,9	1799	xxx
	N96 P96	5083	149,4	1680	xxx
	N96 P96 K40	5702	167,6	2290	xxx
	N96 P64 K40	5445	160,0	2042	xxx
	N64 P64 K40	5354	157,3	1951	
	N96 - applied in spring	5131	150,8	1728	xxx
	DL 5% = 275 kg/ha DL 1% = 539 kg/ha DL 0,1% = 793 kg/ha				

Table 2

The influence of the chemical fertilizer upon the grain production for the autumn barley (the average for 2005 - 2007)

No.	Variant	Absolute prodution (kg/ha) average (2005-2007)	Relative Yield (%) average (2005-2007)	Difference (kg/ha) average 2005-2007	Significance
1.	Not fertilized	2874	100,0	Control	-
2.	P64 N32	4516	157,1	1642	xxx
3.	P64 N64	4520	157,1	1646	xxx
4.	P64 N96	4660	162,3	1786	xxx
5.	N96 P32	4786	166,5	1912	xxx
6.	N96 P96	4715	164,1	1841	xxx
7.	N96 P96 K40	5024	174,9	2150	xxx
8.	N96 P64 K40	5041	175,3	2167	xxx
.9.	N64 P64 K40	4828	168,6	1954	xxx

10.	N96 – applied in spring	4766	165,9	1892	xxx

DL 5% = 161 kg/ha DL 1% = 228 kg/ha DL 0,1% = 330 kg/ha

The quality of the production.

The results for the analyses regarding the quality of the production for the autumn barley grown on differentiated crop area are shown in Table 3.

Table 3

The mass for 1000 grains and the hectolitric mass for the autumn barley, grown on differentiated crop area, during 2005 – 2007

Variant	1000 grains mass(g)				Hectolitric mass(kg)			
	2005	2006	2007	Average	2005	2006	2007	Average
Not fertilized	40,4	41,2	41,7	41,3	66,1	62,2	65,0	64,3
P64 N32	45,6	41,8	43,5	43,6	66,5	66,0	66,4	66,3
P64 N64	46,0	41,4	42,1	43,1	66,6	65,0	66,0	65,8
P64 N96	42,2	42,7	42,4	42,7	64,6	62,0	64,6	63,7
N96 P32	42,0	42,2	43,9	42,7	64,9	66,0	64,8	65,2
N96 P96	42,0	42,7	43,9	42,8	64,4	64,0	64,0	64,1
N96 P96 K40	42,2	43,0	42,7	42,6	64,6	65,6	64,0	64,7
N96 P64 K40	41,6	43,8	41,2	42,2	64,8	64,0	64,8	64,5
N64 P64 K40	43,4	43,7	42,4	43,4	66,4	66,0	66,8	66,4
N96 – applied in spring	42,6	41,6	40,1	41,4	64,8	64,8	64,8	64,8

The mass of 1000 grain varied, on average, from 41,3 g for the type which was not fertilized up to 43,6 at the variant with the smallest quantity of nitrogen P64 N32.

As concerns the type which received fertilizers, the differences regarding the 1000 grain mass are not significant. The variant which received nitrogen in spring registers a very small difference compared to the one not fertilized, an average of 0,3 g, except 2005 when the difference is bigger 2,2 g. it seems that nitrogen fertilizers, together with phosphorus, contributes to the raising of the 1000 grain mass.

The hectolitric mass doesn't show many differences among the variants, the smallest being registered at the type without fertilizers 64,3 kg, and the biggest at the p64 n32 variant, 66,3 kg and N64 P64 k40 variant, 66,4 kg. generally speaking, it can be noticed the same classifying order of the variants as presented at 1000 grain mass.

CONCLUSIONS

Following the experiments carried on during 2005 – 2007 concerning the influence of the usage of chemical fertilizers upon autumn barley crop these conclusions can be drawn:

- for the conditions during the three – years of experimenting, the autumn barley has positive effect upon the growth of the production, the increase obtained being very significant

- the variants which received N96 together with K40 potassium produced 5024 kg/ha and 5041 kg/ha grains: for the variant which received a smaller quantity of N64 nitrogen together with the same potassium quantity, the production decreased by 6,7% to 4828 kg/ha grains. Increasing the phosphorus dose, from P64 to P96 in the presence of potassium didn't bring any production increase, so it means that the element which contributed to the increase of 213 kg/ha was the N32 nitrogen extra dose.

- potassium positively influenced the production for all the three variants which also used nitrogen and phosphorus. Wile N96 P96 variant produced 4715 kg/ha grains, the variants which used potassium produced an increase of 309, 326 and 113 kg/ha, that

means 10,7%, 12,1% and 4,5% increase in comparison with the production obtained from the witness – variant.

- it can also be noticed that there is a difference between the variants with different quantities of phosphorus and the same quantity of nitrogen N96 P96 p64, N96 P32, and that is the highest increase compared to the witness is at the variant with the N:P proportion of 3:1 and that is 66,5% while the variant with the N:P proportion of 3:2 and 3:3 is 62,3% and 64,4% more.

- the element which brought another production increase was the obtaining of a better N:P proportion, which was 3:1 for the experimenting conditions.

- the 1000 grain mass varied from 42,3 g for the type without fertilizers up to 43,6 for the variant with the smallest quantity of nitrogen P64 N32. there are no big differences between the variants which used fertilizers as concerns the mass of 1000 grain. The variant which used nitrogen in spring registers a very small difference compared to the variant without fertilizers, an average of 0,3 g, except in 2005, when the differences is bigger, 2,2 g.

- the nitrogen fertilizers, together with the phosphorus, bring a contribution to the growth of the mass of the 1000 grains.

- the hectolitric ,ass doesn't show big differences among the variants either, the smallest being at the variant without fertilizers, 64,3 kg, and the biggest at the P64 N32 variant – 66,3 kg and N64 P64 K40 variant – 66,4 kg.

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CERCETĂRI PRIVIND CUNOAŞTEREA CONCEPTULUI DE PATRIMONIU GENTETIC ÎN CREŞTEREA PĂSĂRILOR
RESEARCH REGARDING THE KNOLEDGE OF THE GENETIC PATRIMONY CONCEPT IN POULTRY BREEDING

Chereji I.

Keywords: genetic patrimony, FAO, breeding, poultry, gene, bank.

ABSTRACT

Țări cu tehnologii zootehnice avansate au creat rezerve genetice sub forma unor banci de gene, cu scopul de a conserva toate speciile şi rasele din aceste țări, respectiv de a realiza combinații genetice (varietăți, linii) pe baza activității lor de selecție. Țări precum Marea Britanie, Danemarca şi Franța ocupă primele poziții în ierarhia țărilor cu bănci genetice diversificate, unele fiind mai vechi de 100 de ani. În ceea ce priveşte numărul de specii şi rase conservate, Franța deține prima poziție, statistica FAO indicând că deține 100 de rase, varietăți şi linii de găinii, 9 rase, varietăți şi linii de rațe, 12 rase, varietăți şi linii de gâşte şi 3 rase de curcan.

Countries with advanced animal husbandry technologies have created genetic reserves in the form of gene banks, with the purpose of conserving all the species and breeds in these countries, as well as genetic scientific creations (varieties, lines) resulted from their own selection activity. Countries like England, Denmark and France occupy the primary positions in the hierarchy of countries with well maintained and diverse national gene banks, of which some are over 100 years old. As to the number of conserved species and breeds, France holds the top spot, FAO's statistics showing that it has 100 breeds, varieties and lines of chicken, 9 breeds, varieties and lines of ducks, 12 breeds, varieties and lines of geese and 3 breeds of turkey.

INTRODUCTION

Preserving genetic diversity is an essential activity in ensuring food security on Earth; its loss would mean the weakening of agriculture's capacity of maintaining and especially increasing the production of nourishment for the planet's population.

Of the over 5000 known populations of animals, about 1.500 are on the verge of extinction. The data gathered by FAO reveal that 873 populations out of a total of 3.882, belonging to 28 species of animals and birds are threatened by extinction; even in the 180 countries that are under the patronage of FAO concerning the program of protecting vulnerable species and breeds, the situation is critical, but there is hope that joint efforts will help save a good number of endangered species.

Without the genetic basis found in the gene reserve of the mentioned countries, not one of them would have been able to obtain any performances, in the sense of distinguishing proficient lines and from them obtaining corresponding hybrids for meat, eggs and foie gras. Consequently, these countries hold the supremacy and control of meat and egg products on the global market.

In FAO's acceptation, the notion of conservation is used for vulnerable breeds, inefficient at a given time, which can be entered in improvement programs that can render them competitive. The idea of conserving poultry mutants was launched in as early as 1945; in 1959 in the United States of America, a Committee of Genetic Resources for Plants and Animals was established and in 1972 a Register of Gallus domesticus Populations also appears. Since 1967, the Catalog of poultry livestock in experimental centers and educational institutions is published in Canada. Countries like Poland and Spain also own poultry gene banks.

MATERIALS AND METODHS

It has been noticed that there are some countries that do not have a constant preoccupation for the protection of genetic resources and where it was decided (maybe for economic reasons also) to specialize a limited number of perfected breeds, in order to ensure large quantities of poultry meat and eggs. This intensification led to the exhaustion and degeneration of those breeds, which were then declared “genetic residues” and quickly replaced in the respective countries’ improvement programs.

When the genetic reserve diminishes, it is imperative to resort to an infusion of genetic material, either by purchases or by exchanges of valuable sires. At the present time, no poultry breeding company in the world is willing to sell pure lines, but only hybrids and especially final products (meat, eggs). The country that does not respect its animal breeding genetic patrimony will, in time, become an exclusive importer of meat and eggs.

It is considered that a breed of poultry is in danger of becoming extinct when it doesn’t have in the genetic reserve a minimum of 1000 females and at least 20 males for reproduction. The reason for which unimproved indigenous breeds, improperly called “primitive”, are also preserved is that they represent a constant source of revitalization, correction or consolidation of specialized breeds, either by genetic infusion or typical selection methods. This way, it is possible that some features, like resistance to disease, to the factors of microclimate be transmitted, as well as a great diversity of genetic combinations within the breed.

FAO extends an appeal to all the countries facing problems related to the reduction of species and animal breeds’ genetic diversity, in order to impose agro-alimentary strategies in accordance with the possibilities of the genetic reserves - national gene banks according to species – and to prevent the drastic reduction of genetic reserves. These national strategies must involve not only the responsible structures within profile ministries, but also research institutes, specialized trading companies, non-governmental organizations, but especially associations of breeders and individual breeders. The political, economical or social interest aimed solely at the exploitation of one single species over a long period of time results in the destruction of other animal species, particularly if these breed are not protected by means of genetic preservation.

In 1993, the U.N. Convention on Biological Diversity made public the need that every country on the planet take part in the joint effort of preserving the biological diversity of animals, species, plants, ecosystems, but also of respecting each country’s sovereignty over its own biological reserves and the manner of managing them.

Romanian specialists in the field of genetics have requested our country’s adhesion to this convention, being concerned about the staggering reduction of animal livestock and their diversity, especially after 1990. Therefore, in 1994 the Poultry Gene Bank of S.C. “Avicola” Bucharest was registered at FAO and in 1995 this gene bank was enlisted in “World Watch List for Domestic Animal Diversity” with 94 breeds, varieties and lines of gallinaceae. Since our country’s adhesion to FAO, the rules and programs of this organization were assumed, but in keeping with the specificity of homeland conditions.

At this time, the gene bank of S.C. “Avicola” S.A. Bucharest is being shut down, unjustifiably and with grave consequences. Its establishment was based on the National Poultry Breeding Gene Bank in the Mangalia village, founded in 1964 and later transferred to Moşneni-Mangalia, at the initiative and under the ruling of two leaders of Romanian poultry breeding – zootechnician engineers Stan Ţârlea and Mihai Mihailov, doctors in zootechnical sciences.

The poultry breeding gene bank represents an extremely important source of valuable genes for the processes of selection within the improvement programs that have taken place; at the same time, the possibility of diversifying poultry productions for both individual breeders and specialized commercial units is ensured; in time, the poultry

breeding gene bank provides biological material of the highest quality for breeders or collectors worldwide.

Elite farms, placed at the foot of our country's poultry improvement pyramid, have used genetic material found in the genetic reserve of the national gene bank, based on which more than 30 lines and hybrids were created and homologated between 1986 – 2000, of which a part are still in exploitation.

Along with the activities of consolidating the existing pure lines and obtaining the first indigenous commercial hybrids (broilers and layers), one had to proceed to the verification of their quality, either by combinability tests performed in our country or by enrolling these hybrids into different international examinations, where they proved their competitiveness.

As to the activity of selection aimed at obtaining a certain hybrid, the specificity of the poultry's genetic base imposes the use of more than one pure lines; for example, for the obtaining of the commercial chicken hybrid that produces white – shell eggs, 7 pure lines of the Leghorn breed were tested, and for the broiler chicken hybrid, 2 breeds (Cornish and Plymouth-Rock) were used, 4 lines of each breed being tested.

In order to reach the pure lines that are to be finally made use of, the improvement program must possess a fairly extensive range of varieties of the used breeds, given that each of them holds only a part of the features of importance for the hybrid form. An example in that respect is the Plymouth-Rock breed, of which the gene bank of Mosneni possessed 11 varieties and lines, a diversity that allowed Romanian selection specialists to obtain, over the years, several types of commercial hybrids.

The poultry breeding biological material specific to a national gene bank cannot be crammed into small units like elite farms for many reasons; for example, the improvement programs in such farms are aimed at either obtaining layers or broilers; the number of populations owned is often below the admissible minimum (1000 females and 20 males); the lines that are not interesting over a certain period of time are preserved, but not in the best of conditions; the lack of the necessary funding for sustaining a large stock of poultry in good conditions; the risk of closely linked inbreeding within pure lines.

These reasons demonstrate the necessity of a national gene bank, in which as many breeds, varieties and lines of poultry as possible can be maintained and completed, thus ensuring the creation of the poultry gene base's diversity or the novelty which can provide a pure line's specific character.

Before 1960, almost the entire poultry biological material in our country was ensured by repeated imports; at that time, it was nationally decided to develop a modern and dynamic poultry breeding department, based on indigenous genetic resources, hence the interdiction of importing poultry genetic material.

Large sums of money were assigned for the accomplishment of these objectives, with the object of organizing the selection and hybridization activities of poultry, in accordance with the national improvement programs established by specialists in the field; at the same time, the problem of founding a national reserve of poultry genetic material was addressed and thus appeared the National Gene Bank in the Mamaia village. Over the years, the National gene Bank has completed its initial structure of breeds and varieties, reaching in 1994 a number of 94 breeds, varieties and lines.

RESULTS AND CONCLUSIONS

Initially, the gene bank was populated with genetic material collected from 53 individual breeders, living in 7 localities, belonging to 4 counties; almost half of the breeders came from Reşița and Bocşa, in the Caraş - Severin County, but breeders from Sighişoara also contributed. Material from other sources was later acquired, so that the gene bank possessed a collection of 24 breeds of chicken, with a total of 75 genetic subpopulations.

In 1990, there were 38 breeds with 94 genetic subpopulations in the gene bank. Of the 75 initial subpopulations, only 55 remain, the rest being synthesized in unique populations within the same breed (for example, out of 10 populations of Naked necks only 4 are left, and of 7 lines of Leghorn only one remains) and which have either been transformed into active populations, included in selection programs or eliminated. In time, other 39 populations, of which 14 new breeds, were introduced in the gene bank (table1).

One of the main objectives of the gene bank's management was including in the preservation program the subpopulations of different breeds, the essential criterion being the degree of genetic singularity of the population, the distinctive genes it carries.

In 1969, the actual average size of the 75 populations in the gene bank was of 9.9 give or take 1.2, with a very big variation (V%=125%). The majority of populations had an actual size below 10, only one population really surpassing the 50-100marker. Specialty literature recommends an actual size of 250 as ideal when casual reproduction is performed and, respectively, 167 when selection and crossbreeding within one family is used.

In 1990, the actual size of the 94 populations found in the gene bank was of 72.04, give or take 3.6, with a variation of 37, 2%; this corresponded to a noticeable size of 133.3 hens and 22.4 roosters of each population, which represented an adequate size for their preservation.

Regarding the reproduction activity in the National Poultry Breeding Gene Bank, the adopted principle was that of large populations, without pedigree, with the arbitrary refreshing of stocks. In order to avoid natural selection, the populations should be kept in their natural living conditions, which is virtually impossible for the "in situ" conservation.

Table 1.

Genetic populations (breeds, varieties) of chicken from the national gene bank between the years 1969-1990 (Stan, Ţârlea, 1992)

Rasa/Breed	Număr linii/Number of lines (1969-1990)		Rasa/Breed	Număr linii/Number of lines (1969-1990)	
Brahma	2	3	Japoneză de mătase	1	3+2
Cochinchina	1	4	Sultana	2	1
Cornish MS	1	-	Welsumer	1	2
Dresden	1	1	Legwels	-	1
Gât Golaş	10	4	Barboasa de Anvers	-	1
Langshan	1	1	Malteza	-	3
Leghorn	7	1	Bantham	-	1
Italiana	5	7	Barnewlaer	-	1
Minorca	2	1	Australorp	-	1
Negru de Banat	1	1	Marans barat	-	1
New Hampshire	5	3	Faverolles	-	2
Orpington	4	4	Houdan	-	1
Plymouth-Rock (+Porumbaca Palas)	5	5	Orloff	-	1
Reichshuhn	1	-	Paduana	-	1
Reilander	1	1	Portelan	-	1
Rhode Island	5	9	Olandeza	-	1
Sussex	8	7	La Flèche	-	1
Wyandote	8	8	Gourney	-	1
Yokohama	1	-	Indiana (+sintetic)	-	1+3
Chabor	1	1	Negru de Franţa	-	1
Hamburger Negru	1	1	**TOTAL RASE**	**38**	**24**
			TOTAL LINII	**75**	**94**
			Ieşite -20 Intrate +39 Plus +19		

The method of reproduction employed in the gene bank was that of the industrial kind, unitary for all the populations; basically it is founded on the obtaining of 3 – 19 series of hatchings in spring (1-6 series, depending on breed), which represents an average period of 6 weeks, followed by the period of the chicks' growth (in series of hatching, the populations being mixed) of about 25 weeks and of a period of about 26 weeks for laying eggs and reproducing, including the incubation period.

It has been noticed that it is difficult to counteract the action of natural selection, which can proceed only on some populations, especially with regard to the youth's viability and the adults' capacity to reproduce. The analysis of data concerning the number of one day old chicks and that of replacement youths in 1990, showed that, from the 94 existing populations (with an average size of 133.3 hens and 22.4 roosters), in the 3.19 series of incubation an average number of 591,03 give or take 33 day old chicks were obtained, with a variation coefficient of 53%. Moreover, the fact that some populations had difficulties regarding reproduction was also noticed, these populations producing an extremely low number of chicks (the Chabor breed produced in 6 series of hatching only 45 chicks). The average number of youths competing for being kept was 223,8, give or take 11,8 for female chicks and 85,5 give or take 4,1 for male chicks, with big variations from one population to the other. There were some breeds, like Chabor, of which all the chicks were preserved but still didn't manage to reach an actual size that could be considered adequate for reproduction.

The genetic diversity of poultry is indispensable to the development of national programs for the creation of hybrid birds with different particular features and, consequently, any source of poultry related biological material must be identified and kept as a reserve for the moment when it will be needed.

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ANALIZA CONSUMULUI DE DE HRANĂ LA HIBRIDUL „LOHMANN BROWN" ÎNTREȚINUT ÎN BATERII TIP B.P. 3S MODIFICATE

ANALYSIS OF FOOD CONSUMPTION OF THE „LOHMANN BROWN" HEN HYBRID KEPT IN MODIFIED B.P. 3S

Chereji I.

Keywords: hen, modified B.P. 3S. cage, control-lot, food consumption, egg production.

ABSTRACT

Acest experiment face referire la studiul diferențelor legate de consumul de hrana înregistrat la găini întreținute în baterii de tip B.P. 3S modificate.

Au fost folosite 4 loturi experimentale întreținute în diferite tipuri de baterii.

În final, cele mai bune rezultate au fost obținute la lotul de control (în care găinile au fost ținute câte 4 într-o baterie clasică, având la dispoziție 500 cm²/ găină).

As part of this experiment, there were studied the differences in the food consumption acchived by hens kept in modified B.P. 3S.

There were used 4 lots of hens kept in different area conditions.

In the end, the best results were obtained from the Lc control-lot (the hens were kept 4 in a classical cage, having 500 cm²/ hen).

INTRODUCTION

Within this experiment, I have studied the differences regarding food consumtion of hens kept in modified B.P. 3S.

The achievement of the objectives imposed by de European Economical Community, regarding the maintenance conditions for the laying hybrids, has determined the using of modified cages, offering more space to one hen.

MATERIALS AND METHODS

I have been used 4 lots of 342 "Lohmann Brown" hens each; from witch a control lot (Lc) ant three experimental lots (L1 exp, L2 exp, L3 exp).

The hens in Lc were kept 4 in a classical cage, having 500 cm²/ hen.

The hens in L1 exp were kept 5 in a modified cage having 500 cm²/ hen.

The hens in L2 exp were kept 6 in a modified cage having 1000 cm²/ hen.

The hens in L3 exp had 500 cm²/ hen in the forage and watering cage, 500 cm²/ hen in the laying ant the rest cage, and free access in the compartment.

RESULTS

In the order to obtain a good production cost, the studied hens were foraged with mixed forage, different regarding the protein content.

For the hens with the age between 20-45 weeks, it was recorded an average consumption of mixed forage of 106,32 g/hen in control-lot Lc, 109, 48 g/hen in L1 exp, 111,07 g/hen in L2 exp and 115,18 g/hen in L3 exp.

The specific consumption during this period was: 126,29 g/egg in the control-lot Lc, 132,37 g/egg in the L1 exp, 134,38 g/egg in the L2 exp and 141,65 g/egg in the L3 exp (fig.1).

The second forage stage lasted 140 days, from the age of 46 weeks until week 65. The best consumptions were recorded in the control-lot Lc, where daily average consumption was 111,99 g/hen and the specific one was 146,48 g/hen. This lot was followed by L1 exp (average consumption of 113,21 g/hen/day; specific consumption of 150,75 g/egg), L2 exp (average consumption of 113,82 g/hen/day; specific consumption of

153,30 g/egg), L3 exp (average consumption of 115,66 g/hen/day and specific consumption of 158, 38 g/egg).(fig.1).

Towards the end of the laying period, from 66 to 80 weeks old, the forage consumption increased, the average daily ones oscillating between 119,74 g/hen/day, in the control-lot Lc and 135,60 g/hen/day, in the L3 exp, while the specific consumption oscillating between 191,29 g/egg in the Lc and 231,75 g/egg in the L3 exp (fig.1).

For the studied period between 20 and 80 weeks, the most convenient forage consumptions were recorded in Lc, where the hens were kept in the standard cages, 4/hen/cage of 2000 cm²; thus, the average food consumption of this lot was of 112,63 g/hen/day, and the specific one of 145,34 g/egg.

In the case of hens that had free access in the cages, the consumption was 120, 51 g/hen/day and a specific one of 164,38 g/egg.

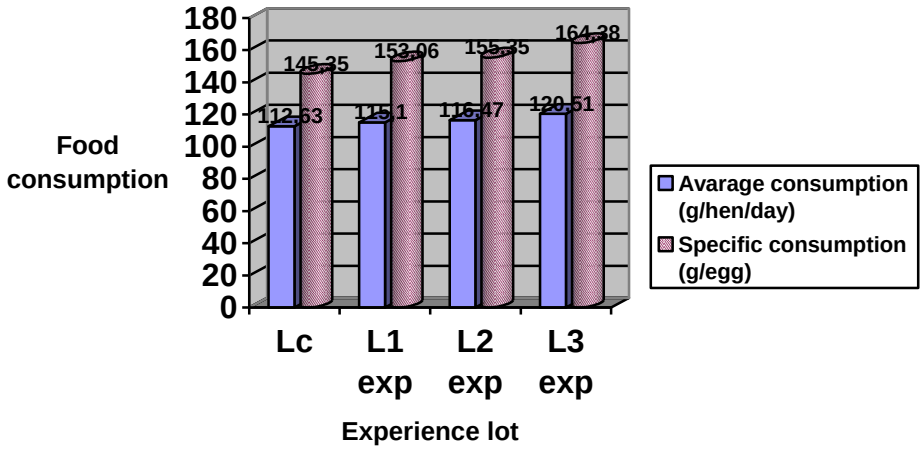
Intermediary values were recorded in the L1 exp and L2 exp, where the average consumption was 115,10 g/hen/day and, respectively, 116,47 g/hen, ant the specific consumption 153,06 g/egg and, respectively, 155,35 g/egg (fig.1).

CONCLUSIONS

The egg production obtained from each lot determined certain food consumption; the best food consumptions were recorded in the lot with the highest egg production, respectively control-lot Lc with a specific consumption of 154,34 g/egg, average consumption of 112,63 g/hen/day; the worst food consumptions being recorded in L3 exp, having the lowest egg production with a specific consumption of 164,38 g/egg and an average consumption of 120,51 g/hen/day.

Under these circumstances, the application of the technologies based on the exploitation of the laying hybrid kept in modified B.P. 3S, doesn't put in advantage nor the hen breeder or the consumer.

Fig. 1.



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CAPACITATEA REPRODUCTIVĂ A VACILOR DIN RASA HOLSTEIN – FRIZĂ IMPORTATE, ÎN FUNCȚIE DE ȚARA DE PROVENIENȚĂ

CAPACITY REPRODUCTIVE HOLSTEIN COWS OF ITS KIND - IMPORTED FIESLAND, DEPENDINGON THE COUNTRY OF ORIGIN

Colă Florica., Colă M.

Keywords: indices of breeding, race, monte, fecund.

ABSTRACT

În general, indicii de reproducție s-au încadrat la toate cele 3 tipuri de Friză, în limitele obişnuite, cu unele fluctuații, putând fi considerați ca favorabili, ținând cont de producția ridicată a rasei Friză. Eficiența folosirii vacilor la reproducție a variat de la 91,49 % la tipul canadian la 100,64 % la cel polonez. Indicele de fertilitate cel mai ridicat de 1,00 s-a înregistrat la materialul biologic polonez, pe când cel mai mare număr mediu de însămânțări pentru o montă fecundă s-a înregistrat la animalele canadiene.

Diferențele înregistrate au fost semnificative între toate cele 3 loturi în privința intervalului mediu între fătări şi semnificative între tipul canadian şi celelalte două tipuri în privința celorlalți doi indici F% şi E % .Făcând o analiză a valorii acestor indici la cele două generații în cadrul fiecărui tip de vaci de lapte se desprinde faptul că, în afara tipului canadian, generația născută în țara noastră au avut indici de reproducție mai favorabili decât generațiile din import

In general, signs of breeding were placed at all 3 types of frieze in the usual, with some fluctuations, which may be regarded as favorable, taking into account the production of high breed frieze. Use efficiency in breeding cows ranged from 91.49% to the Canadian guy at100.64% Polish. Index of the highest fertility of 1.00 recorded in the biological material

Polish, while the highest average number of sowing for a prolific mount occurred at Canadian

animals. The differences were recorded between all the 3 batches in about average interval between calving and type between Canadian and the other two types in respect of the other two indices and F%, E%.By an analysis of the value of these indices on the two generations within each type of dairy cows come off that, in addition to the Canadian type, the generation born in our country indices were more favorable than breeding generations of import .

INTRODUCTION

Improving the production of milk in our country will only be through genetic selection and improvement of the populations of cows, activity can not be achieved only through the techniques and methods so as to the potential value of animal genetic productive. Along with Romania's accession to the European Community and star some projects for establishing new farms of dairy cows in our country have entered a series

of animal milk from Holstein breed-frieze of various origins.

Depending on the geographical area in which format, and the ability of their domestication, breeding indices of these batches of imported cows, had more or less affected, depending on the mode of growth in new environmental conditions And the quality of genetic material from which they originated.

In this connection a number of farmers have faced and are facing more problems on the indices of breeding these types of animals, even if quantitative and qualitative production of milk has not suffered.

MATERIAL AND METHOD

Maintain and improve milk production of bulls Frize imported in recent years in Romania can be achieved by knowing the genetic, physiological and economic them. To bring some clarification about the reproductive capacity of these animals imported in the country today, to carry out a review of the indices of breeding, the types of Holstein cows frieze-Canadian, English and Polish.

The research was conducted in S.C. Prodaco Găneasa - Olt county and profitability growth target of a breed of milk with the indices of breeding high.

Were taken into account a number of dairy cows imported from different countries of the European Union, the types of frieze Canadian, British and Polish.

RESULTS AND DISCUSSION

Indices of breeding.

In tests assessing the reproductive indices were sometimes found difficulties whereas measuring a biological phenomenon as precisely as is done with a lot of patience and involves a long record of phenomena and data processing.

In the research, the work of breeding cows was judged by the average interval between calving, the index of fertility, the index of efficiency in the use of breeding, as the rate of return after the first artificial insemination, and the auxiliary, as the percentage of abortion and placental retention recorded.

The index of fertility (F%) is the number of products produced in a year from 100 cows. It is an index which is calculated based on the average interval between calving (IC) with the formula:

$$F\% = \frac{365}{DG + SP} x100 \text{ that:}$$

365 days in a year;

DG = during pregnancy (average 285 days);

SP = length of service period (days).

The index of effective use of the breeding (E%) cows was calculated with the formula:

$$E\% = \frac{365(n-1)\times 100}{D} \text{ that:}$$

n = number of calving; D = interval between the first and last calving

Analysis of table 1, has found that in general indices for breeding were placed at all 3 types of

frieze in the usual, with some fluctuations, which may be regarded as favorable, taking into account the production of high breed frieze. Use efficiency in breeding cows ranged from 91.49% to the Canadian guy at 100.64% Polish. Index of the highest fertility of 1.00 recorded in the biological material Polish, while the highest average number of sowing for a prolific montă occurred at Canadian animals.

Comparing the value of these indices in the 3 types of origin, it was found that they varied in inverse relation to the amount of production indices. The highest indices were recorded in Polish and English guy, the guy Canadian standup is from this point of view on last place.

The differences were recorded between all the 3 batches in about average interval between calving and type between Canadian and the other two types in respect of the other two indices and F% E%.

By an analysis of the value of these indices on the two generations within each type of dairy cows (Table 2) It is that, outside the Canadian type, the generation born in our

Table 1

Indices of breeding

Country of origin	Specify		Average interval between calving			Efficiency in the use of breeding			(E%) of Indices fertility		
			n intervale	$\overline{X} \pm s_{\bar{x}}$	v %	n cows	$\overline{X} \pm s_{\bar{x}}$	v %	n cows	$\overline{X} \pm s_{\bar{x}}$	v %
Canada	Indices		55	401,00±4,62	18,41	42	91,49 ± 0,94	12,20	42	1,126±0,015	16,74
	Dif.± toward Anglia	absolute	-	+ 25,40	-	-	- 6,82	-	-	+ 0,083	-
		relative %	-	+ 6,76	-	-	- 6,94	-	-	+ 7,95	-
	Dif.± toward Polonia	absolute	-	+ 39,90	-	-	- 9,15	-	-	+ 0,126	-
		relative %	-	+ 11,04	-	-	- 2,32	-	-	+ 12,60	-
Anglia	Indices		54	375,00±4,71	20,01	29	98,31 ± 1,10	12,66	29	1,043±0,012	13,23
	Dif.± toward Canada	absolute	-	- 25,40	-	-	+ 6,82	-	-	- 0,083	-
		relative %	-	- 6,34	-	-	+ 7,45	-	-	- 7,38	-
	Dif.± toward Polonia	absolute	-	+ 14,50	-	-	- 2,33	-	-	+ 0,043	-
		relative %	-	+ 4,01	-	-	- 2,33	-	-	+ 4,30	-
Polonia	Indices		39	361,10±5,85	14,41	27	100,64 ± 0,56	2,93	27	1,00 ± 0,02	10,40
	Dif.± toward Canada	absolute	-	- 39,90	-	-	+ 9,15	-	-	- 0,126	-
		relative %	-	- 9,96	-	-	+ 10,00	-	-	- 11,20	-
	Dif.± toward Anglia	absolute	-	- 14,50	-	-	+ 2,33	-	-	- 0,043	-
		relative %	-	- 3,87	-	-	+ 2,37	-	-	- 4,13	-

Table 2

Indices of breeding to calving - II of

Country of origin	Specify		Age at first calving			Average interval between calving			Efficiency in the use of breeding			Indices fertility		
			n	$\overline{X} \pm s_{\bar{x}}$	**v %**	**n**	$\overline{X} \pm s_{\bar{x}}$	**v %**	**n**	$\overline{X} \pm s_{\bar{x}}$	**v %**	**n**	$\overline{X} \pm s_{\bar{x}}$	**v %**
Canada	Import		88	950,56 ± 14,50	14,31	85	396,11 ± 7,20	16,77	85	90,94 ± 0,93	9,42	85	1,13 ± 0,014	11,99
	G_1		78	820,38 ± 11,98	12,98	57	403,15 ± 12,01	22,49	57	92,33 ± 1,90	15,46	57	1,116 ± 0,033	22,40
	Dif.± toward import	abs.	-	- 130,18	-	-	+ 7,04	-	-	+ 1,39	-	-	- 0,014	-
		rel. %	-	- 13,70	-	-	+ 1,77	-	-	+ 1,52	-	-	- 1,24	-
Anglia	Import		60	956,50 ± 16,21	16,96	60	378,80 ± 6,00	1,58	60	95,32 ± 1,19	12,34	60	1,068 ± 0,014	13,01
	G_1		56	872,32 ± 14,04	12,04	31	341,61 ± 6,81	10,92	31	107,64 ± 1,74	9,02	31	0,96 ± 0,010	10,72
	Dif.± toward import	abs.	-	- 84,18	-	-	- 37,19	-	-	+ 12,32	-	-	- 0,108	-
		rel. %	-	- 8,81	-	-	- 9,82	-	-	+ 12,92	-	-	- 10,12	-
Polonia	Import		21	956,10 ± 21,27	10,19	20	370,00 ± 14,74	17,81	20	97,78 ± 1,93	8,61	20	1,026 ± 0,022	9,74
	G_1		21	875,70 ± 14,20	6,20	7	321,42 ± 6,30	5,19	7	109,66 ± 2,36	5,27	7	1,08 ± 0,028	6,48
	Dif.± toward import	abs.	-	- 80,40	-	-	- 48,58	-	-	+ 11,88	-	-	+ 0,054	-
		rel. %	-	- 8,41	-	-	- 13,13	-	-	+ 12,14	-	-	+ 5,26	-

country indices were more favorable than breeding generations of import. This is due to stronger influence of the crisis on the generation of domestication than on the import born in the country and at the same time, and on account of lower yields of the latter.

Thus, age at first calving ranged between 950.56 days on average to Canadian cows and 956.10 days from the Polish. British animals it was, on average, of 956.50 days

The differences were significant and insignificant British dress in the other two types.

Further appreciation of the breeding value as the percentage of return after the first inoculation, he pointed out that it varied between 39 English and 33 guy at the Canadian. The difference between the generations was not very conclusive in this regard, because the superiority of one or other of them inverse from one type of source to another. It was found that in general, as a whole, regardless of type, approximately 10% of the total herd of cows were needed 3 artificial insemination to achieve a pregnancy. It should also be remembered that of all cows from the farm have been executed inquiries were made about abortion at 2-3% of actual and placental retention in 8-10%.

CONCLUSIONS

In research conducted on the breeding capability of the different types of frieze cows imported in our country, one can say that:

1. Indices of breeding, which characterizes all 3 types, fall within the normal range you want to specialized breeds for milk.

2. It was found that fertility indices that characterize varied in inverse proportion to the level of production, with its values favorable to the type Polish and English, compared with the Canadian.

3. Between generations, it was found that the generation born in our country has achieved in general indices lower than those reported in the generation of import. The differences were too great values but in many cases were not significant.

4. Results lead us to conclude that the material female imported and born in the country of import generation have a phenotypic high, confirming the celebrity race frieze in the world.

5. The value of production and economic indices show that should be given a greater expansion in the country, Canadian type, in terms of raising dairy cows.

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EFECTUL VITAMINEI A ASUPRA REPRODUCTIEI LA PORCINE

EFFECT ON VITAMIN A BREEDING PIG

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Keywords: pigs, vitamin, calving, pregnancy

ABSTRACT

Analizând valorile înregistrate se constată că după primele 3 luni de regim experimental, încep să apară diferențieri între loturi. Aceste diferențe se măresc pe parcurs, devenind semnificative, începând cu doza de 4000 până la 6000 U.I. vitamina A la 1 kg nutreț combinat. Numărul de purcei viabili obținuți în cadrul fiecărui lot prezintă o creştere treptată la dozele mici până la cele mai mari .

Numărul total de purcei născuți s-a constatat de la început că, lotul martor a înregistrat valori inferioare, 5,88 capete, față de 8,38-10,13 capete la loturile experimentale

Analyzing the notes that are registered after the first 3 months of the experimental scheme, started to differentiate between groups. These differences are increasing along the way, becoming significant dose from 4000 up to 6,000 IU vitamin A from 1 kg combined fodder. The number of piglets viable obtained in each batch shows a gradual increase in small doses to the largest.

The total number of piglets born was from the outset that group recorded lower values, heads 5.88, compared to 8,38-10,13 ends at the experimental plots.

INTRODUCTION

In the intensive farming of pigs, knowing more precise requirements in different nutrients, including vitamins, it becomes increasingly urgent. The data in the literature about the needs of pigs in vitamins, particularly vitamin A, shows large variations depending on factors it conditional.

Nutrition standards in force is, however, the minimum requirements in vitamin A, being referred to more than 30 factors that increase this need, such as race, temperature, the level of protein and energy ratios, the presence of disease without clinical manifestations, phenomena stress individuality animal, mycotoxins, etc..

After the data reported by Hoffmann, it appears that the youth in pig rearing, the protein of vitamin A exceeding 3 times the (3000-6000 compared with 1300-2200 IU IU vitamin A to 1 kg feed), and in pregnant sows of about 2 times (6000-9000 IU versus 4100 IU vitamin A to 1 kg feed).

From previous research on adult sows for the testing of two levels of vitamin A has emerged superiority dose of 10,000 IU, compared with the dose of 5,000 IU.

MATERIAL AND METHOD

Animal experiments have been conducted in the SCDA Simnic Craiova, 56 female-headed youth race Great White, from age 2 months until the end of the first lactation. They made lots 7 homogeneous in terms of age, weight and origin. Schedule experience is presented in Table 1, along with food and were given different doses and vitamin A, compared to a lot witness. Resulting piglets in each batch were subdivided into two variants:

- A - which received a supplement of vitamin A doses prescribed in the mother sows, except batch witness, who received dose batch 7;
- B - which has not received a supplement of vitamin A.

Table 1

Schedule of experience

Lot (sows) and variant (piglets)		Sows	Piglets
1	a	-	8000 U.I. vit.A/kg food
	b		-
2	a	600 U.I. vit.A/kg food	600 U.I. vit.A/kg food
	b		-
3	a	1200 U.I. vit.A/kg food	1200 U.I. vit.A/kg food
	b		-
4	a	2000 U.I. vit.A/kg food	2000 U.I. vit.A/kg food
	b		-
5	a	4000 U.I. vit.A/kg food	4000 U.I. vit.A/kg food
	b		-
6	a	6000 U.I. vit.A/kg food	6000 U.I. vit.A/kg food
	b		-
7	a	8000 U.I. vit.A/kg food	8000 U.I. vit.A/kg food
	b		-

Mixed fodder used in feed for sows meet standards for age and class (Table 2), with the exception of content in vitamin A.

As shown above the group in vitamin A content of ratio summarized the contents of fodder in carotene. Knowing is that the pig 1 mg beta-carotene equivalent to 600 IU vitamin A biologically active, has emerged that feeding stuffs combined with vitamin A supplement had a content of about 360-420 IU Vitamin A / kg feed.

Table 2

Recipes for fodder used in combination

	11-24 kg (%)	25-35 kg (%)	36-60 kg and pregnancy (%)	Lactație (%)	Piglets infants (%)
Maize	54	59	60	53	45,2
Barley	20	20	25	22	30
Wheat bran	5	6	5	10	-
Grist sunflower	4	3	3	6	6
Grist soy	7	4	2	-	-
Bone meal	3	2	2	2	2
Fish meal	3	3	1	4	4
Fodder yeast	3	2	1	2	4
Milk powder cream	-	-	-	-	8
Chalk fodder	0,75	0,75	0,75	0,75	0,75
Salt	0,2	0,2	0,2	0,2	-
Vitamin mix	0,02	0,02	0,02	0,02	0,02
Blend elements	0,03	0,03	0,03	0,03	0,03

RESULTS AND DISCUSSION

Results must be considered taking into account the fact that the function of reproduction depends on many factors, among which holds an important role and vitamin A.

In Table 3 are presented data on the evolution of body weight of animals, starting with the weight of 16.8 kg and continuing with the growth, pregnancy and lactation.

Analyzing the notes that are registered after the first 3 months of the experimental scheme, started to differentiate between groups. These differences are increasing along the way, becoming significant dose from 4000 up to 6,000 IU vitamin A from 1 kg

combined fodder. Furthermore, significant differences also were recorded from the consignment 5. This situation continued until the end of the period of gestation.

It should be mentioned that while the group body weight from calving decrease continuously until to wean (from 117.7 kilograms to 101.4 kilograms) in lots 2 and 3 this loss was reduced. In lots 4, 5, 6 indicate that it is almost stationary, while in group 7, they have continued to increase in weight. This weight gain shows that the physiological state in which they found the animals did not affect the process of growth.

Table 3

Evolution of body weight (kg)

Data	**Lot 1 n= 8** $\overline{X} \pm s_{\bar{x}}$	**Lot 2, n = 8** $\overline{X} \pm s_{\bar{x}}$	**Lot 3, n = 8** $\overline{X} \pm s_{\bar{x}}$	**Lot 4, n= 8** $\overline{X} \pm s_{\bar{x}}$	**Lot 5, n = 8** $\overline{X} \pm s_{\bar{x}}$	**Lot 6, n = 8** $\overline{X} \pm s_{\bar{x}}$	**Lot 7, n = 8** $\overline{X} \pm s_{\bar{x}}$
18 VII 2005	16,7 ± 0,41	16,8 ± 0,64	16,8 ± 0,69	16,8 ± 0,71	16,8 ± 0,66	16,8 ± 0,51	16,8 ± 0,58
18 X 2005	46,0 ± 1,81	47,2 ± 2,74	49,1 ± 2,86	52,5 ± 2,32	53,3 ± 2,40	52,1 ± 3,91	54,0 ± 1,96
22 XII 2005	77,7 ± 4,00	80,3 ± 6,00	81,2 ± 3,51	86,2 ± 3,12	83,5 ± 2,28	85,1 ± 4,07	90,0 ± 2,83
22 I 2006	90,2 ± 4,95	90,1 ± 5,75	93,5 ± 4,01	98,5 ± 4,47	104,2 ± 3,64	100,0 ± 4,17	103,1 ± 3,19
Finally gest.	133,0 ± 4,96	135,1 ± 4,92	142,5 ± 6,58	140,3 ± 6,42	147,5 ± 4,05	147,4 ± 2,07	145,8 ± 6,23
Calving	117,7 ± 6,21	126,3 ± 7,33	128,7 ± 6,29	124,2 ± 4,62	128,2 ± 4,42	120,3 ± 3,82	132,5 ± 7,1
1mont.lact.	112,5 ± 6,04	129,0 ± 7,48	124,5 ± 7,63	120,7 ± 4,36	123,2 ± 3,79	120,2 ± 4,33	142,7 ± 7,3
a 2-mon.lact	101,4 ± 5,34	113,7 ± 6,47	117,4 ± 7,07	121,7 ± 5,38	121,8 ± 4,68	124,2 ± 4,68	153,3 ± 7,8

As regards the combined consumption of feed per head per day (Table 4) it has submitted the following: during the period between 17-23 kg was less than 1 kg, ranging between 0961 and 0980 kg with 175-182 g PBD in between 24-35 kg consumption of 1158-1720 kg feed combined with 256-279 g PBD, in the period up to 60 kg a consumer 1,82-1,94 kg of fodder combined with 265-273 g PBD, and during gestation consumption of 2,40-2,70 kg with 338-381 g PBD In lactating a consumption of 4.0 kg feed combined with 648 g PBD.

In order to appreciate the manner in which they developed animals, to follow the age of 6 months and the date Monte, which corresponded roughly with the age of 8 months, body weight, body length and chest perimeter (Table 5). It was noted that these two dimensions are presented in both cases increased quite visible in lots 4 and 7 to those of lots 1, 2, 3, which received a low level of vitamin A.

Analyzing the index of fertility (Table 6), namely, the number of monte made for the installation of pregnancy, it was found that optimal results, expressed in percentage values were obtained with the dose of 8000 IU Vitamin A / kg combined fodder, and because the average age of occurrence of heat was lower in this case.

Table 4

The combined fodder

Tratament	The combined fodder /head/day									
	kg	P.B.D.	kg	P.B.D.	kg	P.B.D.	kg	P.B.D.	Kg	P.B.D.
	11-23 kg		23-34 kg		35-60 kg		60-90 kg and gestație		Lactație	
1	0,980	181	1,72	279	1,93	272	2,60	381	4,00	648
2	0,971	177	1,58	256	1,94	273	2,60	374	4,00	648
3	0,970	176	1,60	259	1,88	265	2,55	359	4,00	648
4	0,964	175	1,62	262	1,95	275	2,53	357	4,00	648
5	0,964	175	1,62	262	1,98	279	2,50	352	4,00	648
6	0,961	175	1,60	259	1,88	265	2,50	352	4,00	648
7	0,961	175	1,61	261	1,94	273	2,50	352	4,00	648

Analyzing the total number of piglets born was from the outset that group recorded lower values, heads 5.88, compared to 8,38-10,13 ends at the experimental plots. The number of piglets viable obtained in each batch shows a gradual increase in small doses to the highest (Table 7).

Table 5

Measurements of conformation

Trata ment	At the age of 6 months			In months		
	Weight (kg)	body length (cm)	chest circumferenc e (cm)	Weight (kg)	body length (cm)	chest circumference (cm)
	$\overline{X} \pm s_{\bar{x}}$	$\overline{X} \pm s_{\bar{x}}$	$\overline{X} \pm s_{\bar{x}}$	$\overline{X} \pm s_{\bar{x}}$	$\overline{X} \pm s_{\bar{x}}$	$\overline{X} \pm s_{\bar{x}}$
1	54,6 ± 5,07	91,6 ± 4,92	74,0 ± 3,70	94,1 ± 5,49	107,8 ± 3,90	104,0 ± 5,30
2	56,1 ± 13,1	93,4 ± 5,30	76,0 ± 4,42	94,7 ± 3,40	108,1 ± 3,19	104,5 ± 2,98
3	58,4 ± 3,18	98,0 ± 4,28	82,6 ± 4,28	100,0 ± 4,14	108,0 ± 0,29	104,0 ± 2,92
4	65,8 ± 2,99	105,0 ± 1,98	84,5 ± 3,71	102,3 ± 4,01	108,0 ± 1,98	103,9 ± 2,96
5	66,0 ± 3,38	105,4 ± 1,59	83,0 ± 1,56	100,4 ± 4,26	116,3 ± 2,52	106,0 ± 2,96
6	65,6 ± 4,48	104,8 ± 4,14	85,0 ± 4,36	100,7 ± 4,43	119,3 ± 2,06	108,8 ± 2,60
7	65,0 ± 1,69	106,0 ± 1,45	91,1 ± 2,21	103,3 ± 2,71	120,2 ± 1,48	109,4 ± 2,49

Table 6

Indices of fertility

Trata ment	Pregnant sows			Infertyl e sows (%)	average in install age pregnancy		% total fertility
	after :				days	%	
	1 months (%)	a 2-a months (%)	a 3-a months (%)				
1	75,0	12,5	-	12,5	273,3	100,0	87,5
2	50,0	37,5	12,5	-	269,1	98,5	100,0
3	87,5	-	-	12,5	268,0	98,1	87,5
4	87,5	12,5	-	-	265,8	97,2	100,0
5	57,1	42,9	-	-	265,8	97,2	100,0
6	75,0	25,0	-	-	363,4	96,4	100,0
7	87,0	12,5	-	-	257,8	94,4	100,0

Almost all cases within the 7 lots at variance with the supplement of vitamin A, achieved a higher number of piglets and a default rate of loss through lower mortality. In a variant (with a supplement of vitamin A) the number of piglets weans exceeded witness with 38-57% and the b variant with 61-77% (Table 7).

At the mortality rate of the largest, was recorded at the group, variant B, and then presented a gradual decrease to lots with a maximum dose. In the dose group of 8000 U.I. Vitamin A losses have been reduced to zero in both.

Following developments in body weight of piglets (Table 8) found that the differences registered at birth were enrolled in a close limit (1,17-1,24 kg).

Body weight of piglets înțărcare presented at a minimum the group and the experimental batches, starting dose of 1200 IU vitamin A, presented significant differences.

In the version of the values at the experimental plots were between 14,63-15,51 kg compared with 13.84 kg to witness achieve is more 5,71-12,07%.

In the variant b, these values were smaller between 13,49-15,11 kg compared with 12.96 kg body weight, achieve is an abundance of 4,09-19,74%. When body weight at înțărcare of all lots and variants was reported to the values that were obtained at the group, variant B, to increase the weight figures 4,09-19,01%.

As regards the specific consumption combined to keep pigs has been found that they were at variance of between 1.32 kilograms (witness) and 1,17-1,30 kg experimental plots, and the variant b, values was something higher, 1.43 kg (the witness) and 1,30-1,44 kg combined fodder in experimental plots.

Table 7

The number of pigs born and wean

LOT	Piglets Born		Nonviable		Viable		Variant	Wean piglets			Mortality (%)
	$\overline{X} \pm s_{\bar{x}}$	%	$\overline{X} \pm s_{\bar{x}}$	%	$\overline{X} \pm s_{\bar{x}}$	%		$\overline{X} \pm s_{\bar{x}}$	% toward ar.a a lot	% toward var.b a witness	
1	5,88±1,08	100	0,50±0,25	100	5,38±1,00	100	a b	5,25±0,75 4,50±0,75	100 100	116,0 100,0	4,5 14,29
2	9,13±2,22	155,3	1,63±0,60	326	7,50±0,26	139,4	a b	7,25±0,29 7,25±0,29	138 161	161,0 161,0	3,33 3,33
3	8,38±0,38	127,5	0,50±0,25	100	7,88±0,27	148,7	a b	8,05±0,25 7,33±0,40	153 162	178,9 162,3	1,23 3,55
4	9,63±0,38	163,8	1,50±0,38	300	8,13±0,30	151,5	a b	8,00±0,10 7,55±0,50	152 172	177,7 172,0	1,60 4,87
5	10,00±0,68	170,1	2,00±0,80	400	8,00±0,19	148,7	a b	8,00±0,30 7,75±0,50	152 172	177,7 172,0	0 3,13
6	9,00±0,33	153,1	0,75±0,41	150	8,25±0,25	153,3	a b	8,25±0,50 8,00±0,25	157 177	183,0 177,7	0 3,03
7	10,13±0,96	171,8	2,00±0,71	400	8,13±0,35	151,1	a b	8,25±0,50 8,00±0,12	157 177	183,0 177,7	0 0

This data shows once again the need to balance the report ratio vitamin A, observed is a better use of combined fodder to lots of experimental version and at doses higher in this substance

Table 8

Body weight to feed pigs and recovery

Lot	Weight at birth		Variant	Weight at the end of lactation			Consumer combined feed / kg gain	
	$\overline{X} \pm s_{\bar{x}}$	%		$\overline{X} \pm s_{\bar{x}}$	% toward var.a a lot	%toward var.b a witness	$\overline{X} \pm s_{\bar{x}}$	%
1	1,17±0,41	100	a b	13,84±0,31 12,96 ±0,70	100,00 100,00	106,79 100,00	1,32±0,13 1,43±0,04	100,0 100,0
2	1,18±0,02	100,85	a b	14,63±0,92 13,49±0,92	105,71 104,09	112,88 104,09	1,30±0,06 1,44±0,15	90,9 102,8
3	1,06±0,15	90,60	a b	13,13±0,11 14,58±0,06	109,32 112,50	116,74 112,50	1,22±0,50 1,30±0,10	92,4 90,9
4	1,20±0,21	102,56	a b	15,31±0,45 14,85±0,15	110,62 114,58	118,13 114,58	1,22±0,06 1,32±0,03	92,4 92,3
5	1,24±0,03	105,98	a b	15,51±0,29 15,11±0,31	112,07 116,59	119,67 116,54	1,20±0,07 1,33±0,07	90,9 93,0
6	1,22±0,02	104,27	a b	15,01±0,14 14,88±0,23	108,45 114,81	115,82 119,81	1,22±0,09 1,33±0,03	92,4 93,4

7	1,18±0,02	100,85	a b	15,25±0,18 14,88±0,27	110,19 119,74	117,67 119,74	1,17±0,08 1,33±0,05	88,6 93,0

CONCLUSIONS

1. Evolution weight youth female Great white race, from age 2 months, presented the indices higher, with significant differences from the age of 5-6 months at a dose of 2000-4000 IU vitamin A from 1 kg fodder combined age of 7 months significant differences were obtained only at the dose of 8000 IU vitamin A, at the age of 8 months (mounted), the dose of 4,000 IU vitamin A.

During pregnancy were recorded, with some oscillations, values higher starting dose of 4,000 IU or a dose of 8000 U.I. Vitamin A / kg feed combined.

2. On lots that have received doses of 600-1200 U.I. Vitamin A / kg feed combined, was the decrease in body weight during lactation. On lots with doses of 2000-6000 U.I. vitamin A, this index was nearly stationary, and the lot with 8000 IU Vitamin A / kg feed, the index has registered an increase.

3. The combined feed / head / day in females and young sows prim pare introduced variations unimportant.

4. Measurements of conformation presented values higher starting dose of 2,000 IU Vitamin A / kg feed combined.

5. Indices of fertility dose showed superiority with 8000 IU Vitamin A / kg feed combined.

6. The number of pigs born and wean presented significant differences in all batches of sows that received vitamin A in food, compared to the lot that has not received vitamin A.

7. The average weight of piglets at înțărcare presented values superior to variants of pigs that received vitamin A supplements and food, since even a dose of 2,000 IU Vitamin A / kg feed combined.

8. Losses by mortality experienced the maximum version of piglets, in which no sows or piglets did not receive a supplement of vitamin A. Loss of piglets were reduced to zero, if the supplement of vitamin A, was introduced in feed sows mothers and piglets from a dose of 4,000 IU Vitamin A / kg feed combined. In the case of the 8000 U.I. Vitamin A / kg feed combined have not registered losses by mortality.

9. Inputs special piglets in the period of adjustment introduced indices lower, if and when Mixed fodder, for piglets, was supplemented with vitamin A starting dose of 1200 IU Vitamin A / kg feed combined.

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INFLUENȚA CONDIȚIILOR CLIMATICE ASUPRA CULTURII COMPARATIVE A GENOTIPURILOR DE FLOAREA- SOARELUI LA S. C. D. A. ŞIMNIC

THE INFLUENCE OF THE CLIMATIC CONDITIONS ON THE COMPARATIVE CROP OF SUNFLOWER GENOME AT ARDS SIMNIC

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Keywords: genomes, sunflower blossom, yielding capcity, climatic conditions

ABSTRACT

La alegerea unui hibrid, pe lângă capacitatea de producție, trebuie să acordăm o tot mai mare atenție cultivării în condiții de siguranță şi calității recoltei..Un hibrid valoros este acela care se adaptează excelent an de an, condițiilor climaterice schimbătoare şi nu înşeală aşteptările fermierilor nici în condițiile extreme ale unui an dificil. Producția bună poate fi realizată doar prin utilizarea unor semințe de o calitate excepțională: puritate, capacitate şi energie germinativă, foarte bună calibrare şi stare de sănătate, caracteristici pe care le îndeplinesc semințele care aparțin genotipurilor create de către firmele AGRICOVER şi KWS.

Abstract

With the choosing of a new hybrid, beside the yielding capacity, we have to pay attention to infield conditions and the yield quality. A valuable hybrid is that which adapts better year by year to the climatic conditions even though they are dry. A good yield can be achieved only by using good quality seeds: purity, capacity and emerging energy, calibration and health status and these conditions were accomplished by the AGRICOVER and KWS companies.

INTRODUCTION

On the brown-reddish soils from Romania there are cropped oilseed crops that constitute an important growing seed reserve. The sunflower (*Helianthus annuus* L.) is the major oilseed crop. By its seed oil content (33-56%) and the quality of the extracted oil, this crop is the major vegetal oil source for Romania. Worldwide, it is the fourth oilseed crop after soybean, palm and rape. There is appreciated that in the future the sunflower surfaces will increase yet in a lower rhythm due to technological constraints (the crops structure, pests) and high performances of the new introduced hybrids.

MATERIAL AND METHOD

The experiment has comprised 25 genomes of sunflower and it was located on a brown – reddish soil with pH = 5.6, clayey texture (clayey silt within the A and AB horizons and clay in the B horizon), the average bulk density of 1.44 t/m^3 , field water capacity of 24%, wilting coefficient of 12-13%, low fertility potential with a humus content of only 1.8-2.2%, low phosphorus supply (8-9 ppm) and average supplied by echangeable potassium (80-90 ppm). The previous crop was corn. The fertilization was performed with complex fertilizers NP -180 kg/ha (N=20%; P2O5=20%; S=3%) before drilling and incorporated into the soil by combinatory tool.

During the vegetation period, when the plants have 6-8 leaves there was applied ammonium nitrate 100 kg/ha. Before drilling the Guardian herbicide was applied, 2l/ha. During the vegetation period there were made two mechanical hoeings and two manual ones. The experiment was set up after the block method: 25 treatments in 4(3) replications on 4 rows of 9 m long (25 sqm – 100 plants per plot). The drilling density was of 40,000

plants/ha with AGRICOVER genotypes and 50,000 plants/ha with KWS genotypes. As calculus method there was used the variance analysis in function of the average value of the group. The climatic conditions of the agricultural year 2006-2007 from the southern zone of Romania have been of extreme drought so the growing of the wide row crops was pretty difficult. The drilling was performed on 16.04.2007 when the soil has had minimal water reserves (the soil water reserve has recorded a deficit during the cold period of the year of 95.3 l/sqm over the normal conditions).

Table 1

Weather data for the vegetation period with sunflower crop in 2006-2007 period at ARDS Simnic

Specification		Cold period 1.10.06-31.03.07	April	May	June	July	August	Sept.
Rainfall l/m²	Rainy days	-	0	7	7	1	8	4
	First decade	-	0	3	36	0	80	47
	Second decade	-	0	92	3	7	24	2
	Third decade	-	0	24	8	0	12	0
	Total	139.5	0	119	47	7	116	49
	Average on 60 years	234.8	42.8	61.7	63.8	56.6	43.6	38.6
	+ or -	-95.3	-42.8	-57.3	-16.8	-47.6	+72.4	+10.4
Temperatu-ri °C	Monthly average	-	12.8	18.7	20.8	29.2	23.1	17.3
	Average on 60 years	-	11.4	16.8	20.4	22.6	22.0	18.8
	+ or -	-	+1.4	+1.9	0.4	+6.6	+1.1	+1.5
Hot days T > 35 °C		-		-	7	20	-	-
Tropical nights T >20 °C		-		-	6	21	-	-

RESULTS AND DISCUSSIONS

At 1.03.2007, the soil water reserve was about 320 m^3/ha lower to the soil field water capacity and at 30.04.2007, the soil moisture has reached the minimal value. During April there were no rains at all. In fact, during the 26.03-18.05.2007 have only fallen 5 mm/m^2 rain and 52 days no rain at all.

Before rainfall (18.05.2007) the soil water deficit was of 1,145 m^3/ha. However, only 2-5% of seeds have emerged in almost normal conditions after a month (17.05.2007) – table 2.

A rather low seed percent (1-2%) have germinated yet not having enough moisture to reach the surface, the embryo has died. The rest of the seeds remained in a latent state in the dry soil and germinated and emerged after abundant rains (almost 100 l/sqm) fallen in the second and third decades of the May month (28.05.2007). We have to say that the experiment was drilled manually, 3-4 seeds in a place. About the rainfall during the summer months there can be said anything because in June there were 47 mm but in 7 days which diminished almost totally the positive effect on plants. In fact, at 02.07.2007 the field soil moisture has reached the wilting point with bad influence on crops.

The data on emerging till blossom have been recorded at 17.05.2007 as well as for the emerged plants at 28.05.2007 – table 3. For the emerged plants in the first stage (17.05.2007) there were recorded: the number of the emerged plants and there was recorded the average percent for each variant; the date of floral point appearance of the blossom and the full blossom time considering that they are closely to the normal developing stages for this region, Simnic – Craiova. Due to drought and hot weather of the June and July months, the flowering time for the emerged plants in the first stage was

pretty long (6-13 days) recording an uneven flowering. The rest of the observations have been made with the emerged plants in the second stage (28.05.2007).

Table 2

Determinations during the vegetation period, comparative crop – sunflower KWS

Nr. Var.	Genotype	Nr. pl/rep. I (17.05.07)			X Var. I	Blossom appearence	Full blossom	Blossom II	Full blossom II	Stem height (cm)	Flower diameter.
		a	b	c							
1	Mateol RO	0	1	3	1	9.06	25.06	2.07	17.07	105	20
2	Heliasol RO	1	4	0	2	9.06	25.06	3.07	18.07	100	15
3	Barolo RO	0	6	2	3	11.06	27.06	4.07	21.07	95	17
4	Arena PR-MT 1	2	4	2	3	18.06	28.06	4.07	19.07	100	16
5	Huracan	1	7	0	3	13.06	27.06	3.07	19.07	125	17
6	KW 5407 (Enduro)	0	1	0	0.3	24.06	3.07	4.07	21.07	110	16
7	KW 5305 (Granero)	0	5	0	2	8.06	24.06	30.06	16.07	90	16
8	Techny/ brio. MT2	0	4	2	2	12.06	27.06	1.07	19.07	105	19
9	Salut RM	1	2	1	1	13.06	26.06	30.06	16.07	110	15
10	PR 63 A90-MT3	0	3	1	1	10.06	25.06	2.07	17.07	120	18
11	Heliasol RM	0	1	2	1	7.06	23.06	30.06	15.07	100	15
12	KW 6201	2	4	2	3	12.06	30.06	1.07	18.07	125	15
13	KW 6302	4	3	2	3	11.06	26.06	2.07	18.07	100	17
14	KW 7201	2	9	2	4	7.06	24.06	1.07	16.07	110	15
15	KW 7404	0	1	1	0.6	16.06	30.05	5.07	20.07	117	20
16	PR 64 A83-MT4	2	5	5	4	15.06	30.06	3.07	19.07	110	19
17	KW 4202 Sparta	1	3	4	3	9.06	25.06	2.07	16.07	100	14
18	Tuscania RM	3	2	3	3	9.06	26.06	30.06	15.07	105	14
19	Heliador (MH 5202)	2	1	0	1	17.06	28.06	3.07	17.07	110	18
20	Heliacan (KW 5306)	3	4	1	3	9.06	26.06	2.07	18.07	135	18

Table 3

Vegetation data with researched hybrids

Genotype	GK OR 0.3				AZ 1814				GKH 002				GIRASOL OROBANCHE 1				GIRASOL OROBANCHE 2			
	a	b	c	d	a	b	c	d	a	b	c	d	a	b	c	d	a	B	c	d
Emerged plants17.05.07	8	2	2	0	5	11	2	1	3	4	6	1	5	3	1	0	4	2	2	1
X %	3				5				3				2				2			
Floral point app.	7.06				13.06				13.06				12.06				9.06			
Blossom date	25.06				26.06				29.06				27.06				25.06			
II flowering	2.07				3.07				30.06				1.07				30.06			
Blossom time II	18.07				20.07				19.07				16.07				15.07			
height	112				112				101				100				101			
Flower diameter	18				19				16				18				20			
Harvested plants	95	98	100	100	100	100	100	100	97	100	100	100	100	100	100	100	100	98	100	97
Yield Kg/parc	3.42	3.45	2.95	3.03	3.43	3.59	3.46	3.36	2.04	2.50	2.51	2.53	2.84	2.78	3.17	2.96	1.66	1.96	1.67	1.94
Yield Kg/ha U% rec.	1368	1380	1180	1212	1372	1436	1384	1344	816	1000	1004	1012	1136	1112	1268	1184	664	784	668	776
U% rec.	8.0				10.3				9.4				7.8				8.5			
yieldSTAS kg-ha	1383	1395	1193	1225	1352	1415	1364	1324	812	996	999	1007	1151	1127	1285	1200	668	788	672	780
Yield X	1300**				1360***				950º				1190				730ººº			
Average var.	1110																			
Dif. X	+190				+250				-160				+80				-380			
MMB (g)	52				38				38				36				38			
MH (kg)	35				40				35				30				33			

Emergence : - 28.05.2007; Harvested : - 2.10.2007; DL 5% = 1.26; DL 1% = 1.77; DL 0.1% = 2.50

Tabelul 4

Determination on the vegetation stages data

Nr. var.	Genotype	Nr. harvested plants			Yield kg/parc.			Yield. kg/ha U% rec.			U% rec.	Yield STAS kg/ha			Yield X	Dif. X	MMB (g)	MH Kg)
		a	b	c	a	b	c	a	b	c		a	b	c				
1	Mateol RO	64	61	64	1.76	1.84	1.82	1353	1415	1400	11.2	1230	1381	1336	1350	+84	42	32
2	Heliasol RO	64	64	64	1.98	1.99	2.19	1523	1530	1684	9.6	1513	1520	1672	1570*	+136	43	31
3	Barolo RO	64	64	64	2.03	2.06	2.20	1561	1584	1692	10.5	1535	1557	1664	1580*	+146	42	36
4	Arena PR-MT 1	64	64	64	1.28	1.19	1.22	984	915	938	9.3	981	912	935	940^{ooo}	-494	33	35
5	Huracan	64	64	59	2.20	2.16	1.95	1692	1661	1500	9.6	1681	1650	1490	1610**	+176	41	37
6	KW 5407 (Enduro)	64	64	64	2.65	2.66	2.61	2038	2046	2007	11.4	1984	1992	1954	1980***	+546	44	40
7	KW 5305 (Granero)	64	64	64	1.31	1.47	1.37	1007	1131	1054	10.5	990	1112	1036	1050^{ooo}	-384	46	31
8	Techny/ brio. MT2	62	64	64	3.22	3.16	3.31	2476	2430	2546	12.6	2378	2334	2445	2380***	+946	38	38
9	Salut RM	58	64	63	1.90	1.92	1.89	1461	1476	1754	9.3	1456	1471	1449	1460	+26	37	34
10	PR 63 A90-MT3	64	60	64	1.34	1.53	1.31	1031	1176	1008	7.0	1053	1201	1030	1090^{ooo}	-344	38	36
11	Heliasol RM	64	64	64	1.64	1.51	1.55	1261	1161	1192	9.9	1248	1149	1180	1190^{ooo}	-244	41	35
12	KW 6201	64	64	64	1.80	1.80	1.88	1384	1384	1446	8.7	1388	1388	1451	1410	-24	40	34
13	KW 6302	64	64	64	2.08	1.95	2.27	1600	1500	1746	10.7	1570	1472	1713	1590*	+156	44	34
14	KW 7201	64	64	64	1.74	1.59	1.67	1338	1223	1284	8.7	1342	1227	1288	1290^{o}	-144	47	36
15	KW 7404	64	64	64	2.17	2.25	2.20	1669	1730	1692	8.8	1673	1734	1696	1700***	+266	46	35
16	PR 64 A83-MT4	64	64	62	2.19	1.95	2.21	1685	1500	1700	8.3	1698	1511	1713	1640**	+206	52	38
17	KW 4202 Sparta	64	64	64	1.26	1.23	1.24	969	946	954	7.4	986	963	971	970^{ooo}	-464	44	36
18	Tuscania RM	64	61	64	1.40	1.55	1.32	1077	1192	1015	8.1	1087	1203	1025	1110^{ooo}	-324	41	32
19	Heliador (MH 5202)	64	64	64	1.40	1.49	1.55	1077	1146	1192	7.6	1093	1164	1210	1150^{ooo}	-284	40	37
20	Heliacan (KW 5306)	62	64	64	1.98	2.22	2.27	1523	1707	1746	10.6	1496	1677	1715	1630**	+196	45	33
	Average	1434																

DL 5% = 1.19 kg/ha; DL 1% = 1.59 kg/ha; DL 0.1% = 2.09 kg/ha

As regard the bending and falling resistance there were not recorded such phenomena. Being a very dry year there were not recorded disease attack symptoms. Sporadically, after July rains, followed by high temperatures there were seen small blight spots and, very rarely, brown spotting of the leaves. All these phenomena have not influenced either the foliar surface or yielding capacity of the genotypes (table 4).

CONCLUSIONS

1. In the soi land clime conditions of ARDS Simnic there can be emphasized with very significant yield the AZ genotype 1814 (1360 kg/ha) and distinctively significant yield GK OR 03 (1300 kg/ha) that belongs to the AGRICOVER Company.
2. The lowest yield has been recorded with the GIRASOL OROBANCHE 2 (730kg/ha) genotype that belong to the same company.
3. The genotypes KW 5407 (ENDURO) - 1980kg/ha; TECHNY/BRIO -2380 kg/ha and KW 7404 -1700 kg/ha are emphasized with very significant yields and HURACAN -1610 kg/ha; PR 64 A 83-1640 kg/ha and HELIACAN (KW 5306)- 1630 kg/ha, as distinctively significant .

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SOIURI NOI DE LUCERNA CU VALOARE NUTRITIVA RIDICATĂ A FURAJULUI CREATE LA INCDA FUNDULEA
ALFALFA NEW VARIETIES WITH HIGH NUTRITION FEED VALUE CREATED AT INCDA FUNDULEA

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Keywords: alfalfa, cultivars, technological variants, productivity

ABSTRACT

For an effective economic zootechnics is necessary to ensure feed in sufficient quantity, high quality and at a low cost price. Alfalfa is a crop that provides great yield of feed and very good quality.

Quality feed involves increasing the proportion of plant leaves in the vegetable mass, short interknots.These objectives shall be responsible to a great variety COSMINA, homologated in 2004 and F lines 1206-00 and F 1208-00, introduced in testing in 2002.

During testing (2002-2004) they were noticed by the average output of 18 tons / ha dry matter, under a intensive technology. Alfalfa yields, obtained by applying intensive technology were higher by 40-60% compared with traditional technology.

INTRODUCTION

To have an effective zootechnics is necessary to ensure feed in sufficient quantity, high quality and at a low cost price.

Alfalfa is a crop that provides high feed crops and very good quality. In the work of improving alfalfa has been intensified pressure of selection in the direction of improving the quality of feed. Quality feed involves increasing the proportion of leaves in the vegetative mass, being aware that the leaves contain more useful substances than the offshoots.

Increasing the proportion of leaves can be achieved by the selection of genotypes with short interknots and rich foliage. Of course, new varieties of alfalfa must ensure high yields of feed and seed to allow the INTRODUCTION and expansion of this in production (Schitea Maria -2000). In large measure, these objectives are meet by the new varieties of alfalfa, created by INCD Fundulea, Cosmina, F 1206-00 and F 1208 / 00.

MATERIAL AND METHOD

The alfalfa genotypes testing was done during 2002-2004 at SCDA Caracal, in two technological variants:

1 - Intensive Technology- - involving sowing in the autumn under irrigated conditions;

2. - Classical technology - sowing in the spring under non irrigated conditions.

Experiences have been organized as randomized blocks, the area sown with 12 m^2/plot, 10 m^2 harvested. In the irrigation system experiences were achieved after intensive technology to feed alfalfa (Moga et al., 1996, 2000) .

As material were used genotypes of alfalfa Cosmina, F 1206-00, F 1208-00, Selena (Reference), Sigma and Magna.

Processing of experimental data was performed after appropriate statistical methods (Cepoiu, 1968).

EXPERIMENTAL RESULTS

During testing hydrous deficit was large, this has affected the yields particularly in the non irrigated conditions.. Hydrous deficit was registered during the October to March, but especially during the growing season, April-September (Table 1).

Table 1

Rainfall recorded at SCDA Caracal, 2001-2004

Year	Oct.-March	Long Average	±	Apr.-Sept.	Long Average	±	Annual Sum	Long Average	±
2001-2002	103	218	-115	390	319	71	493	537	- 44
2002-2003	255	218	37	250	320	-70	505	558	- 53
2003-2004	361	218	143	309	318	-9	670	536	134

During the October to March, the crop year 2001 - 2002 recorded a deficit of 115 mm to long average, and for the entire year the deficit was below the long average with 44 mm.

For alfalfa crop, the year 2002 - 2003 was the most difficult, recording during the growing season, April to September, a deficit of 70 mm, and for the total year the deficit was 53 mm below the long average. Last year test 2003 - 2004 was a good year for alfalfa crop, accumulating in the period October to March 361 mm, with 143 mm over long average, and for the entire year it was an surplus of 134 mm face to long average.

In these circumstances, the SCDA Caracal dry matter yields, obtained from alfalfa tested genotypes, have been negatively affected by hydrous stress, especially during the growing season (April to September).

In terms of irrigation, Cosmina variety achieved the highest production in the first year of vegetation, 22.7 t / ha su, achieving an average production throughout the cycle of 18.7 t / ha su, exceeding variety Selena with a very significantly spor of 13, 9% (Table 2).

Table 2

Production of feed made in comparative culture from alfalfa –watered average (2002-2004) dry substance

VARIANT	YEAR I 2002	YEAR II 2003	YEAR III 2004	AVERAGE		Semnif.
				t/ha	% Mt	
COSMINA	**22,7**	**18.5**	**15.0**	**18.7**	**113.9**	***
F 1206-00	**23.8**	**16.2**	**15.4**	**18.5**	**112.3**	***
F 1208-00	**21.8**	**17.2**	**15.0**	**18.0**	**109.6**	**
Magnat	**20.7**	**17.5**	**14.2**	**17.5**	**106.2**	*
Sigma	**20.1**	**16.8**	**13.8**	**16.9**	**102.9**	
Selena Mt.	**19.3**	**16.4**	**13.6**	**16.4**	**100.0**	
D.L. 5%	***1,0***	***1,0***	***0,6***	***0,8***	***5,3***	

Variety F 1206-00, achieved the highest production in the first year of vegetation, namely 23.8 t / ha su and for the whole cycle of testing an average production of 18.5 tons / ha su, exceeding the reference variety with 12.3%.

Very good yields achieved the variety F 1208-00, the three-year average was 18.0 t / ha su.

In terms of non irrigated conditions (classical technology), yields were much reduced, being between 8.5 tons / ha su at the variety Cosmina and 7.3 tons / ha s.u. at the reference variety Selena (Table 3).

Table 3

Production of feed made in comparative culture of alfalfa -non irrigated average 2 years (2002-2003)

VARIANT	YEAR I 2002	YEAR II 2003	AVERAGE		Semnif.
			t/ha	% Mt	
COSMINA	8,8	8,5	8,5	116,4	**
F 1208-00	9,7	6,4	8,1	111,0	*
F 1206-00	8,6	7,0	7,8	106,8	
Magnat	8,7	6,8	7,8	106,8	
Sigma	9,2	6,1	7,7	105,5	
Selena Mt.	8,4	6,2	7,3	100,0	
D.L. 5%	*0,7*	*0,9*	*0,8*	*10,9*	

Forage yields achieved on 2 years average (2002 - 2003) at the varieties of alfalfa, sown in the two variants technology (Figure 1) were between 20.6 and 17.9 t / ha su under irrigation and between 8.5 and 7.3 tons / ha U.S. in non irrigated conditions.

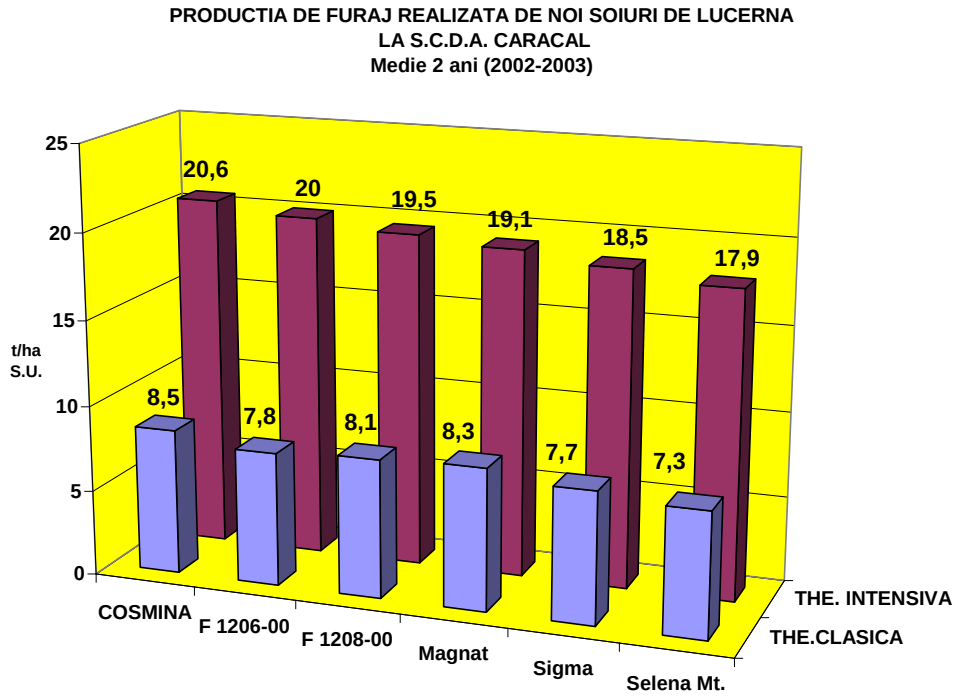

Fig.1 - Forage yields achieved on 2 years average (2002 - 2003) at SCDA Caracal

Table 4

Comparison between the yields obtained in intensive technology and classical technology - 2 years average (2002-2003)

Genotip	t/ha	t/ha	Raport int/clas.	Raport clas/int.
F 1206-00	20,0	7,8	256,4	39,0
SELENA	17,9	7,3	245,2	40,8
COSMINA	20,6	8,5	242,4	41,3
F 1208-00	19,5	8,1	240,7	41,5
SIGMA	18,5	7,7	240,3	41,6
MAGNAT	19,1	8,3	230,1	43,5

In both technology variants it have noted the new genotypes Cosmina, F 1206-00 and F 1208 / 00.

By comparison between the two technological variants, can see that the ratio of technology-intensive and classical are between 256.4% and 230.1%, and the technology of classical and intensive between 39% and 43.5% (Table 4).

Nutritional value of the feed is characterized by digestive coeficient, net energy and oat nutritional units (Table 5).

Table 5

Nutritional value of feed produced of new varieties of alfalfa - average 3 years (2002-2004)

VARIANT	Digestibility Coef.	Net Energy (kcal)	Oat Nutritional Units
F 1208-00	73,7	1515	1,070
COSMINA	72,7	1483	1,050
F 1206-00	72,7	1479	1,046
Sigma	71,7	1452	1,027
Selena - Mt.	70,7	1428	1,013
Magnat	70,0	1402	1,000

Analysis carried out at I.B.N.A. BALOTESTI

On three years average, the value of digestibility coeficient of the new alfalfa genotypes was 73.7 at F 1208-00 and 72.7 at Cosmina F and 1206-00, compared with 70.7 in reference variety Selena, so a difference of 3 and 2 percents.

The three genotypes were superior to the reference variety with quantity of energy which has net value between 1515 and 1479 Kcal. compared to only 1428 Kcal. at Selena variety. Also superiority is presented and its nutritional units.

Table 6

The production of seed made by new genotypes of alfalfa - 2002

Genotype	CARACAL*		CARACAL**		AVERAGE	
	kg/ha	%	kg/ha	%	kg/ha	%
F 1208-00	712	117,7	272	125,3	492	119,7
F 1206-00	650	107,4	252	116,1	451	109,7
COSMINA	612	101,2	227	104,6	419	101,9
SELENA	605	100,0	217	100,0	411	100
D.L. 5%	*45*	*7,4*	*27*	*12,4*	*29*	*9,0*

* - Intensive Technology ** - Classic Technology

The production of seed (Table 6), obtained by the new genotypes of alfalfa at SCDA Caracal, was superior to reference variety Selena. In terms of intensive technology the production of seed was between 712 kg / ha at the 1208-00 F variety and 605 kg / ha at the reference variety. This mean an increase of 17.7%. Using classical technology productions were much reduced, being between 272 kg / ha at the F 1208-00 and 217 kg / ha at Selena. The increase was 25.3%.

Table 7

The main characteristics of new varieties of alfalfa

SPECIFY	SELENA	SIGMA	MAGNAT	COSMINA	F 1206-00	F 1208-00
Energy (notes)	2,8	3,0	3,2	2,8	2,6	2,6
Regeneration capacity (notes)	3,2	3,0	2,8	3,0	2,8	2,8
Winter resistance (notes)	2	2	2	2	2	2
Fusarium wither resistance (notes)	3,5	3,2	3,2	2,5	2,3	2,5
Perenniality (% plants of III year of vegetation)	70	70	82	78	80	75
Precocity (± days compared with Selena)	mt.	-2	-1	+2	+1	0
Height	85	86	84	83	84	88

* - Notes 1-9, 1 - very strong, 9 - very sensitive

The new genotypes of alfalfa have been shown to be superior in terms of plant vigor, ability regeneration after scythe, Fusarium wither resistance, perenniality, etc.. (Table 7).

CONCLUSIONS

- Varieties F 1206, F 1208 and Cosmina made large productions of feed:18,0-18,6 t / ha SU, production efficiency of 9,6-13,9% vs. Selena reference variety in intensive technology;
- Varieties F 1206, F 1208 and Cosmina offers a feed with a good nutritional value:1,046-1,070 U.N., 1479-1515 kcal. Net energy, 72,7-73,7 C.D.;
- Varieties F 1206, F 1208 and Cosmina realise high seed production, between 612 and 712 kg / ha in the intensive technology;
- Show a good resistance to disease and winter;
- Cosmina alfalfa variety is recommended to grow both in the intensive technology and classic technology in the Southern and Eastern country (Oltenia, Romanian Plain, Moldova).

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CERCETĂRI PRIVIND TEHNOLOGIA TRIFOIULUI ROŞU (*TRIFOLIUM PRATENSE)* ÎN ZONA DE DEAL A OLTENIEI

RESEARCHES CONCERNING RED CLOVER (*TRIFOLIUM PRATENSE)* TECHNOLOGY, CULTIVATED IN THE HILL AREA OF OLTENIA

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Keywords: red clover; technology; amendment; manure.

ABSTRACT

In vederea cercetarii tehnologiei trifoiului rosu in zona de deal a Olteniei, la Centrul Experimental pentru Cultura Pajistilor de la Preajba –Gorj s-a amplasat in anul 2005 o experienta cu doi factori: amendarea si ingrasamintele organice.

S-a constatat ca efectul amendamentelor asupra productiei este nesemnificativ, inregistrandu-se chiar productii mai mici fata de variantele neamendate.

Trifoiul roşu a înregistreat rezultate foarte bune în cazul aplicării îngrăşămintelor organice (gunoi de grajd), al cărui efect se face simțit chiar din anul înființării.

For the research of red clover (Trifolium pretense) technology in the hill area of Oltenia, on the Experimental Centre for Pastures Crop Preajba – Gorj, was located in 2005 year an experience with two factors: amendments and manures.

Was observed that amendments effect on productions is insignificant, being recorded even smaller productions towards variants were not applied amendments.

Red clover was registered good results in case of manure application.

INTRODUCTION

Red clover has an outstanding importance because of forage qualities, of a high productivity, also of positive outcomes on the soil attributes.

Red clover hay is rich in protein, calcium, phosphorus and vitamins, having an energetic value of 4410 caloric units / gram of dry substance. If is milled, the resulted flour from red clover hay have a nutritive value close to oat grain, and superior to barley and corn grain, from albuminoidal substances point of view.

Under quantitative production point of view, red clover is surpassed only by lucerne. However, in certain conditions the experimental results show that red clover yields of green mass and hay was bigger than lucerne. Thus, behind researches from Experimental Station Cluj, in the first and second year of vegetation, red clover was give productions bigger than lucerne with 19 – 57 % at green mass and 26 % at hay (Resmerita 1973).

Rised productions were obtained when red clover was cultivated mixed with perennial gramineous, but nutritive value of obtained forage was lower (I. Moga 1993).

In case of fertilizers application, red clover yield register significant increase. Among fertilizers, the most important outcome on yield increase have organic fertilizers specifically manure in dose of 20 – 40 t/ha (I. Moga 1996).

Distinctive experimental results were obtained on the powerful acid soils from Oarja (Arges), where at a dose of 30 t/ha manure, the yield surpass mark production with 200 % (Pop Mircea, 1976).

On a brown forest soil, at a dose of 30 t/ha manure, Resmerita (1973) was obtained an yield of 20,6 t/ha green mass at first crop, comparatively with the mark which registered yield of 11,7 t/ha, the yield growth being 66 %.

Distinctive importance of red clover as forage and amelioration plant, and also scanty experimental results obtained in Oltenia hill area, was induced to study this species for the further assignation of main technological links.

MATERIAL AND METHODES

The experience was established in spring of 2005 year, on Experimental Centre for Pastures Crop Preajba – Gorj and the field was plough from autumn of 2004 year.

Was sown red clover, Merviot sort, using a seed norm of 25 kg/ha. The experience was placed after split lots method, with 12 variants disposed in three repetitions. Were taken in study two factors:

- A factor – amendment, with two graduations:
  - a_1 = non amended;
  - a_2 = amended with 6 t/ha $CaCO_3$.
- B factor – organic fertilization, with three graduations:
  - b_1 = 0;
  - b_2 = 20 t/ha manure;
  - b_3 = 40 t/ha manure.

On the crop start, in springtime of 2005 year were applied amendments ($CaCO_3$) on variants 7, 8, 9, 10, 11, 12. In the same time was applied organic fertilization (manure) in dose of 20 t/ha on variants 3, 4, 9, 10 and 40 t/ha on variants 5, 6, 11, 12.

In 2005 year, first year of experimentation was obtained two harvests, and in second year of experimentation (2006) was obtained three harvests.

RESULTS AND DISCUSIONS

The red clover dry substance yield was more or less influenced by applied treatments on the crop: amendment and organic fertilization.

Table 1.

Separated influence of amendment on red clover yield cultivated at Preajba – Gorj (t/ha dry substance, average 2005 – 2006)

No.	Variant	Yield (t/ha d. s.)	%	Difference	Significance
1	Non amended	7,88	100	-	Mark
2	Amended	7,28	92	-0,60	-

DL 5% = 1,83 t/ha d.s.
DL 1% = 4,22 t/ha d.s.
DL 0,1% = 13,46 t/ha d.s.

In average on the two years of experimentation (2005 – 2006) amendments application on red clover crop have as result an yield of 7,28 t/ha d.s., comparative with non amended mark with an yield of 7,88 t/ha d.s., obtaining a negative difference of 0,60 t/ha d.s., statistically non assured (table 1).

If it consider annual yields, is observed that in first year of vegetation (2005), the amendment gives a yield growth of 0,43 t/ha d.s., as while in second year (2006), was induced an yield diminution of 1,64 t/ha d.s.. Both first year growth and second year yield diminution were proved as insignificant.

Red clover registered biggest yields at organic fertilization, the manure effect is present from the first year of vegetation yet, when were recorded highly significant growth.

In average of two years (2005 – 2006), by application of manure in quantity of 20 t/ha was obtained a yield of 8,10 t/ha d.s., while by fertilization with 40 t/ha organic fertilizer yield was increase up to 9,04 t/ha d.s., in both cases was realized positive differences by

2,49 t/ha d.s. and 3,43 t/ha d.s., distinct significant and highly significant toward unfertilized mark where production was only 5,61 t/ha.

Percentage, the manure brought a yield growth for red clover, by 44 % at variants fertilized with 20 t/ha and 61 % at variants fertilized with 40 t/ha (table 2).

Table 2.

Separated influence of manure on red clover yield cultivated at Preajba – Gorj (t/ha dry substance, average 2005 – 2006)

No.	Variant	Yield (t/ha s. u.)	%	Difference	Significance
1	Unfertilized	5,61	100	-	Mark
2	20 t/ha manure	8,10	144	2,49	**
3	40 t/ha manure	9,04	161	3,43	***

DL 5% = 1,42 t/ha d.s.; DL 1% = 2,07 t/ha d.s; DL 0,1% = 3,10 t/ha d.s

Analyzing combined influence of organic fertilizer and limestone amendment on red clover yield, establish that on non amended variants, at 20 t/ha manure, red clover yield was 8,32 t/ha d.s., comparative with the mark unfertilized, which registered yield of 5,83 t/ha d.s., difference of 2,49 t/ha d.s. being highly significant. At 40 t/ha manure, yield surpass with 3,66 t/ha mark, coming at 9,49 t/ha d.s. (table 3).

Table 3.

Influence of organic fertilizer and amendment on red clover yield cultivated at Preajba – Gorj (t/ha dry substance, average 2005 – 2006)

No.	Amendment	Manure	Yield (t/ha d.s.)	%	Difference	Significance
1	Non amended	0	5,83	100	-	Mark
2		20 t/ha	8,32	142	2,49	*
3		40 t/ha	9,49	162	3,66	***
4	Amended	0	5,38	100	-	Mark
5		20 t/ha	7,88	146	2,50	*
6		40 t/ha	8,58	159	3,20	***

DL 5% = 2,01 t/ha d.s.; DL 1% = 2,92 t/ha d.s.; DL 0,1% = 4,38 t/ha d.s.

Red clover yield on variants amended and fertilized with 20 t/ha d.s. surpass with 46 % the mark, while application of 40 t/ha manure gives an yield growth of 59 %.

Red clover yields growth brought by organic fertilization at 20 t/ha are significant both for amended and non amended variants, while at application of 40 t/ha manure, growth are highly significant.

CONCLUSIONS

1. The effect of limestone amendments on red clover yield is insignificant, are registered just smaller yields at amended variants toward non amended ones.
2. Red clover register very good results when is applied organic fertilizers, manure effect is present from the first year of vegetation yet.
3. Manure is the most efficient fertilizer for the red clover crop, because of complex action gives by contained quantity of elements and microelements, and also for positive effect on soil physical, chemical and biological properties.
4. Recommended doses of manure are 40 t/ha for a average yield over 9 t/ha d. s. or 20 t/ha when can be obtained about 8 t/ha d.s.

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REZULTATE DE CERCETARE PRIVIND FERTILIZAREA CU AZOT, FOSFOR ŞI POTASIU LA ARAHIDELE CULTIVATE PE PSAMOSOLURILE DIN SUDUL OLTENIEI

INVESTIGATORY RESULTS CONCERNING THE AZOTE, PHOSPHORUS AND POTASSIUM FERTILIZATION TO CULTIVATED PEANUTS ON THE PSAMOSOILS FROM SOUTH OF OLTENIA

Milica Dima

Keywords: psamosoil,peanut, fertilization

ABSTRACT

Cercetările efectuate la CCDCPN Dăbuleni în perioada 2001-2003, pe un psamosol cu fertilitate redusă,slab aprovizionat în azot, mijlociu aprovizionat în fosfor şi conținut redus de potasiu , evidențiază importanța unei fertilizări echilibrate cu azot, fosfor şi potasiu la soiul de arahide Dăbuleni.

Dozele optime economice de îngrăşăminte la care se pot realiza cele mai bune rezultate se situează la nivelul de 67 kg N/ha, 63,37 kg P_2O_5/ha şi 54,63 kg K_2O/ha.

The researches made to CCDCPN Dabuleni in the period 2001-2003, on psamosoil with reduced fertility, deafly aprovozionat in middling azote supplied in phosphorus and contained reduced of potassium, emphasized the of a importance well-balanced fertilizations with azote, phosphorus and potassium to the kind of peanuts Dabuleni.

The optimum economic doses of manures whereat are can achieved most good results is placed to the level of 67 kg N/ha, 63, 37 kg P2O5/ha and 54, 63 kg K2O/ha.

INTRODUCTION

The capitalization of sabulous soils from the south Oltenia presupposes a system of specific agriculture, rationally and incorporate, with less pretentious plants against the fertility of the soil and tolerant to the factors of stress, carry to assure profitabilitate and the protection environment(Gheorghe, D. and colab., 2001).

The peanuts contribute to the superior capitalization the sabulous soils from our country, due to the reduced requirements against the fertility of the soil, of little consumption of manures and water, of the enrichment of the soil in fixed symbiotic azote(Pop, L. and colab., 1986).

The results obtained on world plans demonstrates that the fertilization contributes with the precinct 40 to the growth of the harvests on the above-ground unit and the productions obtained in different countries are tight corelated with the amounts manurial(Hera, Cr. and colab., 1984).

The researches made in the period 2001-2003 to CCDCPN Dabuleni followed the of a realization nutritious equilibrium in soil, that concentration and the report in which am due to lost]ed simultaneously differed nutritious ions from the solution of the soil to accord with the satisfaction of biologic requirements of the plants of peanuts in different vegetation phases.

MATERIAL AND METHOD

The researches they accomplished in the period 2001-2003, in conditions of irrigation, on psamosol with reduced fertility, deafly supplied in azote(0, 037), middling

supplied in phosphorus(28 the ppm) and contained reduced of potassium(129 the ppm).
was amplasată in in a field crop-rotation of three years: wheat-peanuts- mays, after the method subdivizate parceles with three factors.
He experimented the kind of peanuts Dabuleni.

The factors take under consideration:

The factor A- The dose of potassium(kg/ha s.a)

a_1-K_0

a_2- K_{50}

a_3- k_{100}.

The factor B- The dose of phosphorus(kg/ha s.a)

b_1- P_0

b_2- P_{60}

b_3- P_{120}.

The factor C- The dose of azote(kg/ha s.a)

c_1- N_0

c_2- N_{60}

c_3- N_{90}

c_4- N_{120}.

The manures they applied in the shape of ammoniac azotate(33, 5%N), superphosphate(18 %P2O5), potassic salt(46% K2O).

They accomplished the determinations concerning: the size of the plant, number of mature capsules plant, number of beans in capsule, massage 1000 beans, the production of capsules obtained to harvest.

The results investigatory obtained was prelucrated and interpretated through the method of the variant analysis.

RESULTS AND DISCUSSIONS

The azote is one of the most important elements ale the mineral nutrition of the plants.

Is known the fact that the peanuts assures the azote in eldest part on symbiotic path. The results obtained in the conditions from CCDCPN Dabuleni demonstrates the must adhibition manures with azote to the culture of peanuts. The manures with azote proved useful with discrepancy in first phases of vegetation, when he influences the size, the elements of productivity and found the of a procurance increase productions of capsules.

Analysing the influence of the dose of azote about number of capsules on plant, consisted the superiority of the use of the dose of 90kg/ha, when they registered on the average on three one years of study 28, 8 capsules on plant with 2, 8 beans in capsule(the table 1).

Following the influence manures with azote about number of mature capsules on plant and number of beans in capsule is remarked the favorable effect of the dose of N90 whereat they registered 28, 8 capsules plant and 2, 8 beans capsule, with distinct significant comparative differences with the witness. The adhibition of the dose of N60 assures 26, 2 capsules plant, with a significant efficiency against witness.

The administration of the doses with azote influences favourably the size of the beans of peanuts, obtained values to MMB contained between 531-557 g.

Table 1

The influence fertilization with azote about of a characters and elements of productivity to peanuts Dabuleni(2001-2003)

The dose of azote(kg/ha s.a.)	The size of the plant (cm)	Nr. Mature capsules/plant	Nr.beans in capsule	MMB(g)
0	27,4	22,6	1,8	490
60	31,5*	26,2*	2,2	533
90	31,3*	28,8**	2,8**	557
120	33,4**	26,6*	2,3	531
DL 5% DL 1% DL 0,1%	2,6 4,0 6,4	2,6 4,0 6,4	0,4 0,6 1,0	122 185 298

The average of the results of production show that the efficiency of 638 kg/ha he achieved in the variant waves he applied the dose of N90 kg/ha comparative with the witness unfertilized, distinct significant difference. Significant efficiency of production of 350 kg/ha he obtained and in the situation in which he applied the dose of N60.

In the conditions of experimentation, the dose of N120 aplicated to the culture of peanuts don't brings significant efficiencies of production, what fact drives to the limitation of the level of fertilization with azote, for the culture of peanuts, to the dose of N90.

The results obtained the by-pathes diferențiate statistically as the distinct significant against the unfertilized witness with azote in what looks the size of the plant in the variant fertilized with 120 kg/ha. Significant efficiencies concerning the height of the plants is achieved and in the situation of the variants fertilizated with N60 and N90.

Table 2

The influence fertilization with azote about the production of capsules to peanuts the kind Dabuleni.

The dose of azote (kg/ha s.a.)	The production(kg/ha)			The average 2001-2003		
	2001	2002	2003	The production (Kg/ha)	The relatively production (%)	The different (kg/ha)
0	1931	1703	1820	1818	100,0	Mt.
60	2050	2150	2305	2168	119,2	350*
90	2348	2540	2480	2456	135,0	638**
120	2170	1950	1737	1952	107,3	134
				DL 5%=	392 416	289 343
				DL 1%=	593 630	437 519
				DL 0,1%=	953 1013	703 834

The researches made of Pichot, J. And Roche, P.(1972) they showed that the supply with phosphorus of the soil influences the level of the harvests obtained through the procurance of efficiencies of production.

The phosphorus is an indispensable element without of which any metabolisms is excluded. The synthesis of the protein don't is can achieved than in the presence phosphorus.

The phosphorus assists in differently enzimatic process , influencing favourably the process of fructify.

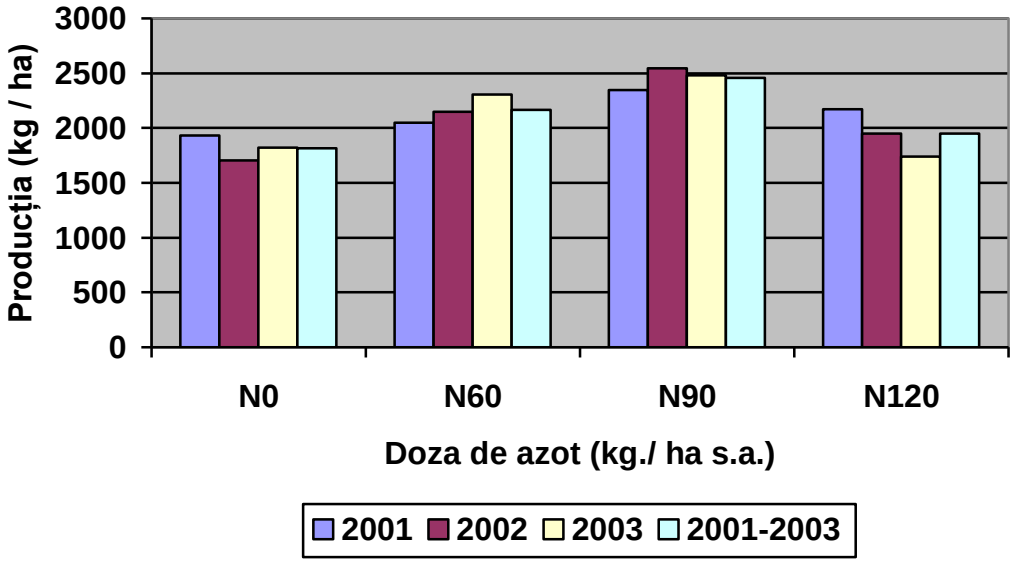

Fig. 1: The influence fertilization with azote about the production to peanuts.

Disorders ale the regime of the phosphorus on the sabulous soils appear very frecvently, pursuant to the use of big doses of azote to the cults from crop-rotations, what doses causes acidifity of the soil, through the growth of the content of aluminum, manganese and iron, what elements block the mobility phosphorus.

The results obtained to peanuts emphasize the role phosphorus in the process of fructify of the plant and in the increase weight of the beans(the table 3), pursuant to this implication the element in the enlargement surface foliare and in the photosynthetic capacity the plant.

In the variant fertilized with 60 kg P2O5/ha he achieved a number of 27, 6 capsules on plant and a number of 2, 6 beans in capsule, again were of 560g. The adhibition of the dose of 60 kg/ha drove to the of a procurance number of 27, 6 capsules on plant, with 4, 8 more capsules than to the variant the witness, assuring thus a very significant efficiency of capsules on plant.

The influence favourably manures with phosphorus is registered and in what looked the number of beans in capsule(2, 6 beans in capsule), distinct significant comparative value with the unfertilizer variant with phosphorus.

The manures with phosphorus in dose of 60 kg P2O5/ha influenced favourably and massaged 1000 of beans driving to the of a procurance values of 560 g comparative with the unfertilizer variant whereat he registered the value of 505 g.

Table3

The influence fertilization with phosphorus about of a elements of productivity to peanuts Dăbuleni (2001-2003)

The dose of phosphorus(kg/ha s.a.)	Number capsules on plant	Number beans in capsule	MMB(g)
0	22,8	2,0	505
60	27,6***	2,6**	560
120	26,0***	2,2	525
DL 5%	0,8	0,3	166
DL 1%	1,3	0,5	276
DL 0,1%	2,4	0,9	516

Analysing the influence adhibition phosphorus about the production of capsules, consisted that eldest production of capsules(1840 kg/ha), on the average on 3 years he obtained in the variant fertilizer with 60 kg P2O5/ha presenting an efficiency of 11, 5% comparative with the witness.

Table 4

The influence fertilization with phosphorus about the production of capsules to peanuts the kind Dabuleni.

The dose of phosphorus(kg/ha s.a)	The production(kg/ha)			The average 2001-2003		
	2001	2002	2003	ThePro duction (kg/ha)	The relatively production(%)	The different(kg/ha)
0	1595	1620	1735	1650	100	Mt.
60	1548	1875	2100	1840	111,5	190
120	1900	1449	1820	1723	104,4	73
DL 5%=	378	225	464	444		
DL 1% =	625	372	768	736		
DL 0,1%=	1170	697	1437	1377		

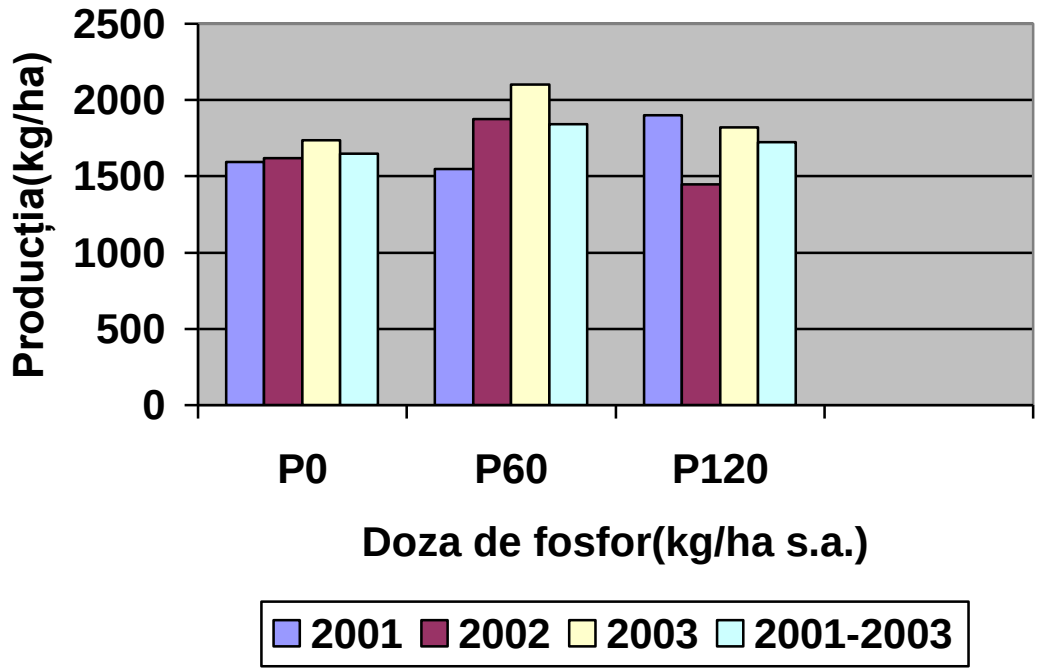

Fig. 2. The influence Fertilization With phosphorus about the production to peanuts.

The peanuts extract the big amounts of potassium from soil, but don't always his adhibition as the manure is along to efficiencies of harvest.

The researches efectuated of Borlan, Z., Andres, E.,(1997) he rules the role potassium in adjustment of the opening stomatelor from leafs, assuring the diminution coefficient of perspiration and the efficient utilization of the water.

In the conditions from SCDCPN Dabuleni, the aplication doses of 50 kg/ha K2O to favored, the formation capsules, driving to the procurance on the average 25, 2 capsules on plant, what value assures a distinct significant comparative efficiency with the unfertilizer variant (the table 5). The fertilizers with potassium in dose of K50 and K100 influenced significantly the number of beans in capsule, bringing an important contribution and in the MMB increase.

The experimentation of the different doses of potassium to the culture of peanuts emphasized one the elder the efficiency of insured statistical production as the distinct significant(380 kg/ha) against unfertilize, to the use of the dose of 50 kg/ha(the table 6).

Table 5

The influence fertilization with potassium about of a elements of productivity to peanuts the kind Dăbuleni (2001-2003)

The dose of potassium(kg/ha s.a)	Number capsules on plant	Number beans in capsule	MMB(g)
0	20,6	1,8	495
50	25,2 **	2,3*	550
100	25,0**	2,2*	530
DL 5% =	1,9	0,3	225
DL 1% =	3,2	0,6	372
DL 0,1% =	6,1	1,2	697

Table 6

The influence fertilization with potassium about the production of capsules to peanuts the kind Dabuleni

The dose of potassium(kg/ha s.a)	The production(kg/ha)			The average(2001-2003)		
	2001	2002	2003	The average productio n. (kg/ha)	The relatively production(%)	The different(kg/ha)
0	1454	1720	1566	1580	100	Mt.
50	1783	1931	2166*	1960	124	380**
100	1623	1695	1842	1720	108	140
DL 5%=	305	417	389	222		
DL 1%=	506	690	644	368		
DL 0,1%=	947	1290	1205	688		

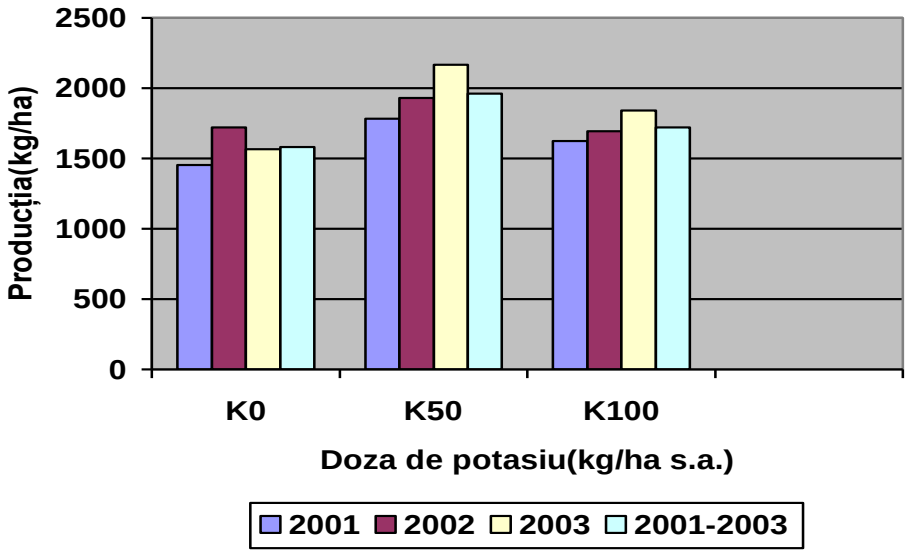

Fig. 3. The influence Fertilization With potassium about the production to peanuts.

Limit his optimum maxim of allocate was determined with help of the function polinomiale of the degree II with a free variable, aplicated the average production realizated for each factors.

Below the appearance fertilization with azote, the optimum production from economic viewpoint(2291 kg/ha) he achieved with 67 kg/ha.

The maximum of production, below the influence fertilization with azote he achieved with a dose of 68, 18 kg/ha.

Achieved a maximum of production to peanuts through the adhibition of the dose of 66, 27 kg P2O5/ha(1835 kg/ha).The optimum production from economic viewpoint he obtained through the fertilization of the culture with 63, 37 kg P2O5/ha.

The optimum dose of allocate the potassium he placed to the level 54, 63 kg K2O/ha, dose drove to the procurance of optimum production from economic viewpoint of 1953 kg/h

$$y = 1780 + 15x - 0{,}11x^2$$

CD = 0,723; MT = 68,18 kg N/ha; OE = 67 kg N/ha

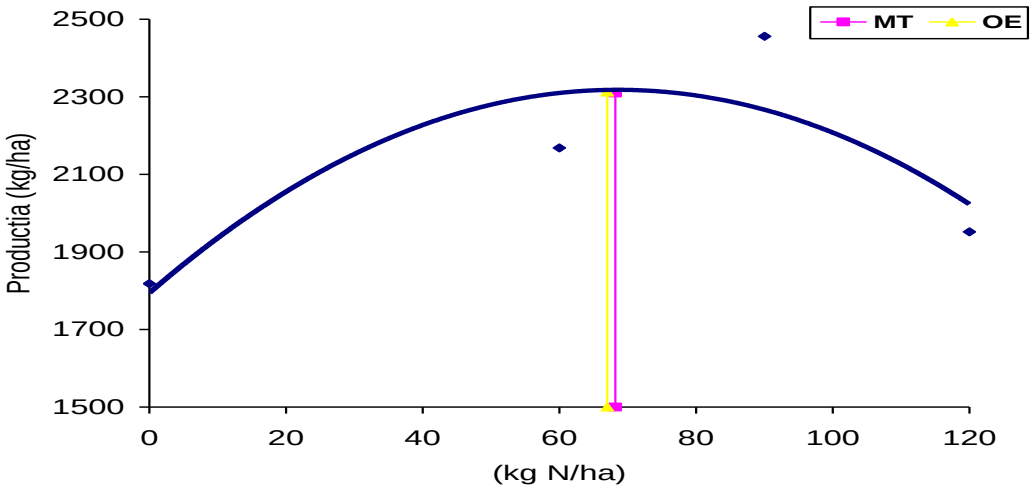

Fig. 4. The correlation among the fertilization with azote and the production of peanuts(2001-2003)

$$y = 1646 + 5{,}7x - 0{,}043x^2$$

CD = 0,995; MT = 66,27 kg P_2O_5/ha; OE = 63,37 kg P_2O_5/ha

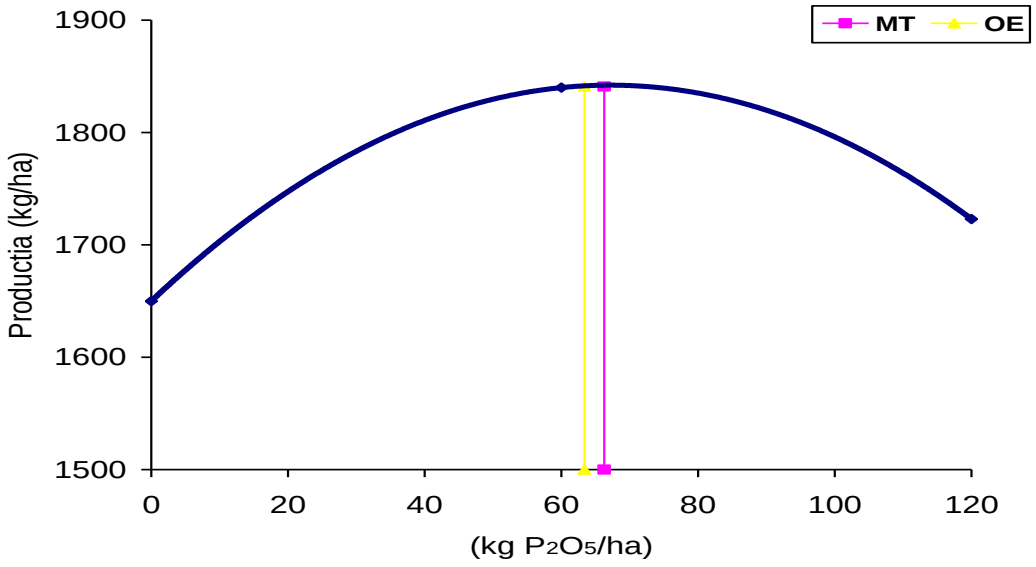

Fig. 5. The correlation Among the fertilization with phosphorus and the production of peanuts (2001-2003)

$y = 1570 + 13x - 0{,}124x^2$

CD = 0,994; MT = 55,64 kg K_2O/ha; OE = 54,63 kg K_2O/ha

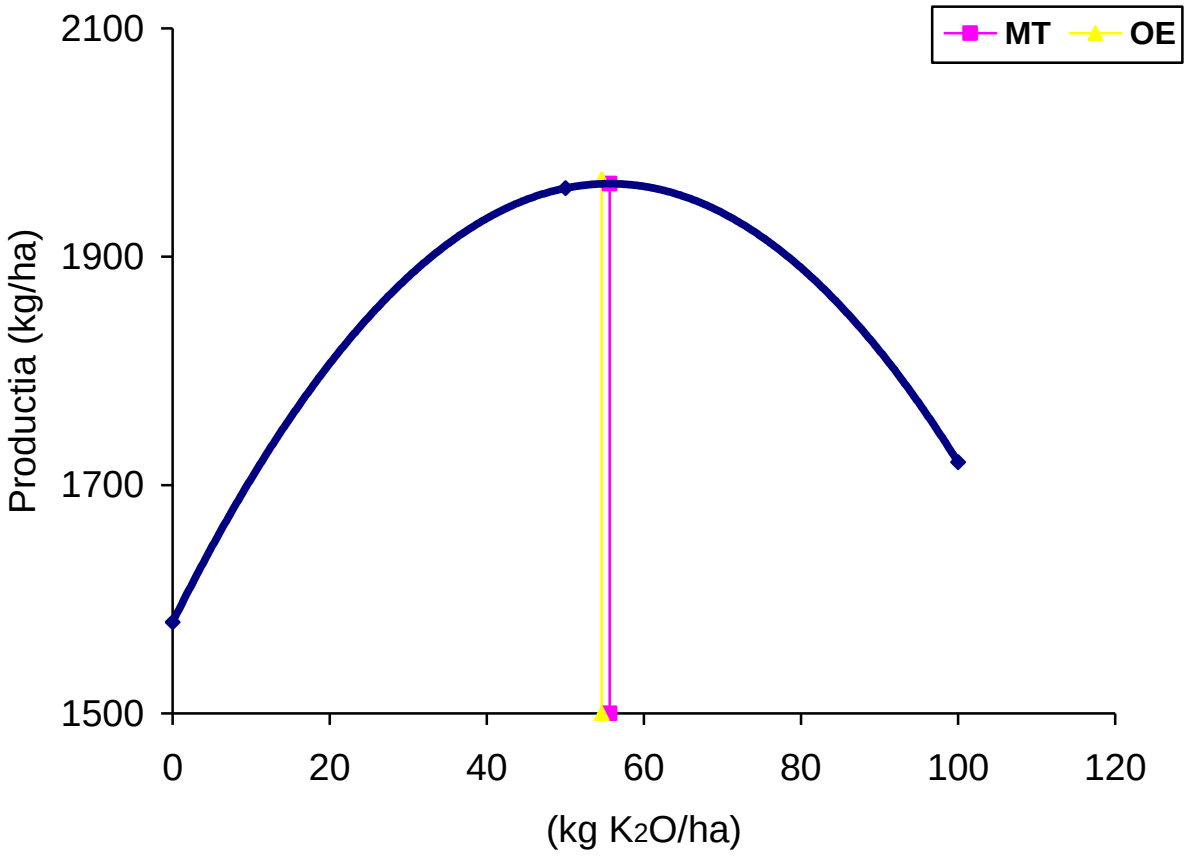

Fig. 6. The correlation among the fertilization with potassium and the production of peanuts (2001-2003)

CONCLUSIONS

1. The azote applied in dose of 90 kg/ha causes the distinct significant increase number of mature capsules on plant and number of beans in capsule.
2. The fertilization of the culture of peanuts with 90 kg drove, to the of a realization the distinct significant efficiency of production of 638 kg/ha against unfertilizer with azote.
3. The adhibition 60 Kg P2O5/ha influences the growth of the production against unfertilizer with 11, 5%.
4. Against unfertilized with potassium, through the adhibition 50 kg K2O/ha he achieved eldest production, the difference be of 380 kg/ tchick, distinctly significant.
5. The optimum economic doses of manures whereat are can achieved most good results is placed to the level of 67 kgN/ha, 63, 37 kg P2O5 /ha and 54, 63 kg K2O/ha.

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MODIFICĂRI MORFOLOGICE DETERMINATE DE FERTILIZANȚII FOLIARI ECOLOGICI LA CULTURA DE CASTRAVEȚI ÎN SOLAR

THE MORPHOLOGICAL'S CHANGES DETERMINATED BY ECOLOGICAL FOLIAR FERTILISERS ACROSS THE CUCUMBER CROP IN TO GREENHOUSES

Maria Dinu, P. Savescu, Pelaghia Chilom

Key words: cucumber, ecology, foliar fertilizers, Orgevita

ABSTRACT

Specia Cucumis sativus este una dintre cele mai valoroase culturi care se efectuează în spații protejate. Pentru cultura în ciclul II, cultură tip cornichon, s-au utilizat patru tipuri de fertilizanți foliari ecologici care au fost aplicați în timpul vegetației după ce la pregătirea terenului s-a aplicat o ferilizare organică de-a lungul rândului de plante, cu fertilizantul organic Orgevita (fertilizant din excremente de pasăre).

Rezultate superioare martorului s-au înregistrat în urma aplicării tuturor celor patru produse aplicate la cultura de castraveți, hibridul Karaoke.

The Cucumis sativus specie is registered like as the better valuable crop in to protected areas. For the second cycle crop, the cornichon crop were used four lots of ecological foliar fertilizers which were applied during the growing time, after the preparation of soil and after organic fertilizer task, along the plant rows with Orgevita fertilizer (a fertilizer from the bird excrements).

For the all variants which were treated with foliar fertilizers were registered the high values than the witness, the best variant was the variant with Bionat and Raykat. The used hybrid in to crop stage was Capricorn.

INTRODUCTION

In our country, as in the entire world, the vegetable sort for culture is very diverse and the ecological mass production and technologies are in continuous growing in correlation with growing of specific market. The farmers will get support for recon version insurance of crop from this point of view (2).

The legumiculture is affected by the agro system and vice versa (1).

For preserve the agro system equilibrium and conserve the clean environment, we must practice biological legumiculture, in correlation with life sciences. This is based on the clean lands, on the knowledge of ecological plants exigencies and right choosing of varietals sort and applied of treatments and fertilization with ecological products or very less pollutants.

The obtained products in these conditions will give the high quality with zero or very low pollutants and assure the food assurance consumers of fresh and processed vegetable.

MATERIAL AND METHOD

The experience was effectuate in the solar greenhouse, at "Stațiunea Didactică Banu Mărăcine" and consist in five variants: V1 – untreated reference, V2 – treated with Humus, V3- treated with Raykat, V4 – treated with Microcat, V5 – treated with Bionat.

We perform 3 foliar treatments, in vegetation stage, at 14 days between them. We must mention that at soil preparation, on each row of plants we perform the organic fertilization with Orgevita.

The name of studied hybrid is Karaoke, and was planted at 29 July 2008 following the next scheme.

RESULTS AND DISCUSSIONS

After applied of each treatments we effectuate the morphological determinations of plant size, diameter of stalk and number of leafs per plant. From table 1 data we can conclude that V2, V3 and V5 exceed the referential relative to size of plants, and with same tendencies relative to diameter of stalk.

The average number of leafs per plant exceed referential for all studied variants.

After second treatments, we observe that for all three studied variables, the V4 variant have negative values relative to plant size and stalk diameter (see table 2).

The size of plant was between 237.0 cm and 263.6 cm with the big values for V3 variant . The diameter of plants has the great values for V2 and V5.

Table 1

The changes of growing characteristics of cucumber plants under influences of fertilizers after first treatment (average values)

Variant	Height		± dif. relative to ref. (cm)	Diameter		± dif. relative to ref. (mm)	Leafs		± dif. relative to ref. (no.)
	cm	%		mm	%		No.	%	
V1 – ref.	142.2	100,0	ref.	11,4	100,0	ref.	15,0	100,0	ref.
V2	145.4	102,2	+3,2	11,3	99,1	-0,1	16,6	110,6	+1,6
V3	151,6	106,6	+9,4	11,5	100,8	+0,1	16,8	112,0	+1,8
V4	142,0	99,8	-0,2	11,4	100,0	0	16,6	110,6	+1,6
V5	151,6	106,6	+9,4	11,2	98,2	-0,2	16,2	108,0	+1,2

Table 2

The changes of growing characteristics of cucumber plants under influences of fertilizers after second treatment (average values)

Variant	Height		± dif. relative to ref. (cm)	Diameter		± dif. relative to ref. (mm)	Leafs		± dif. relative to ref. (no.)
	cm	%		mm	%		no.	%	
V1 – ref.	250,6	100,0	ref.	19,5	100,0	ref.	20,0	100,0	ref.
V2	259,0	103,3	+8,4	20,1	103,0	+ 0,6	22,0	110,0	+2,0
V3	263,6	105,1	+13,0	19,9	102,0	+0,4	22,3	111,5	+2,3
V4	237,0	94,5	- 13,6	19,0	97,4	- 0,5	21,3	106,5	+1,3
V5	254,6	101,5	+4,0	20,4	104,6	+ 0,9	23,0	115,0	+3,0

When applied the third treatment (see table 3) the 2,3 and 5 variants have superior values relative to untreated referential.

Table 3

The changes of growing characteristics of cucumber plants under influences of fertilizers after third treatment (average values)

Variant	Height		± dif. relative to ref. (cm)	Diameter		± dif. relative to ref. (mm)	Leafs		± dif. relative to ref. (no.)
	cm	%		mm	%		No.	%	
V1 – ref.	358,4	100,0	ref.	24,8	100,0	ref.	28,6	100,0	ref.
V2	366,8	102,3	+8,4	25,0	100,8	+ 0,2	29,0	101,3	+0,4
V3	371,9	103,7	+13,0	24,9	100,4	+0,1	29,2	102,0	+0,6
V4	345,8	96,4	- 12,5	24,6	99,1	- 0,2	28,4	99,3	- 0,2
V5	363,4	101,3	+5,0	25,1	101,2	+ 0,3	29,3	102,4	+0,7

Using values for height of plant we can calculate the daily average growing rate.

From values represented in table 4 we can observe that after 29 days from planting the plant have the growing rate between 4,89 – 5,22 cm/day with great values for V3 and V5 variants. At the second measurement we record same tendencies for above variants and also we record increased values for all plants treated with Humus.

In the time interval between treatments we note that the growing rate of plants is between 7,35 cm and 8,11 cm, with the big value for variant treated with Humus, followed by variant treated with Raykat.

The calculation of average daily growing rate concludes that Humus, Raycat and Bionat have good influence to the development and growing of cucumber plants.

Table 4

The average daily growing rate of cucumber plants under influence of applied treatments (at 29 and 43 after plantation)

Variant	Plant height on first measurement		The increasing in height from first to second measurement		Plant height on second measurement	
	(cm)	Growing rate(cm/day)	(cm)	Growing rate(cm/day)	(cm)	Growing rate(cm/day)
V1- ref.	142.2	4,90	108,4	7,74	250,6	5,82
V2	145.4	5,01	113,6	8,11	259,0	6,02
V3	151,6	5,22	112,0	8,00	263,6	6,13
V4	142,0	4,89	95,0	6,78	237,0	5,51
V5	151,6	5,22	103,0	7,35	254,6	5,92

CONCLUSION

After applied of ecological foliar fertilizers on the cucumber culture in solar greenhouse we conclude:

- The best results for morphological elements were obtained for variant treated with Bionat after applied all the three treatments. Is followed by the variant treated with Raycat where we obtain the best values for plant diameter with influences to the plant greenness, the third variant is variant treated with Humus.

It is need for more research for development the treatment technologies and finds the new combination of treatments.

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DETERMINĂRI BIOCHIMICE ŞI DE PRODUCȚIE LA CULTIVARELE DE PEPENI GALBENI OBȚINUTE ÎN SERE NEÎNCĂLZITE

THE BIOCHEMICAL AND YIELD STUDIES AT ANY YELLOW MELON CULTIVARS WHICH ARE OBTAINED IN TO UNHEATED GREENHOUSES

Maria Dinu, P. Săvescu, I.Pintilie

Keywords: cultivar, yellow melon, unheated greenhouse

ABSTRACT

Pepenele galben este o specie apreciată pentru valoarea sa alimentară, care este mai mare decât a castraveților, specie care deține ponderea la cultura în sere, şi pentru diversificarea sortimentului de specii legumicole care se pot consuma în extrasezon pretându-se foarte bine la cultura în sere.

Articolul de față se referă la un studiu efectuat pe 14 cultivare de pepene galben cu privire la calitatea fructelor precum şi la producția obținută. Cele mai bune rezultate au înregistrat şapte cultivare care au avut cantitatea de SUS mai mare, raportul între coajă şi pulpă mai mare, greutatea/fruct de aproximativ 1000 g şi alte calități apreciate de consumator în comparație cu martorul Galia.

The yellow melon are the most appreciated specie for nutritive value, bigger than cucumber (the second specie after tomatoes, in to greenhouses crops) and for divert of vegetable species sorts which can be consumed during out of the season. Their behavior in to green houses crop are very good.

This work paper is a study on the fourteen yellow melon types; the main study direction was the fruit quality and the obtained yield on the surface unit.

The best results were registered at seven types which probed a Soluble Dry Substance percent, the skin/calf report was bigger than witness and the 1000g fruit weight (the consumer requests) and another higher qualities than Galia witness, appreciate for the consumer diet.

INTRODUCTION

The yellow melon is known about 2000 years, in ancient Egypt was cultivate at great surfaces. In Europe penetrate in the Middle Age (XV century), in Italy, follow by France and Belgium (1).

In our country the first culture of yellow melon was in the first decade of XVII century and, in present, the culture is on 2,5 – 3,0 thousand ha and 176 thousand tons production in 2005 (3).

Because of organoleptic properties and large consuming period (in season and extra season) this specie begin to be cultivate on more surface in greenhouse. The researchers create new cultivars (4) and grafting this species on the productive and resilient cultivars at diseases (2).

MATERIAL AND METHOD

The experience consist in 14 variants: V1 – the referential Galia, V2 – Solarbel, V3 – Polidor, V4 – Corin, V5 – Delada, V6 – Ogen, V7 – Pancho, V8 – Maestro, V9 – Gustal, V10 – Charantais, V11 – Ratato Degli Ortolani, V12 – Tedral Verde, V13 – Piel di Sapo, V14 – Amarillo Canaria with emplacements in “Complexului de sere Almăj”, in unheated greenhouse.

We perform measurements, determinations and analyzes on the yellow melon fruits regarding the morphological and biochemical characteristics: fruits form, crude and net average weight, the color of tegument, the aspect of fruit surface, the color and

consistency of fruit pulp, the grossness of pulp, the dimensions of seminal house, dry soluble substances, the reducing sugars and organoleptic note.

RESULTS AND DISCUSSIONS

The fruit sizes represent the bred characteristic but are very variable in function of assured technologies conditions.

The differences between cultivars are appreciable and values always represent the quality element, with influence in establishes of these.

The average crude weight (g/fruit) (see figure 1) of all 14 cultivars is between 915,0 and 3186,0 g/fruit with significant difference between variants. Eight cultivars is placed above referential Galia recorded at 1275,0 g/fruit.

We classify the fruits relative to crude weight, in function of the market requirement. The cultivars: Gustal, Retato Degli Ortolani, Maestro, Ogen, Pancho, Delada and Galia have values of crude weight near to 1000 g/fruit, optimum for market and important indicator for establish of fruits quality.

The proportions of net weight from crude weight is between 82,5% at Gustal and 96,5% at Piel de Sapo.

For determination of net weight we remove the seed placenta. After this, we separate seed from placenta by washing, and next we weight all the seed for all 14 cultivars. The weight of seeds is between 40,0 – 134,0 g/fruit.

The great values was obtained for Retato Degli Ortolani, Ogen, Pancho, with values above 90%; this aspect is used on the quality appreciation because represent the edible part of fruits.

These two characteristics is very important for establish of quality but is not final and lonely.

The crude weight of fruits is important for establish of packing case and storage space.

The measurements of the two specific diameter permit to calculate the form index of the yellow melon cultivar's fruits (see figure 2). We observe that the form index is between 1,00- 1,63 values, these value is a breed characteristic with very low influence resultant from climacteric conditions and applied technologies.

The values recorded classifies the cultivar fruits Tedral verde, Charantais, Retato Degli Ortolani and Ogen in spherical; slight ellipsoidal for fruit of Galia, Solarbel, Corin, Delada, Pancho, Maestro, Gustal and Piel de Sapo; ellipsoidal-elongated on the Polidor and Amarilo Canaria cultivars.

We establish that the size of the seminal house, all recorded value are between 5,7 – 15,5 cm first diameter and 5,0 – 8,0 cm for second diameter.

The low value for this character is more important because a low value influence positively the fruit quality and the preservation time period.

We done observations regarding the tegument of yellow melon fruits, also a breed characteristic, and we observe that the surface feature is: smooth for Ogen, Maestro, Gustal and Charantais; rough for Galia, Solarbel and Retato Degli Ortolani; ridgy for Tedral Verde, Piel de Sapo and Amarillo Canaria. QAlso this character is important for qualitative aspect of fruits.

The tegument color is variable: a) intense green to olive-green, b) yellow to intense yellow, c) yellow-green and orange. Is is important for quality aspect regarding the consumers preferences.

The grossness of tegument is between 4,0 to 10,0 mm, with great values for Solarbel,Pancho (10,0 mm) and Galia (8,7 mm); and the low values for Amarilo Canaria (3,9 mm), Tedral Verde (4,0 mm), Piel de Sapo (4,0 mm), Gustal (4,2 mm), Maestro and Ogen (4,3 mm) cultivars. In the grossness of tegument is included a small uneatable parts from edible volume.

The pulp represent the edible part of analized cultivar, varied regarding color from white-green to green and green-yellow and from yellow to intense yellow, from yellow orange to orange. The color is also a breed characteristic linked to the consumer preferences.

The consistency of pulp is dense, juicy and very juicy in function of variety and linked to the consumer preferences.

The grossness of pulp is between 3,0 and 5,0 cm, in function of cultivar , with great importance for establish of the edible part of fruit, represent also a quality character but not critical. The characteristics of fruits linked to the grossness of tegument and pulp consistency are very important to the shipping of fruit at very long distances and elongation of time preservation period.

The content of yellow melon fruit pulp in soluble dry substance (SDS) (see figure 3) has average values between 7,92 and 11,36 %. We can distinguish the Tedral Verde cultivar with 9,32 %, Solarbel cultivar with 9,34 %, Polidor cultivar with 9,98 %, Piel de Sapo cultivar with 10,26 % and Amarillo Canaria cultivar with 11,36 %, all values above referential value (9,26 %) for Galia cultivar.

SDS is very near to total dry substance (TDS) and has a very big importance in qualitative appreciation of fruit, maybe the most important character for consuming; the total yield can be evaluate by TDS/ surface unity.

The reduced sugar is between 5,09 and 8,42 %, relative to 7,98 % for referential.

The content of fruits in SDS and in reduced sugar is very important index for establish of fruit quality, with influences in flavor when values is between some limits and correlated with other components.

The consistency of fruits and chemical content of these determine the quality of fruits and contribute to establish and appreciation with notes on the fruit flavor.

Based on taste test we can give notes and establish average values of these notes for organoleptic characters (see figure 4). Notes is between 8,1 and 9,9 , values exceed referential value (9,4) only for Corin (9,6) , Amarillo Canaria (9,8) and Piel de Sapo (9,9).

The average total yield is between 20,94 t/ha for Pancho and 48,56 t/ha for Gustal.

Six from 14 studied cultivars exceed referential Galia: Delada, Maestro, Tedral Verde, Piel de Sapo, Retato Degli Ortolani and Gustal.

The yield differences come from these cultivars are not significant relative to referential. The cropping is justified by the differences in time for achieve the physiological maturity: first decade of July month for earlier cultivar, therefore cultivars are earlier, half-earlier, half-late and lately. The price is also very important for farmers.

CONCLUSIONS

- After biochemical and morphological determinations effectuated on cultivar fruits we observe that seven cultivar have about 1000g/fruit, an optimum crude weight; the tegument is between 4,0 and 10,0 mm (good index for schipping of fruits). The grossness of fruits pulp is between 3,0 to 5,0 cm, and SDS content have appreciable values (7,92-11,35%);
- The obtained average yield is 22,05 t/ha for Charantais and 47,05 t/ha for Retato Degli Ortolani, seven cultivars exceed referential values of Galia cultivar.

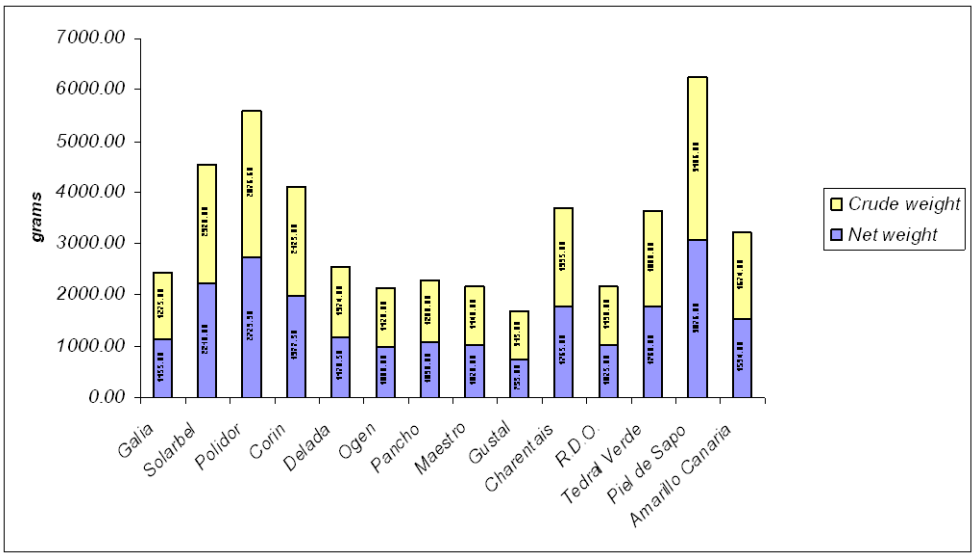

Figure 1. The crude and net weight values for all cultivars.

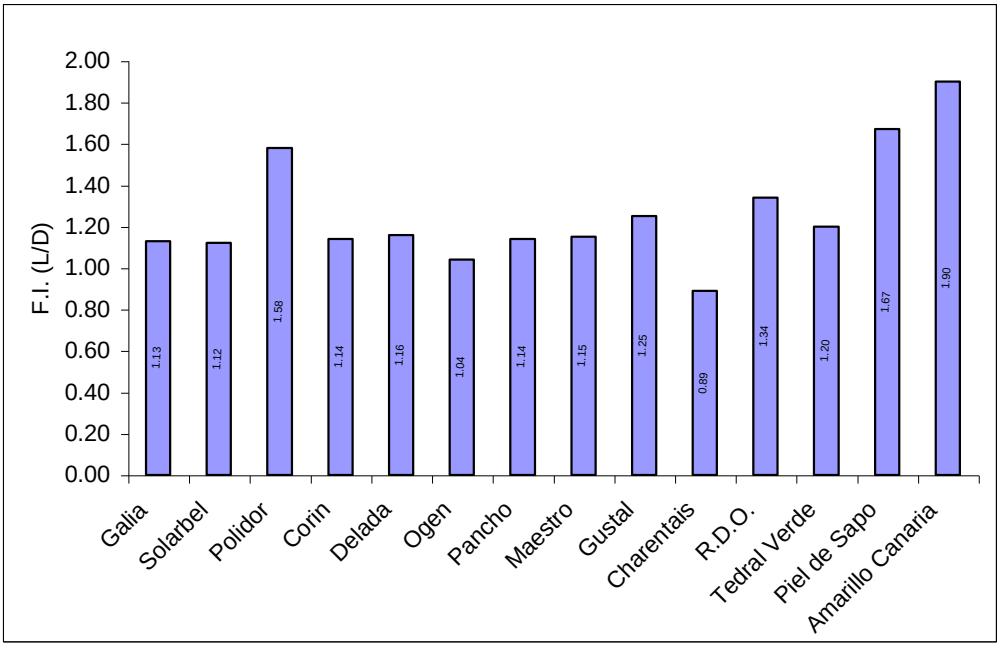

Figure 2. Form index for all cultivars.

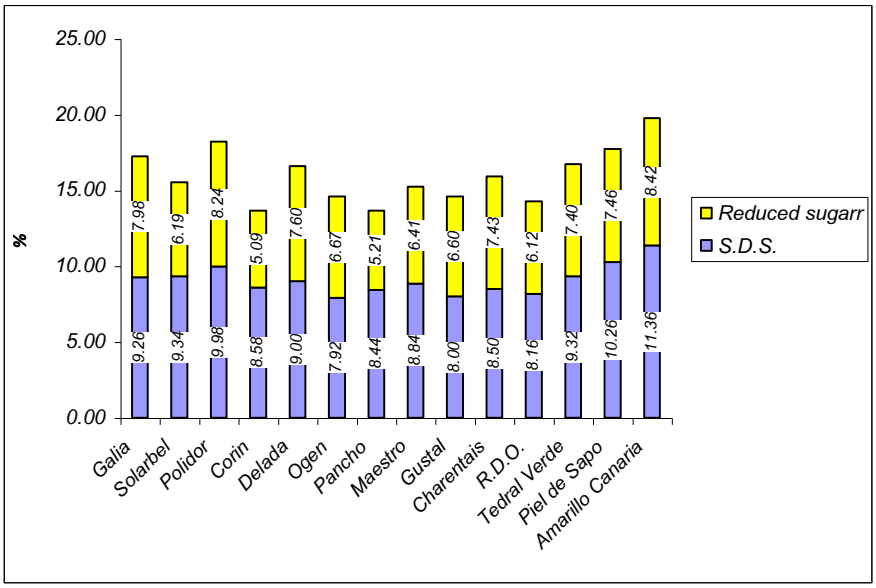

Figure 3. Chemical composition for cultivar's fruits.

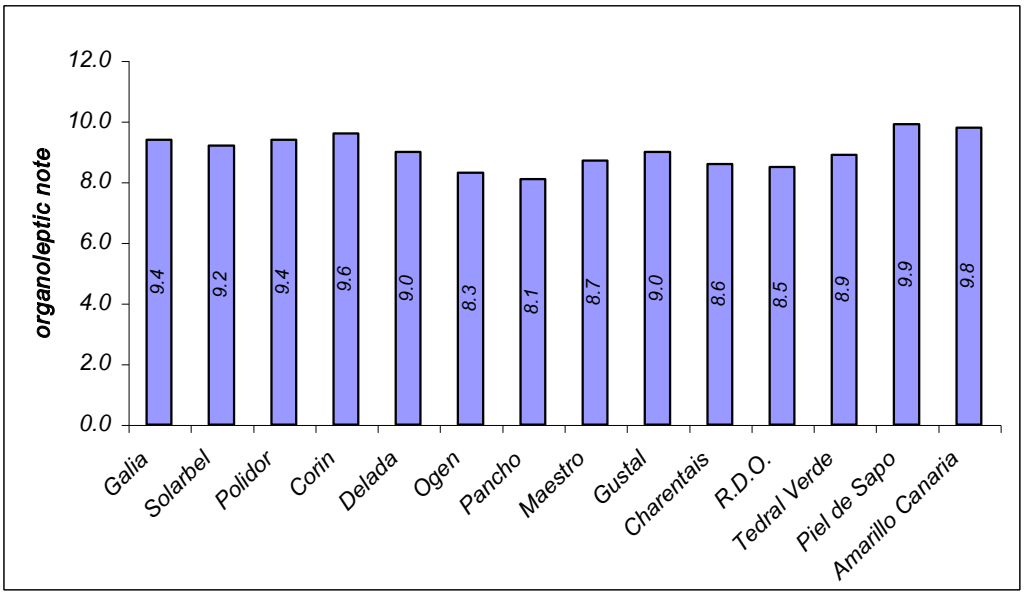

Figure 4. The notes for each cultivar after taste test.

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INFLUENTA EPOCII DE RECOLTARE ASUPRA PRODUCTIEI SI CALITATII BIOMASEI LA SORGUL ZAHARAT CULTIVAT PE SOLURILE NISIPOASE DIN SUDUL OLTENIEI

THE INFLUENCE OF THE EPOCH OF HARVEST ABOUT THE YIELD AND BIOMASS QUALITY TO THE SWEET SORGHUM CULTIVATED ON THE SABULOUS SOILS FROM THE OLTENIA SOUTH

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Keywords: Sabulous soils, sweet sorghum, epochs of harvests, quality.

ABSTRACT

Rezultatele cercetarilor efectuate la CCDCPN Dabuleni, in conditii de irigare, privind productia si calitatea biomasei obtinuta la sorgul zaharat in conditiile ecopedologice specifice solurilor nisipoase in functie de epoca de recoltare au scos in evidenta faptul ca solurile nisipoase ofera conditii optime de obtinere de productii ridicate de biomasa de calitate superioara (30-55,1 t/ha la coasa I, 28,9-47,2 t/ha la coasa II si o productie totala de 58,9-102,3 t/ha). In functie de epoca de recoltare, continutul tulpinilor in zaharuri a oscilat intre 11,2-17,6% la coasa I si 10,8-16,8% la coasa II. Substanta uscata s-a acumulat pe parcursul avansarii in vegetatie fiind cuprins intre 13,5-47,2%. Aceeasi evolutie s-a inregistrat si în cazul S.E.N. a caror valori au fost cuprinse intre 54,68-62,14%.

The researches result effected to CCDCPN Dabuleni, in irrigation conditions, looking yield and the biomass quality obtained to the sweet sorghum in ecopedological conditions specify the sabulous soils depending on the age of harvest emphasized the fact as the the sabulous soils offer eighth conditions of procurance of erect yield of biomass of high-quality(30-55, 1 to/ha to the scythe I, 28, 9-47, 2 to/ha to sew II and an aggregate output of 58, 9-102, 3 t/ ha). In according as the epoch of harvest, the sugars content in haulms of the in oscillated between 11, 2-17, 6% to the scythe I and 10, 8-16, 8% to sew II. Substance dried he accumulated on promotion overrange in vegetation be contained between 13, 5-47, 2%. One the evolution registered and in the case S. E..N. , values were contained between 54, 68-62, 14%.

INTRODUCTION

The sweet sorghum, little pretentious plant against the guy of soil and with increased resistance to were, entered the in the assortment of which plants can cultivated with good results on the sabulous soils. Expand the culture of sweet sorghum is motivated so big biomass yield, quotient and of erect content in sugars(Antohe i. And colab., 1986, Sentov R., Petkov T., 1971, Roger Samson. 1992, Purnomo E., Sumantri 1997). This in the sense, the researches effectedof Gh. V. Novels, D. Hall, Gh. Gosse, Ana Maria Roman, V. Ions and Gh. Alexe, 1998, they established as after 85 after day sowed, the amount of biomass harvested is of 58 t/ha(the plants are in proportion of 40-50% equal-phase in of efflorescence), and to 115 after day sowed, were evaluated to 80-100 t/ha (the plants are in the ripening phase.

The sweet sorghum utilized with success in the food of the animals as much in capable fresh, quotient and ensiled. He assure with 53% the many maul green mass and with 25, 7% the much more the substance dried than the corn, caning achieve 13340-19600 UN and 754-1260 kg a digestibily brute protein to the above-ground unit(Antohe, I., Novel, Gh. V., 1989, Ricaud, R., Martin, F. Cochran, B. J. 1981).

In favourably conditions, the sweet sorghum assure on the sabulous soils two scythes, or two scythes and a rowens. To the utilization as the green fodder are

harvesting when the plants arrived at 40-50 cm size, the duration of use be of 10-12 days, up to panicle appearance . For hay, are harvesting to panicle appearance, when is obtained the maxim yield of nutritious units and the digestibily protein .

In the present work the by-path presented result researches effected to CCDCPN Dabuleni, looking yield and the biomass quality obtained to the sweet sorghum in specify ecopedological conditions the sabulous soils depending on the epoch of harvest .

MATERIAL AND RESEARCH METHOD

The experiment were emplaced in the irrigation conditions, after the method of the block of random flats in 4 repetitions, the surface experimentally variant be of 14 m^2(2, 8m x 5m), in a crop-rotation of 3 years: cowpea(peanuts) - wheat - sorghum.

The system of used-up fertilization in the frame were 150 kgN/ha + 80 kg P2O5 /ha+ 80 kg K2O/ha.

The phosphorus and the potassium they applied below ploughing, and the azote he applied fractional, 1/2 from the dose to preparation of the bed germinativ and 1 from the dose after harvesting each scythes. On overrange of the period of vegetation they applied a number of 3-4 affusions, depending on the pluviometric regime of the year of the culture.

The factors take the in under consideration on overrange experiment scroll (2005-2007) they were:

The factor A - the epoch of harvest

a1- the size of the plants 90-120 cm

a2 -of the skin bags

a3- flowery

a4 -of the formation of the beans

a5-the physiological maturity beans

a6- the absolute maturity beans.

The factor B - the hybrid taked under consideration

b1 - Carmen

b2 - Roza

b3 - F - 135 ST

RESULT AND DISSCUSIONS

The table 1

Principal chemical qualities of sabulous soil from the frame of experimental device

Depth (cm)	*Horizon*		*Chemical qualities*						
			Ph	*Humus (%)*	*S.B (me/ 100 g soil)*	*V (%)*	*N total (%)*	*P (ppm)*	*K (ppm)*
0 – 20	Ap		5,1	0,51	1,70	75,5	0,038	28	129
20 – 40	Bt		7,0	0,35	2,92	97,6	0,022	23	41,8
40 – 60		fascia	5,7	0,22	8,98	87,0	0,029	19	67,8
60 – 80		interfascia	6,6	0,13	6,96	93,9	0,024	14	30,7
80 – 100		fascia	6,2	-	5,54	90,2	-	-	-
100 – 120		interfascia	7,1	-	1,50	96,8	-	-	-

From the analysis of the results presented this in the table consisted as on depth of 0-120 cm meeting 2 horizons of demarcations, from one which on depth 0 - 20 cm(Ap characterized by Ph acid(5, 1%), a content an in a humus of 0, 51%, 0, 038% Nt, 28 ppm P and 129 ppm K. On the depth of 40-120 cm are a horizon Bt with bands and interbands

with fertility differed. Thus on depth of 40-60 cm the horizon Bt in the band characterized by Ph = 5, 7, 0, 22% humus, 0, 029% Nt, 19 the ppm P and 67, 9 the ppm K. The interband finded out to 60-80 cm depth characterized through Ph = 6, 0, 13% humus, 0, 024% Nt, 14 the ppm P and 30, 7 the ppm K. On depth of 80-120 cm registered a neutral Ph(6, 2-7, 1), (table 1).

The table 2

Principal climatic elements on the period of vegetation sweet sorghum on the sabulous soils(2005 – 2007)

Climatic elements	*year*	*Year months from the period of vegetation*					*Average*	*Σ (mm)*
		V	*VI*	*VII*	*VIII*	*IX*		
The average temperature of the air (^{0}C)	2005	17,8	21,7	23,6	21,3	18,1	20,5	
	2006	18,9	22,2	24,2	23,2	19,6	21,6	
	2007	21,3	23,8	27,3	23,7	16,3	22,5	
Average 2005-2007		*19,3*	*22,6*	*25,0*	*22,7*	*18,0*	*21,5*	
The amount of hurried (mm)	2005	68,1	49,9	63,6	178,6	94,8		455,0
	2006	39,2	91,4	107,4	120,1	31,0		389,1
	2007	33,8	53,4	0,0	107,2	52,4		246,8
Average 2005 – 2007		*47,03*	*64,90*	*57,00*	*135,30*	*59,40*		*363,63*

From the analysis principal climatic elements registered on the period of vegetation sweet sorghum (table 2), consisted as, as much below the appearance of the temperatures of the air, quotient and of hurried were difference between the years of experimentation. Thus, the average temperature from air on the period of were of 20, 5^{0}C in the year 2005, and in the years 2006 and 2007 bold the phenomenon of heating, the media on the period of vegetation be 21, 6-22, 5^{0}C, with 1, 1-2^{0}C, in plus against 2005. Caused the adhibition 1-2 affusions plus in against 2005.

Below the appearance of pluviometric regime, consisted a differentiation an amount of hurried on overrange of the period of vegetation sorghum. Thus in the year 2005, the sum were of 455 mm, most big amount registered in the month August(178, 6 mm), after harvesting of the bonus scythes(phenophase of the formation of the beans), caused the decrease of the norm of irrigation. Were, most favorable below the appearance amount of hurried the si of repartition on the period of vegetation(107, 4 mm in the July and 120, 1 mm in August), in the phase of maximum consumption of the plants. In the year 2007, the phenomenon of bold heating, decreasing same in in the same time the amount of hurried(246, 8 mm). He remarked the absence the hurried in the month the July, carry corelate with average temperatures in air of 27, 3^{0}C caused the adhibition supplemental two the affusions. The hurried geted down on the month August(107, 2 mm), they have stricken favorable the development of the plants after harvest of the bonus scythes.

In the table 3 are presented the determinations biometrical etrice to the sweet sorghum the harvest different in phenophas. Referenced to the size of the plants, this are diferenced depending on phenophase and of hybrid, as much to harvest of the bonus scythes, quotients and to two. Harvest when the plants had 90-120 cm, the size were of 98-119 cm to the scythe i and 99-115 cm to sew II. Most rise size to the scythe I registered to harvest sorghum in c of flowery(267-269 cm to hybrid Carmen, 268-270 cm to the Roza and 279-285 cm to F-135 ST)., and to sew II, between 254-262 cm to Carmen, 255-270 cm to Roza and 271-278 cm to F-135 ST.

The plants of sorghum achieved eldest diameter of the haulms of the in phenophases of physiological efflorescence beans. Referenced to number of ratoon on the plant, he consisted an erect degree of regeneration after scythes, reaching to 5-6 ratoon on the plant after harvest of the bonus scythes.

The accumulation sugar in haulms he did progressively, as the plants advanced the in the

vegetation.

In the table 4 are presented the results looking the content of the haulms of sweet sorghum harvest different in phenophases. The content most erect in sugars registered in phenophases of flowery the absolute maturity beans(16, 7-17, 6% to the scythe I and 15, 5-16, 8 %to sew II).

The yield of biomass are differenced depending on the epoch of harvest (the table 5). To harvest sorghum when the size were of 90-120 cm, the yield of were of 30 t /ha to the scythe I and 28, 9 t/ha to sew II, with an aggregate output cumulata of 58, 9 t tchick. Most big biomass yield are registered in the phenophases for form's sake beans(51, 2 t /ha to the scythe I and 42, 5 t/ha to sew II, with an aggregate output cumulative of 93, 7 t /ha), in cumulative of physiological maturity beans(55, 1 t/ha to the scythe I and 47, 2 t / ha to sew II, with an aggregate output of 102, 3 t/ha) and in physiological of absolute maturity beans(53, 8 t /ha to the scythe I and 45, 8 t /ha to sew II, with an aggregate output of 99, 6 t/ha). He harvested to these epochs, against average yield of the epochs taked the in under consideration they obtained significant efficiencies of yields, contained between 5, 12 t /ha to the scythe I and 7, 94-16, 54 t/ha to sew II.

In what looing the behavior three celor hybrids take the in under consideration, the yields obtained to these were as follows(the table 6). The Carmen hybrid achieved a yield of 54, 3 t/ha to the scythe I, 32, 5 t /ha to sew II, with an aggregate output cumulative of 77, 8 t /ha. The Roza hybrid achieved 49, 7 t/ha to the scythe I, 40, 7 t/ha to sew II and an aggregate output of 90, 4 t /ha. The F-135 hybrid achieved, yields of 53, 5 t/ha to the scythe I, 42, 0 t/ha to sew II and an aggregate output of 95, 5 t /ha, be solitarily which achieved efficiencies of yields(against the average yield hybrids) insured statistical.

The weight principal fractions(haulms, leafs, panicles) in as part as the total of biomass yield, are differenced depending on the age of harvest, in in chief of phenophase(The table 7). The weight of the haulms of the in as part as biomass yield of were contained between 61, 5 t /ha, 5 t/ha, respectively 65, 6-69, 9 % from total yield to harvest in the phenophases for form's sake beans - absolute maturity beans. The leafs represented 28, 1-29, 1 t/ha, respectively 32, 8-39, 1%, in phenophases of skin bag - spiked. The weight the panicles in the total yield were of 8, 7-10, 2 t /ha, respectively 9, 3-10, 0%, in phenophases for form's sake beans - absolute maturity beans .

The protein content are of 10, 14%(the epoch I), 3, 82-3, 52%(the epochs 5 and 6). The fattiness have registered the values of 4, 78% (the epoch I), 5, 86-4, 26%(the epochs 2, 3) and 2, 76-2, 33% (the epochs 5, 6). The minerals substance have registered 6, 92-6, 40% (the epochs 1, 2) and 3, 56-3, 04%(the epochs 5, 6). The cellulose content in had the values contained between 24, 33 % in as part as the bonus epoch and 28, 28-29, 33 % in as part as the epochs 5 and 6. In what looking the content in Azotates Extractive Substances (S.E.N.). This oscillated between 53, 73 % to the epoch I and 61, 58-61, 78% in as part as the epochs 5 and 6 (the table 8).

The table 3

The size of the plants, the diameter of the haulms and the number of ratoon on the plant

The epoch of harvest	*Hybrid*	*The plant size (cm)*		*The diameter of the haulms (cm)*		*The number of ratoon on the plant.*	
		The scythe *I*	The scythe *II*	The scythe *I*	The scythe *II*	The scythe *I*	The scythe *II*
the size of the plants 90-120 cm	Carmen	98	99	1,2	1,0	1,4	5,0
	Roza	104	108	1,3	1,1	1,5	5,0
	F-135 ST	119	115	1,4	1,2	1,6	5,5
of the skin bags	Carmen	245	235	1,6	1,3	1,5	5,0
	Roza	252	242	1,8	1,4	1,5	5,5
	F-135 ST	258	253	2,0	1,7	1,6	5,6
flowery	Carmen	267	254	2,2	1,9	1,5	5,5
	Roza	270	266	2,3	2,1	1,6	5,5
	F-135 ST	282	275	2,4	2,2	1,7	5,8
of the formation of the beans	Carmen	269	262	2,2	1,9	1,5	5,0
	Roza	273	270	2,4	2,2	1,6	5,5
	F-135 ST	285	278	2,5	2,3	1,6	5,8
the physiological maturity beans	Carmen	267	260	2,1	1,8	1,4	5,0
	Roza	270	268	2,2	2,0	1,5	5,5
	F-135 ST	281	274	2,3	2,2	1,5	6,0
the absolute maturity beans	Carmen	262	255	1,7	1,6	1,5	5,0
	Roza	268	259	1,9	1,8	1,5	5,0
	F-135 ST	279	271	2,0	19	1,5	6,2

The table 4

Content the haulms of sorghum in sugars(%S.U.S.- reading BRIX), hybrid average / harvest epoch in the conditions the sabulous soils from the south Oltenia

The epoch of harvest	The scythe I			The scythe II		
	Sugars (% S.U.S.)	Difference (%)	Signification	Sugars (% S.U.S.)	Difference (%)	Signification
the size of the plants 90-120 cm	11,2	-4,8	ooo	10,8	-4,4	ooo
of the skin bags	15,8	-0,2	-	14,7	-0,5	-
flowery	16,7	0,7	-	15,5	0,3	-
of the formation of the beans	17,6	1,6	xxx	16,8	1,6	x
the physiological maturity beans	17,5	1,5	xx	16,6	1,4	x
the absolute maturity beans.	17,4	1,4	xx	16,5	1,3	x
Average	16,0	0	Mt.	15,2	0	Mt.
Dl. 5%		0,8%			1,1%	
Dl. 1%		1,1%			1,7%	
Dl. 0,1%		1,6%			2,1%	

The table 5

Influence of the epoch of harvest about biomass yield to the sweet sorghum harvest in different in phenophases of vegetation

The epoch of harvest	*The scythe I*			*The scythe II*			Total yield (scythe I + scythe II)		
	Yield (t/ha)	*Diffe-rence (t/ha)*	*Signifi-cation*	*Yield (t/ha)*	*Diffe-rence (t/ha)*	*Signifi-cation*	*Yield (t/ha)*	*Diffe-rence (t/ha)*	*Significatio n*
the size of the plants 90-120 cm	30,0	-16,08	ooo	28,9	-10,78	ooo	58,9	-26,86	ooo
of the skin bags	40,4	-5,68	o	34,0	-5,68	o	74,4	-11,36	ooo
flowery	46,0	-0,08	-	39,7	0,02	-	85,7	-0,06	-
of the formation of the	51,2	5,12	x	42,5	2,82	-	93,7	7,94	xx
the physiological maturity beans	55,1	9,02	xxx	47,2	7,52	xx	102,3	16,54	xxx
the absolute maturity beans	53,8	7,72	xx	45,8	6,12	x	99,6	13,84	xxx
Average	46,08	0	Mt.	39,68	0	Mt.	85,76	0	Mt.
Dl. 5%		4,8 t/ha			5,1 t/ha			5,2 t/ha	
Dl. 1%		6,4 t/ha			6,7 t/ha			7,1 t/ha	

Dl. 0,1% 7,8 t/ha 8,1 t/ha 8,3 t/ha

The table 6

Influence of the hybrid of harvest about biomass yield to the sweet sorghum harvest in different in phenophases of vegetation (epochs average)

Hybrid	The scythe I			The scythe II			Total yield *(scythe I + scythe II)*		
	Yield (t/ha)	*Diffe-rence (t/ha)*	*Signi-fication*	*Yield (t/ha)*	*Diffe-rence (t/ha))*	*Signi-fication*	*Yield (t/ha)*	*Diffe-rence (t/ha)*	*Signi-fication*
Carmen	45,3	-4,2	oo	32,5	-5,9	ooo	77,8	-10,1	ooo
Roza	49,7	0,2	-	40,7	2,3	-	90,4	2,5	-
F-135 ST	53,5	4,0	xx	42,0	3,6	xxx	95,5	7,6	xxx
Average	49,5	0	Mt.	38,4	0	Mt.	87,9	0	Mt.
Dl. 5%	3,1 t/ha			2,8 t/ha			3,2 t/ha		
Dl. 1%	4,0 t/ha			3,4 t/ha			4,1 t/ha		
Dl. 0,1%	4,9 t/ha			4,1 t/ha			5,2 t/ha		

The table 7

The weight principal fractions in total of biomass yield to the sweet sorghum cultivated on the sabulous soils

The epoch of harvest	Total yield (t/ha)	Haulms		Leafs		Panicles	
		(t/ha)	(%)	(t/ha)	(%)	(t/ha)	(%)
the size of the plants 90-120 cm	58,9	37,2	63,2	21,7	36,8	-	-
of the skin bags	74,4	45,3	60,9	29,1,	39,1	-	-
flowery	85,7	53,1	61,9	28,1	32,8	4,5	5,3
of the formation of the beans	93,7	61,5	65,6	23,5	25,1	8,7	9,3
the physiological maturity beans	102,3	71,5	69,9	20,6	20,1	10,2	10,0
the absolute maturity beans	99,6	71,4	71,7	18,7	18,8	9,5	9,5

Tabelul 8

Chemical composition the sweet sorghum harvest to different phenophases (%from dry substance)

The epoch of harvest	The dry substance (%)	The protein (%)	The fattiness (%)	The minerals substance (%)	The cellulose (%)	S.E.N. (%)
the size of the plants 90-120 cm	13,5	10,14	4,78	6,92	24,43	53,73
of the skin bags	14,0	8,70	5,86	6,40	25,51	53,53
flowery	28,2	6,23	4,26	4,96	24,81	59,74
of the formation of the beans	30,4	5,54	3,84	4,30	26,19	60,13
the physiological maturity beans	44,7	3,82	2,76	3,56	28,28	61,58
the absolute maturity beans	47,2	3,52	2,33	3,04	29,33	61,78

CONCLUSIONS

1. The sabulous soils offer eighth conditions of procurance of erect biomass yield and high-quality of sweet sorghum;

2. The size of the plants, were differenced depending on phenophas and of hybrid, as much to harvestof the bonus scythes, quotients and to doua.

3. The sweet sorghum reflection through erect degree of regeneration after scythes, registerering to 5-6 ratoon on the plant after harvest of the bonus scythes.

4. Most erect content in sugars are registered in phenophases of flowery the absolute maturity beans(16, 7-17, 6 to the scythe I and 15, 5-16, 8 to sew II).

5. Most big yield of biomass registered in phenophases for form's sake beans(51, 2 t/ha to the scythe I and 42, 5 t/ha to sew II, with an aggregate output cumulative of 93, 7 t/ha), in phenophase of physiological maturity beans(55, 1 t /ha to the scythe I and 47, 2 t/ha to sew II, with an aggregate output of 102, 3 t/ha) and in phenophase of absolute maturity beans(53, 8 t /ha to the scythe I and 45, 8 t/ha to sew II, with an aggregate output of 99, 6 t /ha

6. Chemical composition the sweet sorghum harvest to different phenophases (from dry substance) are diferenced depending on the age of harvest.

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EFECTUL ACIDOZEI SUBACUTE RUMINALE ASUPRA CONSUMULUI VOLUNTAR DE BICARBONAT DE SODIU LA VACILE DE LAPTE

EFFECTS OF SUBACUTE RUMINAL ACIDOSIS ON FREE CHOICE INTEKE OF SODIUM BICARBONATE IN LACTING DAIRY COWS

Gavan C., Cola M., Motorga V., Butura Constanta

Keywords: subacute ruminal acidosis, sodium bicarbonate

ABSTRACT

Obiectul prezentului studiu a fost stabilirea efectelor acidozei ruminale (ASAR) asupra consumului volunjtar de bicarbonat de sodiu (BS) la vacile de lapte. ASAR a fost indusă la 4 primipare Holstein Friză cu fistulă ruminală într-un experiment cu patru perioade de o săptămână, prin înlocuirea a 25 % din consumul "ad libitum" aI unui amestec unic (A:U:) cu concentrate constând din 50 % grâu boabe măcinate şi 50 % orz boabe măcinate, şi prin restricționarea furajării între orele 8^{00} şi 18^{30}. În timpul fiecărei perioade, ASAR a fost indusă la două vaci, iar celelalte două au primit AU "ad libitum" (martor).

În săptămâna ulterioară tratamentul a fost schimbat. BS a fost asigurat "ad libitum" în găleți de 10 litri pentru fiecare vacă. Inducerea ASAR a dus la scăderea pH-ului mediu zilnic ruminal de la 6,10 la 5,86 şi a crescut durata medie a pH-ului sub 5,6 de la 130 minute/zi la 395 minute/zi. Consumul mediu de BS a fost de 30 g/zi în timpul ASAR indusă şi de 34 g/zi în timpul perioadei martor. Consumul de BS a fost diferit între vaci. Acest consum mic de BS nu a efectat semnificativ pH-ul ruminal. Aceste date arată că vacile nu preferă BS pentru a atenua efectul ASAR.

The objective of the present study was to determin the effect of subacute ruminal acidosis (SARA) on the free choice intake of sodium bicarbonate (SB), in dairy cows.

*The SARA was induced in four rumen fistulated primiparous Holstein cows in a switchover experiment with for 1 week periods, by repalcing 25 % of the ad libitum intake of total mixed ration (TMR) with 50 % ground wheat and 50 % ground borley and restricting access to TMR from 8:00 to 18:30 hour. During each period SARA was induced in two cows and other two cows received a TMR ad libitum intake *control (Each subsequent week treatments were switched. SB was provided for ad libitum consumption for each cow in 10 /L sucket. Induction of SARA reduced the average dailz rumen pH from 6,10 to 5,86 and increases the average duration of rumen pH below 5,6 from 130 minutes /daz to 395 minutes/daz. Average intake of SB was 30 g/daz during SARA and 34 g/daz during control. SB intake differend betwean cows. This low SB intakes not have substantiallz affected rumen pH. These data indicate that cows did not select SB to attennuate SARA.*

INTRODUCTION

SARA is characterized by sepeated episodes of depressed ruminal pH betwen 5,2 and 5,6 (Owens et all, 1998).The length of time per day when ruminal pH is below 5,6 (Keunen et all, 2002) or below 5,8 *Krause et all, 2002, is a more important determinant of rumen acidosis than the mean daily ruminal pH. The SARA commonly oecurs in early lactation dairy cows when the rumen has not yet adfapted from a switoh from a forage based to a concentrate based diet. Fermentation of nonstructural carbohydrates, such as starches and sugars leads to production of large quantities of volatile fathy acids and lactate that accumulate in the rumen and decrease yumen pH. Low rumen pH impair microbial function especially the function of fibrolytic microflora.

Sodium bicarbonate (SB) is a wrak base that suffors hydrogen ions of organic acids and prevents rumen epithelium damage and ruminal stasis that accompanies SARA.

Induction of SARA in lactating dairy cows incrases the preferance of long alfaefa hay ovor pelleted alfalfa (Keunen et all, 2002). It has becn proposed that ruminants increase intake of SB in order to prevet low ruminal pH. We hypothesized that inducing SARA in dairy cows qould increase their intake of powdesed SB offered free chice.

Ruminal acidosis may be exacerbated in primiparens cows, when compared with multiparens cows because primiparens cows have not hod prevides long term exposum to highley fermentable carbohidrates. The effect of SARA on free/choice intake of SB has been separted by Kennen et all,2003 but not for primiparens.

The objective of this study was to determin the effect of induced SARA on free/choice intake of SB in primiparens dairy cows.

MATERIALS AND METHODS

Four primiparens, ruminally fistulated Holstein dairy cows wese housed in individual tie stall at S.C.D.A. Simnic. Cows averaged 680 kg ± 81 kg of Body Weight (BW) and 75 ± 12 dais in milk (DIM).

The experiment was conducted as a switchover design with four periods of 1 week (wk) duinny each period SARA was induced in two cows according to the protocol described by Kennen et al., 2002. The ather two cows received a TMR for adlibitum intake (control).

The SARA was inducedby replecing 25 % of the TMR dry mother intake (DMI) measured in previous period with an equal amount of DIM from 50 % wheat and 50 % barley and restinting the availability of TMR between 08:00/18:30 h (Kennen et all, 2002).

Cows received a TMR withant SB. The TMR cuesisted of(as fed basis)> 41 % coru siloge, 20 % hayloge, hay 6 %, 17 % coru grain and 16 % mixed lactating cow supliment.

Samble of feed ingredients were taken each day. The DM content of the samples were determined in oven at 60^0C for 48 h. Milk yields were recoreled daily.

Rumen pH was monitored via in/dwelluiy protes using the method described by Cumby et all (2001) cited by Kennen , 2002.Dates were sumari zed by calculating average pH, time below pH 6, and below pH 5,6. Each cow had its own 10 l bucket filled with SB. Daily DM intake of the SB was determined by substracting the xmaining dry SB from the initial known amount of SB (ie, 600 g).

The TMR had a composition of (DM basis) 50,4 % DM and 15,4 % crude protein (CP). The whatgrain and borley grain had a composition of 87,3 % DM and 12,5 % CP.

Analysis of variance of weckly average of pH data, SB intakes DM 1 and milk yields for each cow wos conducted using the general linear models procedure.

RESULTS AND DISCUSSION

Induction of SARA resulted in a siginificant drop in average daily rumen pH from 6,10 to 5,86 and increases the average duration of rumen pH below 6^{00} from 540 minutes/day to 920 minutes/day (table 1). Duration of time with rumen pH below 5,6 was increased from 130 minutes/day to 395 minutes/day.

Table 1

Summary of DM 1 and daily pH data

	SARA	Central
DM 1 kg/d	18,1	19,8
Average SB intake g/d	30	34
Average pH	5,86	6,10
Time below pH 6,0 minutes/d	920	540
Time below pH 5,6 minutes/d	395	130

Rumen pH during SARA was similar to that observed in trasition dairy cow in the first week postpartum by Plaizier et al 1999 (cited by Kennen et al, 2002.

Inducing SARA did not significantly effect DM 1. DM 1 was an average 18,1 kg/d ± 0,6 kg/d during control. Individual cow intakes of SB were variable and independent of treatment. Inducing SARA did not significantly affect SB intake. Intake of SB averaged 30 ± 4,2 g/d for SARA periods and 34 ± 4,2 g/d for control periods. SB appeared too low to provide sufficient rumen buffaring. It is recommended that lactating dairy cows to receive 0,6 to 0,8 % of DM 1 SB in their diet (~ 200 g/d / NRC 2001).

Cooper et al 1996 cited by Kennen found that sheep fed diets that depress pH chose pellets containing SB vs. pellets without. SB is commonly added to water as the key ingredient in drenches to increase blood/buffenug capacity of race horses (Preston et al 1989).

CONCLUSIONS

The intake of SB was not sufficient evough (in magnitude or duration) to sufficiently impact the rumen pH.

These data indicate that cows did not select SB in order to attenuate SARA.

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SEPARAREA GRAVITAȚIONALĂ A GRĂSIMII DIN LAPTELE DE VACĂ MATERIE PRIMĂ

GRAVITY SEPARATION OF FAT CONTENT OF ROW BOVINE MILK

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Keywords: gravity separation, bovine milk

ABSTRACT

Obiectivul prezentului studiu a fost determinarea efectelor timpului şi temperaturii asupra schimbărilor conținutului de grăsime al fracțiunilor laptelui în timpul separării gravitaționale. Laptele proaspăt de bovine a fost separat gravitațional la 4^0C. După 0, 12, 24 şi 48 ore şapte fracțiuni au fost drenate dintr-o coloană de separare începând cu fracțiunea 1 (F 1) (din partea de jos a coloanei) către fracțiunea 7 (din partea de sus a coloanei). După 48 ore la temperatura de 4^0C conținutul în grăsime al F 1 a scăzut de la 3,75 % (timpul 0 al separării) la 0,20 %. Conținutul în grăsime al F 7 după 48 ore la 4^0C a ajuns la 26,25 %. Separarea gravitațională poate fi aplicată în industrializarea laptelui. Datorită simplității ei, această procedură poate fi utilizabilă în unitățile mici de prelucrarea laptelui materie primă pentru obținerea de lapte pentru consum cu conținut variabil în grăsime fără folosirea separatoarelor centrifugale.

The objective of the present study was to determin the effects of time and temperature on changes of fat content in milk productions during gravity separation. Fresh row bovine milk was gravity separated at 4^0C. After 0, 12, 24 and 48 h seven fractions, from bottom fraction (F1) to top fraction (F7) were drained from a separation column. After 48 h at 4^0C, fat content of F 1 decreased from 3,75 % (time 0 of separation) to 0,20 %. The fat content of F 7 reached 26,25 % after 48 h at 4^0C. Gravity separation may have unique applications in the diry industry today. Its simplicity makes it an effective procedure for small scale diry product manufacturers to produce milk with a range of fat contents without using a centrifugal cream separator.

INTRODUCTION

The natural creaming proces or gravity separation, was used for removing or concentrating milk fat prior to the invention of cream separateds.

Intrestingly, in Italy, gravity separation is stiel used today as a critical processing step in the manufacturing of certain aged cheesis, especially Paraigiana Reggiano and Grana Padano. Row whale milk is stored in shallow separation basins at 10 to 16^0C for 6 to 12 h to gravity separate milk. When the desired extent of fat separation is achieved, the partially skimmed raw milk of about 2 % fat is drained from the bellow of the basins and transferred to cheese vats (Zannoni, M. 1981 citied by Y Ma, 2000). The cream is used to make butler. In larger modern Italian cheese factories, the gravity separation procedure is done in enclosed vessels equipped with sensors to monitor and control the gravity separation process.

Gravity separation not only partially removes fat, but it also removes a high parcentage of the microorganisus present in raw milk (Dellaglio et al, 1969 citied Y Ma 2000). The influence of time and temperature during gravity separation on the particule size distribution of milk fat globules was studied by Y Ma and Barbano 2000. Under the influence of gravity milk fat globules tend to rise. Gravity separation produce a port skim milk that has a larger proportion of smaller size fat glotules.

The objective of this study was to determine the fat content in milk fractions during gravity separation. The effects of time and temperature were evaluated by separating milk for 0, 12, 24 and 48 h at 4^0C.

MATERIALS AND METHODS

Row bovine milk was collected at Agriculture Research Station Simnic dairy farm and cooled to 4^0C.

Milk (60 ml) was gravity separated in plastic cylindrical columns. Milk fractions (F 1 to F7) were drained from to battom of the column in separate vials. Fractions F 1 (bottom fraction) and F 1 (top fraction) were 5 ml, and F 2 to F 6 were 10 ml each. All experiments were replicated with milk collected on different days.

Row whole bovine milk was separated at 4^0C fov 12, 24 and 48 h.

Fat content of each fraction F 1 to F6 was teternioned using EKOMILK ultrasonic milk Analyzers. For fraction F 7 was used Kohler method.

Creaming capacity expressed as grams of fat in the cream layer pe 100 g of fat in the whole milk column was calculated as follow 10 % x [(%fat of F 7,g/g x 5 ml x density of cream, g/ml)/% fat of separated roow milk, g/g x 60 ml x density of whole milk g/ml)]

RESULTS AND DISCUSITION

For F 1 to F 5 most of the change of fat content oecured in the first 12 h (1; 1,97; 2,15; 2,28; 2,45).

The change of fat content was slowest in F 6, and only after 48 h its fat conteat (2,60 %) decreased from thot of whole milk. Fraction 1 had the lowest fat content at each separation time at 48 h the fat content of F 1 was 0,2 %.

The change in fat content of F 7 at 4^0C after 0, 12, 24 and 48 h is shown table 1.

Table 1

Fat content in F 7 after gravity separation at 4^0C for 0, 12, 24 and 48 h

Separatine time (h)	Fat (%)
0	3,75
12	18,80
24	23,50
48	26,25

The rate of increase in fat content was greater in the first 12 h than in the subsequent 12 h intervales.

The creaning capacity of milk that was separated for 12, 24, 48 h on listed in Table 2.

Separation Time	Creaning capacity %
12	41,7
24	52,4
48	58,3

After 48 h separation at 4^0C 58,3 % of the total fat euded in the top 5 ml cream layer F 7.

At 4^0C for 48 h 58,3 of the total fat was concentrated in the top 8,5 % of the original milk volume indicating o substantial separation of milk fat craning capacity reparted in athor papers were: 58,8 % Ma and Barbano, 50,0 % Masuda and Koyanea citied by Y Ma, 2000.. Gravity separation coued be used small scale dairy prodact manufacturer to produce milk products of various fat content. A schematic example of how gravity-separated milk fractions can be used effectively in small -scale fluid milk procesing. It row milk is held for 48 h at 4^0C, the bottom fraction F 1 is skimmed milk with 0,2 % fat and yield of 8,3 % of the original volum. F 2 and F 3 and F 4 on combined is obtained milk 1 % fat,

with yield of 50 % of the original milk volume F 5 and F 6 combined is obtained milk 2 % fat, with yield of 33,3 %. F 7 is naturally light cream with 25/27 % fat and a yield of 8,3 %.

CONCLUSION

Fat content in the top layer (F 7) continued to increase with separation time. After 48 h at 4^0C the procentage of fat in the bottom decreased to 0,2 %, whereas that of top (F 7) increased to 26,25 %, and a creamug capacity of 58,3 %.

Gravity separation at 4^0C for 48 h can yield skim milk (0,2 % fat) low fat milk (1 and 2 %) and cream (25/27 % fat).

The simplicity of gravity separation coald made it au effective procedure for small/scale diry processors.

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CERTARI IN VEDEREA STABILIRII UNEI TEHNOLOGII CU GRAD REDUS DE POLUARE PENTRU COMBATEREA PATOGENILOR SI DAUNATORILOR LA CULTURA DE CASTRAVETI IN CAMP
RESEARCHES CONCERNING THE ELABORATION OF A TECHNOLOGY WITH LOW POLLUTION DEGREE TO CONTROL THE PATHOGEN AGENTS AND PESTS AT THE FIELD CUCUMBERS CULTURE

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Key words: pathogen, pest, cucumbers, control

ABSTRACT

In lucrare se arata ca diminuarea suprafetelor in camp (in ogor sau in cultura succesiva) la aceasta specie legumicola are drept cauza principala agresivitatea patogenilor si daunatorilor specifici a caror intensitate a fost "exploziva" inregistrindu-se valori mari pe tot parcursul verii, cu mult peste pragul de daunare, cu urmari evidente in scaderea productiei de castraveti.

Tehnologia cu grad redus de poluare la aceasta specie legumicola, s-a referit la urmatorul flux tehnologic: alegerea unui soi de castraveti cu toleranta fata de patogenii specifici pentru aceasta cultura; in acest sens, soiul de castraveti Mondial prezinta toleranta fata de ciuperca Pseudoperonospora cubensis care produce mana si fata de bacteria Pseudomonas syringae pv. lachrymans care provoaca patarea unghiulara a frunzelor; prevenirea si combaterea patogenilor si daunatorilor prin tratamente foliare cu pesticide (fungicide, insecticide si acaricide) admise de Uniunea Europeana, "prietenoase" pentru plante si risc redus pentru mediu, utilizator si consumator; asigurarea unor sporuri de productie, prin fertilizari extraradiculare cu biostimulatori, in mare masura de natura vegetala, aplicate la intervale de 7-10 zile.

Prin aplicarea acestei tehnologii cu grad redus de poluare s-a inregistrat o productie de 5,350 kg/mp, la soiul de castraveti Mondial.

In this study it is showed that the decrease of the field surfaces (land or successive cultivation) at this species has as main cause the aggressiveness of the characteristic pests. Their intensity has been "explosive", high values being recorded during summer, high above the damage threshold, with obvious effects over the cucumber production.

The low degree pollution technology for this species concerns the following technological flow: choosing a cucumber species with tolerance to the pests characteristic for this culture; the cucumber species Mondial shows tolerance to the Pseudoperonospora cubensis fungus that causes mildew (blight) and to the bacteria Pseudomonas syringae pv. lachrymans that causes angular spots on the leaves; prevention and control of the pathogen agents and pests through foliar treatments with pesticides (fungicides, insecticides and miticides), approved by the European Union, "friendly" for the plants and with low risk for the environment, user and consumer; ensuring production increases through root fertilization with biostimulation, mostly vegetable, applied at intervals of 7-10 days. By applying this low degree pollution technology a production of 5,350 kg/mp was obtained at the Mondial variety.

INTRODUCTION

It is known the fact that in the last 10 –15 years the surfaces occupied by the field cucumbers cultures are decreasing and the succesive cultures are almost inexistent.

The main cause that determined the decrease of the surfaces for this vegetable species is represented by the agresivity of the specific pests and pathogenic agents, that manifested an “explosive” intensity, recording very high values during the summer, a lot higher than the damage limit.

In order to prevent and control the pests and pathogenic agents in the fiels cucumbers culture it is recommended to use conventional pesticides (fungicides, insecticides), contact or systemical, more or less toxic, that need longer break time after the treatments. Taking into consideration that this vegetable is consumed usually fresh in salats but also for industrizalization and the harvesting must be done rythmically, at 2-3 days intervals, it results the need for a technology with low pollution degree that protects the cucumbers culture against the specific pests and also includes pesticides “friendly” for this species and low risk for the environment, user ans consumer.

MATHERIALS AND METHODS

The work was done with 2 cucumbers variety: Cornichon de Paris and Mondial.

The monitored experimental variants were the following:

V1 = technological variant with low pollution degree, comprising the following technological links: (Cornichon de Paris variety):

a. for preventing and controlling the main pathogenic agents for this culture (*Pseudomonas lachrymans* and *Pseudoperonospora cubensis*), 6 treatments with Bouille bordelaise 0,75% were made at intervals of 7-10 days, the first treatment after planting the small plants, in the stage of 3-4 real leaves.

b. for preventing and controlling the pests treatments were made with: Chess 0,04% (1 treatment), Mospilan 0,04% (1 treatment), Laser 0,06% (1 treatment), Milbeknock 0,075% (2 treatments);

c. weekly root fertilization with:

- Kendal 0,3% + Megafol 0,3%, one week after planting, then at intervals of 7 days as follows and :
- Cropmax 0,1% + Agroleaf high P 0,3%;
- Kendal 0,3% + Brexil combi 0,3%;
- Cropmax 0,1% + Agroleaf total 20-20-20. 0,3%;
- Megafol 0,3% + Plantafol 20-20-20 0,3%;
- Cropmax 0,1% + Agroleaf total 20-20-20. 0,3%;
- Kendal o,3% + Calbit C 0,3%;
- Cropmax 0,1% + Agroleaf K 0,3%.

V2 = idem **V1**, with Mondial variety

V3 = variant with conventional treatments for Cornichon de Paris variety as follows:

a. for preventing and controlling the pathogenic agents 6 treatments were made at intervals of 7-10 days (the first treatment in the stage of 3-4 real leaves) as follows: Previcur 607 SL 0,15% + Dithane M45 0,2% (treatments 1, 3, 5) and Previcur 607 SL 0,15% + Merpan 0,15% (treatments 2, 4, 6).

b. for preventing and controlling the pests treatments were made with Confidor 70 WG 0,02% (1 treatment), Mospilan 0,04% (1 treatment), Laser 0,06% (1 treatment), Sanmite 0,075% (2 treatments).

V4 = idem **V3** with Mondial cucumber variety.

V5 = variant without treatments – Cornichon de Paris variety

V6 = variant without treatments – Mondial variety

Observations were made regarding:

- structure of the pathogenic agents and of the pests;
- frequency and intensity of the attack using scales specific to pathogenic agents and pests;

- dynamics of the harvesting.

When the small plants were planted the density in the technology of the culture was respected.

Also we mention that the irrigation was made by dripping and for fertilization Complex fertilizer was administered weekly 20:20:20.

RESULTS AND DISCUSSION

The climatic conditions of our country, with big temperature variations from one area to another have determined a certain structure of the pests species, influencing also their appearance and evolution with obvious results in decreasing the cucumbers production.

After the surveillances made lately it was established that the fungus *Pseudoperonospora cubensis* that causes mildew creates the biggest problems every year for this field culture; if preventive treatments aren't used, due to the "explosive" appearance and very fast evolution of the disease, the culture can be compromised. Other pathogenic agents also manifested in the cucumbers cultures, but with a lower attack frequency: the bacterium *Pseudomonas syringae pv. lachrymans* that causes the ungular spotting of the leaves and the fungus *Sphaerotheca fuliginea* that causes also mildew.

Concerning the pests, it was observed that for the field cucumbers culture the red spider *Tetranychus urticae* was the main species; other pests were also momitored: *Myzodes persicae* and *Thrips tabaci* .

The experimental results for this species are presented in tables 1 – 3.

This year, like in 2007, the pathogenic agent with economical value for this species was the fungus *Pseudoperonospora cubensis* that causes cucumber mildew.

From table 1 results that for the variant without treatments the appearance of the attack in the southern part of the country took place on the 13th of June for Cornichon de Paris variety and on the 23rd of June for Mondial variety. For the variants using treatments: (with low pollution degree and with conventional treatments), the appearance of mildew took place on the 18th of June for Cornichon de Paris variety and on the 30th of June for Mondial variety.

The lowest degree of attack was recorded for the technology with low pollution degree – Mondial variety with 5,8%, realizing also the biggest production, that is 5,350 kg/mp. compared to Cornichon de Paris variety where for the same technology the attack degree was of 11,5% and the production 3,620 kg/mp.

For the technology with conventional treatments the attack degree was 7,6% for the Mondial variety and the realized production 4,870 kg/mp. compared to Cornichon de Paris where the attack degree was 15,7% and the obtained production was 3,150 kg/mp.

For the variant without treatments (untreated witness), Cornichon de Paris variety, the attack degree was of 62,4% with a production of 2,650 kg/mp, while for the Mondial variety the attack degree was of 12,2% and the obtained production 3,850kg/mp.

Table 1

Results regarding the technology with low pollution degree in preventing and controlling the pathogenic agents in the field cucumbers culture

Specification	Cucumber mildew *(Pseudoperonospora cubensis*)			Production
	Disease appearance	Frequency of attack (%)	Attack degree (%)	(kg/mp)
Technology with low pollution degree Cornichon de Paris variety Mondial variety	18th of June 30th of June	64,0 39,0	1,5 5,8	3,620 5,350
Technology with conventional treatments Cornichon de Paris variety Mondial species		69,2 47,0	15,7 7,6	3,150 4,870

Variant without treatments Cornichon de Paris variety Mondial variety	 13th of June 23rd of June	 100 64	 62,4 12,2	 2,650 3,850

From tables 2 and 3 results that for the cucumbers culture Cornichon de Paris and Mondial variety the following pests were present: *Myzodes persicae, Tetranychus urticae, Thrips tabaci.* Among these the red spider *Tetranychus urticae* was the main species with values of 54,23 individuals/leaf on the 15th of July 2008 for the variant without treatments, compared to 32,18 individuals/leaf for the technology with low pollution degree and the technology with conventional treatments fos the variety Cornichon de Paris, while for the Mondial variety the values were as follows: 26,67 individuals/leaf for the variant without treatments, 10,23 individuals/leaf for the technology with low pollution degree and 22,23% for the variant with conventional treatments. Concerning the aphids for the Cornichon de Paris variety, the average number of colonies/plant with *Myzodes persicae* on the 15th of July 2008 was of 6,23 colonies/plant for the variant without treatments compared to 3,29 colonies/plant for the technology with low pollution degree and 4,56 colonies/plant for the technology with conventional treatments, while for the Mondial variety these values were of 5,11 colonies/plant for the variant without treatments, 3,11 colonies/plant for the technology with low pollution degree and 3,96 colonies/plant for the technology with conventional treatments. Concerning the attack caused by *Thrips tabaci* on the same date, the 15th of July 2008, on the Cornichon de Paris variety the following values were recorded: 18,92 individuals/leaf for the variant without treatments, 12,33 for the technology with low pollution degree and the technology with conventional treatments, while for the Mondial variety the values were: 7,43 individuals/leaf for the variant without treatments, compared to 5,23 individuals/leaf for the technology with low pollution degree and 3,29 individuals/leaf for the technology with conventional treatments.

Table 2

Pests observed in the cucumbers culture – Cornichon de Paris variety

Technology with low pollution degree - Cornichon de Paris variety				
Date	Aphididae (*Myzodes persicae*) (average number of colonies/plant)	*Tetranychus urticae* (average number of individuals/leaf)	*Thrips tabaci* (average number of individuals/leaf)	Useful and auxiliary fauna
10.06.08	0,34	0,00	0,00	*Coccinellidae* (*Coccinella 7-punctata*) and adults of *Syrphus* spp. were observed
17.06.08	0,62	1,20	0,00	
24.06.08	0,71	1,67	2,13	
01.07.08	1,86	3,12	2,89	
08.07.08	3,21	15,23	4,50	
15.07.08	3,29	32,18	12,33	
Technology with conventional treatments – Cornichon de Paris variety				
Date	*Aphididae(Myzodes persicae*) (average number of colonies/plant)	*Tetranychus urticae* (average number of individuals/leaf)	*Thrips tabaci* (average number of individuals/leaf)	Useful and auxiliary fauna
10.06.08	0,65	0,00	0,00	*Coccinellidae* (*Coccinella 7-punctata*) was observed
17.06.08	0,87	1,20	0,00	
24.06.08	1,32	1,67	2,13	
01.07.08	2,96	3,12	2,89	
08.07.08	3,80	15,23	4,50	
15.07.08	4,56	32,18	12,33	
Variant without treatments – Cornichon de Paris variety				
Date	*Aphididae* (*Myzodes persicae*) (average number of colonies/plant)	*Tetranychus urticae* (average number of individuals/leaf)	*Thrips tabaci* (average number of individuals/leaf)	Useful and auxiliary fauna
10.06.08	0,65	0,00	0,00	*Coccinellidae* (*Coccinella 7-punctata*), eggs of
17.06.08	0,79	2,22	1,34	
24.06.08	3,71	4,28	4,12	

01.07.08	5,27	38,40	6,18	*Chrysopidae*, adults of *Syrphus* spp.were observed
08.07.08	4,98	42,11	8,22	
15.07.08	6,23	54,23	18,92	

Table 3

Pests observed in the cucumbers culture – Mondial variety

Technology with low pollution degree				
Date	*Myzodes persicae* (average number of colonies/plant)	*Tetranychus urticae* (average number of individuals/leaf)	*Thrips tabaci* (average number of individuals/leaf)	Useful and auxiliary fauna
10.06.08	0,14	0,00	0,00	*Coccinellidae* (*Coccinella 7-punctata*) and adults of *Syrphus* spp. were observed
17.06.08	0,20	0,00	0,00	
24.06.08	0,22	1,07	0,00	
01.07.08	1,00	1,12	0,00	
08.07.08	2,92	8,12	2,11	
15.07.08	3,11	10,23	5,23	
Technology with conventional treatments – Mondial variety				
Date	*Myzodes persicae* (average number of colonies/plant)	*Tetranychus urticae* average number of individuals/leaf)	*Thrips tabaci* (average number of individuals/leaf)	Useful and auxiliary fauna
10.06.08	0,26	0,00	0,00	*Coccinellidae* (*Coccinella 7-punctata*) was observed
17.06.08	0,37	0,00	0,00	
24.06.08	0,89	1,34	0,00	
01.07.08	2,07	2,56	0,00	
08.07.08	3,11	11,12	1,08	
15.07.08	3,96	22,23	3,29	
Variant without treatments – Mondial variety				
Date	*Myzodes persicae* (average number of colonies/plant)	*Tetranychus urticae* (average number of individuals/leaf)	*Thrips tabaci* (average number of individuals/leaf)	Useful and auxiliary fauna
10.06.08	0,49	0,00	0,00	*Coccinellidae* (*Coccinella 7-punctata*), eggs of *Chrysopidae*, adults of *Syrphus* spp. were observed
17.06.08	0,70	0,00	0,00	
24.06.08	0,98	1,00	0,07	
01.07.08	1,32	6,32	0,86	
08.07.08	2,22	8,09	1,07	
15.07.08	5,11	26,67	7,43	

CONCLUSIONS

The technology with low pollution degree that we suggest protects the cucmber cultures against the specific pathogenic agents and pests and reffers to the following technological flow:

a. choosing a cucumber variety with tolerance against the pathogenic agents specific for this culture; “Mondial” variety has tolerance for the fungus *Pseudoperonospora cubensis* that causes cucumber mildew and for the bacterium *Pseudomonas lachrymans* that causes the angular spotting of the cucumbers;

b. preventing and controlling the pathogenic agents with economical value for this culture; we reffer firstly at the mildew attack caused by the fungus *Pseudoperonospora cubensis* and then at the attack caused by the bacterium *Pseudomonas lachrymans* and at the one caused by the fungus *Sphaerotheca fuliginea* that causes also mildew. In vegetation for preventing and controlling these pathogenic agents 6 foliary treatments were applied Bouille bordelaise 0,75% at intervals of 7-10 days; the first treatment was done after planting the small plant in the field in the moment it has 3-4 real leaves;

c. for preventing and controlling the pests treatments were made with: Chess 0,04% (1 treatment), Mospilan 0,04% (1 treatment), Lasser 0,06% (1 treatment), Milbeknock 0,075% (2 treatments);

d. for production increases root fertilizations with vegetable biostimulators are necessary, applied at intervals of 7-10 days, like: (Kendal 0,3% + Megafol 0,3%, Cropmax 0,1% + Agroleaf high P 0,3%, Kendal 0,3% + Brexil combi 0,3%, Cropmax 0,1% + Agroleaf total 0,3%, Megafol 0,3% + Plantafol 20-20-20 0,3%, Cropmax 0,1% + Agroleaf total 0,3%, Kendal 0,3% + Megafol 0,3%, Cropmax 0,1% + Agroleaf K 0,3%).

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STUDIUL COMPORTĂRII ESTIVALE AL UNOR AMESTECURI PENTRU GAZON ÎN CONDIȚIILE ZONEI DE VEST A ROMÂNIEI

STUDY CONCERNING THE BEHAVIOR DURING SUMMER OF SOME TURF MIXTURES IN THE CONDITION OF WESTERN ROMANIA

Adriana Hanc-Stoian, Alexandru Moisuc

Keywords: turf, mixtures, evaluation, behaviour.

ABSTRACT

În această lucrare este studiată comportarea estivală a unor amestecuri pentru gazon. Este apreciată abilitatea covorului vegetal de a rămâne "verde" sub efectul temperaturilor ridicate şi a lipsei de apă. Întrucât destinația gazonului este atât de diversă, speciile de graminee sunt evaluate prin prisma unor indici de caracterizare, comuni tuturor speciilor şi care fac dovada valorii de utilizare la care se pretează.

In this paper we have studied the behaviour of some turf mixtures during summer. The vegetal carpet's ability to remain "green" is very appreciated under the influence of the high temperatures and lack of water. Because the use of turf mixtures is so divers, the species of grasses are evaluated from the point of view of some features common to all the turf species and make proof of the utilisation value to which is more suitable.

INTRODUCTION

Ornament, pleasure, games, sport, vegetation re-composition, adaptation to unfavorable environments, the exigencies are many, and also in contradictory, the turf that has generalized in almost all the countries, is specialized according to the usage and the conditions of the environment.

Turf plays a very important role in the substantial improvement of the quality of life, because grass functions in the habitat fated for recreative activities and leisure, working as a safety buffer in case of an involuntary impact between people and soil (ANNE VERTEUIL, V. BOURTON, 1993). The aesthetic value of turf is also very important, being the ideal setting for landscapes.

As time passed, the finicalities grew, and turf became a luxury of modern life. For some decades, the surfaces covered with turf grew considerably, thus the meadows that gave the charm to our villages have the tendency to rediscover themselves in a more studied manner, adapted to the demands of the modern human being (CAMELIA GIUCHICI, 2004).

The turf appearance remains a very important quality, but not decisive, because other exigencies appear like: the facility of installation, the resistance to traffic, good aestival and hibernal behavior; additionally the grass must to be well adapted to climate and soil (most of the time anthropic), and the upkeep to be not very sensitive (AL. MOISUC et al, 2001).

MATERIALS AND METHOD

Studied material is represented by seven turf different mixtures and a *Lolium perenne* variety. These are represented by:

1. *Lolium perenne* – Boulevard variety

2. Belvedere – for sunny places

- 55 % *Lolium perenne* – Boulevard variety
- 33 % *Festuca rubra* – Herald variety
- 10 % *Poa pratensis* – Evora variety
- 2 % *Agrostis capilaris* – Kromi variety

3. Sport – for sport fields
- 30 % *Lolium perenne* – Boulevard variety
- 30 % *Festuca rubra commutata* – Tatjana variety
- 20 % *Poa pratensis* – Evora variety
- 20 % *Festuca rubra* – Herald variety

4. Sunshine – for sunny and dry places
- 65 % *Festuca arundinacea* – Southern Comfort variety
- 25 % *Lolium perenne* – Boulevard variety
- 10 % *Poa pratensis* – Evora variety

5. Turf with flowers
- 60 % *Festuca rubra* – Herald variety
- 30 % *Lolium perenne* – Boulevard variety
- 10 % *Poa pratensis* – Evora variety
- 1 g – flower seeds

6. Ornamental turf – for parks and gardens
- 45 % *Festuca rubra* – Herald variety
- 30 % *Lolium perenne* – Boulevard variety
- 15 % *Poa pratensis* – Evora variety
- 10 % *Festuca rubra commutata* – Tatjana variety

7. Turf mixture
- 25 % *Lolium repens*
- 23 % *Lolium perenne*
- 19 % *Festuca rubra*
- 8 % *Festuca arundinacea*
- 8 % *Festuca rubra commutata*
- 8 % *Festuca rubra rubra*
- 4 % *Poa pratensis*
- 2 % *Festuca rubra meadow*
- 1 % *Agrostis capilaris*
- 1 % *Festuca ovina duriuscula*
- 1 % *Festuca rubra trychophylla*

8. Shadow – for shadow places
- 25 % *Lolium perenne* – Boulevard variety
- 25 % *Festuca rubra commutata* – Tatjana variety
- 20 % *Lolium perenne* – Juventus variety
- 20 % *Festuca rubra* – Herald variety
- 10 % *Poa pratensis* – Evora variety

The experiences were carried out in the experimental field of the Agriculture Faculty of Banat's University of Agricultural Sciences and Veterinary Medicine from Timisoara. The experimental plots have four replicates.

The parameters of appreciation for behavior during summer are evaluated with marks from 1 to 9, according to NTEP (National Turf-grass Evaluation Program) (DATTE, D'AMONVILLE, 1999).

RESULTS AND DISCUSSION

Researches are made on seven turf mixtures and a *Lolium perenne* turf variety.

For the varieties from the same species the value of parameters is relative, whereas between the species the differences are obvious, every variety, manifesting more or less obvious the qualities and limits of the species that they belong to. In general the turf mixture of which parameters are superior to the value of 6 is considered acceptable. In fact the quality of the turf mixture is the result of the interaction between the specie or species used, the culture technology, season and the moment when the observations are made.

Table 1

The behaviour of turf mixtures during summer

Nr. crt.	Variants	Replicates				The average of marks
		I	II	III	IV	
1.	*Lolium perenne*	7	6	6	6	6,25
2.	Belvedere	8	7	8	7	7,50
3.	Sport	9	9	9	8	8,75
4.	Sunshine	8	8	8	8	8,00
5.	Turf with flower	8	7	8	7	7,50
6.	Ornamental turf	8	7	7	8	7,50
7.	Turf mixture	8	7	8	8	7,75
8.	Shadow	9	8	9	8	8,50

The parameters of appreciation for turf winter resistance are evaluated according to NTEP (National Turf-grass Evaluation Program) with marks from 1 to 9, as it follows:

- 9 – for a perfect turf mixture;
- 1 – for entirely degraded turf mixture.

Climatic conditions during research period:

- Climate – temperatures are between $+2^0$ C and $+ 38^0$ C, thus:
  - $+ 1,2^0C \rightarrow + 23,2^0C$ (April, 2008);
  - $+ 4,8^0C \rightarrow + 35,1^0C$ (May, 2008);
  - $+ 10,6^0C \rightarrow + 34,9^0C$ (June, 2008);
  - $+ 11,7^0C \rightarrow + 34,9^0C$ (July, 2008);
  - $+ 8,6^0C \rightarrow + 38,3^0C$ (August, 2008);
  - $+ 4,5^0C \rightarrow + 36,8^0C$ (September, 2008).
- Rainfall amount – in 24 hours are among 0 – 28 mm/m^2;
- Relative air humidity are between 23 – 98 %;
- Wind speed – is among 0 – 10 m/s.

The best behaviour during summer can be noticed in the case of the turf mixtures:

✓ **Sport** (30 % *Lolium perenne* – Boulevard variety, 30 % *Festuca rubra commutata* – Tatjana variety, 20 % *Poa pratensis* – Evora variety, 20 % *Festuca rubra* – Herald variety);

✓ **Shadow** (25 % *Lolium perenne* – Boulevard variety, 25 % *Festuca rubra commutata* – Tatjana variety, 20 % *Lolium perenne* – Juventus variety, 20 % *Festuca rubra* – Herald variety, 10 % *Poa pratensis* – Evora variety);

✓ **Sunshine** (65 % *Festuca arundinacea* – Southern Comfort variety**,** 25 % *Lolium perenne* – Boulevard variety, 10 % *Poa pratensis* – Evora variety);

✓ **Turf mixture** (25 % *Lolium repens,* 23 % *Lolium perenne,*19 % *Festuca rubra,* 8 % *Festuca arundinacea,* 8 % *Festuca rubra commutate,* 8 % *Festuca rubra rubra,* 4 % *Poa pratensis,* 2 % *Festuca rubra meadow,* 1 % *Agrostis capilaris,* 1 % *Festuca ovina duriuscula,* 1 % *Festuca rubra trychophylla*).

The lowest behaviour during summer can be noticed in the case of the turf mixtures:

- ***Lolium perenne*** – Boulevard variety;
- **Belvedere** (55 % *Lolium perenne* – Boulevard variety, 33 % *Festuca rubra* – Herald variety, 10 % *Poa pratensis* – Evora variety, 2 % *Agrostis capilaris* – Kromi variety);
- **Turf with flowers** (60 % *Festuca rubra* – Herald variety, 30 % *Lolium perenne* – Boulevard variety, 10 % *Poa pratensis* – Evora variety);
- **Ornamental turf** (45 % *Festuca rubra* – Herald variety, 30 % *Lolium perenne* – Boulevard variety, 15 % *Poa pratensis* – Evora variety, 10 % *Festuca rubra commutata* – Tatjana variety).

CONCLUSIONS

Analyzing the obtained data we can conclude:

- the greatest behaviour during summer is found in the case of the turf mixtures **Sport**, **Shadow, Sunshine** and **Turf mixture**;
- the lowest behaviour during summer is found in the case of the turf mixtures ***Lolium perenne*** – Boulevard variety, **Belvedere, Turf with flowers,** and **Ornamental turf**.

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CONSTRUIREA MODELULUI PLS-LEVERAGE PENTRU DETERMINAREA CONȚINUTULUI TOTAL DE PROTEINĂ BRUTĂ DIN FURAJELE PROVENITE DE PE O PAJIŞTE PERMANENTĂ (GRĂDINARI; CARAŞ-SEVERIN) UTILIZÂND SPECTROSCOPIA NIR

THE CONSTRUCTION OF PLS-LEVERAGE MODEL FOR DETERMINATION OF TOTAL CRUDE PROTEIN CONTENT IN FORAGES FROM A PERMANENT PASTURE (GRĂDINARI; CARAS-SEVERIN) USING NIR SPECTROSCOPY

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Keywords: total crude protein content, forages, NIR Spectroscopy, PLS-Leverage Model

ABSTRACT

În această lucrare ştiințifică sunt prezentate cercetările desfăşurate de noi în vederea determinării conținutului total de proteină brută (%) din furajele recoltate la data de 31 martie 2008 de pe o pajişte permanentă din Grădinari (Caras Severin), utilizând spectroscopia NIR. Pajiştea permanentă a fost organizată în zece variante experimentale fertilizate cu diferite doze de îngrăşăminte organice şi minerale, pentru fiecare variantă fiind înființate cinci repetiții. Pentru determinarea conținutului total de proteină brută (%) prin metoda NIRS a fost creat un model matematic utilizând rezultatele obținute prin metoda Kjeldahl şi valorile reflectanțelor din spectrele NIR (800-2500nm). Pentru interpretarea statistică a rezultatelor obținute s-a folosit modelul de regresie PLS-Laverage al soft-ului UNSCRAMBLE. Coeficientul de regresie R^2 al modelului PLS-Laverage a fost egal cu 0.988726, iar valorile deviației au fost cuprinse în domeniul 0,620 - 0,696 %. Aceasta înseamnă că spectrele NIR, prelucrate cu soft-uri adecvate, pot fi utilizate pentru determinarea rapidă a conținutului total în proteină brută din probele de furaje de pe o pajişte permanentă.

This scientifically paper presents our researches regarding the determination of total crude protein content (%) of forages, harvested in March 31st, 2008, from a permanent pasture from Gradinari (Caras Severin), using NIR Spectroscopy. The permanent pasture was organized in ten trials with different doses of organic and mineral fertilizations, and five replicates for each trial. For total crude protein content (%) determination by NIRS method was created a mathematical model with the values obtained using Kjeldahl method and those for reflectance from NIR spectra (800-2500nm). To realize the statistical interpretation of obtained results was used PLS-Laverage regression model from UNSCRAMBLE software. The regression coefficient R^2 for PLS-Laverage model was equal with 0.988726 and the values for deviation in the range 0,620 - 0,696 %. That means NIR spectra, processed with adequately software, can be utilized for quickly prediction of the total crude protein content of forages samples from permanent pasture.

INTRODUCTION

For a rational human's nutrition it is necessary to consume both vegetal and animal food, because these two are complementary [Socaciu, 2003]. In present, for be competitive on European markets, it is necessary that the producers assure a high level of

food quality. The main objectives of Rumanian authorities in the last years were to implement also in our country the European directives regarding the safety and security of food. Thanks to these new standards it is possible now to detect easily and to reduce at low level the potential risks responsible for the food deterioration. That means the technological flow become “sure” regarding the quality of final products and the main preoccupations of actual producers remain the quality of the raw matter.

To obtain a high level of quality for the raw matter with animal origin it is necessary to produce a sufficient quantity of forages with the best quality [Moisuc&Đukič, 2002]. One of the most important parameter which can define partial the quality of forages is crude protein. The total crude protein content of forages has an important signification for animal’s nutrition because can’t be replaced from other compounds in specific function like:

- the protein synthesis from milk;
- the maintaining the hydro-metabolism balance;
- the plastic roll, being the fundamental components of the cells and tissues;
- the support for genetic material, being present in the structure of nucleic acids;
- the protection of animal’s organism against the pathogens;
- the involvement in different digestive, hormonally and reproductive activities [Georgescu coord. et al, 2007].

In present in Roumania the determination of total crude protein content of forages is made by chemical Kjeldahl method. This method request a long time for digestion and distillation of samples, a high quantity of reagents to perform the determination, thermal and electrical energy consumption, and qualified human resources.

NIRS can be used like an alternatively method for the determination of total crude protein content of forages, but its necessary first to perform a good mathematical model for calibration this method for the plants from Romanian permanent pasture. Several from the most important advantages of NIRS method are the following:

- ♣ is a very fast method, the spectra can be obtained in appreciatively 30 seconds;
- ♣ it is possible to determine a lot of quality parameters in the same time, function of calibration method;
- ♣ its not necessary to make many preparatory process of the analyzed forages samples;
- ♣ its not necessary to use the reagents, once the method was calibrated, being a friendly method for the environment
- ♣ its non-destructive method, the same samples can be used also for other determination [Wilson, 1994; Yu, 2006; Moron & Cozzolino, 2003].

The main objective of this study was to determine the total crude protein content (%) of forages, harvested in March 31st, 2008, from a permanent pasture from Gradinari (Caras Severin), using NIR Spectroscopy and Partial Last Square -Leverage model.

MATERIAL AND METHODS

The analyzed forages samples were harvested in March 31st, 2008, from a permanent pasture from Gradinari, a collinear village situated in Caras-Severin County. The average height of permanent pasture is around 190 m; the slope of relief is between 30-45 grades; the multi-annual average of temperature is 10.4^{o}C and the multi-annual average of rainfall is around 836 mm [Vîntu et al, 2007]. The experience was located on a brown soil argiloiluvial. The study was carried out in stationary field trial involving fertilization over a five year period 2003-2007. The permanent pasture was organized in ten trials with different doses of NPK and sheep manure fertilization, using the method of

randomized plots, in multiple stage blocks with five replications. The fertilization doses for all the ten trials are present in Table 1:

Table 1

The fertilization doses for all the ten trials of permanent pasture (Gradinari; Caras-Severin)

Experimental variants	Characterization of variants
GP1	unfertilized variant
GP2	20 t sheep manure
GP3	40 t sheep manure
GP4	60 t sheep manure
GP5	20 t sheep manure + 50 P
GP6	20 t sheep manure + 50 P + 50 K
GP7	20 t sheep manure + 50 N + 50 P + 50 K
GP8	100 N + 50 P + 50 K
GP9	150 N + 50 P + 50 K
GP10	100 + 100 N + 50 P + 50 K

G – Gradinari; P – permanent pasture, 1-10 –trials number

The botanical composition of permanent pasture from Gradinari (Caras-Severin) was made using geo-botanical method (Braun Blanque). The main species founded on permanent pasture from Gradinari were: *Festuca rupicola* and *Calamagrostis epigeios*. Other species were *Antohoxanthum odoratum*, *Briza media*, *Poa pratensis*, *Trifolium arvense*, *Trifolium medium*, *Genista tinctoria*, *and Lotus corniculatus*. From the other botanical families was presented *Filipendula vulgaris*.

Each sample harvested from the ten trials was dried in normal conditions (in shadow, appreciatively 24-28^{o}C) for two weeks. Then the forages samples were grounded and sieved under 0.3 mm diameter of particle.

Total nitrogen content was determined chemically using Kjeldahl method in conformity with AOAC, *method* 978.04. Digestion of samples (appreciatively 1g) was made with concentrated H_2SO_4 and cupric catalizator in DK6 Heating Digester Unit from Velp Scientific. Distillation of samples was made with UDK 127 Distillation Equipment from Velp Scientific. The 95% sulphuric acid, 0.1N sulphuric acid solution used for titration and 4% boric acid solution for ammonium capture were of pure grade (Merck, Germany). All solutions were prepared using deionized water. For all the samples the determination were made in triplicate. The results were reported to dry matter. The total crude protein content was calculated multiplying total nitrogen content with 6.25.

NIRS spectra were scanned with V 670 Spectrophotometer instrument by Abble-Jasco in the range 800-2500 nm. For all the samples the scan was made in triplicate.

Statistical interpretation of obtained results using Partial Last Square - Laverage regression model was performed with UNSCRAMBLE software.

RESULTS AND DISCUSSIONS

The results determinated for total crude protein content (%) by classical Kjeldahl method are summarized in Table 2:

Table 2

Total crude protein content (%) for forages from a permanent pasture (Gradinari; Caras-Severin) determinated by classical Kjeldahl method

Samples	Total crude protein - Kjeldahl [%]				
	1st Replicate	2nd Replicate	3rd Replicate	4th Replicate	5th Replicate
GP1	13.78	10.21	9.62	11.80	11.44
GP2	16.05	11.42	9.08	9.82	11.39
GP3	17.51	14.52	11.49	10.27	13.78
GP4	20.73	15.38	13.21	11.60	14.03
GP5	17.96	12.14	10.92	11.76	15.21
GP6	19.03	9.09	15.84	11.28	9.66

GP7	15.64	14.46	12.01	13.14	11.59
GP8	16.02	13.89	14.79	16.22	11.89
GP9	17.43	17.37	18.16	15.68	15.20
GP10	19.54	14.06	16.56	13.71	12.15

G – Gradinari, P – permanent pasture, 1-10 – trials number

PLS - Leverage model for the correlation of total crude protein (%) values determinated by Kjeldahl method with those for reflectance from NIR spectra is presented in Figure 1.

From Figure 1 it is possible to observe that the correlation coefficient R^2 for PLS – Leverage model, performed with the values obtained for total crude protein content (%) of forages by Kjeldahl method and all the reflectance values from NIRS spectra, is one very good, equal with 0.988726. The variance of regression coefficient decrease for all spectral domain (2500 to 800 nm), heaving the higher variation between 1900-2500 nm and smaller for 800-1900 nm. The number of principal components of PLS – Leverage model is around eight, and the distribution of analyzed forages samples function of the main principal components PC1 and PC2 is grouping in all quadrates of xy-axis.

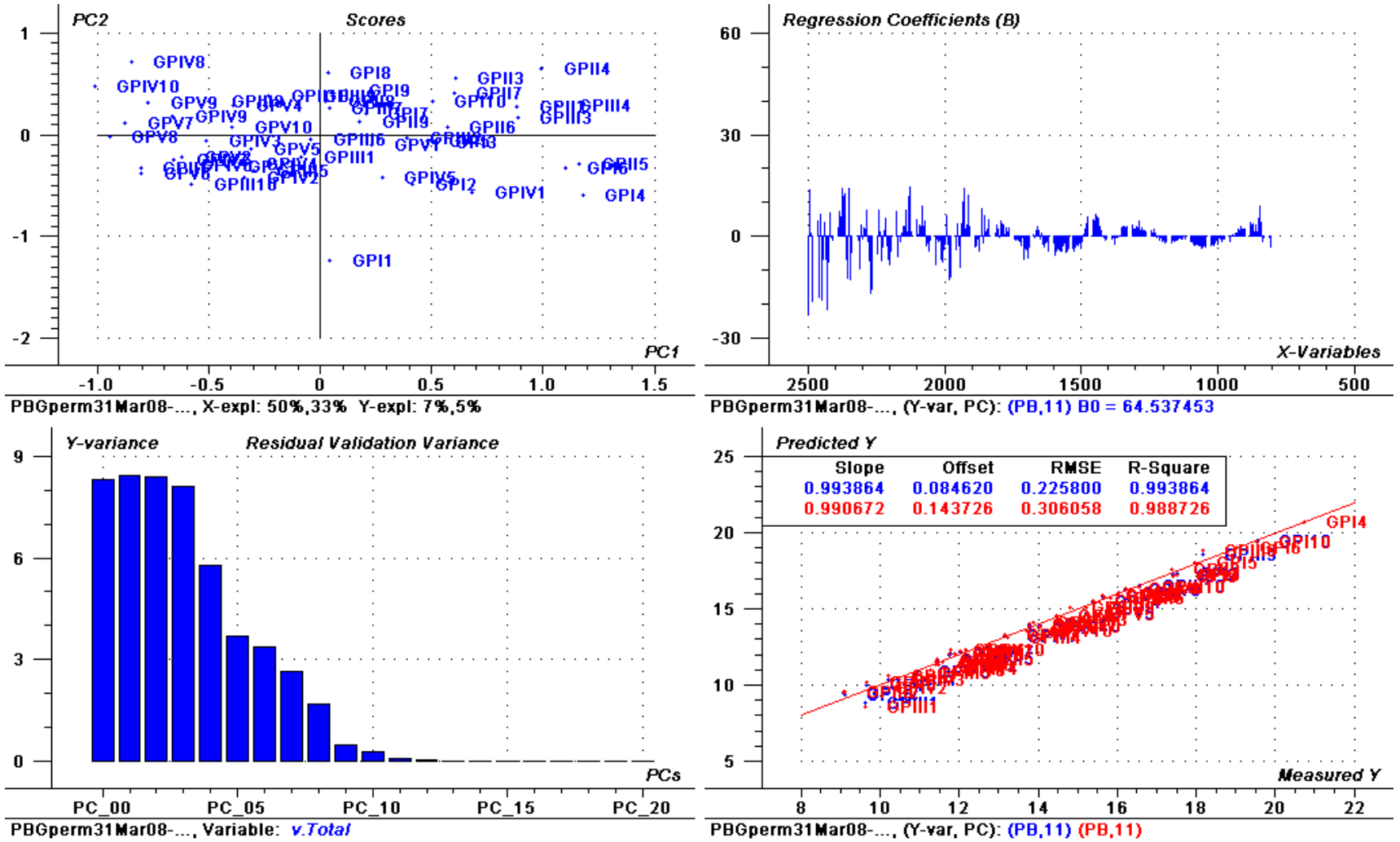

Figure 1. PLS - Leverage model for the correlation of total crude protein (%) values for analysed forages determinated by Kjeldahl method with those for reflectance from NIR spectra (800-2500 nm)

For external validation of obtained mathematical PLS – Leverage model were used other ten samples, processed in the same conditions with the samples used to perform PLS – Leverage model, harvested from the same permanent pasture, but in October 11th, 2007. The predicted values for the forages harvested in 2007, calculated with obtained PLS – Leverage model, presented comparatively with those obtained by chemical Kjeldahl method, are summarized in Table 3:

Table 3

The predicted values for the forages harvested in 2007 (Gradinari, Caras-Severin), calculated with obtained PLS – Leverage model, presented comparatively with those obtained by chemical Kjeldahl method

Samples names	Total Crude Protein Content – Kjeldahl method (%)	Predicted Total Crude Protein Content (%)	Deviation for Total Crude Protein Content (%)	Differences between predicted and real values for Total Crude Protein Content (%)
gp1	6.810	9.232	0.659	2.422
gp2	8.500	13.525	0.621	5.025
gp3	9.190	13.583	0.622	4.393
gp4	10.870	14.862	0.696	3.992
gp5	7.620	11.762	0.620	4.142
gp6	7.810	11.137	0.637	3.327
gp7	7.440	11.166	0.690	3.726
gp8	6.560	10.473	0.646	3.913
gp9	8.690	12.510	0.651	3.820
gp10	6.870	9.235	0.684	2.365

g – Gradinari, p – permanent pasture, 1-10 – trials number

The data from Table 3 shows that the differences between predicted and real values for Total Crude Protein Content (%) of forages are in range 2,365 - 5,025 %. These differences between real and predicted values are higher than the deviation of mathematical PLS – Leverage model (0,620 - 0,696 %) shows in Figure 2:

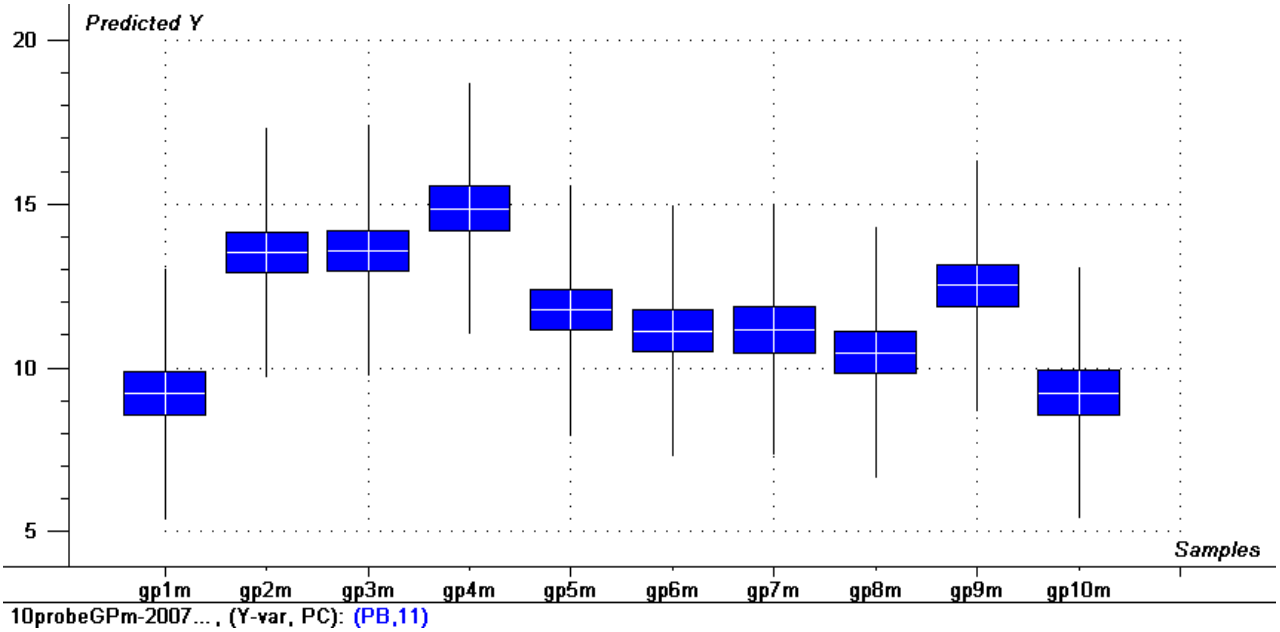

Figure 2. Deviation values for total crude protein content prediction using PLS – Leverage model

That means the obtained PLS – Leverage model is not so precise for total crude protein content (%) prediction, even the regression coefficient was 0.988726. One of the main causes can be the number of samples harvested, around fifty, which don't cover all

the possible seasonal variations of crude protein content of analyzed forages samples, and the different total nitrogen content of the soil which is influenced by the erosion processes caused by slope of permanent pasture relief.

CONCLUSIONS

The correlation coefficient R^2 for PLS – Leverage model, performed with the values obtained for total crude protein content (%) of forages by classical Kjeldahl method against all the reflectance values from NIRS spectra (800-2500nm), is one very good, equal with 0.988726. But even the regression coefficient was 0.988726 the mathematical model is not precise, because the differences between real and predicted values for total crude protein content are higher than the deviation of mathematical PLS – Leverage model

To obtain a valid mathematical model for prediction it is necessary to harvest a higher number of forages samples from the studied permanent pasture to cover better the possible variations depending on the botanical composition, on the seasonal variation of crude protein of plants, on the soil erosion processes caused by the slope of permanent pasture from Gradinari (Caraş-Severin).

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INFLUENȚA FERTILIZĂRII NPK ŞI CU GUNOI DE OVINE ASUPRA CONȚINUTULUI TOTAL DE PROTEINĂ BRUTĂ DIN FURAJELE RECOLTATE LA ÎNCEPUTUL PRIMĂVERII (2008) DE PE O PAJIŞTE PERMANENTĂ (GRĂDINARI; CARAŞ-SEVERIN)

THE INFLUENCE OF NPK AND SHEEP MANURE FERTILIZATION ON THE TOTAL CRUDE PROTEIN CONTENT IN FORAGES HARVESTED AT THE BEGINNING OF SPRING (2008) FROM A PERMANENT PASTURE (GRĂDINARI; CARAS-SEVERIN)

Hărmănescu Monica*, A. Moisuc

Key words: total crude protein content, forages, NPK fertilization, manure fertilization

ABSTRACT

În această lucrare ştiințifică sunt prezentate cercetările noastre legate de influența fertilizării minerale NPK şi cu gunoi de ovine asupra conținutului total de proteină brută din furajele recoltate la data de 31 martie 2008 de pe o pajişte permanentă de la Grădinari (Caraş-Severin). Pajiştea permanentă a fost organizată în zece variante experimentale cărora li s-au aplicat diferite doze de îngrăşăminte minerale NPK şi gunoi de ovine, pentru fiecare variantă înființându-se câte cinci repetiții. Conținutul total în proteină brută (%) al furajelor a fost determinat utilizând metoda Kjeldahl. Interpretarea statistică a rezultatelor obținute s-a realizat utilizând soft-ul Statistica 6.

Coeficientul de corelație obținut pentru conținutul total de azot din sol şi cel de proteină brută din furajele analizate este pozitiv şi egal cu 0.62. Coeficienții de corelație între conținutul total în proteină brută al furajelor şi formele mobile ale fosforului şi potasiului sunt de asemenea pozitivi şi egali cu 0.63, respectiv 0.42. Corelația între conținutul total în proteină brută al furajelor şi fertilizarea cu gunoi de grajd de ovine este pozitivă şi are un coeficient egal cu 0.52.

In this scientifically paper we present our researches regarding the influence of NPK and sheep manure fertilization on the total crude protein content (%) of forages, harvested in March 31st from a permanent pasture from Gradinari (Caras Severin). The permanent pasture was organized in ten experimental variants with different doses of NPK and sheep manure fertilization, and five repetitions for each variant. The total crude protein content (%) for forages was determinated by Kjeldahl method. To realize the statistical interpretation of obtained results was used Statistica 6 software.

The correlation coefficient between the total nitrogen content from the soil and total crude protein content of forages is positive and equal with 0.62. The correlation coefficients between total crude protein content of forages and mobile phosphorus and potassium from soil are also positive and equal with 0.63, respectively 0.42. The correlation between total crude protein content of forages and sheep manure fertilization is positive and has a coefficient equal with 0.52.

INTRODUCTION

Fertilisation has the most important role between the complex of measures used both for the increase of biomass production and for the improvement of nutritive values of forages, considering that the forages harvested from the meadow dislocate a high quantity

of soil nutritive elements: for 1 t dry matter are extracted 20-21 kg N, 6-8 kg P_2O_5, and 20-21 kg K_2O [Moisuc&Dukic, 2002].

The scientifically researches realised in our country accumulate a lot of data regarding the influence of the application period and the doses of minerals and organic fertilization on the forages production from meadow [Cardaşol&Oprea, 2001].

The fermented sheep manure is a complex organic fertilizer, responsible to the enrichment of the soil in humus, in the main nutritive elements, in some microelements, micro-organisms and its metabolites [Moisuc&Dukic, 2002].

The mineral fertilizers used contain nitrogen (assure the increase of vegetal biomass and crude protein content of forages), phosphorus (stimulate the formation of reproductive organs, favour the roots growth, increase the plants resistance to the drought, have positive effects on fraternity process) and potassium (stimulate the chlorophyll assimilation, regulate the water ratio of the plants, increase the plants resistance to the frost and diseases) [Şumălan, 2006; Moga et al, 1983].

The mineral fertilizers can be administrated individually (in dosses between 50-200 kg/ha N and 50-100 kg/ha P and K), mixture (NPK complex) or complementary to the organic fertilisation [Georgescu coord. et al, 2007].

The main objective of this study was to observe the influence of NPK and sheep manure fertilization on the total crude protein content (%) of forages, harvested in March 31st from a permanent pasture from Gradinari (Caras Severin).

MATERIAL AND METHODS

The analyzed forages samples were harvested in March 31st, 2008, from a permanent pasture from Gradinari, a collinear village situated in Caras-Severin County. The average height of permanent pasture is around 190 m; the slope of relief is between 30-45 grades; the multi-annual average temperature is 10.4^{o}C and the multi-annual average rainfall is around 836 mm [Vîntu et al, 2007].

The botanical composition of permanent pasture from Gradinari (Caras-Severin) was made using geo-botanical method (Braun Blanque). The main species founded on permanent pasture from Gradinari were: *Festuca rupicola* and *Calamagrostis epigeios*. Other species were *Antohoxanthum odoratum*, *Briza media*, *Poa pratensis*, *Trifolium arvense*, *Trifolium medium*, *Genista tinctoria*, *and Lotus corniculatus*. From the other botanical families was presented *Filipendula vulgaris*.

The experience was located on a brown argiloiluvial soil. The study was carried out in stationary field trial involving fertilization over a five year period 2003-2007. The permanent pasture was organized in ten trials with different doses of NPK and sheep manure fertilization, using the method of randomized plots, in multiple stage blocks with five replications. The fertilization doses for all the ten trials are present in Table 1:

Table 1

The fertilization doses for all the ten trials of permanent pasture (Gradinari; Caras-Severin)

Experimental variants	Characterization of variants
GP1	unfertilized variant
GP2	20 t sheep manure
GP3	40 t sheep manure
GP4	60 t sheep manure
GP5	20 t sheep manure + 50 P
GP6	20 t sheep manure + 50 P + 50 K
GP7	20 t sheep manure + 50 N + 50 P + 50 K
GP8	100 N + 50 P + 50 K
GP9	150 N + 50 P + 50 K
GP10	100 + 100 N + 50 P + 50 K

G – Gradinari; P – permanent pasture, 1-10 –trials number

The sheep manure was applied on the permanent pasture in first year (2003), and then after each two years. The mineral fertilizers NPK were applied yearly.

Each forages and soil sample harvested from the ten trials of the first replicate was dried in normal conditions (in shadow, appreciatively 24-28^{o}C) for two weeks. Then the forages and soil samples were grounded and sieved under 0.3 mm diameter of particle.

Total nitrogen content was determined chemically using Kjeldahl method in conformity with AOAC, *method* 978.04. Digestion of samples (appreciatively 1g for forages, respectively 0.5 g for soil samples) was made with concentrated H_2SO_4 and cupric catalizator in DK6 Heating Digester Unit from Velp Scientific. Distillation of samples was made with UDK 127 Distillation Equipment from Velp Scientific. The 95% sulphuric acid, 0.1N sulphuric acid solution used for titration and 4% boric acid solution for ammonium capture were of pure grade (Merck, Germany). All solutions were prepared using deionized water. For all the samples the determination were made in triplicate. The results for forages were reported to dry matter. The total crude protein content of forages was calculated multiplying total nitrogen content with 6.25.

Statistical interpretation of obtained results was made with Statistica 6 software.

RESULTS AND DISCUSSIONS

The results obtained for total crude protein content (%) by wet chemical Kjeldahl method, for the forages and soil samples harvested from the ten trials of the first replicate, and the main agrochemical soil parameters (pH, Humus, Total Nitrogen Content, NPK from fertilizers, Sheep Manure, P mobile form, K mobile form) are summarized in Table 2:

Table 2

The total crude protein content and the main agrochemical soil parameters (pH, Humus, Total Nitrogen Content, NPK from fertilizers, Sheep Manure, P mobile form, K mobile form)

Samples	CP %	pHS	Km	Pm	N%	H%	Nfert	Pfert	Kfert	Man
GP1	13.78	7.03	280	17	0.266	5.72	-	-	-	-
GP2	16.05	6.61	248	28	0.320	6.30	-	-	-	20
GP3	17.51	6.72	320	79	0.375	7.84	-	-	-	40
GP4	20.73	6.82	370	135	0.433	9.25	-	-	-	60
GP5	17.96	6.82	268	30	0.280	5.15	-	50	-	20
GP6	19.03	6.54	248	53	0.305	6.01	-	50	50	20
GP7	15.64	6.33	270	30	0.306	5.95	50	50	50	20
GP8	16.02	6.12	280	28	0.280	5.61	100	50	50	-
GP9	17.43	6.08	220	21	0.280	5.44	150	50	50	-
GP10	19.54	6.05	287	22	0.314	4.98	200	50	50	-

G – Gradinari, P – permanent pasture, 1-10 – trials number

H% - Humus; pHS – pH of soil; N% - Total Nitrogen Content of soil; Nfert, Pfert and Kfert – the quantity applied from mineral fertilizers, Man - Sheep Manure, Pm - mobile form of phosphorus, Km - mobile form of potassium

The correlation matrix for total crude protein content of analysed forages and the main agrochemical soil parameters (pH, Humus, Total Nitrogen Content, NPK from fertilizers, Sheep Manure, P mobile form, K mobile form) is presented in Table 3:

Table 3

Correlation matrix for total crude protein content of analysed forages and the main agrochemical soil parameters (pH, Humus, Total Nitrogen Content, NPK from fertilizers, Sheep Manure, mobile form of P, mobile form of K)

	PB	H%	N%	Nfert	Pfert	Pm	Kfert	Km	Gun	pHS
PB	-	0.40 p=0.259	0.62 p=0.054	0.16 p=0.660	0.14 p=0.696	**0.63* p=0.050**	0.08 p=0.822	0.42 p=0.233	0.52 p=0.126	-0.13 p=0.715
H%	0.40 p=0.259	-	**0.93*** p=0.000**	-0.50 p=0.144	**-0.68^{o} p=0.030**	**0.95*** p=0.000**	-0.50 p=0.143	**0.80** p=0.006**	**0.91*** p=0.000**	0.45 p=0.191
N%	0.62 p=0.054	**0.93*** p=0.000**	-	-0.29 p=0.424	-0.55 p=0.103	**0.94*** p=0.000**	-0.39 p=0.269	**0.82** p=0.004**	**0.91*** p=0.000**	0.27 p=0.449
Nfert	0.16 p=0.660	-0.50 p=0.144	-0.29 p=0.424	-	0.58 p=0.081	-0.42 p=0.231	**0.71* p=0.022**	-0.27 p=0.444	-0.60 p=0.067	**-0.88^{ooo} p=0.001**
Pfert	0.14 p=0.696	**-0.68* p=0.030**	-0.55 p=0.103	0.58 p=0.081	-	-0.48 p=0.163	**0.82** p=0.004**	-0.53 p=0.120	-0.52 p=0.124	**-0.70^{o} p=0.025**
Pm	**0.63* p=0.050**	**0.95*** p=0.000**	**0.94*** p=0.000**	-0.42 p=0.231	-0.48 p=0.163	-	-0.39 p=0.271	**0.82** p=0.000**	**0.93*** p=0.000**	0.39 p=0.272
Kfert	0.08 p=0.822	-0.50 p=0.143	-0.39 p=0.269	**0.71* p=0.022**	**0.82** p=0.004**	-0.39 p=0.271	-	-0.46 p=0.183	-0.53 p=0.115	**-0.87^{oo} p=0.001**
Km	0.42 p=0233	**0.80** p=0.006**	**0.82** p=0.004**	-0.27 p=0.444	-0.53 p=0.120	**0.82** p=0.004**	-0.46 p=0.183	-	**0.73* p=0.017**	0.40 p=0.248
Gun	0.52 p=0.126	**0.91*** p=0.000**	**0.91*** p=0.000**	-0.60 p=0.067	-0.52 p=0.124	**0.93*** p=0.000**	-0.53 p=0.115	**0.73* p=0.017**	-	0.51 p=0.133
pHS	-0.13 p=0.715	0.45 p=0.191	0.27 p=0.449	**-0.88^{ooo} p=0.001**	**-0.70* p=0.025**	0.39 p=0.272	**-0.87^{oo} p=0.001**	0.40 p=0.248	0.51 p=0.133	-

* Correlations are positive significant at p <0.05; ^{o} Correlations are negative significant at p <0.05;

** Correlations are positive distinctive significant at p <0.01; ^{oo} Correlations are negative distinctive significant at p <0.01

*** Correlations are positive very significant at p <0.001; ^{ooo} Correlations are negative very significant at p <0.001

From the data presented in Table 3 it is possible to observe that the total crude protein content of forages harvested from all the ten trials of first replicate in March 31st 2008 correlate positive with the total nitrogen content of the soil (r=0.62, p=0.054), soil humus (r=0.40, p=0.259) (Figure 2), sheep manure applied (r=0.52, p=0.126) (Figure 1), mobile form of potassium from soil (r=0.42, p=0.233) (Figure 2). Between NPK mineral fertilizers and total crude protein content is a positive correlation, but the coefficients are in the range 0.08 – 0.16 (Figure 1).

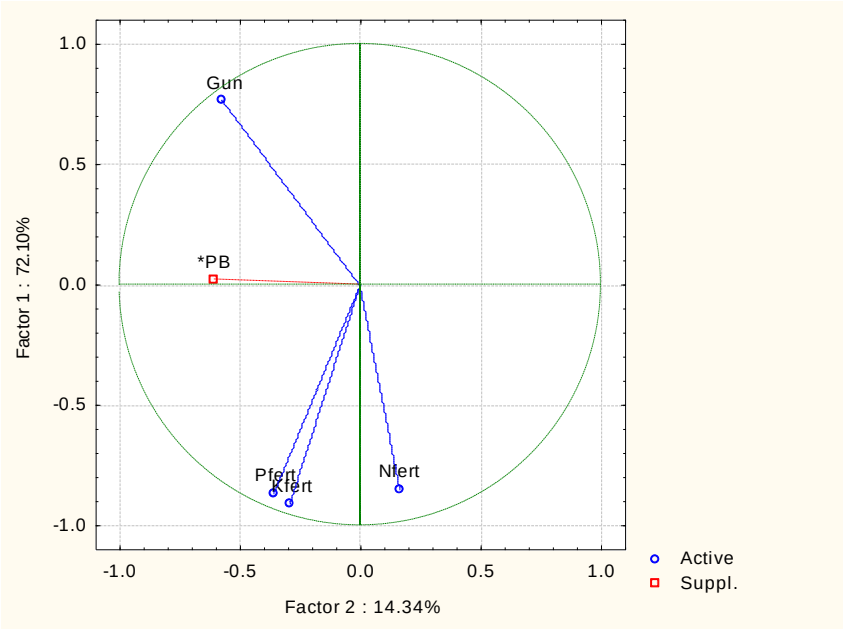

Figure 1. Correlation between total crude protein content of analysed forages and different mineral and organic fertilization applied of the soil from permanent pasture from Grădinari (Caraş-Severin)

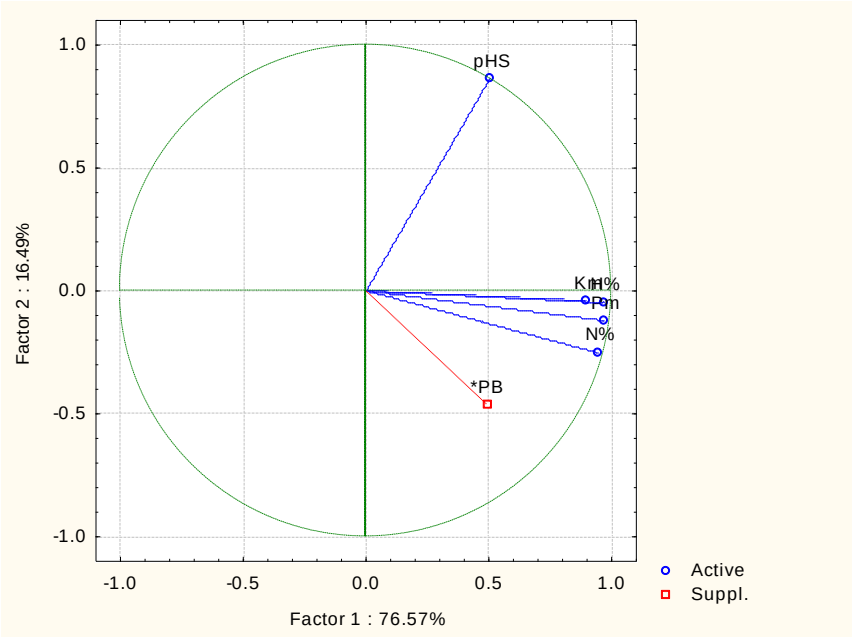

Figure 2. Correlation between total crude protein content of analysed forages and the main indicators of the soil (pH, humus, total nitrogen content, the mobile form of phosphorus and potassium) from permanent pasture from Grădinari (Caraş-Severin)

Organic fertilization with sheep manure is responsible with the enrichment of soil in humus, (the correlation being positive and very significant, r = 0.91, p<0.001) and increased very significantly the soil total nitrogen content (r = 0.91, p<0.001). The nitrogen from soil is accessible for the plants like NO_3^- and NH_4^+. In soil NH_4^+ behave like a cation, being adsorbativ kept by the soil clay, in plant passing by active absorption with energy consume. NO_3^- behaves like an anion in the soil, passing to the plants by diffusion processes, without energy consume [Davidescu&Davidescu, 1992].

The organic fertilization determine also a better supply of soil with Pm and Km, in the first case the correlation is positive and very significant (r = 0.93, p<0.001), and in the second the correlation is positive and significant (r = 0.73, p<0.05). The correlation between the mobile form of phosphorus from soil and the total content of crude protein

from analyzed forages is positive and significant, r=0.63 and p=0.050. The main nutritive phosphorus ions for the plants are $H_2PO_4^-$ and HPO_4^{2-}, the most accessible being $H_2PO_4^-$, followed by HPO_4^{2-} [Davidescu&Davidescu, 1992]. The phosphorus ions, unlike the nitrogen ions (NO_3^-, NH_4^+), can not be easily remove from the first five cm of soil [Ianoş et al, 1997]. The efficiency of nitrogen fertilizers increased when the plants are supply with easy assimilation forms of phosphorus and potassium [Davidescu&Davidescu, 1992].

The correlation between the mobile form of potassium from soil and the total content of crude protein from analyzed forages is positive, r=0.42 and p=0.233. The presence of potassium in plants determines the apparition of the potential responsible to the cell membrane movements. Also it has an important role in the maintaining of cell acid-basic equilibrium, in the transport of photosynthetic products, on the water retention process in the cell, increased the plants resistance against the unfavourable environmental conditions [Sumalan, 2006].

Analyzing statistically the correlation coefficients between Nfert–pHS (r=-0.88), Pfert-pHS (r=-0.70) and Kfert – pHS (r=-0.87) it is possible to concluded hat NPK mineral fertilisation determine the decrease of soil pH, unlike the organic fertilization with manure sheep, when the correlation coefficient is positively, equal with 0.51, and p=0.133. The most significant influence on the pH decrease of soil has nitrogen (p<0.001), followed by potassium (p<0.01) and phosphorus fertilizers (p<0.05).

CONCLUSIONS

The correlation coefficient between the total nitrogen content from the soil and total crude protein content of forages samples harvested from all the ten trials of first replicate of permanent pasture from Gradinari (Caras-Severin), in March 31st 2008, is positive and equal with 0.62. The correlation coefficients between total crude protein content of analyzed forages and mobile phosphorus and potassium from soil are also positive and equal with 0.63, respectively 0.42. The correlation between total crude protein content of forages and sheep manure fertilization is positive and has a coefficient equal with 0.52.

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The authors are grateful to Assist. PhD. Veronica Sărățeanu for the determination of botanical composition from studied permanent pasture, to PhD Student Doru Laieş who is responsible with the fertilisation of permanent pasture from Gradinari, to collective from OSPA Timiş for the soil analyses, and to collective from Ecological and Durable Agriculture and Food Safety Laboratory (Banat's University of Agricultural Sciences and Veterinary Medicine Timişoara) for the possibility to use Kjeldahl Equipment from Velp Scientific.

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CERCETĂRI PRIVIND INFLUENȚA FERTILIZĂRII MINERALE ASUPRA PRODUCȚIEI LA SOIA CULTIVATĂ ÎN CONDIȚIILE PEDOCLIMATICE DE LA SCDA CARACAL

RESEARCH REGARDING THE INFLUENCE OF MINERAL FERTILIZATION TO THE YIELD ON SOYBEAN CULTIVATED IN THE PEDOCLIMATICAL CONDITIONS FROM SCDA CARACAL

Matei Gh., Petrescu E., Vilau N., Roşculete C.

Keywords: soybean, yield, mineral fertilization

ABSTRACT

În lucrarea de față sunt prezentate rezultate privind influența aplicării unei fertilizării minerale la cultura de soia în condițiile de climă şi sol de la SCDA Caracal. Cultivată în cultură principală pe cernoziomul argic din Câmpia Caracalului soia a reacționat favorabil la aplicarea macroelementelor, în special a azotului şi fosforului, fapt ce a dus la realizarea unor producții bune de boabe, însă cu fluctuații mari de la un an la altul în funcție de regimul pluviometric al anului în care s-a experimentat. În medie pe cei 2 ani de experimentare valoarea producțiilor a fost cuprinsă între 11,71 q/ha la varianta nefertilizată şi 20,43 q/ha la varianta unde dozele de azot şi fosfor au avut valoarea de 120 kg/ha substanță activă.

Din punct de vedere al calității recoltei obținute se poate reține ca aplicarea unei fertilizării minerale a condus la creşterea conținutului de proteină şi azot din boabele de soia, macroelementele influențând în mod diferit această creştere în funcție de nivelul de fertilizare aplicat. Creşteri foarte semnificative ale conținutului de proteină au fost observate la variantele unde s-a aplicat doze crescute de azot pe fond de fosfor unde nivelul mediu a fost de 38,31% proteine la o fertilizate cu fosfor in doze de P_{40}.

In this paper we present results regarding the influence of the applied mineral fertilization at the soybean crop made in the pedological and climatically conditions from SCDA Caracal. The soybean crop realized on the chernozem from the Caracal plain registered a favorable reaction to the applied macro elements, especially to the nitrogen and phosphorus levels and goes to the obtaining of good seed yields, but with big differences between the two experimented years due the rain fall regime on the vegetation period. In average on the experimented years the obtained yields varied between 11.71 q/ha on the unfertilized variant and 20.43 q/ha at the variant with nitrogen and phosphorus of 120 kg/ha active substances.

From the yields quality point of view we can say that the application of the mineral fertilization conduct to significant increase of the protein and nitrogen levels into the soybean seeds, the macro elements having different influence to the seed content. Very significant increases of the protein level were observed at the variants with high level of nitrogen on the backgrounds of phosphorus with a value of 38.31% protein at the P_{40} variant.

INTRODUCTION

The soy bean is one of the most important species from the leguminosae group due the chemical compositions of seeds, reach in proteins and fat substances, and due the multiples use: in human alimentation, in industry, animal husbandry, etc. Having these features the soybean is considered the “wonder plant” or “gold plant” that has the role to ensure the world deficits of proteins.

In Romania the favorable areas for the soybean crop were limited by the rain fall

regime and the level of the obtained yields is strongly influenced by the natural fertility of the soil and levels of mineral fertilizers applied, especially by the nitrogen.

Regarding this two factors – humidity regime and level of fertilization – at the Agricultural Research and Development Station Caracal we take into study few varieties of soybean in different conditions of fertilization to establish the most valuable level of macro elements for this crop cultivated on chernozem.

MATERIAL AND METHODS

The research was carried out at the Agricultural Research and Development Station Caracal due the 2006 and 2007 years on chernozem soil with good natural fertility.

The experience has three factors:

A Factor - Phosphorus level (kg/ha):

A1= 0

A2= 40

A3= 80

A4= 120

B Factor - Potassium level (kg/ha):

B1= 0

B2= 80

B3= 40

C Factor - Nitrogen level(kg/ha)

C1 = 0

C2 = 30

C3 = 60

C4 = 90

C5 = 120

As an experimented variety we use Pacific with a density of 45 germinable seeds/m^2. The witness used for the statistically interpretation was the unfertilized variant ($N_0P_0K_0$).

RESULTS AND DISCUSSIONS

The two experimented years were different as favorability for soybean culture in non irrigated conditions: 2006 was considered a normal year for soybean culture; 2007 was unfavorable year due the very strong drought who affected all the crops from the Caracal plain (fig. 1). As it can be observed the rain fall regime on the period of vegetation at the soybean in 2007 is situated below the level of multi annual registered precipitations with a high deficit in April and July.

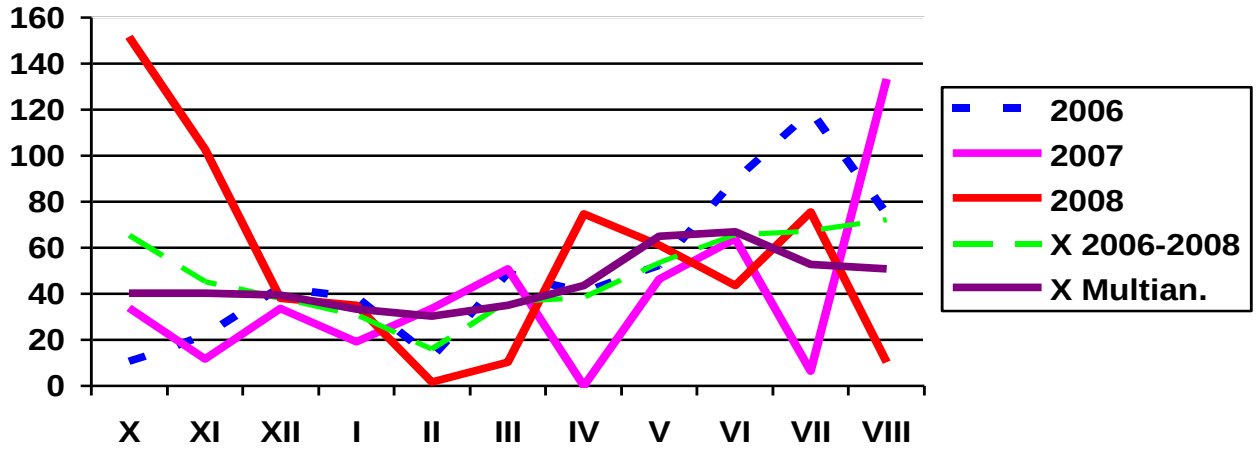

Fig. 1 – The rainfall regime on the experimented years in comparison with the multi annual average

The influence of A factor – phosphorus levels

The application of the phosphorus at the soybean crop has conduct to increase of yields in both experimented years. As it can be observed in table 1 the level of productions has high values in 2006 comparative those from 2007 years. The average yields on the experimented years varied between 14.43 q/ha at the unfertilized variant and 17.54 q/ha on variant with highest levels of phosphorus – P_{120}. Related to the witness distinct significant increases in production were obtained on P_{80} and P_{120} variants with a plus production of 2.81 q/ha, respectively 3.11 q/ha.

Table 1

The influences of the applied phosphorus to the soybean yield

A FACTOR Phosphorus level (kg/ha s.a.)		Yield (q/ha)		Average yields 2006-2007 (q/ha)	Differences		Signif.
		2006	2007		q/ha	%	
A 1	P 0	23,55	5,31	14,43	MT	100	MT
A 2	P 40	26,11	5,66	15,89	1,46	110,1	*
A 3	P 80	28,68	5,80	17,24	2,81	119,5	**
A 4	P 120	29,15	5,93	17,54	3,11	121,6	**
DL 5%		1.7	0.2		1.0		
DL 1%		3.2	0.3		1.8		
DL 0.1%		7.1	0.8		4.0		

The influence of B factor – potassium levels

The second factor studied proved to be also important in mineral nutrition of the soybean crop. In 2006 the most valuable level of potassium prove to be K_{80} with a plus production of 1.92 q/ha. In the conditions of 2007 with high lack of rain the influence of potassium to the yield was smaller than the previous year with a plus production of 0.14 q/ha at the same level of K_{80}.

In average the increases in production in comparison with the witness were statistically considered as significant and those increases were ensured on the K_{80} variant which registered a plus production of 6.6% related to the unfertilized variant (table 2).

Table 2

The influences of the applied potassium to the soybean yield

B FACTOR Potassium level (kg/ha s.a.)		Yield (q/ha)		Average yields 2006-2007 (q/ha)	Differences		Signif.
		2006	2007		q/ha	%	
B 1	K 0	25.80	5.59	15.70	MT.	100	MT
B 2	K 80	27.72	5.73	16.73	1.03	106.6	*
B 3	K 40	27.10	5.71	16.41	0.71	104.5	-
DL 5%		1.5	0.1		0.8		
DL 1%		2.2	0.2		1.2		
DL 0.1%		3.3	0.4		1.9		

The influence of C factor – nitrogen levels

From the point of view of obtained yields the nitrogen proved to be the most important macro elements in the development of the plants and the formation of the productions elements. The yields in 2006 have high values which varied between 22.93 q/ha at N_0 level and 30.69 q/ha at N_{120} level. Very good productions were obtained in this year also on the N_{90} variant with a production of 29.27 q/ha, with a plus production statistically considered as very significant too (table 3).

Table 3

The influences of the applied nitrogen to the soybean yield

C FACTOR Nitrogen level (kg/ha s.a.)		Yield (q/ha)		Average yields 2006-2007 (q/ha)	Differences		Signif.
		2006	2007		q/ha	%	
C 1	N 0	22.93	4.17	13.55	MT.	100	MT.
C 2	N 30	24.64	4.97	14.81	1.26	109.3	-
C 3	N 60	26.84	5.67	16.23	2.68	119.8	**
C 4	N 90	29.27	6.63	17.95	4.40	132.5	***
C 5	N 120	30.68	6.94	18.81	5.26	138.8	***
DL 5%		2.7	0.3		1.5		
DL 1%		3.5	0.5		2.0		
DL 0.1%		4.6	0.7		2.7		

In 2007 due the extreme climatically conditions the levels of yields were smaller at all the experimented levels. Also the influence of the applied nitrogen was decreased by the lack of water in soil and the yields varied between 4.17 q/ha and 6.94 q/ha, levels with small increase in productions related to the others experimented macro elements (phosphorus and potassium).

The levels of yields in average on the two experimented years were moderate due the special conditions from the second year. The most valuable variant of nitrogen fertilization has the one with highest level of nitrogen N_{120} of 18.81 q/ha, followed by the N_{90} with a production of 17.95 q/ha. These two variants registered very significant increases in production of 38.8% and respectively 32.5%.

The moderate level of N_{60} ensure a production difference related the level of witness statistically point of view as distinct significant, with a plus of 19.8%.

In the experimented conditions the favorable effect of the nitrogen is put in the light when the fertilizer was applied after the nodule formation.

The influence of phosphorus and nitrogen levels

The interaction of phosphorus and nitrogen has a significant influence to the soybean yields (table 4).

On the P_0 background, as a consequences of nitrogen applied, the productions were registered a higher level comparative to the situation when the phosphorus and

nitrogen were applied as unilateral elements. On this level of phosphorus the yields varied between 11.71 q/ha at the witness and 16.87 q/ha in the situation when we applied N_{120}. Statistically differences in production were observed only at the N_{120} and N_{90} variants with a plus production of 44.1 % and respectively 38.7%.

On the P_{40} background the values of the yields were higher than the previous background and put in to the light the contribution of the phosphorus at the yield's components. The increases in production varied between 1.12 q/ha (N_{30}) and 4.86 q/ha (N_{120}) and were statistically point of view ensured at N_{90} and N_{120} variants.

On the P_{80} background the yields has registered an increase in productions with values of 7.2% to 35.4% related to the unfertilized variant. Significant differences were observed at the variants with high levels of nitrogen N_{90} and N_{120}. The application of both macro elements gave on this background the most economically yields.

On the last backgrounds P_{120} the values of the yields were the highest from all the experimented variants and varied between 14.6 q/ha at the $P_{120}N_0$ and 20.43 q/ha at the variant with 120 kg/ha active substances.

Although on this level of phosphorus fertilization we obtained the most valuable production at all variants, the increases registered were small related the plus production per kilogram yield and the efficiency of fertilizer use is decreased. Based on these results we recommend using the level of P_{120} on soybean crop only in irrigated conditions.

Table 4

The influences of the applied phosphorus and nitrogen to the soybean yield

FACTORS		Yield (q/ha)		Average yields 2006-2007 (q/ha)	Differences		Signif.
		2006	2007		q/ha	%	
P 0	N 0	19.97	3.45	11.71	MT	100	MT
	N 30	21.43	4.91	13.17	1.46	112.5	-
	N 60	23.27	5.23	14.25	2.54	121.7	-
	N 90	25.97	6.51	16.24	4.53	138.7	*
	N 120	27.10	6.63	16.87	5.16	144.1	**
P 40	N 0	22.33	4.26	13.30	MT	100	MT
	N 30	23.90	4.93	14.42	1.12	108.4	-
	N 60	26.33	5.76	16.05	2.75	120.7	-
	N 90	28.47	6.58	17.53	4.23	131.8	*
	N 120	29.53	6.78	18.26	4.86	136.5	**
P 80	N 0	24.73	4.48	14.60	MT	100	MT
	N 30	26.23	5.06	15.65	1.05	107.2	-
	N 60	28.83	5.83	17.33	2.73	118.7	-
	N 90	31.03	6.64	18.84	4.24	129.0	*
	N 120	32.57	6.97	19.77	5.17	135.4	**
P 120	N 0	24.70	4.50	14.60	MT	100	MT
	N 30	27.00	5.14	16.07	1.47	110.1	-
	N 60	28.93	5.85	17.39	2.79	119.1	-
	N 90	31.60	6.79	19.20	4.60	131.5	*
	N 120	33.50	7.36	20.43	5.83	139.9	**
DL 5%		5.3	1.8		3.5		
DL 1%		7.1	2.7		4.9		
DL 0.1%		9.2	7.3		8.3		

The effect of the applied fertilizers to the quality of the seed yields at soybean cultivated on argic chernozem from SCDA Caracal.

The quality of the seed yields at soybean was appreciated by the protein content determinate at all the experimented variants. Due the phosphorus fertilization the protein and nitrogen contents have registered increases of level related the unfertilized variant. The highest level of protein was obtained in case of application of P_{40} level when we obtain 6.13% nitrogen and 38.31% protein (fig. 2).

Increasing the phosphorus level at P_{80} and P_{120} we observe a decrease of the protein level at 35.31% respectively 33.63%. The same situation was obtained in case of nitrogen content from the soybean seed.

The influence on long term of mineral fertilization is distinguished very clear in the nitrogen and protein content from the soybean seed (fig. 3). In the same time with the increase of the applied nitrogen level we observe the increase of the protein content from 34.5% at N_0 level to 37.5% at the N_{120} variant. The level of nitrogen content from the soybean seed has an increase trend with values from 5.52% at unfertilized variant to 6.0% at N_{120} level.

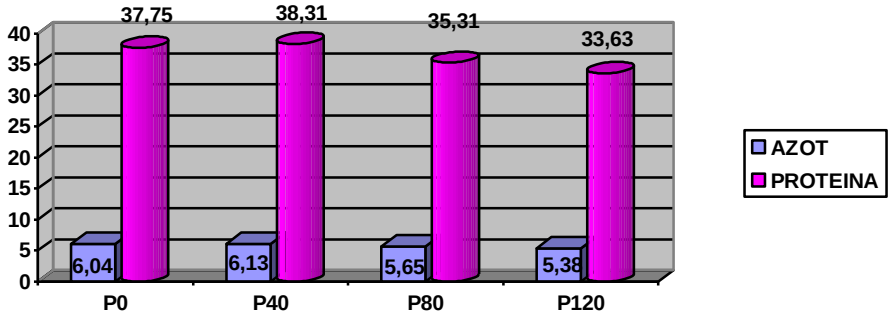

Fig. 2 – Nitrogen level and protein content (%) from the soybean seed under the phosphorus fertilization

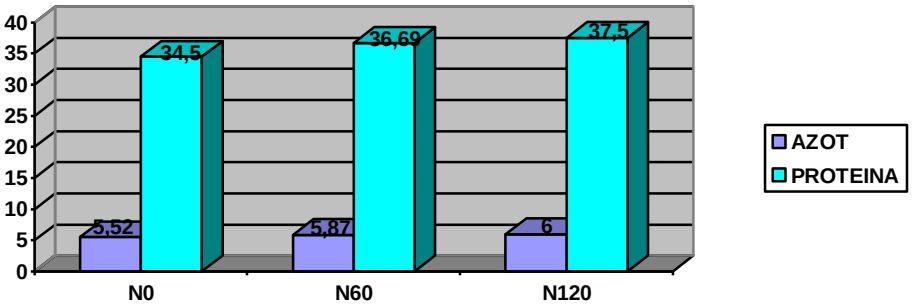

Fig. 3 - Nitrogen level and protein content (%) from the soybean seed under the nitrogen fertilization

The mineral fertilization with potassium has a small influence to the chemical content of the soybean seed related to the nitrogen and protein content. The differences between the experimented variants were small and the highest content of protein was obtained at the unfertilized variant of 36.44% (fig. 4).

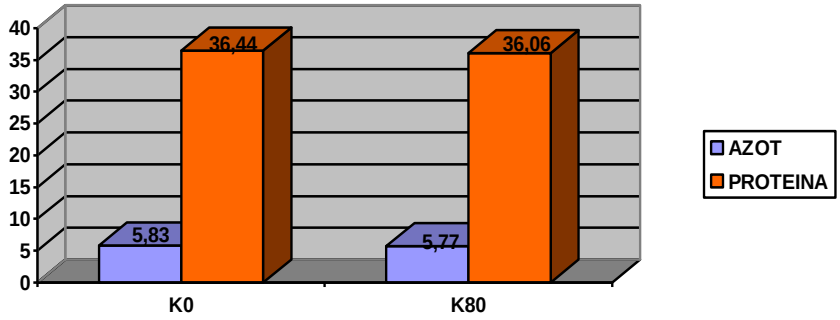

Fig. 4 - Nitrogen level and protein content (%) from the soybean seed under

CONCLUSIONS

From the presented data we con say that:

- the soybean crop cultivated on the argic chernozem from SCDA Caracal in non irrigated conditions gave good seed productions, but the level of yields is high influenced by the rain fall from the period of soybean vegetation;
- the three experimented macro elements – nitrogen, phosphorus and potassium - proved to have a different influence to the levels of the obtained yields;
- at the unilateral application of the phosphorus the highest yields were obtained at the P_{80} and P_{120} variants;
- the potassium fertilization registered significant increases in production only at K_{80} level of 16.73 q/ha;
- very significant increase in productions were observed at the nitrogen application at the variants with N_{90} and N_{120} with 4.40 q/ha and respectively 5.26 q/ha;
- the highest yields were obtained when the nitrogen was applied together with the phosphorus at the $P_{120}N_{90}$ and $P_{120}N_{120}$ variants;
- the quality of the soybean seed was appreciated due the protein content which has strongly influenced by the mineral fertilization applied to the culture.

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INFLUENȚA ASOLAMENTULUI ŞI FERTILIZĂRII DE LUNGĂ DURATĂ LA SCDA ŞIMNIC CRAIOVA ASUPRA FERTILITĂȚII NATURALE A SOLULUI

THE INFLUENCE OF THE CROP ROTATION AND LONG TERM FERTILIZATION AT SCDA SIMNIC CRAIOVA TO THE SOIL'S NATURAL FERTILITY

Matei Ghe., Păunescu Gabriel, Nicolescu M.i, Cojocaru Ileana

Keywords: crop rotation, long term fertilization, soil's natural fertility;

ABSTRACT

În lucrarea de față sunt prezentate rezultate obținute în urma studiului privind influența aplicării unei fertilizării minerale şi organice şi a sistemului de rotație şi asolamentului la principalele culturi agricole cultivate în experiențele de lungă durată de la Stațiunea de Cercetare – Dezvoltare Şimnic Craiova.

Sub influența fertilizării şi a asolamentului la nivelul solului de la SCDA Şimnic Craiova s-au înregistrat creşteri ale valorii respirației solului generate de activitatea microflorei bacteriene, cu valori mai ridicate la variantele fertilizate organic în asolamentele de 4 ani unde grâul urmează după floarea soarelui şi porumb.

Sunt constatate de asemenea creşteri ale pH-ului de la 5,7 la 6,1 sau 6,3 în funcție de varianta de fertilizare. Conținutului total de azot a înregistrat creşteri la fertilizarea minerală – varianta cu N100P60, iar fertilitatea naturală a solului a crescut în urma creşterii valorilor conținutului de fosfor mobil din sol şi a conținutului de potasiu din variantele de fertilizare cu N100P60 şi 20 t gunoi de grajd în rotațiile experimentate.

In this paper we present results regarding the study of the influence of the applied mineral and organic fertilization and of the crop rotation at the most cultivated species cultivated in long term experiences from the Agricultural Research Station from Simnic Craiova.

Under the influence of the fertilization and the crop rotation at the soil level from SCDA Simnic Craiova were registered increases of the soil breath generate by the soil's micro flora activity, with high rate on the organic fertilization at variants in the rotation of 4 years where the wheat follows the sun flower and corn crops.

They are also found increases in pH from 5.7 to 6.1 or 6.3 depending on the version of fertilization. Total nitrogen content recorded increases in mineral fertilization - the variants with N100P60, and natural fertility of the soil increased as a result of increasing amounts of content for mobile phosphorus from the soil and potassium content of variants of fertilization with N100P60,and 20 t of manure the rotations tested.

INTRODUCTION

The soil is regarded as the natural resource base of the agricultural efficient, productive and sustainable, while limited and more complex than air and water, representing the essential life support (Dumitru et al., 2005).

Evaluation of productive capacity, choosing the most appropriate way of land use and cultivation technologies, based on scientific and in relation to the favorability contributes to the conservation and sustainable growth of productivity.

Based on this reasons at the Agricultural Research and Development Station Simnic Craiova were made experiences aiming the influences of the crop rotation and fertilization systems thru the natural features of the soil.

MATERIAL AND METHODS

The research was carried out at the Agricultural Research and Development Station Simnic Craiova on the long term experiences on luvosoil with low natural fertility, having a pH of 5.8 to 6.0. The result from this paper belongs to the 2006 and 2007 years.

The humus content of the luvosoil from Simnic varied from 1.8% to 2.0% with easy assimilable phosphorus of 9.6 – 13.1 ppm, mobile potassium of 87.2 – 116.2 ppm and total nitrogen of 0.100% to 0.120% (Paunescu G. and oth., 2008).

The experience has two factors:

A Factor **– crop rotation:**

- **wheat monoculture;**
- 2 years rotation: wheat-corn;
- 3 years rotation: pea-wheat-corn;
- 4 years rotation: sunflower-wheat-corn-wheat.

B Factor **– levels of fertilization:**

- unfertilized variant;
- N_{100};
- P_{60};
- $N_{100}P_{60}$;
- 20 tons/ha manure.

The factors that we want to determinate has: the soil breath (mg CO_2/100 g soil), the level of pH in these rotations and the influence of the combined factors (crop rotation and level of fertilization) to the soil content of total nitrogen, level of assimilable phosphorus, mobile potassium and zinc content.

The witness used for the statistically interpretation was the unfertilized variant from all experimented crop rotation.

RESULTS AND DISCUSSIONS

Breath of soil averaged (between 30-80 mg CO_2/100 g soil) in most variants, except variant fertilized organic turnover in 4 years with wheat in the third year and the 4-year wheat in the first year, fertilized mineral and organic, where metabolic processes of micro flora had great intensity.

In tables 1 and 2 are presented statistical calculation and meanings for the intensity of soil respiration (mg CO2/100 g soil).

Related to the influence of the fertilization to the soil breath (table 1) it is obvious that the high intense soil breath was observed at all experimented variants where we applied 20 t/ha manure on all kind of rotation. The differences related to the withes were statistically point of view ensured as very significant. Also, in the 4 years rotation when the winter wheat follow after sunflower and corn, the differences in comparison with the witness variant were ensured as very significant, with increases of 17.31 mg CO_2/100 g soil and respectively 30.31 mg CO_2/100 g soil.

The crop rotation had a major influence thru the soil breath also (table 2). Related to the standard used – wheat in monoculture – we can observe that the intensity of soil breath was influenced only by the 4 years rotation: 4 years rotation: sunflower-wheat-corn-wheat, with very significant values registered at all variants excepting the variant of 4 years crop rotation on unfertilized background where the increase of the intensity of soil breath was with 9.75 mg CO_2/100 g soil higher that the witness.

Table 1

The influence of the fertilization to the soil breath related the crop rotation

A Factor	B Factor	Soil breath mg CO_2/100 g soil	Difference mg CO_2/100 g soil	Signification
Monoculture	Unfertilized	34.69	mt	-
	N100P60	39.92	+5.23	-
	20 t/ha manure	55.42	+20.73	xxx
2 years rotation: wheat-corn	Unfertilized	35.79	mt	-
	N100P60	34.69	-1.1	-
	20 t/ha manure	50.76	+16.07	xxx
3 years rotation: pea-wheat-corn;	Unfertilized	32.30	mt	-
	N100P60	31.59	-0.71	-
	20 t/ha manure	47.44	+15.14	xxx
4 years rotation: sunflower-wheat-corn-wheat	Unfertilized	44.43	mt	-
	N100P60	61.74	+17.3117.31	xxx
	20 t/ha manure	84.63	+40.2	xxx
4 years rotation: sunflower-wheat-corn-wheat	Unfertilized	73.23	mt	-
	N100P60	103.54	+30.31	xxx
	20 t/ha manure	98.69	+25.46	xxx

DL 5% = 5.81; DL 1% = 7.89; DL 0.1% = 10.70

Table 2

The influence of the crop rotation to the soil breath related to the fertilization

B Factor	A Factor	Soil breath mg CO_2/100 g soil	Difference	Signification
Unfertilized	Monoculture	34.68	mt	-
	2 years rotation: wheat-corn	35.79	+1.11	-
	3 years rotation: pea-wheat-corn;	32.30	-2.38	-
	4 years rotation: sunflower-wheat-corn-wheat	44.43	+9.75	xx
	4 years rotation: sunflower-wheat-corn-wheat	73.23	+38.55	xxx
N100P60	Monoculture	39.92	mt	-
	2 years rotation: wheat-corn	34.69	-5.23	-
	3 years rotation: pea-wheat-corn;	31.59	-8.33	o
	4 years rotation: sunflower-wheat-corn-wheat	61.74	+21.82	xxx
	4 years rotation: sunflower-wheat-corn-wheat	103.54	+63.62	xxx
20 t/ha manure	Monoculture	55.42	mt	-
	2 years rotation: wheat-corn	50.76	-4.66	-
	3 years rotation: pea-wheat-corn;	47.44	-7.98	o
	4 years rotation: sunflower-wheat-corn-wheat	84.63	+29.21	xxx
	4 years rotation: sunflower-wheat-corn-wheat	98.69	+43.27	xxx

DL 5% = 5.72; DL 1% = 7.93; DL 0.1% = 11.10

Breath of soil averaged between 30-80 mg CO2/100 g soil in most variants, except for variations, and chemical fertilized organic turnover in 4 years, the metabolic processes of soil micro flora had high intensity (figure 1).

Breath soil is determined almost entirely by all the 3 levels of fertilization of soil.

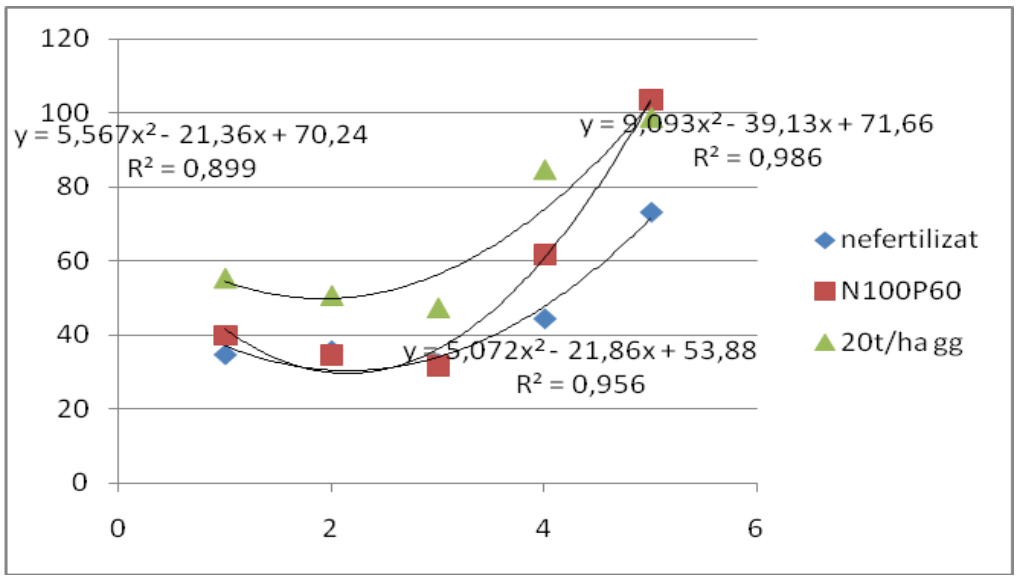

Fig. 1 - the influence of the crop rotation and fertilization to the soil breath (mg CO_2/100 g soil)

The luvosoil from SCDA Şimnic in unfertilized variant has a reaction, moderate acid, (pH = 5.6-5.9) in all rotations: wheat in monoculture, turns 2, 3 and 4 years rotation (figure 2). The pH values are lower at variant $N_{100}P_{60}$ with 0.1-0.4 pH units compared with the unfertilized variant from each rotation. This is due to acidification caused by nitrogen applied.

Applying the manure on luvosoil from SCDA Şimnic conduct to very significantly improves the acidity of soil in all rotations resulting in increased soil in response with 0.36-0.53 units.

On unfertilized agro found the pH remains constant in all rotations (5.7 - 5.8)
On $N_{100}P_{60}$ agro found the pH is a downward curve in turns 2 and 3 years (below 5.4) and get in the rotation for 4 years with a 4 units (5.8)

When applying to manure pH is between 6.1-6.3 in all rotations, registering an increase of 0.3-0.5 units.

The pH is determined at the rate of 93% of interaction rotation-fertilization at variance $N_{100}P_{60}$ (figure 2).

Soil acidity lowers the variant with chemical fertilizers N100P60 in rotations of 2-3 years with units to the 0.2-0.4 monocultures

Interaction nitrogen - pre-plant wheat has a significant influence on the variation of the duration of pH, such as pea, the pH values decrease more rapidly with the dose of nitrogen, probably due to the intake of important amoniacal symbiotic nitrogen fixed.

At the option not to intervene in fertilizers soil pH remained constant 5.7-5.8.

The interaction rotation - with the fertilization of stable manure, leading to an increase in soil pH from 5.7 to 6.1-6.3.

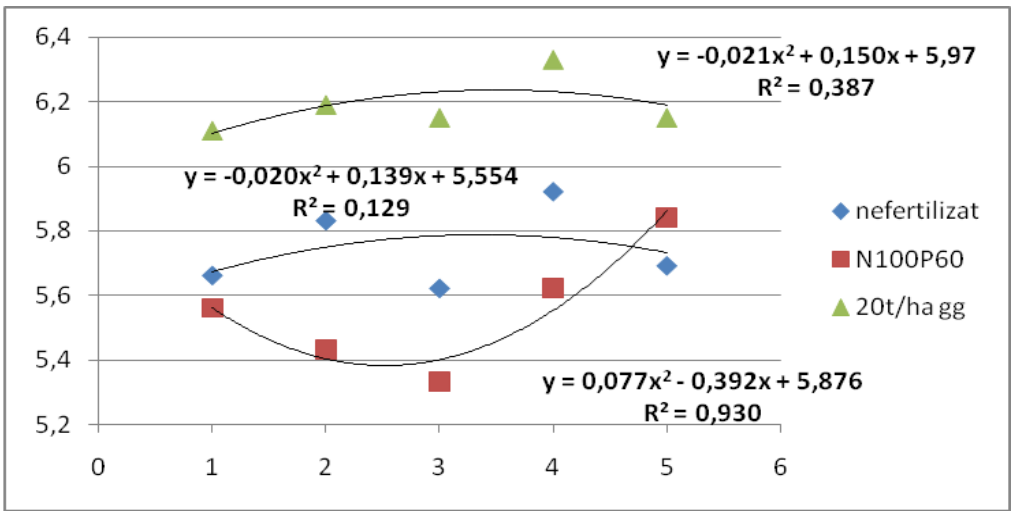

Fig. 2 – The influence of the crop rotation and fertilization to the soil pH

The luvosolul from SCDA Şimnic has a total nitrogen content of 0.110% to 0.120%.

The total nitrogen content is influenced by fertilization, and fewer than the rotation. A significant increase in the total nitrogen content is going to the variants fertilized with nitrogen and phosphorus ($N_{100}P_{60}$) and trash from stable, adult witness unfertilized ranging between 0.019% and 0.067%. It notes that high total nitrogen content is in monocultures of wheat from variant fertilized with the manure – 0.202%.

In unfertilized variant the nitrogen content is low, with values lower turnover in 4 years (0.131%).

In variant fertilized with the manure of stable nitrogen content recorded higher values in both monocultures (0.202%), and other rotations of 2-4 years (0.186-0.189%).

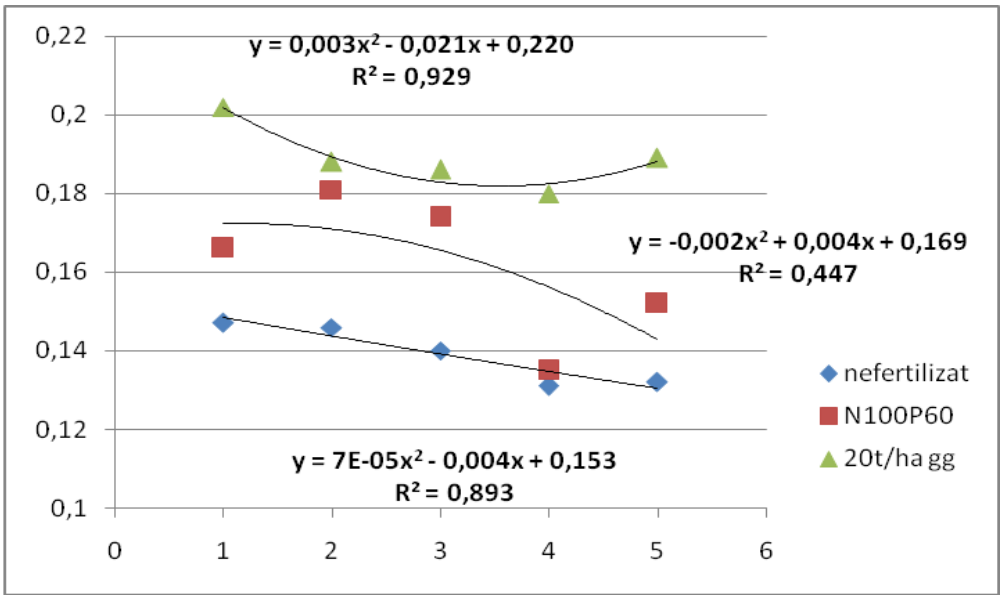

Fig. 3 – The influences of the crop rotation and fertilization to the soil content in total nitrogen

The mobile phosphorus content on luvosolul from Şimnic is low - PAL 9.6-13.1 ppm.

A significant increase in the mobile phosphorus content was meet at variants $N_{100}P_{60}$ fertilized with the manure and stable, but only in monocultures of wheat in the rotation of 2 year: wheat-corn.

The content of mobile phosphorus in the soil decreases as the variant $N_{100}P_{60}$, and the trash from the stable monocultures of 125 mg / kg to 40-49 mg / kg. The content of phosphorus in the soil at the unfertilized variant is very low (between 23-32 mg / kg).

In the case of phosphorus content, the highest influence has the fertilization with $N_{100}P_{60}$ and garbage shed the light of the determination coefficients of 95% and 87% (figure 4).

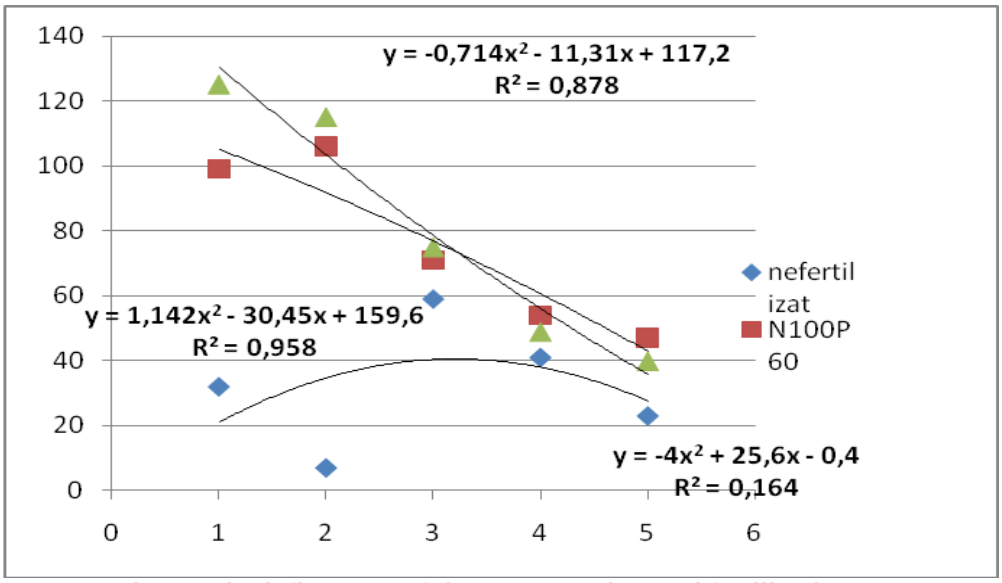

Fig. 4 - The influences of the crop rotation and fertilization to the soil content phosphorus

The mobile potassium content is middle KAL 123-148 pm on luvosoil from SCDA Şimnic. In experiments with the rotation growth in mobile potassium is observed in all rotations and especially the variant fertilized with the manure from stable.

The potassium content is almost constant at unfertilized variant and on $N_{100}P_{60}$ variant with the few exceptions to the latter.

The content of mobile potassium is the highest at variance with the trash and stable rotation in 3 years (400 mg / kg) (figure 5).

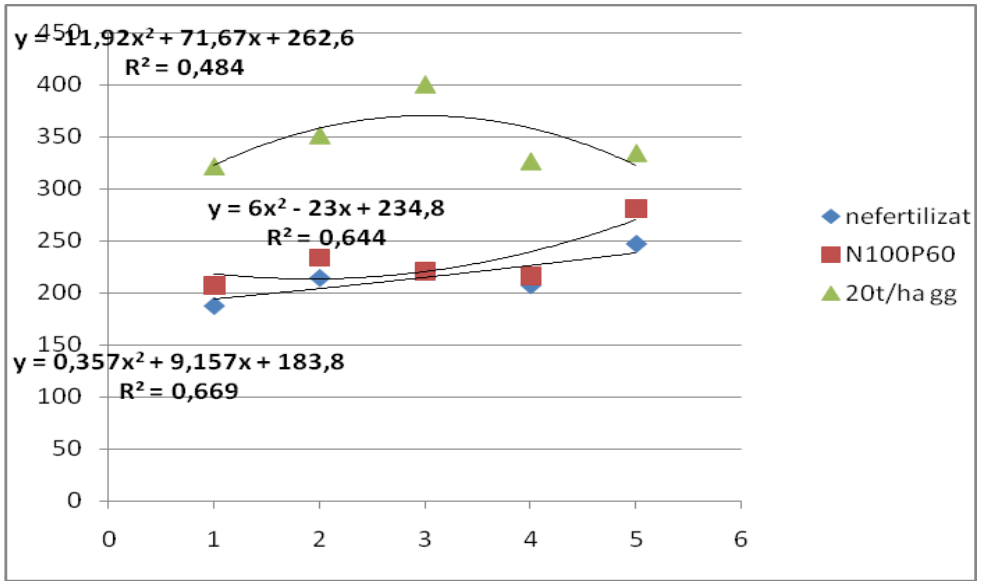

Fig.5. The influences of the crop rotation and fertilization to the soil content in potassium

CONCLUSIONS

From the presented data we can say that:

- under the fertilization and crop rotation in the long term experiences from SCDA Simnic Craiova the soil breath registered very significant increases of intensity at the fertilizes variants with $N_{100}P_{60}$ and 20 tons manure/ha;
- the pH was stabilized at the values of 5.7 – 5.8 on variants without fertilization, but were registered very significant increases at the values under the influences of fertilization and crop rotation (of 93%);
- the natural fertility of the soil has registered increases at all fertilized variants but the most valuable proved to be the variants with $N_{100}P_{60}$ and 20 tons/ha manure on the 4 years rotation of wheat-corn-wheat-sunflower;
- the values of assimilable phosphorus and mobile on variants from the experimented crop rotation has increase to high and constant values.

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CERCETARI PRIVIND ELABORAREA UNEI TEHNOLOGII CU GRAD REDUS DE POLUARE PENTRU COMBATEREA PATOGENILOR, DAUNATORILOR SI BURUIENILOR LA CULTURA DE TOMATE IN CAMP

RESEARCHES CONCERNING THE ELABORATION OF A TECHNOLOGY WITH LOW POLLUTION DEGREE TO CONTROL THE PATHOGEN AGENTS, PESTS AND WEEDS AT THE FIELD TOMATOES CULTURE

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Key words: pathogen, pest, tomatoes, control

ABSTRACT

In aceasta lucrare sunt prezentate rezultatele cercetarilor privind tehnologia cu grad redus de poluare pentru combaterea patogenilor, daunatorilor si buruienilor la cultura de tomate in camp.

Prin aplicarea tehnologiei cu grad redus de poluare, unde s-a urmarit fluxul tehnologic cu: posibilitatea optionala a erbicidarii amplasamentului, astfel: 3-4 zile inainte de plantarea rasadului de tomate in camp, cu Dual 960 Gold, iar la mijlocul perioadei de vegetatie, in functie de prezenta/absenta buruienilor in cultura, cu erbicidul Fusilade forte; prevenirea si combaterea patogenilor si daunatorilor prin tratamente foliare cu pesticide (fungicide, insecticide si acaricide), "prietenoase" pentru plante de tomate si risc redus pentru utilizator si consumator; aplicarea unor fertilizari extraradiculare cu biostimulatori in majoritatea cazurilor de natura vegetala. S-a obtinut o productie de 7,450-7,900 kg/mp.

In this study are presented the results of the researches regarding the low degree pollution technology for controlling the pathogen agents, pests and weeds at the autumn field tomatoes culture.

By applying the low degree pollution technology, the technological flow was followed with: the optional possibility of using herbicides on the location as follows: 3-4 days before planting the tomato seedling in the field, with Dual 960 Gold and in the middle of the vegetation period, depending of the presence/absence of the weeds in the culture, with Fusilade forte; pests prevention and control through foliar treatments with pesticides (fungicides, insecticides and miticides), "friendly" for the tomato plants and with low risk for the user and consumer; applying root fertilization with biostimulation in most of the vegetable cases. A production of 7,450-7,900 kg/mp was obtained.

INTRODUCTION

In obtaining sure and stable productions the protection of plants has a very important role, by establishing an efficient technological complex ment to prevent or to maintain below the damage limit the pests and pathogenic agents, this being necessary because lately the climatic conditions have favorized the appearance of deseases and pests at this vegetable species.

In realizing big productions of tomatoes, according to the productive potential of the cultivated soil, a very important link reffers to the concept of using the "tollerance limit" – in controlling the weeds.

In this paper are presented technological links with low pollution degree that protect the field tomatos cultures from the specific pests and weeds, by using several pesticides “friendly” to this species and with a low risk for the environment, user and consumer.

MATERIALS AND METHODS

The work was done using Rio Grande tomato variety for industrialization.

The monitored experimental variants were the following:

V1 = technological variant with low pollution degree, comprising the following technological links:

a. – for preventing and controlling the pathogenic agents 8 treatments with Bouille bordelaise 0,75% were made, at intervals of 7-10 days; first treatment when the flowers from the inflorescence have o,5 – 1,0 cm.;

b. - for preventing and controlling the pests treatments with Chess 0,04% were made (2 treatments), Mospilan 0,04% (2 treatments), Laser 0,06% (1 treatment), Milbeknock 0,075% (2 treatments);

c. – weekly root fertilization with:

- Kendal 0,3% + Megafol 0,3%, one week after planting, then at intervals of 7 days as follows:
- Cropmax 0,1% + Agroleaf high P 0,3%;
- Kendal 0,3% + Brexil combi 0,3%;
- Cropmax 0,1% + Agroleaf total 0,3%;
- Megafol 0,3% + Plantafol 20-20-20 0,3%;
- Cropmax 0,1% + Agroleaf total 0,3%;
- Kendal 0,3% + Calbit C 0,3%;
- Cropmax 0,1% + Agroleaf K 0,3%;

d. – erbicides formula:

- 3-4 days before making the culture Dual 960 Gold was applied 1,0 litru/ha. + 2 manual weeder + mechanical weeder;
- after the middle of the vegetation perio, depending on the presence/absence of the weeds in the culture Fusilade forte erbicide is applied 0,8 liters/ha.

V2 = idem **V1,** without erbicides;

V3 = variant with conventional treatments as follows:

a. in order to prevent and control the pathogenic agents 4 treatments were made (1,3,5,7) with Previcur 607 SL 0,15% + Dithane M 45 0,2% and 4 treatments (2,4,6,8) with Dithane M 45 0,2% + Topsin 0,1%

b. in order to prevent and control the pests treatments were made with Confidor 70 WG 0,02% (2 treatments), Confidor energy 0,1% (2 treatments), Vertimec 0,09% (1 treatment), Sanmite 0,075% (2 treatments).

V4 = variant without treatments

Observations were made regarding:

- structure of the weeds, of the pathogenic agents and of the pests;
- frequency and intensity of the attack using scales specific to pathogenic agents and pests;
- dynamics of the harvesting.

When the small plants were planted, the density in the technology of the culture was respected; also we mention that the irrigation was made by dripping and for fertilization 100 kg/ha Complex fertilizer was administered weekly 20:20:20.

RESULTS OF THE RESEARCH

In the interval 2006 - 2008, the climatic conditions, with large temperature variations, determined a certain structure of the pathogenic species, pests and weeds, influencing their appearance and their evolution.

Thus, after the surveillance made in the south part of the country, it was established that the pathogenic agents with a high frequency in the previous years were: *Septoria lycopersici, Alternaria solani* and *Phytophthora infestans*. The pathogenic agents: *Phytophthora parasitica, Colletotrichum coccodes, Xanthomonas campestris pv. vesicatoria and Pseudomonas syringae pv. Tomato* appeared with a reduced frequency of attack in the autumn cultures

In what concerns the pests, it was observed that the red spider – *Tetranychus urticae* was the main species; also there were other pests studied*: Macrosiphum euphorbiae, Myzodes persicae and Thrips tabaci* .

Regarding the structure of the weeds it was observed the presence of the species*: Echinochloa crus-galli* and *Sorghum halepense* from monocotyledons (44,5%) and *Amaranthus retroflexus, Capsella bursa-pastoris, Hibiscus trionum, Convolvulus arvensis, Galinsoga perviflora and Polygonum oleraceea* from dycotyledons (55,5%).

The experimental results at this vegetable species are presented in the tables below (tables 1 - 3).

Table 1

Effectiveness of the technology with a low pollution degree for preventing and controlling the pathogenic agents at the field tomato culture, Rio Grande variety

Specification	Pathogenic agents with economical value observed in the culture:					
	Alternaria solani		*Septoria lycopersici*		*Phytophthora infestans*	
	F (%)	GA (%)	F (%)	GA (%)	F (%)	GA (%)
Technology with low pollution degree - with erbicides - without erbicides	38,6	7,0	40,8	6,0	31,5	4,2
Technology using treatments with conventional products	35,4	5,2	38,5	6,2	62,5	9,2
Variant without treatments with pesticides	100	43,4	100	38,2	100	48,5

From table 1 results that the pathogenic agents with economical value observed in the tomatoes culture in this year were: *Alternaria solani, Septoria lycopersici* and *Phytophthora infestans*.

For the variant without treatments (witness variant), at the attack of the leaves, the recorded values for the attack frequency (F %) and attack degree (GA %) were of 100% and 34,4% for *Alternaria solani* fungus,100% and 38,2% for *Septoria lycopersici* and 100% and 48,5% for the fungus *Phytophthora infestans*.

For the technology with low pollution degree (with or without erbicides), the following values of the attack frequency and degree were recorded: 38,6% and 7,0% for *Alternaria solani*, 40,8% and 6,0% for the attack produced by *Septoria lycopersici* and 31,5% and 4,2% for *Phytophthora infestans*.

For the technology using conventional treatments the recorded values for the attack frequency and degree were the following: 35,4% and 5,2% for *Alternaria solani*, 38,5% and 6,2 % for attack produced by the fungus *Septoria lycopersici and* 62,5% and 9,2% for *Phytophthora infestans.*

Comparing the two technologies that use different treatments for controlling the specific pests we observe very small differences regarding the recorded values for the efficiency of these treatments against *Alternaria solani* and *Septoria lycopersici*, while against the fungus *Phytophthora infestans*, the efficiency of the technology with low

pollution degree was bigger than the efficiency of the technology using treatments with conventional products.

From table 2 results that for the technology with low pollution degree (with or without erbicides), the recorded production was of 7,450 kg/mp – 7,900 kg/mp compared to 6,400kg/mp for the technology using treatments with conventional products and 4,350kg/mp for the variant without treatments (witness variant).

The frequencies of the attacked fruits were of 11,6 – 12,6% for the technologies using treatments compared to 38,5% for the variat without treatments.

The fruits attacked by *Phytophthora infestans* that causes the mildew and the ones attacked by *Alternaria solani* had bigger values compared to the attack frequencies for *Xanthomonas vesicatoria*, *Pseudomonas tomato* and *Phytophthora parasitica*.

Comparing the two technologies that use different treatments for controlling the specific pests we observe very small differences regarding the efficiency of these treatments, the production recorded for the technology with low pollution degree was bigger than the production for the technology using treatments with conventional products.

This production difference is due mainly to the fact that for the technology with low pollution degree during the vegetation period suplimentary root fertilizations were made that determined the increase of production.

From table 3 results that the following pests were present in the tomatoes culture: *Macrosiphum euphorbiae, Myzodes persicae, Tetranychus urticae* and *Thrips tabaci*.

Among these the red spider - *Tetranychus urticae* was the most important, wit values of 18,76 individuals/leaf on the 22nd of July 2008 for the variant without treatments compared to 16,12 individuals/leaf for the technology with low pollution degree and of 10,66 individuals/leaf for the technology using conventional treatments.

In what concerns *Macrosiphum euphorbiae* and *Myzodes persicae*, the lowest values can be observed for the technology with low pollution degree with 5,85 colonies/plant on the 22nd of July 2008 compared to 6,11 colonies/plant for the technology using conventional treatments and 8,12 colonies/plant for the variant without treatments.

The attack caused by *Thrips tabaci* was noticed late, on the 24th of June 2008, with 1,24-1,89 individuals/leaf for the variants using vegetation treatments compared to 2,89 individuals/leaf for the variant without treatments. On the 22nd of July 2008 14,23 individuals/leaf were observed for the variant without treatments while for the technology with low pollution degree and the technology using conventionl treatments these values were of 5,89 individuals/leaf and 6,14 individuals/leaf.

Table 2

Results concerning the technology with low pollution degree for controlling the pathogenic agents at the field tomato culture, Rio Grande variety

Specification	*Realized production as follows:*			*Frequency of the attack at fruits, with the observed pathogenic agents*			
	total (kg/mp)	*Healthy fruits (%)*	*Attacked fruits (%)*	**X. vesicatoria si P. tomato *(%)***	**Phytophthora infestans *(%)***	**Phytophthora parasitica *(%)***	**Alternaria solani *(%)***
Tehnology with low pollution degree A. with erbicides B. without erbicides	7,450 7,900	87,2 88,4	12,6 11,6	***1,8*** 1,5	***4,2*** 3,8	***2,8*** 2,5	***3,8*** 3,8
Technology using treatments with conventional products	6,400	***87,6***	***12,4***	***2,1***	***4,0***	***1,8***	***4,5***
Variant without treatments with pesticides	***4,350***	***61,5***	***38,5***	***3,5***	***16,7***	***6,5***	***11,8***

Table 3

Pests observed in experimental variants

Variant – technology with low pollution degree				
Date	*Aphididae* (*Macrosiphum euphorbiae, Myzodes persicae*) (average number of colonies/plan)	*Tetranychus urticae* (average number of individuals/leaf)	*Thrips tabaci* (average number of individuals/leaf)	Useful and auxiliary fauna
10.06.2008	0,89	0,00	0,00	*Coccinellidae* (*Coccinella 7-punctata*), eggs and adults of *Chrysopidae*, adults and larva of *Syrphus* spp.
17.06.2008	1,12	0,00	0,00	
24.06.2008	3,24	1,32	1,24	
01.07.2008	4,28	7,32	1,44	
08.07.2008	5,12	9,76	1,98	
15.07.2008	5,22	12,53	3,56	
22.07.2008	5,85	16,12	5,89	
21.08.2008	Cleared culture			
Variant – without treatments				
Date	*Aphididae* (*Macrosiphum euphorbiae, Myzodes persicae*) (average number of colonies/plan)	*Tetranychus urticae* (average number of individuals/leaf)	*Thrips tabaci* (average number of individuals/leaf)	Useful and auxiliary fauna
10.06.2008	1,16	0,00	0,00	*Coccinellidae* (*Coccinella 7-punctata*), eggs and adults of *Chrysopidae*, adults and larva of *Syrphus* spp., adults of *Pterostichus* spp. were observed
17.06.2008	2,56	0,00	0,00	
24.06.2008	3,21	3,18	2,89	
01.07.2008	4,80	6,32	12,10	
08.07.2008	6,89	11,14	12,65	
15.07.2008	7,46	14,02	14,00	
22.07.2008	8,12	18,76	14,23	
21.08.2008	Cleared culture			

Sequel of table 3

	Variant – conventional treatments			
Date	*Aphididae* (*Macrosiphum euphorbiae, Myzodes persicae*) (average number of colonies/plant)	*Tetranychus urticae* (average number of individuals/leaf)	*Thrips tabaci* (average number of individuals/leaf)	Useful and auxiliary fauna
10.06.2008	1,00	0,00	0,00	*Coccinellidae* (*Coccinella 7-punctata*) and adults of *Syrphus* spp. were observed
17.06.2008	1,23	0,00	0,00	
24.06.2008	2,34	2,16	1,89	
01.07.2008	3,12	3,18	2,78	
08.07.2008	5,11	4,36	6,12	
15.07.2008	6,00	10,14	7,00	
22.07.2008	6,11	10,66	6,14	
21.08.2008	Cleared culture			

CONCLUSIONS

The technology with low pollution degree that we suggest protects the tomatoes culture against the specific pathogenic agents, pests and weeds and reffers to the following technological flow:

a) the facultative possibility to use erbicides:

- 3 - 4 days before making the culture with Dual 960 Gold 1,0 litre/ha;
- after the middle of the vegetation period, depending on the presence/absence of the weeds in the culture the erbicide Fusilade forte 0,8 litres/ha. Will be applied;

b) preventing and controlling the pathogenic agents through foliary treatments at intervals of 7 –10 days with contact product Bouille bordelaise 0,75% that can assure an efficient protection for the field tomatoes against the specific bacterium and fungus;

c) preventing and controlling the pests through foliary treatments with insecticides and acaricides “friendly” for the plants and with low risk for the user and consumer like: Chess 0,04% (2 treatments), Mospilan 0,04% (2 treatments), Lasser 0,06%(1 treatment), Milbeknock 0,075% (2 treatments);

d) applying some root fertilizations with mostly vegetal biostimulations (Kendal 0,3% + Megafol 0,3%, Cropmax 0,1% + Agroleaf high P 0,3%; Kendal 0,3% + Brexil combi 0,3%; Cropmax 0,1% + Agroleaf total 0,3%; Megafol 0,3% + Plantafol 20-20-20 0,3%; Cropmax 0,1% + Agroleaf total 0,3%; Kendal 0,3% + Calbit 0,3%; Cropmax 0,1% + Agroleaf K 0,3%); production increases of 15-20% can be obtained using this method.

By respecting the technological flow mentioned above has lead to tomato productions of 7,900 – 9,700 kg/mp.

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CERCETARI PRIVIND ELABORAREA UNEI TEHNOLOGII CU GRAD REDUS DE POLUARE PENTRU COMBATEREA PATOGENILOR, DAUNATORILOR SI BURUIENILOR LA CULTURA DE FASOLE DE GRADINA

RESEARCHES CONCERNING THE ELABORATION OF A TECHNOLOGY WITH LOW POLLUTION DEGREE TO CONTROL THE PATHOGEN AGENTS, PESTS AND WEEDS AT THE GARDEN BEANS CULTURE

Ghe. Marinescu,I. Geamăn, Al. Alexandri, Minodora Tudose, Fulvia FloricaVlad, C. Gutue, Doina Vărgălui, V. Miron, Emilia Vasile, Ionela Dobrin, Vasilica Luchian

Key words: pathogen, pest, garden beans, control

ABSTRACT

In lucrare se prezinta rezultatele cercetarii cu privire la tehnologia cu grad redus de puluare pentru fasolea de gradina, ce s-a referit la urmatorul flux tehnologic: alegerea unui soi de fasole cu toleranta fata de patogenii specifici; soiul de fasole cu pastaie galbena Sonesta are aceasta calitate; posibilitatea optionala a erbicidarii amplasamentelor ce vor fi ocupate cu acesta specie legumicola astfel: preemergent cu Dual 960 Gold si postemergent cu Fusilade forte; prevenirea si combaterea patogenilor si daunatorilor prin tratamente foliare cu pesticide (fungicide, insecticide si acaricide) "prietenoase" pentru plante si risc redus pentru mediu, utilizator si consumator; asigurarea unor sporuri de productie, prin fertilizari extraradiculare cu biostimulatori, in mare masura de natura vegetala, aplicate la intervale de 7-10 zile.

Prin aplicarea acestei tehnologii cu grad redus de poluare s-a inregistrat o productie de 2,880 – 2,950 kg/mp pastai.

In this study are presented the results of the researches concerning the low degree pollution technology for the garden beans, referring to the following technological flow: choosing a beans variety with tolerance to the characteristic pests; the beans variety *with yellow pod Sonests has this quality; the optional possibility of using herbicides on the location that will be planted with this vegetable species as follows: preemergent with Dual 960 Gold and postemergent with Fusilade forte; prevention and control of the pathogen agents and pests using foliar treatments with pesticides (fungicides, insecticides and miticides), "friendly" for the plants and with low risk for the environment, user and consumer; ensuring production increases through root fertilization with biostimulation, mostly vegetable, applied at intervals of 7-10 days. By applying this low degree pollution technology a beans production of 2,880-2,950 kg/mp was obtained.*

INTRODUCTION

In realizing increased garden beans productions (field culture or succesive culture), efficient measures for plants protection are necessary meant to maintain below the "damage and tolerance limit" the specific pathogenic agents, pests and weeds.

It is known the fact that in preventing and controlling the pathogenic agents, the pests and the weeds conventional products are used, that often need a longer break after the treatments are made. We also need to mention the fact that this species – known as the test plant – is very sensitive to pesticides, many times appearing fitotoxicity effects that can sometimes lead to compromising the culture.

In this paper are presented the experimental results regarding a technology with low pollution degree that protects the beans culture from the specific pathogenic agents, pests and weeds, by using several pesticides "friendly" to this species and with a low risk for the environment, user and consumer.

MATERIALS AND METHODS

The work was done using Sonesta garden beans variety.

The monitored experimental variants were the following:

V1 = technological variant with low pollution degree, comprising the following technological links:

a. for preventing and controlling the pathogenic agents 6 treatments with Bouille bordelaise 0,75% were made, at intervals of 7-10 days, the first treatment at the appearance of the first trifoliary leaf;

b. for preventing and controlling the pests 5 treatments were applied: 1 treatment with Chess 0,04%, 2 treatments with Mospilan 0,04% and 2 treatments with Milbeknock 0,075%;

c. weekly root fertilization with:

- Kendal 0,3% + Megafol 0,3%, at the phenological stage, plants at the first trifoliary leaf, then at intervals of 7 days as follows:
- Cropmax 0,1% + Agroleaf high P 0,3%;
- Kendal 0,3% + Brexil combi 0,3%;
- Cropmax 0,1% + Agroleaf total 20-20-20. 0,3%;
- Megafol 0,3% + Plantafol 20-20-20 0,3%;
- Cropmax 0,1% + Agroleaf total 20-20-20 0,3%;

d. erbicides formula: before Dual 960 Gold 1,0 litres/ha. And after Fusilade forte 0,8 litre/ha.

V2 = idem **V1,** without erbicides;

V3 = variant with conventional treatments as follows:

in order to prevent and control the pathogenic agents 6 treatments were made Dithane M 45 0,2% + Topsin 0,1%;

in order to prevent and control the pests 5 treatments were made with: Confidor 70 WG 0,02% (1 treatment), Confidor energy 0,1% (2 treatments) and Sanmite 0,075% (2 treatments).

V4 = variant without treatments

Observations were made regarding:

- structure of the weeds, of the pathogenic agents and of the pests;
- frequency and intensity of the attack using scales specific to pathogenic agents and pests;
- dynamics of the harvesting.

The density in the technology of the culture was respected.

Also we mention that the irrigation was made by dripping and for fertilization 100 kg/ha Complex fertilizer was administered weekly 20-20-20.

RESULTS OF THE RESEARCH

The climatic conditions in aor country influence the appearance and evolution of diseases and pests at the garden beans variety.

After surveys made in diferent areas of the country it was established that the bacterium *Axonopodis campestris pv. phaseoli,* synonymous with *Xanthomonas phaseoli,* that causes the common burn of the beans creates the biggest problems of this culture on the field. The following pathogenic agents manifested a lower frequency of the attack in the beans cultures: *Pseuomonas syringae pv. phaseolicola, Colletotrichum lindemuthianum* and *Sclerotinia sclerotiorum*.

Concerning the pests it was observed that the red spider *Tetranychus urticae* was the main species; the black lice *Aphis fabae* was also monitored but with a lower frequency.

Concerning the structure of the weeds the following species were monitored: *Echinochloa crus-galli* and *Sorghum halepense* among the monocotiledons (24,1%) and *Amaranthus retroflexus, Capsella bursa-pastoris, Hibiscus trionum, Convolvulus arvensis, Galinsoga perviflora and Polygonum oleraceea* among the dicotiledons (75,9%).

The experimental results of the year 2008 for this vegetable species are presented in tables 1-2.

From table 1 results the fact that for the variants using treatments during the vegetation period and also for the variant without treatments (untreated witness), there were no pathogenic agents observed in the culture, except some sporadic attacks on the pods with *Sclerotinia sclerotiorum* (below 1%).

From table 2 results that in the culture of garden beans the pests *Tetranychus urticae and Aphis fabae* were present.

On the 15th of July for the variant without treatments were present 122,50 individuals/leaf with *Tetranychus urticae* and an intensity of 88,71%, for the technology with low pollution degree were observed 61,18 individuals/leaf, with an intensity of 19,30% and for the variant with conventional treatments 86,72 individuals/leaf and an intesity of 21,71%.

In what concerns the pest *Aphis fabae* , the average number of colonies/plant monitored on the 15th of July 2008 was of 4,28 colonies/plant for the technology with low pollution degree, 5,14 colonies/plant for the variant with conventional treatments and 5,71 colonies/plant for the variant without treatments.

It needs to be mentioned the fact that the recorded results concerning the pests were influenced by the presence in the culture of the useful and auxiliary fauna that includes: *Coccinellidae* (*Coccinella 7-punctata, Adonia variegata*), eggs of *Chrysopidae*, adults of *Nobis spp*., *Pyrrhocoris apterus*, *Forficula auricularia* and *Syrphus spp*.

Concerning the realized production, from table 1 results that for the technology with low pollution degree (with and without herbicides), 2,880 – 2,950 kg/mp were obtained, while for the technology with conventional treatments 2,250 kg/mp were obtained, compared to 2,070 kg/mp for the variant without treatments.

Table 1

Results concerning the technology with low pollution degree for preventing and controlling the pathogenic agents, pests and weeds in the garden beans culture, Sonesta variety.

Specification	Pathogenic agents observed	Pests observed on the 15th of July 2008	Weeds present in the culture	Pods production kg/mp.
Technology with low pollution degree Without erbicides	Insignificant attack caused by *Sclerotinia sclerotiorum* on the pods	-*Tetranychus urticae* cu 61,18 individuals/leaf F(%) = 100,00 I(%) = 19,30 -*Aphis fabae* cu 4,28 colonies/plant	**Monocotiledons (14/mp):** *Echinochloa crus-galli* (10), *Sorghum halepense* (4); **Dicotiledons (44/mp):** *Amaranthus retroflexus* (14), *Capsella bursa – pastoris* (4), *Hibiscus trionum* (6), *Galinsoga perviflora* (8), *Polygonum oleracea* (12)	2,950
With erbicides			Eficacitate 86%	2,880
Technology using conventional products	Insignificant attack caused by *Sclerotinia sclerotiorum* on the pods	-*Tetranychus urticae* 86,22 individuals/leaf F(%) = 100,00 I(%) = 21,71 -*Aphis fabae* cu 5,14 colonies/plant	**Monocotiledons (14/mp):** *Echinochloa crus-galli* (10), *Sorghum halepense* (4); **Dicotiledons (44/mp):** Amaranthus retroflexus (14), Capsella bursa – pastoris (4), Hibiscus trionum (6), Galinsoga perviflora (8), Polygonum oleracea (12)	2,250
	Insignificant attack caused by *Sclerotinia sclerotiorum* on the pods	-*Tetranychus urticae* cu 122,50 individuals/leaf F(%) = 100,00 I(%) = 88,71 -*Aphis fabae* cu 5,71colonies/plant	**Monocotiledons (14/mp):** *Echinochloa crus-galli* (10), *Sorghum halepense* (4); **Dicotiledons (44/mp):** *Amaranthus retroflexus* (14), *Capsella bursa – pastoris* (4), *Hibiscus trionum* (6), *Galinsoga perviflora* (8), *Polygonum oleracea* (12)	2,070

Table 2

Pests observed in the beans culture

Technology with low pollution degree					
Date	***Aphis fabae*** **(**average number of colonies/plant**)**	***Tetranychus urticae***			Useful and auxiliary fauna
		average number of individuals/leaf	**F (%)**	**I (%)**	
10.06.2008	0,71	0,00	0,00	0,00	*Coccinellidae* (*Coccinella 7-punctata, Adonia variegata*), eggs of *Chrysopidae*, adults of *Nabis* spp., *Pyrrhocoris apterus* and *Forficula auricularia* were observed
17.06.2008	0,85	3,57	7,12	3,25	
24.06.2008	0,89	6,71	26,23	6,23	
01.07.2008	1,14	14,22	59,21	7,86	
08.07.2008	4,00	34,22	100,00	12,25	
15.07.2008	4,28	61,18	100,00	19,30	
Technology with conventional treatments					
Date	***Aphis fabae*** (average number of colonies/plant)	***Tetranychus urticae***			Useful and auxiliary fauna
		average number of individuals/leaf	**F (%)**	**I (%)**	
10.06.2008	0,89	1,14	3,12	2,34	One species was present – *Coccinella 7-punctata*
17.06.2008	1,12	14,22	11,24	5,56	
24.06.2008	1,37	21,71	32,14	6,45	
01.07.2008	4,28	34,22	64,12	9,12	
08.07.2008	4,57	59,18	100,00	16,23	
15.07.2008	5,14	86,22	100,00	21,71	
Variant without treatments					
Date	***Aphis fabae*** (average number of colonies/plant)	***Tetranychus urticae***			Useful and auxiliary fauna
		average number of individuals/leaf	**F (%)**	**I (%)**	
10.06.2008	2,03	6,21	28,57	7,00	*Coccinellidae* (*Coccinella 7-punctata, Adonia variegata*), eggs and adults of *Chrysopidae*, adults of *Nabis* spp., *Pyrrhocoris apterus, Forficula auricularia* and *Syrphus* spp. were observed
17.06.2008	3,00	12,24	57,14	7,42	
24.06.2008	4,14	36,21	71,42	13,71	
01.07.2008	4,28	87,72	85,71	36,85	
08.07.2008	5,42	102,11	100,00	51,71	
15.07.2008	5,71	122,50	100,00	88,71	

CONCLUSIONS

The technology with low pollution degree that we suggest protects the garden beans cultures against the specific pathogenic agents, pests and weeds and reffers to the following technological flow:

a. choosing a beans variety with tolerance against the specific pathogenic agents, with economical value for this culture; we mean mainly the tolerance against the two bacterias with high frequency at the beans cultures in our country: *Xanthomonas axonopodis pv. phaseoli* that causes the common burn of the beans and *Pseudomonas phaseolicola* that causes the halo burn of the beans. Against these bacterias the Sonesta variety has allways been tolerant;

b. the facultative possibility to use erbicides on the places that will be occupied with this species, as follows:

- before, with Dual 960 Gold 1,0 litre/ha;
- after with Fusilade forte 0,8 litre/ha;

c. for preventing and controlling the pathogenic agents 6 treatments were made with Bouille bordelaise 0,075% at intervals of 7-10 days, the first one at the appearance of the first trifoliary leaf;

d. for preventing and controlling the pests 5 treatments were applied with the following insecticides: Chess 0,04% (1 treatment), Mospilan 0,04% (2 treatments) and Milbeknock 0,075% (2 treatments); root fertilizations with biostimulators like: Kendal 0,3% + Megafol 0,3%, beginning with the phenological stage of the plants at the first trifoliary leaf and then at 7 days intervals: Cropmax 0,1% + Agroleaf high P 0,3%, Kendal 0,3% + Brexil combi 0,3%, Cropmax 0,1% + Agroleaf total 0,3%, Megafol 0,3% + Plantafol 20:20:20 - 0,3%, Cropmax 0,1% + Agroleaf total 0,3%.

The technological flow with low pollution degree for the beans culture, Sonesta variety, has lead to a production of 2,950 kg/mp pods.

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DESCRIPTORII AMPELOGRAFICI ELEMENTARI LA UNELE SOIURI DE VITA DE VIE AUTOHTONE

THE BASIC AMPELOGRAPHIC DESCRIPTORS FOR SOME NATIVE VINEYARD VARIETIES

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Key-words: vineyard, descriptors, native varieties.

ABSTRACT

Marea diversitate a soiurilor de vița de vie creaza dificultati în identificarea acestora dupa schemele de descriere clasice. Pentru o descriere unitara, OIV impreuna cu UPOV şi Bioversity, au elaborat editia a 2-a a Listei descriptorilor OIV pentru varietațile şi speciile viței de vie. În acesta editie au fost adaugați 18 descriptori ampelometrici care joaca un rol important in diferențierea soiurilor, iar partenerii programului Genres CT 96 No 81 au alcatuit o lista de descriptori prioritati, elementari. Aceasta lista grupeza 14 descriptori, selectati pentru buna lor capacitate discriminanta intre varietați şi pentru faptul ca sunt usor de observat. Lucrarea cuprinde descrierea unor soiuri autohtone, din punct de vedere al caracterelor ampelometrice si al descriptorilor elementari prioritari.

The varieties grapevines diversity may cause difficulties in identifying them, taking into consideration the classic description models. For a unitary description, OIV together with UPOV and Biodiversity worked out the second edition of the OIV descriptors list for grape varieties and Vitis species. To this edition, there were added, too the 18 ampelometric descriptors. These descriptors have a basic influence on the distinctive characteristics of grape varieties. The Genres CT 96, No. 81 partners worked out a list of basic descriptors, which groups 14 descriptors that were selected due to their discrimination capacity among varieties, and due to the fact that they are easily to be noticed.

The paper hereby deals with Romanian traditional varieties, from the point of view ampelometric characters and basic descriptors.

INTRODUCTION

In Order no. 1432 in 17th of November 2005, the Romanian Government defines the vineyard sector as being a high important national domain in Romanian agriculture. The developing viticulture strategy, during 2006-2015 supposes that native varieties prevail over 50%. Given this context, the description of Romanian varieties of vineyards is to be realized in accordance with the new standards elaborated by internationally recognized institutions, in order to avoid confusions and losing an important genetic heritage.

MATERIAL AND METHOD

The biologic material consists of: traditional vineyard varieties from the Dragasani vineyards (Cramposie, Braghina, Gordan and Romanian Muscatel), varieties considered natives, due to their long term cropping in Romania (White Cornelian Cherry, Black Cornelian Cherry), old Romanian varieties (Gordin, Negru moale, Negru vartos, Black Babeasca neagra, Feteasca group), new varieties, obtained at SCVV Dragasani (Victoria,

Vilarom, Novac, Alutus, Calina) and at SDC Tamburesti, University of Craiova (Haiduc and Pandur).

Observations on the top of the twig, claspers, young leaves and twig have been made before the vineyard bloomed. There were studied 10 twigs from 10 different vines, for every character, in the same evolution stage. In order to note coded 084 and 087, observations were made using the optic web stereo microscope. Primary descriptors, as well as corresponding codes are presented in table 1.

List of primary used descriptors:

Table no.1

code OIV	Descriptor	
001	Young shoot	Opening of the shoot tip
004	Young shoot	Density of prostrate hairs on the shoot tip
016	Shoot	Number of consecutive tendrils
051	Young leaf	Color of upper side of blade (4th leaf)
067	Mature leaf	Shape of blade
068	Mature leaf	Number of lobes
070	Mature leaf	Area of anthocyanin coloration of main veins on upper side of blade
076	Mature leaf	Shape of teeth
079	Mature leaf	Degree of opening / overlapping of petiole sinus
081-2	Mature leaf	Petiole sinus base limited by vein
084	Mature leaf	Density of prostrate hairs between main veins on lower side of blade
087	Mature leaf	Density of erect hairs on main veins on lower side of blade
223	Berry	Shape
225	Berry	color of skin

In order to determine ampelometric characteristics, measurements were made on adult leaves, between the fruit binding and ripening process. Measurements were made on 10 adult leaves, on the middle third of the twig, above the grape.

Ampelometric characteristics and the corresponding codes are presented in table 2.

Used ampelometric descriptors

Table no. 2

code OIV	Descriptor
601	length of vein N1
602	length of vein N2
603	length of vein N3
604	length of vein N44
605	length petiole sinus to upper lateral leaf sinus
606	length petiole sinus to lower lateral leaf sinus
607	angle between N1 and N2 measured at the first ramification
608	Mature leaf: angle between N2 and N3
609	angle between N3 and N4
610	angle between N3 and the tangent between petiole point
611	length of vein N5
612	length of tooth N2
613	width of tooth N2
614	length of tooth N4 614
615	width of tooth N4 615
616	number of teeth between the tooth tip of N 2 and the tooth tip of the first secondary vein of N2 including the limits
617	length between the tooth tip of N2 and the tooth tip of the first secondary vein of N2
618	opening/overlapping of petiole sinus

RESULTS

After observations and measurements were made, there was established the expression level for each descriptor, and ameplographic notices were made for every variety.

The expression level of prior descriptors is presented in table 3, and of ampelometric descriptors, in table 4. From the data that were presented in table 3, there were noticed differences between the studied varieties, except the ones for the blooming of the top of the twig, and distribution of claspers.

The thickness of hairs on the end of the top of the twig (Code 004) has high values at the following varieties: Coarna, Negru vartos, Gordan, Calina, Braghina, and little values at Feteasca neagra and Victoria.

The young leaf (code 051) is very colored with anticianic pigments, at Băbeasca neagra, Tamaioasa, Calina, Braghina, Alutus, Haiduc and Rosioara varieties. At the other varieties, the color alters between tamed green (Coarna alba, Feteasca neagra), and tamed yellow (Coarna neagra, Victoria).

The expression level of primary ampelographic descriptors

Table no.3

Code / Variety	01	04	16	51	67	68	70	76	79	81-2	84	87	23	25
COARNA ALBA				/3										
COARNA NEAGRA				/3		/3								
FETEASCA NEAGRA				/3										
BABEASCA NEAGRA														
NEGRU MOALE				/3										
NEGRU VARTOS				/3		/2								
GORDAN						/2								
GORDIN														
CRAMPOSIE						/2								
FETEASCA ALBA				/3										
TAMAIOASA						/2								
CALINA														
VICTORIA				/3										
FETEASCA REGALA				/3										
BRAGHINA														
NOVAC				/3										
ALUTUS														
VILAROM														
HAIDUC						/5								
PANDUR				/3										

The expression level of ampelometric descriptors

Table no. 4

Code / Variety	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618
COARNA ALBA																		
COARNA NEAGRA																		
FET																		

EASCA NEAGRA																		
BAB EASCA NEAGRA																		
NE GRU VARTOS																		
GO RDAN																		
GO RDIN																		
CRA MPOSIE																		
FET EASCA ALBA																		
TAM AIOASA																		
CAL INA																		
VIC TORIA																		
FET EASCA REGALA																		
BRA GHINA																		
NO VAC																		
ALU TUS																		
VIL AROM																		
HAI DUC																		
PAN DUR																		

The shape of the limb (Code 076) is cuneiform at Feteascaneagra and Coarna alba, orbicular at Negru vartos and Tamaioasă, and pentagonal at the other varieties.

Most varieties have 5 lobes (code 068), except for Negru moale, Gordin and Feteasca regala, whose leaf is intact, and for Haiduc variety, which often has the tendency to divide into 7 lobes.

The distribution of anticianic pigmentation of main ribs on the upper side of the leaf (code 070) represents a high expression level at varieties like: Babeasca neagra, Braghina and Pandur, an average expression level at Feteasca neagra, Calina, Alutus and Haiduc. The other varieties have green-colored ribs.

The teeth shape (code 076) is: convex at Coarna alba, Negru moale, Feteasca albă, Victoria and Vilarom; a concave and convex side at Fetească neagră, Gordan, Cramposie. The teeth shape for other varieties is straight.

The expression level of he opening/superposition degree of the petiole sinus (code 079) is 1 at Feteasca neagra, Feteasca alba, Gordin, Calina, Victoria and Feteasca regala; the petiole sinus is wide open; the expression level at Coarna alba, Braghina, Haiduc and Pandur is 7, and the lobes are superposed, while for the rest of vineyard varieties the average petiole sinus is open.

The base of the petiole sinus is only delimitated by ribs (code 081-2) at Haiduc and Pandur varieties (this characteristic was inherited from the paternal genitor, Cabernet Sauvignon). At Coarna alba, the base of the petiole is sometimes delimitated by one side.

The thickness of hairs between the main ribs on the lower side (code 084) is: very high (9) al Alutus at Coarna alba and Pandur; high (7) at Braghină, average (5) at Negru vartos, Gordan and Pandur and low at the other varieties.

The thickness of stiffed hairs on the main ribs on the low side (code 087) is: high (7) at Alutus and Haiduc, average, at Coarna alba, Negru vartos, Gordan, Gordin, Novac, Vilarom, Haiduc and Pandur, and low and null at the other varieties.

The grape bean shape (code 223) is flat spherical at Babeasca neagra, cylindrical at Victoria, and spherical or oval at the other varieties.

The color of the epidermis (code 225) is yellow-green at Coarna alba, Gordan, Gordin, Cramposie, Feteasca alba, Tamaioasa romaneasca, Victoria, Feteasca regala, Vilarom; pink, at Braghina and Calina, and blue-black at the other varieties.

The ampelographic descriptors have different values from one variety to another, and are of great help in differencing certain varieties.

CONCLUSIONS

- Basic descriptors are useful when varieties are characterized, and are easy to be noticed;
- The ampelographic description, using basic ameplographic descriptors helps to avoiding variety confusions;
- Ampelometric characters complete the description of varieties, and help differencing and identifying vineyard varieties.

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***HOTARARE nr.1.432 din 17 noiembrie 2005- *M.Of. nr. 1059/26 noi. 2005 privind măsurile şi instrumentele de reglementare a filierei vitivinicole*

*** Code des caractères descriptifs de variétés et espèces de Vitis, 2001, *2-eme édition de la liste des descripteurs O*

CERCETĂRI PRIVIND IGIENA ALIMENTAȚIEI OVINELOR PE CATEGORII DE VÂRSTĂ ŞI PRODUCȚIE ÎN NORD-VESTUL ROMÂNIEI

RESEARCH REGARDING THE NUTRITION OF SHEEP DEPENDING ON AGE AND PRODUCTION IN THE NORTH-WEST OF ROMANIA

Maerescu Cristina Maria

Key words: mutrition of sheep, floristic composition

ABSTRACT

Cea mai mare parte a păşunilor sunt folosite printr-un sistem de păşunat liber. Acest sistem de păşunat, nu se dovedeşte a fi competitiv din mai multe motive : nu se pot aplica lucrări de îngrijire deoarece animalele stau mai tot timpul pe păşune ; consumul selectiv al plantelor (animalele aleg plantele tinere cu valoare nutritivă mare şi le ocolesc pe cele aflate într-un stadiu avansat de vegetație şi cu valoare nutritivă scăzută) duce la dispariția speciilor valoroase şi înmulțirea celor mai puțin valoroase care nefiind consumate ajung la maturitate şi produc semințe; formarea gropilor şi a muşuroaielor, etc.

The largest part of pastures is used in a free-grazing system. This grazing system is proven not to be competitive on a series of reasons: no maintenance work can be applied because animals are on the fields most of the time; the selective consumption of plants (the animals choose young plants, with high nutritional values and avoid the ones in an advanced state of vegetation, which have lower nutritional value) leads to the disappearance of valuable species and the proliferation of the less valuable ones, which, as they are not consumed, they reach maturity and produce seeds; formation of holes and anthills etc.

INTRODUCTION

The nutrition of sheep in the North-Western part of our country consists of grazing in the spring-summer period and until late fall, without any forage supplements. During winter, hay and maize stalks are administered and, in case of a gentle winter, without snow, the sheep are taken out for grazing in the near-by pastures.

A variant of the grazing system used in the natural pastures from the Western part of the country, which actually represents a rationalisation, is to lead the herd on a certain set itinerary, so that the animals don't stay in one place but graze in different spots, returning after a while. The second system of rational grazing employed in the nutrition of sheep, with a fairly low spread, is the grazing in one front; in this case, the shepherd sits in front of the herd and, as they consume the grass, they advance.

MATERIAL AND METHOD

The determination of the floristic composition was done using the method of the double metre (BĂRBULESCU C., 1980). The identification of the dominant species was realized by establishing the specific volume (Vs%), the sum of presences on the vegetal carpet (the specific frequency Fs) as well as of the percentage of participation of the dominant species (the specific contribution Cs%) in the meadows used as grazing fields for sheep. The surface placed in the use of exploitations is 2,5 ha for the exploitation in the Bihor county; 3,2 ha for the exploitation in the Satu-Mare county and 1,9 ha for the exploitation in the Salaj county (tables 1, 2 and 3).

RESULTS AND DISCUSSIONS

The determination of the floristic composition of the studied pastures is shown in tables 1, 2 and 3.

Table 1

The dominant species found in pastures in the Bihor county

Species	VS (%)	F.S.	C.S. %
Festuca arundinacea	38	18	6,5
Poa pratensis	18	34	27,6
Lotus corniculatus	24	33	26,8
Medicago lupulina	26,66	21	8,86

Table 2

The dominant species found in pastures in the Satu-Mare county

Species	VS (%)	F.S.	C.S. %
Festuca arundinacea	26,66	24	8
Dactylis glomerata	20	32	10,66
Lathyrus pratensis	10	33	11

Table 3

The dominant species found in pastures in the Sălaj county

Species	VS (%)	F.S.	C.S. %
Festuca arundinacea	46,67	6	3,33
Poa pratensis	18,66	23	12,77
Lotus corniculatus	19,33	11	6,11
Agropyron repens	16,66	40	16

By analyzing the floristic composition of meadows, one can observe that they are composed of graminaceous plants, with mediocre nutritional value (Festuca arudinacea, Poa pratensis) or gramineaes with high nutritional value, but low productivity (Agropyron repens). In the pastures of the Bihor and Satu-Mare counties an important percent of the floristic structure is held by the bird's-foot trefoil (Lotus corniculatus), which has a high nutritional value.

The nutrition of sheep is conditioned by such factors as gestation, which refers to the first part of the gestation period and the second, the lactation period. The latter has two stages: the nursing of lambs and the milking.

The observations performed in the field concerning the manner of handling and respecting the forages to be administered as well as the quantities dispensed brought out the fact that the rations do not comply with the requirements of the animals' physiological condition, in the majority of the studied exploitations. Therefore, in tables 4, 5, 6 we show standard forage rations administered in the best farms in the area. What can be remarked is that, in all the farms, the grazing period begins early in spring and continues until thick layers of snow are set. Usually the sheep do not receive other forages except what they can procure themselves.

As long as the grazing field is in good condition, the necessary is generally ensured, but during the milking period, in the months of July, August and during the mating period in September-October and early gestation the forage ration is lacking in U.N. and Pd. In

winter, during the stage of advanced gestation, the foraging with little hay and many coarse fodder (maize stalks, cereal leaves, bean stalk) ration is deficient, for which reason the percent of underweight lambs is high and the ewes cannot prepare adequately for a new lactation. It is a well-known fact that a quantitatively and qualitatively inadequate nutrition of sheep has a negative influence on fertility and prolificacy, vitality of products, intensity of growth as well as quality of production and sheep's economic efficiency. Moreover, a low level of nutrition reduces the milk production, but leads to an increase of the percent of fat in the milk and the reduction of the raw protein content (Stoica I., 1977).

Table 4

The ration of forage given to sheep in the period before mating and during the first three months of gestation

norm / forage	Kg	S.U. (kg)	U.N.	PD. (g)	CA (g)	P (g)	SALT (G)	CAROTENE (mg)
		0,78 - 1,30	0,75 - 0,90	70 -90	6	3	8	14
Hill pasture	5,0	0,90	0,85	80	8,0	3,0	0	225
Salt	In abundance	0	0				8	0
Ensured	-	0,90	0,85	0,80	8,0	3,0	8	225
%by comparison with the norm	-	-15,4	-13,3	+14,0	+33,3	0	0	+1507,1

Table 5

The ration of forage given to sheep during the period of nursing

norm / forage	KG	S.U. (kg)	U.N.	PD. (g)	CA (g)	P (g)	SALT (g)	CAROTENE (mg)
		2,13	1,5-2,0	135-200	8	5	8	14
Hill-land hay	1,5	1,29	0,70	84	8,10	3,0	0	27,0
Corn stalks	1,0	0,84	0,38	18	4,6	1,8	0	0
Corn cobs	0,2	0,16	0,20	12	0,10	0,50	0	0
Salt	In abundance	0	0	0	0	0	8	0
Ensured	-	2,29	1,28	114	12,8	5,3	8	27,0
% by comp. to the norm	-	+ 7,5	- 27,7	-31,3	+ 60	+ 6,0	0	+ 92,8

Table 6

The ration of forage given to sheep during the lactation period

norm / forage	KG	S.U. (kg)	U.N.	PD. (G)	CA (g)	P (g)	SALT (g)	CAROTENE (mg)
		2,13	1,3	120	7,5	4	8	14
Hill pasture	7	1,47	1,33	140	14	5,6	-	315
Salt	In abundance	-	-	-	-	-	8	-
Ensured	-	1,47	1,33	140	14	5,6	8	315
% by comp. to the norm	-	-31,00	+ 2,3	+ 16,7	+ 86,7	+ 4,00	-	+ 2150,0

The quality of the forages also has a great influence on digestibility and productive effect. The forages must not be altered, rotten, frozen, because they may have a negative effect on the quality of the obtained products and on the animals' health condition.

CONCLUSIONS

The research concerning the hygiene of sheep nutrition in farms from the Bihor, Salaj and Satu-Mare counties reveals the following:

1. During the grazing period, which begins in early spring and lasts until the first snow, sheep graze on natural pastures, then on stubble fields and downy brome fields, guided by the principle "the sheep eats what it can and as much as it can", without any other supplementary forage. For long periods of time, sheep are malnourished, only 60-80% of the necessary U.N. and Pd. Being provided.

2. The analysis of the floristic composition of permanent pastures evaluated by identifying the dominant species, the specific volume and the sum of the presence on the vegetal carpet demonstrate that, in the three counties, the dominant species are *Festuca arudiancea*, *Poa pratensis*, *Lolium perene*, also appearing *Lotus corniculatus*, *Dactylis glomerata* and rarely *Medicago lupulina.* The nutritional value of this vegetal association is average and it degrades with moving into summer. The pastures are poorly maintained, they are overrun by weeds and inedible plants, like the thistles that stick to the sheep's wool.

3. During the stabulation period, the foraging of sheep is made by means of hay, maize stalks and some breeders provide 0,100-0,200 kg of various concentrates (corn cobs, corn grains, barley). Generally, the deficit of U.N. and Pd. is between 10-44%.

4. The farms in the studied area do not employ the system of pastures cultivated with an optimum mixture of gramineae and leguminosae, which would ensure the nutritional requirements as a green source and also as mown hay.

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ASPECTE PRIVIND ÎNSUŞIRILE FIZICO CHIMICE SI MICROBIOLOGICE ALE BRÂNZEI TELEMEA DE OAIE

ASPECTS REGARDING THE PHYSICOCHEMICAL AND MICROBIOLOGICAL CHARACTERISTICS OF SHEEP'S MILK COTTAGE CHEESE

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Key words: sheep's milk cottage cheese, bacteriological exam, physicochemical exam

ABSTRACT

Prin studiul efectuat s-a urmarit modul în care sunt respecte anumite măsuri de igienă, începând de la recoltarea laptelui şi până la punerea lui în consumație.Toate probele recoltate din căşării, piețe publice şi de la țăranii din gospodărie, conțin Bacterii coliforme, deci sunt poluate cu bacterii de origine enterală. Dar e de reținut că 35% din probele de brânză telemea matură, 32,5% din cele de brânză telemea proaspătă, conțin peste 10 bacterii coliforme/g, abătându-se de la prevederile O.M.S. nr 975/1998. Acest fapt denotă mari deficiențe în igiena mulsului şi pe flux tehnologic. De remarcat că un număr mare de enterobacterii induc modificări nedorite în procesul de fabricare, maturare şi conservare a diferitelor tipuri de produse lactate.

Identificarea E. coli. Prin teste specifice E. coli a fost identificată într-un număr de probe prea mare: 24,16% la telemeaua maturată; 26,66% la telemeaua proaspătă. Impurificarea laptelui materie primă cu fecale de origine animală este certă şi acest lucru este greu de combătut în condițiile precare de igienă în care se face mulgerea manuală a ovinelor în fermele româneşti.Incidența probelor conținând peste 10 stafilococi coagulaza pozitivi pe 1 gram produs, este de 11,66% la brânza telemea maturată si 15% la brânza telemea proaspătă. În nici o probă analizată nu s-a depistat Salmonella. În ce priveşte prezența drojdiilor şi mucegaiurilor în probele de produse lactate analizate, faşă de cerințele O.M.S. nr. 975/1998, raportate la 1g produs, normele sunt depăşite la 21,66% din probele de telemea maturată si la 25,83% la telemea proaspătă. Responsabile de această situație se fac condițiile precare de lucru, de igienă, reflectate în produsele lactate şi în calitatea acestora.

The conducted study surveyed the manner in which certain hygiene regulations were complied with, starting with the collection of the milk and ending with its delivery to consumption. All the samples collected from cheese dairies, public markets and family farmers contain Coliform bacteria, thus being polluted with bacteria of enteric origin. But it is important to point out that 35% of the ripened cottage cheese samples and 32.5% of fresh cottage cheese samples contained over 10 Coliform bacteria per gram, thus not complying with the provisions of the O.M.S. no. 975/1998. This fact indicates serious deficiencies regarding the hygiene of the milking process and of the technological flux. It is worth mentioning that a high number of enteric bacteria induce unwanted changes in the processes of producing, maturing and preserving various types of dairy products.

Identification of E. coli. With the help of specific tests, E. coli was identified in too high a number of samples: 24.16% in matured cottage cheese and 26.66% in the fresh kind. Soiling of the milk used as raw material with animal feces is certain and this fact is hard to overcome, considering the poor conditions of hygiene in which the manual milking of the sheep is performed in Romanian farms. The incidence of samples containing over 10 coagulase-positive Staphylococci per one gram of product is of 11.66% in the mature cottage cheese and 15% in the fresh kind.

Salmonella was not discovered in any of the analyzed samples.

Regarding the presence of yeasts and molds in the samples of analyzed dairy products as stipulated in O.M.S. nr. 975/1998, per 1g of product, the dispositions are exceeded in 21.66% of the mature cheese samples and in 25.83% of the fresh cheese ones. The main causes of this situation are the poor work and hygiene conditions, which are reflected in the dairy products and in their quality.

INTRODUCTION

Sheep's milk can affect the consumer's health on some occasions, regardless of its significant nutritional and biological qualities.

The main objective in obtaining a high quality, hygienic, and wholesome milk consists of taking all possible measures to prevent the penetration of microbes in the milk from the milking stage to the consumer, as well as of preventing the development of microbes that have eventually infiltrated the milk (Man, 1996). The rules concerning milk hygiene must be satisfied, therefore, from the milking process until its final delivery to the consumer.

MATERIAL AND METHOD

The determinations were performed on samples of cottage cheese, the samples being collected from individual producers (sheepfold and public markets).

The cottage cheese was analyzed from an organoleptic (aspect, consistency, color, smell, taste), chemical (determination of fat using the acid-butyrometric method, with the help of the VAN-GULIK butyrometer or of the milk butyrometer, determination of dry substance, determination of proteinic substances, determination of Sodium Chloride) and microbiological point of view (determination of the number of Coliform bacteria per 1g of product, presence of Escherichia coli/1 g of product, presence of Salmonella/ 25 g of product, determination of the number of coagulase-positive Staphylococci per 1g of product, determination of the number of yeasts and molds per 1g of product).

Standardized appliances and methods were used for these determinations (ROTARU O şi col., 1994).

RESULTS AND DISCUSSIONS

The results of the organoleptic test of cottage cheese obtained in sheep exploitations are presented in table 1.

Table 1

The organoleptic characteristics of ripened cottage cheese

Place of collection	Number of samples	Organoleptically inadequate samples
Husasău de Tinca cheese dairy	30	10 – showed pronounced traces of cheesecloth, frail consistency, slightly rubbery; white color on the surface and yellowish on the inside; has a slight taste and smell due to using insufficiently clean pots or a dirty cheesecloth; the brine presents some impurities.
Carei cheese dairy	30	23 – had traces of blackened salt on the surface; smell and taste were different from those of sheep's milk; too salty a taste due to excessively seasoning the cheese with salt; the brine contained impurities and a slight moldy odor.
Cefa cheese dairy	30	15 – were inadequate when it came to their appearance, which showed signs of blackened salt, whereas the brine contained impurities; sour taste due to processing milk with high levels of acidity.
Oradea	30	18 – had a frail consistency, yellowish color, salty taste due to excessive use of salt and a slight odor due to the use of hygienically inadequate milk containers.
Total samples	120	55 % present quality shortcomings regarding their organoleptic features.

The standard chemical characteristics that both ripened and fresh sheep's milk cottage cheese must have are presented in table 2.

Table 2

Chemical characteristics of sheep's milk cottage cheese

Characteristic	Sheep's milk cottage cheese		STAS
	fresh	ripened	
GR/SU, % min	47	47	6352/2-87
Dry substance, % min	43	45	6344-88
Proteinic substances, %, min	16		6355-89
Salt, % max	4		6354-84

The following tables, 3 and 4, present the chemical characteristics of ripened and fresh cottage cheese collected on location.

Table 3

Chemical properties of ripened cottage cheese collected on location

Place of collection	No. of samples	Chemical characteristics of mature cottage cheese (%)				
		Dry substance	Water	Fat	Salt	Proteinic substances
Husasău de Tinca cheese dairy	30	45,4 ± 0,3	54,55 ± 0,3	50,60 ± 1,2	4,5 ± 1,2	19,1 ± 0,2
Miersig cheese dairy	30	46,0 ± 0,4	54,0 ± 0,4	51,20 ± 0,9	4,0 ± 1,5	18,4 ± 0,5
Cefa cheese dairy	30	43,0 ± 0,7	57,0 ± 0,7	47,40 ± 1,5	4,8 ± 1,7	16,0 ± 0,6
Oradea cheese dairy	30	44,2 ± 0,9	55,8 ± 0,9	47,2 ± 1,7	5,0 ± 1,9	16,8 ± 0,9

Table 4

Chemical properties of fresh cottage cheese collected on location

Place of collection	No. of samples	Chemical characteristics of fresh cottage cheese (%)				
		Dry substance	Water	Fat	Salt	Proteinic substances
Husasău de Tinca cheese dairy	30	43,5 ± 0,5	56,45 ± 0,5	47,6 ± 1,5	3,39 ± 0,8	18,68 ± 0,8
Miersig cheese dairy	30	42,0 ± 0,8	58,0 ± 0,8	46,3 ± 1,8	4,68 ± 0,4	17,65 ±0,2
Cefa cheese dairy	30	44,2 ± 0,7	55,8 ± 0,7	48,2 ± 1,6	4,52 ± 1,1	18,35 ± 0,9
Oradea cheese dairy	30	43,7 ± 0,2	56,6 ± 0,2	48,6 ± 1,3	4,80 ± 0,7	16,80 ± 1,2

The physicochemical characteristics of the studied dairy products fit within the norms regarding dry substance, fat, proteins, water.

It was noticed that the percentage of salt was exceeded with up to 20% in the case of fresh cottage cheese and 25% in that of mature cottage cheese.

The standard microbiological characteristics that fresh and ripened sheep's milk cottage cheese must have are presented in table 5.

Table 5

Microbiological characteristics of sheep's milk cottage cheese (OMS nr. 975/1998)

Characteristic	Sheep's milk cottage cheese		STAS
	fresh	mature	
Coliform Bacteria /1g of product	10	10	SR ISO 5541/1-94 SR ISO 5541/2-94
Escherichia coli/1g of product	1	absent	6349/4-80
Salmonella/25 g of product	absent	absent	6349/11-83
Coagulase-positive Staphylococci/1g of product	10	10	6349/12-83
Yeasts and molds /1g of product	100	1000	6611-96

The results of the microbiological exam performed on the fresh and ripened cottage cheese collected on location are presented in tables 6 and 7 (diagrams 1, 2).

Table 6

Bacteriological characteristics of ripened cottage cheese collected on location

Place of collection	No. of samples	Coliform Bacteria / 1 g of product	Escherichia coli/1 g product	Salmonella/ 25 g product	Coagulase-positive Staphylococci / 1 g product	Yeasts and molds/ 1g product
Husasău de Tinca cheese dairy	30	13 p. > 10 17 p. < 10	23 p. abs. 7 p. pres.	abs.	2 p. > 10 28 p. < 10	6p. > 1000 24p. < 1000
Miersig cheese dairy	30	10 p. > 10 20 p. < 10	20 p. abs. 8 p. pres.	abs.	4 p. > 10 26 p. < 10	8p. > 1000 22p. < 1000
Cefa cheese dairy	30	8 p. > 10 22 p. < 10	22 p. abs. 6 p. pres.	abs.	3 p. > 10 27 p. < 10	3p. > 1000 27p. < 1000
Oradea	30	11 p. > 10 19 p. < 10	18 p. abs. 8 p. pres.	abs	5p. > 10 25 p. < 10	9p. > 1000 21p. < 1000
Total	120	65 % adequate samples 35% inadequate samples	75.84% adequate samples 24.16 % inadequate samples	abs.	88.33 % adequate samples 11.66% inadequate samples	78.33 % adequate samples. 21.66% inadequate samples.

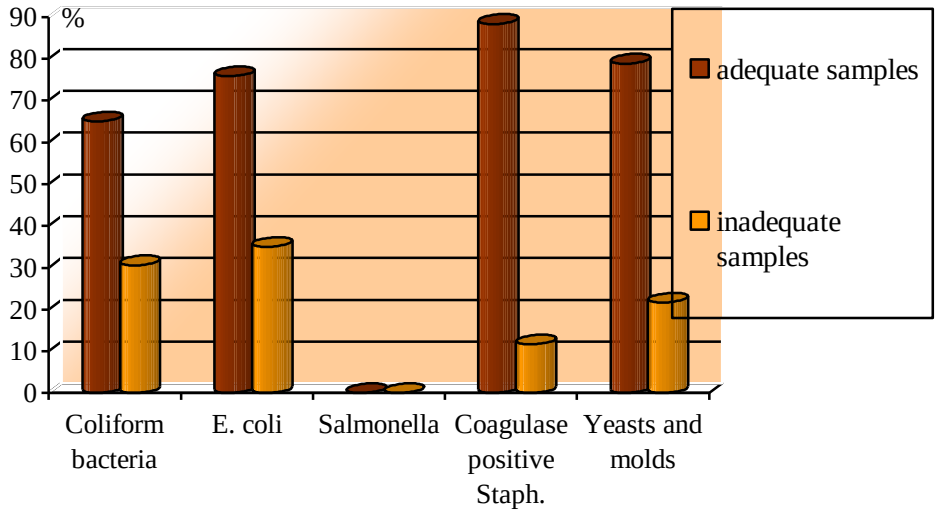

Fig.1. Graphic representation of the bacteriological characteristics of matured sheep's cream cheese

Tabelul 7

Bacteriological characteristics of fresh cottage cheese collected on location

Place of collection	No. of samples	Coliform Bacteria / 1 g product	Escherichia coli/1 g product	Salmonella /25 g product	Coagulase-positive Staphylococci /1g product	Yeasts and molds/ 1 g product
Husasău de Tinca cheese dairy	30	11 p. > 10 19 p. < 10	21 p. abs. 9 p. pres.	abs.	4 p. > 10 26 p. < 10	8p. > 100 22p. < 100
Miersig cheese dairy	30	9 p. > 10 21 p. < 10	22 p. abs. 8 p. pres.	abs.	5 p. > 10 25 p. < 10	7p. > 100 23p. < 100
Cefa cheese dairy	30	7 p. > 10 23 p. < 10	19 p. abs. 5 p. pres.	abs.	3 p. > 10 27 p. < 10	5p. > 100 25p. < 100
Oradea cheese dairy	30	12 p. > 10 18 p. < 10	26 p. abs. 10 p. pres.	abs	6p. > 10 24 p. < 10	11p. > 100 19p. < 100
Total	120	67.5% adequate samples 32.5% inadequate samples	73.33% adequate samples 26.66% inadequate samples	abs.	85 % adequate samples 15% inadequate samples	74.16% adequate samples 25.83% inadequate samples

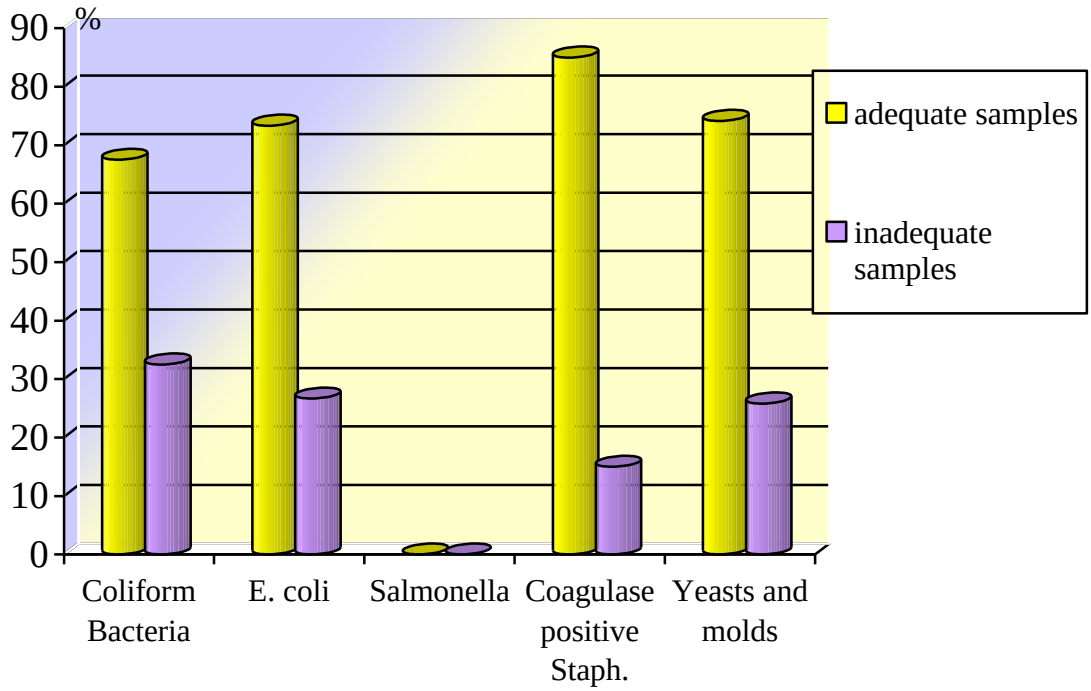

Fig. 2. Graphic representation of the bacteriological characteristics of fresh sheep's cream cheese

As to the bacteriological characteristics of ripened sheep's milk cottage cheese, out of a total of 120 samples, 65% are adequate when it comes to Coliform Bacteria, 75.84% of the samples are adequate regarding Escherichia coli, 88.33% of the samples are adequate for the coagulase-positive staphylococcus, whereas 78.33% of the samples are adequate regarding yeasts and molds. Salmonella was absent in all of the studied samples.

For the fresh cottage cheese, out of a total of 120 samples, 65.7% are adequate from the point of view of Coliform Bacteria, 73.33% of the samples do not present any Escherichia coli, 85% are adequate regarding the coagulase-positive staphylococcus, and concerning yeasts and molds, 74.16% of the samples were adequate. Salmonella was not found in any of the analyzed samples.

CONCLUSIONS

All the samples collected from cheese dairies, public marketplaces and individual farmers contain Coliform Bacteria, and are therefore polluted with enteric bacteria. But it is important to point out that 35% of the mature cottage cheese samples and 32.5% of fresh cottage cheese samples contained over 10 Coliform bacteria per gram, thus not complying with the provisions of the O.M.S. no. 975/1998. This fact indicates serious deficiencies regarding the hygiene of the milking process and the technological flux. It is worth mentioning that a high number of enteric bacteria induce unwanted changes in the processes of producing, maturing and preserving of various types of dairy products.

Identification of E. coli. With the help of specific tests, E. coli was identified in too high a number of samples: 24.16% in matured cottage cheese and 26.66% in the fresh one. Soiling of the milk used as raw material with animal feces is certain and this fact is hard to overcome, considering the poor conditions of hygiene in which the manual milking of the sheep is performed in Romanian farms.

The incidence of samples containing over 10 coagulase-positive Staphylococci per one gram of product is of 11.66% in the mature cottage cheese and 15% in the fresh kind.

Salmonella was not discovered in any of the analyzed samples.

Regarding the presence of yeasts and molds in the samples of analyzed dairy products as stipulated in O.M.S. nr. 975/1998, per 1g of product, the dispositions are exceeded in 21.66% of the mature cheese samples and in 25.83% of the fresh cheese ones. The main causes of this situation are the poor work and hygiene conditions, which are reflected in the dairy products and in their quality.

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EFECTUL ACIDIFIERII HRANEI SAU A APEI DE BĂUT, ASUPRA MICROFLOREI DIGESTIVE ŞI PERFORMANȚELOR BIOPRODUCTIVE LA PUII DE CARNE

THE EFFECT OF ACIDIFYING FEED OR DRINKING WATER ON THE DIGESTIVE MICROFLORA AND ON THE BIOPRODUCTIVE PERFORMANCES OF BROILER CHICKENS

Mierliță D.

Key words: organic acids, digestive microflora, performance, broiler

ABSTRACT

În cercetările întreprinse de noi, am urmărit efectul administrării diferențiate a acidifiantului, respectiv în furaj sau în apa de băut, la puii de carne, asupra pH-ului şi microflorei digestive, precum şi asupra performanțelor bioproductive (sporul în greutate, consumul şi gradul de valorificare a hranei, indicii de abator şi calitatea carcasei).

Acidifierea hranei sau apei de băut, cu ajutorul acizilor organici (Biotronic - 1‰ în furaj şi respectiv 2‰ în apă) la puii de carne, a determinat creşterea sporului mediu zilnic în greutate (5,2-7,7%), îmbunătățirea gradului de valorificare a hranei (2,8-7,2%) şi scăderea cheltuielilor cu furajarea ce revin pe kg spor (2,8-3,9%). Efectele pozitive ale acidifiantului au fost mai pronunțate în prima fază de creştere (0-14 zile) când diferențele față de lotul martor au fost mai mari.

Utilizarea acizilor organici în alimentația puilor de carne (asigurați în apă sau furaj) duce la scăderea pH-ului digestiv, mai ales în primele segmente (proventricul, guşă şi intestinul subțire) unde de fapt se desfăşoară cea mai mare parte a proceselor de digestie şi absorbție.

Referitor la distribuția cantitativ topografică a microflorei digestive sub influența acizilor organici se remarcă faptul că în afara bacteriilor anaerobe şi ciupercilor care nu sunt afectate numeric de acizii organici, celelalte specii microbiene au înregistrat, în general, o modificare numerică față de lotul martor astfel încât raportul de dominanță a lactobacililor față de coliformi a fost modificat în favoarea lactobacililor. Noul echilibru stabilit între lactobacili şi coliformi, a devenit avantajos pentru pui, contribuind la îmbunătățirea sporului în greutate şi a gradului de valorificare a hranei.

Introducerea acidifiantului în structura furajului asigură performanțe bioproductive, economice şi condiții de digestie (pH, microfloră) mai bune comparativ cu administrarea acidifiantului în apa de băut.

During our research, we surveyed the effect of the differential administration of the acidifier, respectively in the fodder or in the drinking water, on broiler chickens, on the pH and digestive microflora, as well as on the bioproductive performances (weight gain, feed consumption and degree of capitalization, slaughter indices and carcass quality)

Acidifying the feed or drinking water using organic acids (Biotronic - 1‰ in feed and respectively 2‰ in water) of broiler chickens has determined the increase of the average daily weight gain (5.2-7.7%), an improvement in the degree of feed capitalization (2.8-7.2%) and the reduction of the necessary costs for feed per kg of weight gain (2.8-3.9%) . The acidifier's positive effects were more obvious in the first stage of development (0-14 days), when the differences compared to the reference lot were more significant.

Using organic acids in the feed of broiler chickens (provided whether in water or feed) leads to the reduction of the digestive pH, especially in the first sectors

(proventriculus, crop and small intestine), where, in fact, most of the processes regarding digestion and absorption take place.

Regarding the quantitative-topographic distribution of the digestive microflora under the influence of organic acids, it was observed that, except for the anaerobic bacteria and fungi, which are not numerically affected by the organic acid, the other microbial species showed, in general, a numerical modification compared to the reference lot, hence the rapport of dominance between lactobacilli and coliforms was modified in favor of lactobacilli. The new balance established between coliforms and lactobacilli became an advantageous one for the chickens, on one hand contributing to the improvement of weight gain and degree of feed capitalization.

Introducing acidifier in the structure of the feed ensures bioproductive and economical performances, as well as better digestive conditions (pH, microflora) than in the case of administering the acidifier in the drinking water.

INTRODUCTION

The purpose of acidifying animal feed or water using organic acids is to control the digestive microflora, to improve feed capitalization, to stimulate production and to maintain a state of health (I.M. Pop, 2006).

The rapid and lasting increase in the acidity of the gastrointestinal content, in the presence of organic acids, determines the faster transformation of pepsinogen into pepsin, which contributes to an increase in the digestion of proteins from the feed (Halga P. and col. 2005) and to the reduction in the fermenting of nutritious substances in the intestine (McDonald P. and col. 2002). Furthermore, an improvement in the secretion of pancreatic enzymes is recorded, as well as an increase in the degree of absorption and use of nutritious substances, as a result of the chelate effect and of the participation of organic acids as intermediaries in the energetic metabolism (Choct M., G. Annison 1992a). To all of this we can add the antimicrobial effect of organic acids, which have both an inhibiting effect on the microbial proteinic neo-synthesis as well as a stimulating effect on the immune system (Best P., 2000).

Countless research has pointed out the positive influence of acidifying poultry's feed or drinking water on both productive performances and state of health, which in the case of broiler chicken and turkey younglings, are the increase in body weight on delivery, the improvement in the degree of feed capitalization and the reduction of mortality (Chapman, 1998; Guerrero and Hoyos, 1998; Adams, 1999; Hyden, 2000 – quoted by de I.M. Pop, 2006; Mierliță D. and col, 2003).

MATERIAL AND METHOD

During our research, we surveyed the effect of the differential administration of the acidifier, respectively in the fodder or in the drinking water, on broiler chickens, on the pH and digestive microflora, as well as on the bioproductive performances (weight gain, feed consumption and degree of capitalization, slaughter indices and carcass quality) (table 1).

During the performing of the experiments all the conditions of maintenance prescribed by specialty literature were ensured, including those that refer to the factors of microclimate and to the prophylactic sanitary-veterinary program.

Table 1

The experimental plan

Objectives of research	Experimental factor	No. of lots no. cap./lot	Aspects surveyed in the process.
1. The influence of acidifying feed or drinking water with organic acids on the digestive processes in poultry (meat chicks) (digestive pH, structure and quantitative-topographic distribution of the digestive microflora, the viscosity of the intestinal content). **2.** The influence of acidifying feed or drinking water with organic acids on the bio-productive performances of meat chickens.	● The commercial product BIOTRONIC (made by the Austrian company Biomin): solid form for mixing it with the feed and liquid form for administration in water. ● The used acidifier has a 4.1 pH and contains: formic acid - 30%; propionic acid -7%, lactic acid -15%, citric acid -5%, sorbic acid -1%.	3 lots, Ross 308 hybrid 50 chicks / lot **L1** – reference lot **L2** – lot with acidifier in the drinking water (2‰) **L3** – lot with acidifier in the feed (1‰)*	- the gradual evolution of weight gain; - the gradual evolution of feed consumption; - the degree of feed capitalization; - the slaughter indices; - the digestive pH; - the quantitative-topographic distribution of the main germs that inhabit the digestive tract; - the viscosity of the digestive content.

* - it was considered that for each kg of feed, poultry consume an average of 2 l of water, thus the quantity of acidifier was equal in the two lots.

The research was conducted on 150 day-old broiler chickens, of the Ross-308 hybrid; randomly distributed in 3 experimental lots of 50 chickens /lot:

L1 (M) – reference lot;

L2 – lot in which the acidifier was introduced in the drinking water (2 l acidifier per 1000 l water);

L3 – lot in which the acidifier was introduced in the feed (1 kg acidifier/1000 kg feed).

The chicken lots were held in separate boxes, with a density of 16 chickens /m^2, but in the same hen-run, thus sharing the same microclimate and breeding technology.

The gradual feeding of broiler chickens was provided in abundance, using combined fodder, whose structure and nutritional value was similar in the three lots, thus the only difference was represented by the experimental factor (the presence and the manner of administration of the acidifier).

The weighing of the chicks and of the feed was performed gradually, the average daily weight gain being calculated, as well as the average daily consumption of feed and the degree of feed capitalization.

At the end of the experimental period, 10 chicks from each lot were slaughtered, their weight roughly representing the average weight of the lot, determining the main slaughter indices. In order to establish the influence of the acidifier on the digestive processes, the following aspects were determined:

● the pH of the digestive content on several levels of the gastrointestinal tract, using a type M. V. 84 pH-meter, set for the domain of pH=2,5-7,5.

● the quantitative-topographic distribution of the main groups of germs that inhabit the digestive tract, which were isolated according to selective environments. The number of germs was expressed in logarithmic units (UL/g of fresh digestive content);

The data regarding weight gain and the main slaughter indices was statistically processed by testing the significance of the differences between environments using the Student test.

RESULTS AND DISCUSSIONS

The best results throughout the entire period of the experiment were recorded in the chicks from the lot in which the acidifier was introduced in the fodder (the case of chickens from lot number 3); compared to the reference lot 1 (M), these chickens' daily gain was 7.72% higher; their specific consumption was 6.20% lower, whereas the costs for fodder corresponding to one kilogram of weight gain were 3.93% lower. As to the administration of the acidifier in the drinking water (the case of lot number 2), the results were unmistakably better compared to those recorded in the reference lot (without acidifier), but not as good as those obtained by administering the acidifier in the fodder's structure (table 2).

It is worth mentioning the fact that the organic acids present in the structure of the acidifier supplement the endogenous production of acids, thus increasing the rate of transformation of digestive proenzymes into active enzymes, which bolster the digestive processes of the nutrients and implicitly the speed of growth and the degree of feed capitalization.

Table 2

Evolution of the main production indices recorded during the experimental period (1 – 42 days)

Specification			L1 (reference)	L2 (acidifier in water)	L3 (acidifier in feed)
Average body weight (g)	initial		41,27 ± 0,2	41,43 ± 0,21	41,30 ± 0,19
	in 14 days		386,76 ± 4,46	406,66 ± 8,56*	413,86 ± 7,5**
	in 35 days		1690,36 ± 32,25	1758,79 ± 35,06*	1775,31 ± 29,15*
	in 42 days		2227,14 ± 41,28	2340,83 ± 33,54*	2395,96 ± 29,4**
Total weight gain (g)			2185,87	2299,40	2354,66
Average daily gain	1-14 days	g	24,67	26,09	26,61
		%	100,00	105,76	107,86
	15-35 days	g	62,08	104,39	64,83
		%	100,00	103,72	104,43
	36-42 days	g	76,69	83,15	88,66
		%	100,00	108,42	115,61
	1-42 days	g	52,04	54,75	56,06
		%	100,00	105,21	107,72
Average daily consumption	1-14 days	g	43,18	43,76	43,78
		%	100,00	101,34	101,39
	15-35 days	g	128,20	130,66	129,15
		%	100,00	101,92	100,74
	36-42 days	g	185,53	190,65	186,97
		%	100,00	102,76	100,78
	1-42 days	g	109,41	110,60	110,33
		%	100,00	101,09	100,84
Specific consumption (kg N.C./kg gain)	1-14 days	kg	1,75	1,68	1,64
		%	100,00	96,00	93,71
	15-35 days	kg	2,07	2,02	1,99
		%	100,00	97,58	96,13
	36-42 days	kg	2,42	2,30	2,11
		%	100,00	95,04	87,19
	1-42 days	kg	2,10	2,02	1,97
		%	100,00	97,14	93,80
Costs for feed		%	100,00	97,28	96,07

* -p < 0.05 ; ** -p < 0.01;

At the end of the experiment, 10 chickens from each lot were slaughtered, determining the main slaughter indices (carcass output and commercial output) (table 3).

Table 3

Variation of the main slaughter indices

Lot	Live weight on slaughtering (g/chick)	Carcass weight (g)	Total Edible organs (g)	Carcass output (%)	Commercial output (%)
L1 (reference)	2215,01 ± 50,11	1620,00 ± 36,32	194,75	73,14 ± 0,99	81,93 ± 0,70
L2 (acidifier in water)	2354,14 ± 40,72	1714,05 ± 43,21	206,19	72,81 ± 1,10	81,57 ± 1,71
L3 (acidifier in feed)	2370,51 ± 50,91	1729,29 ± 41,4	197,49	72,95 ± 1,42	81,28 ± 1,14

The analysis of the data regarding carcass output shows that it recorded very similar values in the chickens from the three lots. It can be thus concluded that acidifying the feed or drinking water using organic acids did not influence the main slaughter indices.

The pH of the digestive content was established on several levels of the digestive tract (crop, proventriculus, duodenum, jejunum, ileum, cecum and colon), immediately after slaughter, by means of a type M.V.-84 pH-meter, set for the domain of pH = 2.5-7.5. The presence of organic acids in the feed or water led, as expected, to a decrease of the digestive pH from 5.78 (reference lot) to 5.76-5.95 (in lots 2 and respectively 3) (table 4). This reduction of the digestive pH caused by the supplementing of the endogenous production of acids increased the rate of the transformation of digestive proenzymes into active enzymes, thus leading to a better digestion and absorption of the nutritious substances from the feed. This way, we can explain the increase of feed intake and production performances (average daily gain and degree of feed capitalization) in the case of chickens from lots that received acidifier in the feed or in the drinking water (lots 2 and 3). The better metabolic use of the substances contained in the feed can be explained by the fact that organic acids function as chelating agents and are important intermediaries in the energy metabolism (I. M. Pop - 2002).

Table 4

Influence of organic acids on the evolution of digestive pH in broiler chickens

Lot	Digestive sectors							
	crop	glandular stomach	gizzard	duodenum	jejunum	ileum	cecum	colon
L1-reference	4,55	4,20	2,57	5,72	5,92	6,57	5,95	6,42
L2-acidifier in water	4,41	3,95	2,40	5,60	5,63	6,70	5,52	6,40
L3-acidifier in feed	4,27	3,80	2,51	5,56	5,70	6,31	5,67	6,48

The influence of the acidifiers on the digestive microflora was established by studying the quantitative-topographic distribution of the main groups of germs and fungi that inhabit the digestive tract: lactobacilli, coliforms, enterococci, aerobic bacteria, anaerobic bacteria and fungi, which were isolated according to selective environments. The number of germs in the 6 segments of the digestive tract that were subject to analysis – glandular stomach, duodenum, jejunum, ileum, cecum, and colon – was expressed in logarithmic units per gram of fresh digestive content (UL/g).

The analysis of the quantitative-topographic distribution of the digestive microflora under the influence of the organic acids added in feed or water reveals that, except for anaerobic bacteria and fungi, which are not numerically affected by the organic acid, the other microbial species presented, in general, a numerical modification compared to the reference lot (diagram 1). As diagram 2 shows, the rapport of dominance between lactobacilli and coliforms was modified in favor of lactobacilli, under the effect of the organic acids. Therefore, the new balance between coliforms and lactobacilli became an advantageous one for the chickens, on one hand contributing to the improvement of weight gain and degree of feed capitalization and, on the other hand, exerting an antimicrobial effect against the pathogenic microflora, which prefers a slightly alkaline pH (Miles R.D. 2000).

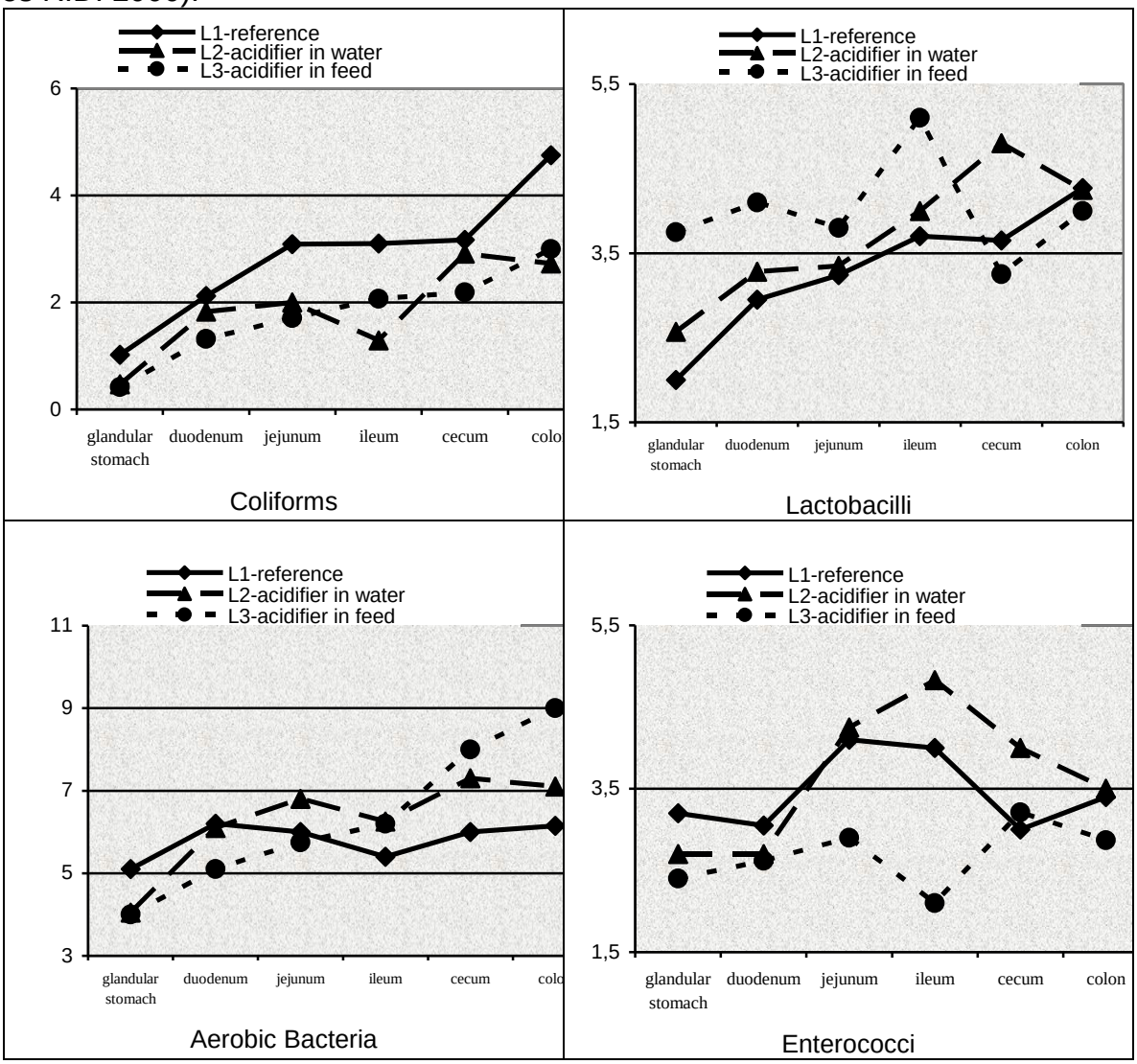

Fig. 1. The influence of organic acids on the quantitative-topographic distribution of the main groups of germs which inhabit the digestive tract.

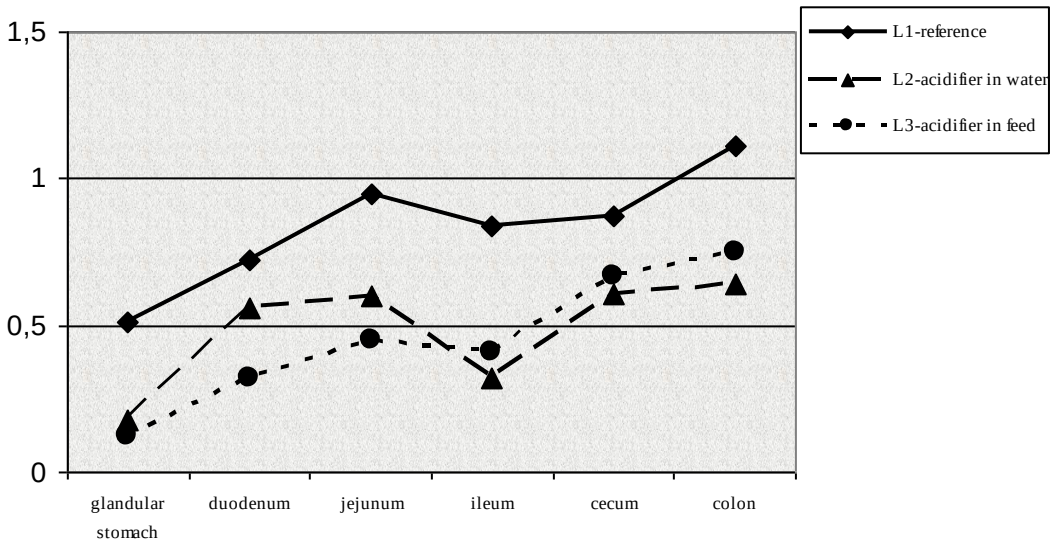

Fig. 2. The influence of organic acids on the dominance rapport between lactobacilli and coliforms

CONCLUSIONS AND RECOMMENDATIONS

♦ Acidifying the feed or drinking water using organic acids (Biotronic - 1‰ in feed and respectively 2‰ in water) of broiler chickens has determined the increase of the average daily weight gain (5.2-7.7%), an improvement in the degree of feed capitalization (2.8-7.2%) and the reduction of the necessary costs for feed per kg of weight gain (2.8-3.9%) . The acidifier's positive effects were more obvious in the first stage of development (0-14 days), when the differences compared to the reference lot were more significant.

♦ Using organic acids in the feed of broiler chickens (provided whether in water or feed) leads to the reduction of the digestive pH, especially in the first sectors (proventriculus, crop and small intestine), where, in fact, most of the processes regarding digestion and absorption take place.

♦ Regarding the quantitative-topographic distribution of the digestive microflora under the influence of organic acids, it was observed that, except for the anaerobic bacteria and fungi, which are not numerically affected by the organic acid, the other microbial species showed, in general, a numerical modification compared to the reference lot, hence the rapport of dominance between lactobacilli and coliforms was modified in favor of lactobacilli. The new balance established between coliforms and lactobacilli became an advantageous one for the chickens, on one hand contributing to the improvement of weight gain and degree of feed capitalization.

♦ Introducing acidifier in the structure of the feed ensures bioproductive and economical performances, as well as better digestive conditions (pH, microflora) than in the case of administering the acidifier in the drinking water.

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CERCETĂRI PRIVIND BIOEFICIENȚA UTILIZĂRII ACIZILOR ORGANICI ÎN ALIMENTAȚIA PURCEILOR

RESEARCH CONCERNING THE BIOEFFICIENCY OF USING ORGANIC ACIDS IN PIGLETS' FEEDING

Mierliță D.

Key words: feeding, piglets, organic acids

ABSTRACT

Acest studiu vrea să atragă atenția asupra unor posibilități de îmbunătățire a performanțelor de producție ale purceilor înțărcați, prin utilizarea prebioticelor pe bază de acizi organici (Acid Lac Dry®) ca alternativă la utilizarea antibioticelor de uz furajer (Salocin-120) sau chiar prin asocierea celor doi aditivi furajeri în alimentația purceilor înțărcați. Salocin-120 este un antibiotic de uz furajer admis in UE pentru a fi folosit în alimentația porcilor la îngrăşat, iar Acid Lac Dry® este un amestec de acizi obținuți prin fermentație naturală (acid lactic, acid fumaric, acid propionic, acid formic şi acid citric). Acizii organici, ca şi antibioticele au posibilitatea de a regrupa flora bacteriană din tubul digestiv, favorizând-o pe cea utilă digestiei prin modificarea pH-ului digestive.

Au fost constituite 4 loturi de purcei înțărcați în vârstă de 50 zile, a câte 8 capete/lot (4 vieruşi + 4 scrofițe). Pentru obținerea materialului biologic s-au folosit 8 scroafe şi material seminal provenit de la doi vieri, astfel încât fiecare scroafă a avut câte un purcel în fiecare lot iar câte doi purcei din fiecare lot au fost semifrați după tată. La lotul 1 (martor) s-a administrat un nutreț standard corespunzător categoriei de vârstă; la lotul 2 la rația de bază s-a adăugat antibioticul Salocin-120 (0,05%); la lotul 3 la rația de bază s-a adăugat prebioticul pe bază de acizi organici Acid Lac Dry® (0,5%) iar la lotul 4 la rația de bază s-a adăugat antibioticul în asociere cu prebioticul în proporțiile menționate. Prezența aditivilor furajeri testați în alimentația purceilor, nu a modificat consumul de hrană, însă au determinat o îmbunătățire a sporului în greutate cu 11,4% ($p<0,01$) în cazul asocierii antibioticului cu acizii organici în hrană (lotul 4); cu 9,16% ($p<0,01$) în cazul suplimentării hranei cu antibiotice (lotul 2) şi cu 7,61% ($p<0,05$) în cazul suplimentării hranei cu acizi organici (lotul 3).

O Imbunătățire s-a înregistrat şi în cazul şi în cazul gradului de valorificare a hranei; consumul de nutreț combinat pentru un kg spor în greutate fiind mai mic față de lotul martor cu 9,93% la purceii din lotul 4 (antibiotice + acizi organici); cu 7,72% la purceii din lotul 2 (antibiotice) şi respectiv cu 6,25% la cei din lotul 3 (cu acizi organici).

Efectele pozitive au fost mai pronunțate în primele 30 zile după înțărcare, când producția endogenă de acid clorhidric este mică, iar pH-ul digestiv este mai mare decât cel optim pentru o digestie bună şi realizarea unui microbism digestiv favorabil purcelului.

This study is meant to emphasize some improvement possibilities of the production performances of the weaned piglings, by the use of prebiotics ou the basis of organic acids (Acid Lac Dry®) as au alternative to using forage antibiotics (Salocin-120) or by associating the two forage additives in the piglings feeding. Salocin-120 is a forage antibiotic accepted by the EU in order to be used in the piglings and pigs feeding, Acid Lac Dry® being a mixture of acids obtained by natural fermentation (lactic acid, fumaric acid, propionic acid, formic acid and citric acid).

Four lots of 50 days old weaned piglings have been formed, each lot having 8 head of cattle (4 young boars + young sows). In order toobtain the biological material 8 sows and seminal material taken from 2 boars have been used, to that each sow had a pigling in each lot whreas 2 piglings in each lot were stepbrothers ofter father.

The first lot was fed with blended forage suitable for the age category in the sense of structure and nutritive value; for the second lot, Salocin-120 antibiotic (0,05%) was added to the essential ratio; for the third lot, Acid Lac Dry® (0,50%) prebiotic was added to the essential ratio and for the fourth lot, the antibiotic tagether with the prebiotic werw added to the assential ratio. The presence of forage additives tested in the weaned piglings food didut modify the food consumption, but it determined improvement weight gain with 11,4% (p<0,01), in case of association between the antibiotic and the prebiotic (lot 4); with 9,16% (p<0,01) in case of food addition with antibiotics (lot 2); and with 7,61% (p<0,05) in case of food addition with organic acids (lot 3). An improvement of the food valorization bas been noticed, too; blended forage consumption for 1 kilo being bualler than lot 1, with 9,93% at the piglets in lot 4 (antibiotics + organics acid); with 7,72% at the piglets in lot 2 (antibiotics) and with 6,25% at those in lot 3 (organics acid).

Positive effects have been wore obvious after the first 30 days after weaning, when the endogenous production of hydrochloric acid is little, and the digestive pH is higher than the ole that is the best for an adequate digestion and for the aduevement of a digestive microbism convenient for the piglets.

INTRODUCTION

Achieving greater productions of meat with minimal production costs supposes using biological material with high genetic potential and finding some solutions for a better capitalization of the feed, taking into account in this sense all the factors that influence the consumption of feed and the balance between the nutrients of the ration which can allow the genetic potential for production to manifest itself. In this respect, in the feeding of pigs, a series of fodder additives, amongst which fodder antibiotics hold an important position.

This method of increasing the degree of feed capitalization is largely used by all the great international producers of pork, especially in the USA, Canada and some European countries. Lately, due to fears that fodder antibiotics might generate anti bio-resistance in human beings, people attempted eliminating and replacing them in animals' fodder. A series of specialty works attest the fact that antibiotics can be successfully replaced in animal fodder by probiotics (Chapman D.J.- 1998; Mierliță D., 2003). A few researchers (quoted by I.M. Pop-2002) have revealed the positive influence of various types of antibiotic and probiotic combinations on the performances of farm animals, without any mention of a possible association between antibiotics and probiotics being made in specialty literature.

The following paper means to draw attention to the possibility of improving the production performances of weaned piglets, by using organic acid based prebiotics (Acid Lac Dry) as an alternative to using fodder antibiotics (Sal-120) or even by associating the two fodder additives in the feed of weaned piglets. Organic acids, like antibiotics, have the possibility of regrouping the bacterial flora in the digestive tract, favoring the one that is useful to the digestion by modifying the digestive pH (Mierliță D. and col. 2003).

MATERIAL AND METHOD

Four lots of 50 day-old weaned piglets were constituted, each lot containing 8 piglets (4 males and 4 females). The biological material was obtained using 8 sows and seminal material from 2 boars, so that every sow had a piglet in each lot and two piglets in each lot were half-brothers (same father).

In the first lot (reference) combined fodder adequate in structure and nutritional value to the age category was used; in the second lot, the Sal-120 (0.05%) antibiotic was added in the basic food ration; in the third lot, the organic acid based prebiotic Acid Lac Dry (0,50%) was added to the basic ration, whereas in lot number 4, the antibiotic combined with the prebiotic was added, in the proportions mentioned for lots 2 and 3.

Sal-120 is an antibiotic obtained through natural fermentation, being approved for the feeding of piglets and pigs intended for fattening. This antibiotic regroups the digestive flora, favoring the digestion and the absorption of nutrients from the feed. Acid Lac Dry is a mix of acids obtained through natural fermentation (lactic ac., fumaric ac.; propionic ac.; formic ac. and citric ac.). These acids have the role of supplementing the endogenous production of acids, which leads to the reduction of the digestive pH and implicitly to the increase in the rate of transformation of proenzymes into active enzymes (Ciurel V. 1989).

The piglets from the experimental lots were housed in collective pens, separately according to lot. The temperatures recorded during the experiment were within the limits of thermal comfort (17-20 0C), considering the period in which the experiment took place (February – March). The feed was provided in abundance, with combined fodder that was adequate regarding structure, energetic and proteinic levels, as well as regarding the content of lysine, methionine, Ca and P; the only difference between lots was represented by the experimental factor (table1). By inserting the tested fodder additives, the nutritional value of the combined fodder remained practically equal to that of the fodder used in the reference lot. The weighing of the piglets and of the fodder was performed at the beginning of the experiment (at the age of 50 days), at the age of 80 days and respectively at the end of the experimental period (at the age of 100 days); the average daily weight gain, the average daily consumption of combined fodder and the degree of feed capitalization were thus calculated.

The employed work techniques were the standard ones, which are recommended by specialty literature in the field. The data was statistically processed using the method of the variant analysis and the significance of the difference was established using the "Student" test.

Table 1

Structure and nutritional value of basic combined fodder

a) **Structure of CF** (% of weight)		b) **Nutritional characteristics** of CF	
Maize	60,30	E.M. (kcal/kg)	3170
Barley	10,00	Protein b. (%)	18.54
Soy groats	15,00	Lisyne (%)	1,16
Fish flour	7,50	Met.+cystine (%)	0,72
Powdered milk	2,50	Ca (%)	0,91
Vegetable oil	2,0	P (%)	0,62
Calcium Carbonate	0,80	**Experimental plan:**	
Dicalcium phosphate	0,70		
Salt	0,20	**L1** – reference lot	
Zoofort	1,00	**L2** – lot *Sal-120*: 0,05% additive	
T O T A L	100,00	**L3** – lot *Acid Lac Dry*: 0,5% additive	
		L4 – lot *Sal-120* (0,05%) + *Acid Lac Dry* (0,5%) additives	

RESULTS AND DISCUSSIONS

Upon surveying the main production performances obtained by the piglets in the experimental lots (table 2), we can notice the positive influence of the two fodder additives on the speed of growth and on the degree of feed capitalization, both in the case of using them independently but especially in the case of using them in combination with organic acids in the feed of weaned piglets (the case of the piglets in lot number 4).

Table 2

Evolution of the main production and consumption performances recorded during the experimental period (piglets' age: 50-100 days)

Specification			L_1 (reference)	L_2 (Sal-120: 0.05%)	L_3 (Acid Lac Dry: 0.50%)	L_4 (Sal-120: 0.05% + Acid Lac Dry: 0,50%)
Nr. piglets/lot			8	8	8	8
Duration of experiment (days)			50	50	50	50
Piglets' age (days): - initial - final			50 100	50 100	50 100	50 100
Average body weight (kg): - initial - after 80 days - final			11,30 22,42 30,63	11,15 23,56** 32,25**	11,10 23,14* 31,90*	11,25 24,02** 32,78**
Average daily gain	51-80 days	g/day	370,67	413,6**	401,33*	425,66**
		%	100,00	111,60	108,27	114,82
	81-100 days	g/day	410,50	434,50*	438,00*	438,00*
		%	100,00	105,85	106,70	106,70
	51-100 days	g/day	386,60	422,0**	416,00*	430,60**
		%	100,00	109,16	107,61	111,40
Average daily consumption	51-80 days	kg/day	0,868	0,872	0,870	0,872
		%	100,00	100,46	100,23	100,46
	81-100 days	kg/day	1,323	1,342	1,345	1,336
		%	100,00	101,44	101,66	100,98
	51-100 days	kg/day	1,05	1,06	1,06	1,06
		%	100,00	100,95	100,95	100,95
Specific consumption	51-80 days	Kg	2,34	2,10	2,17	2,05
		%	100,00	89,74	92,73	87,60
	81-100 days	Kg	3,22	3,09	3,07	3,05
		%	100,00	95,96	95,34	94,72
	51-100 days	Kg	2,72	2,51	2,55	2,45
		%	100,00	92,28	93,75	90,07

* - $p< 0.05$; ** - $p< 0.01$

The piglets from the experimental lots had the same age at the beginning (50 days) and approximately the same body weight (11.10-11.30 kg/piglet), but the evolution of the latter was influenced by the two fodder additives present in the feed. It can be noticed that the antibiotic had a maximum effect in the first part of the experimental period, respectively during the period following the weaning, helping the piglets to better overcome this stress; the intensity of the effect decreased after 30 days from its insertion in the feed.

During the entire experimental period, the best results were obtained when using the Sal-120 antibiotic in combination with the organic acids based prebiotic, Acid Lac Dry (the case of lot number 4), because, compared to the piglets from lot number one (reference lot), the average weight gain was 11.40% higher, whereas the degree of feed capitalization was 9.93% improved (table 2). Similar results were obtained by the piglets in lot 2 (the Sal-120 antibiotic was used in the feed), in which, compared to the reference lot, the average daily gain was 9.16% higher, whereas the degree of feed capitalization was 7.72% improved. The piglets in whose feed the organic acids based prebiotic was introduced (the case of lot 3) achieved unmistakably better production performances than those from the reference lot, but poorer results compared to those obtained by the piglets in whose feed the fodder antibiotic was used (lots 2 and 4). Even though the production performances achieved by using organic acids are lower than those ensured by antibiotics, they still constitute a viable alternative to using antibiotics, as they are natural products, safe for man, animals and the environment, without having the specific shortcomings of antibiotics.

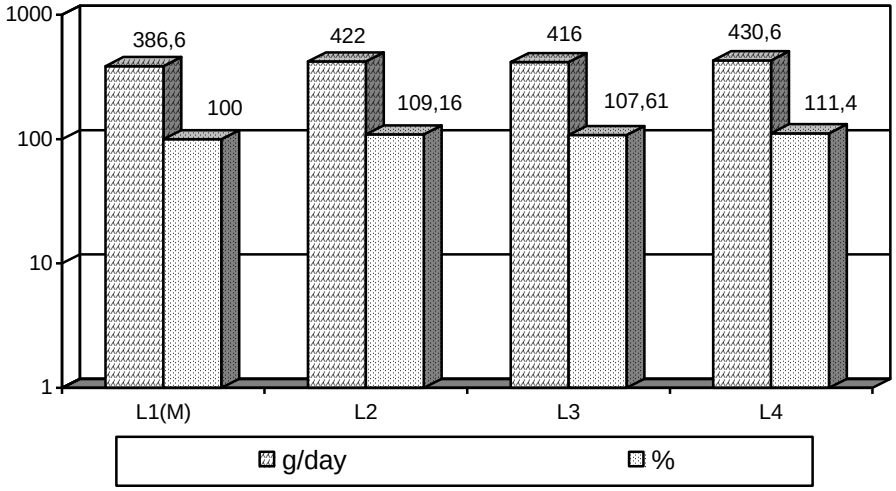

Fig. 1. The influence of acidifying the feed on the average daily gain

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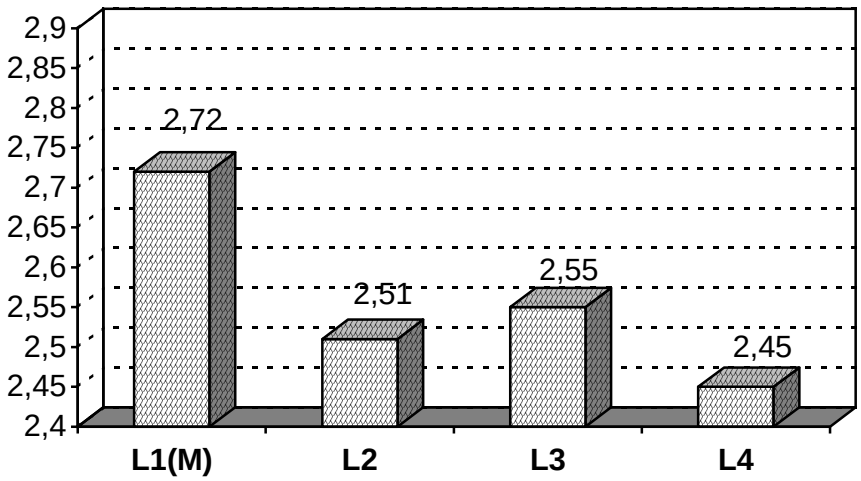

Fig. 2. The influence of acidifying the feed on the degree of feed capitalization (kg of combined fodder/kg of gain)

The reduction in the efficiency of the two fodder additives tested in the feeding of weaned piglets, after the age of 80 days, can be explained by the fact that the endogenous production of hydrochloric acid reaches an adequate level, thus ensuring a reduction in the

value of pH in the digestive tract, which, on one hand prevents the proliferation of some germs that are not adaptable to the acid environment (ex: *Salmonella, Clostridium, Staphylococcus, E. coli*) and on the other hand favors the transformation of pepsinogen into pepsin, followed by a better digestion and use of mainly proteins contained in the feed (Halga P - 2000).

CONCLUSIONS

- The positive influence of the two fodder additives tested in the feeding of weaned piglets (Sal-120 and Acid Lac Dry) (in combination or independently), is more obvious during the first weeks after weaning, helping the piglets to overcome the stress of weaning.
- The best results concerning growth and feed capitalization were obtained in the case of using the antibiotic in combination with the prebiotic (the case of lot 4); following in descending order the lot which received antibiotic in the feed and the one in which the organic acid based prebiotic was used.
- Even though organic acid based prebiotics ensure lower production performances, they constitute a viable alternative to using antibiotics, as they are natural products, safe for man, animals and the environment, without having the specific shortcomings of antibiotics.
- The two tested fodder additives do not have an additive (cumulative) effect, which means they also have common effects that overlap; probably regarding the regrouping of the eubiotic digestive flora.

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THE MANAGEMENT OF THE CEREALS AND TECHNICAL CROPS MECHANIZATION

MANAGEMENTUL MECANIZĂRII CULTURILOR DE CEREALE ŞI PLANTE TEHNICE

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Key words : management of agriculture mechanization, agricultural tehnical equipment, agricultural technologies, farm dimension types.

ABSTRACT

Romanian agriculture has to be transform into a modern economic domain following the trends that are currently manifesting within global and European agriculture. These trends focus on the efficience and knowledge, management training, technical progress, computerization etc.

The agriculture of future requires a certain type of agricultural producer who must be a good agronomist and an animal husbandry expert, a specialist in the environmental protection, a competent financial analyst, a good IT expert and a gifted marketing specialist.

Under these circumstances the authors of the present paper considered that developing a guide with information on the overall problems of the plant production management would be greatly appreciated by the interested parties.

For this reason, an analysis was done in three agricultural exploitation types regarding some general characteristic in order to implement modern mechanization activities.

In order to implement a management plant for the farm success, several possible variants of equipment supply were suggested taking into account the economic efficiency.

Agricultura românească trebuie transformată într-un domeniu economic modern, în conformitate cu tendințele care se manifestă în agricultura europeană şi mondială. Aceste tendințe se bazează pe eficacitate şi cunoaştere, pregătire managerială, progres tehnic, informatizare, etc.

Agricultura viitorului cere un anumit tip de producător agricol, care trebuie să fie un bun agronom şi zootehnist, un specialist în protecția mediului înconjurător, un analist financiar competent, un bun expert IT şi un specialist în ceea ce priveşte marketingul.

Având în vedere aceste componente, autorii prezentei lucrări au considerat că elaborarea unui ghid conținând informații asupra problemelor generale ale managementului producției vegetale va fi foarte apreciat de toți cei interesați.

În acest sens, s-a efectuat o analiză pe trei tipuri de exploatații agricole, urmărindu-se unele caracteristici generale ale implementării unor activități de mecanizare moderne.

Pentru implementarea managementului în exploatațiile culturilor de câmp, în fermele de succes, au fost sugerate posibile variante de dotare cu echipamente tehnice, ținând cont de eficiența economică.

In order to produce efficiently and competitively, the farms, regardless of their type, must be integrated in the trends that are currently manifesting within global agriculture, to facilitate the promotion of qualitative factors amongst which we can name

the development of knowledge, management training, technical renewal, use of modern technologies, computerization etc.

The orientation to this promotion constitutes a prerequisite for the advancement of our country's agriculture and for our "de facto" accession to the European Union.

The transformation of our agricultural farms into economical operators able to help increase the market competitiveness of local agricultural products and the accomplishment of the European Union accession entail the attainment of a higher cultural and professional training level of the population involved in agriculture. The agriculture of the future requires a certain type of agricultural producer, who must be and will be a good agronomist and animal husbandry expert, a better specialist in environmental protection, a better financial analyst, a better IT expert and a better marketing specialist.

The farm's managers must take into account the market's mechanisms, requirements, its constraints in a constantly changing economic environment and find solutions for an appropriate adaptation. Given these conditions of risk and uncertainty, the progress of farms and agriculture as a whole relies heavily on the quality of management activities, in the process of fulfilling the management functions - forecasting, organizing, launching the operations, activity control and correction. Concurrently with the training of managers in the management of farms, it is necessary to promote the managerial culture even for other people inplied in agriculture.

Although the main objective of the management activity is the production and thereby obtaining the maximum possible results, measurable through profit or net income, the decisions concerning the farm structure and its levels must take into consideration both the existing natural resources and the human resources available for employment as well as the market requirements.

The increase of the competitive capacity within the market results from the auspicious conditions of the culture areas, a better provision of certain production inputs, the standing on the agricultural markets, the shift towards the production of "clean" products, which will be more and more in demand both on the local market and on the external market, as well as a"friendly" attitude towards the environment.

Under these circumstances, **the information** is just as important as natural resources. In the present stage of our agriculture, **developing a guide with information on the overall problems of the plant production management, to be distributed to interested parties, would be greatly appreciated.**

In Romanian agriculture, currently, the organizational structure of farms consist of small farms (predominant peasant - 99.5% of the total agricultural establishments in Romania and operating over 55% of the agricultural area of the country) and large and very large farms 0.5% (agricultural companies with the majority of shares owned by the state or agricultural companies with legal personality, employees' associations, private companies.

The present situation of the family farms does not encourage a competitive and profitable agricultural production on the local and foreign markets and one that can ensure a decent standard of life for the farmers. Overcoming this situation involves the conversion of the present rural type family farms into family farms with a commercial, modern character, capable to generate technological progress and able to make best use of the natural resources, labour and material resources available in our country.

The size of the farms can be evaluated by using various criteria: the agricultural area used by the farms; the standard gross margin (SGM), that represents the difference between gross product of the agricultural units and the related variable expenses (operational costs). SGM is calculated within the EU for each EU member state and is expressed in European currency units (ECU-euro) European dimension unit (ESU) is used to express the economical scale of a farm, a unit that is equal to 1200 Euro.

Technical Base Modernisation of the Agricultural Exploitations

The mechanization of agricultural work plays a major role in the achievement of a competitive and performing agriculture. Therefore, improving the farms endowment with tractors and agricultural machinery are among the first priorities for the revival of this sector. The disproportion between the number of tractors and agricultural equipment and their real requirements, evaluated by experts, is considerable. According to data from the Statistical Yearbook of Romania (2005), in 2003, there were 169,000 tractors and 26,000 combines, compared to the necessary of 392,000 tractors and the 78,000 combine. The disparity is even greater if we consider the high degree of physical and moral wear of the majority of tractors and agricultural equipment. Substantial is also the difference existing between our country and other European countries. Compared with a surface load of 12-13 hectares per tractor which is the European average, in Romanian agriculture the area which is worked by a tractor is of 56 hectares.

By equipping the farm modules studied with tractors and agricultural machinery , in creating the guide, the aim was to:

- increase the productivity of the agricultural machine operators;
- improve the quality of mechanized work;
- shortening the deadlines for the implementation of works and finalizing them in the optimal periods;
- reducing costs incurred by the implementation of mechanized work.

Advanced Technologies

In the creation of a performing and competitive agriculture, an ever-increasing role is played by the advanced technologies. There is a large gap between the technologies that can be used and their actual use, the tendency that manifests itself was and still is to substitute certain technologies that produce quite high results to traditional technologies.

Thus, the use of fertilizers represents one of the essential requirements in order to ensure a performing and competitive agriculture. A rational use of fertilizers involves ensuring the balance between the total fertilizer quantity applied to the soil (mainly nitrogen, phosphorus and potassium) and the total quantity of nutrients that are extracted from the soil each year in order to maintain sufficient nutrients for a sustainable crop production with the desired quantity and quality. The fertiliser's use in excess, as well as their insufficiency has a negative effect on the production, costs and production efficiency.

As in the case of fertilizers, the use of herbicides, insecticides and fungicides on a greater scale is necessary, concurrently with the implementation of technologies and practices designed to reduce the risk to human health and environmental quality.

Establishing a modern and competitive agriculture is conditioned by the quality of the seminal material. Although there are regulations on the production, quality control, marketing and use of seeds and seeding material as well as the patenting of agricultural plant cultivars (Law no. 75/1995), in practice there are still used uncertified seeds of inferior biological categories.

The newly proposed technologies survey:

- reducing the consumption of energy, raw materials and other materials, labour per unit of effect (in terms of production factors);

- obtaining the products with superior technical-operating parameters, with utilization values at comparable levels as the highest requirements (in terms of product);

- fostering the development of renewable resources, environmental conservation, the production of clean "products" (ecological products);

Fostering a high level of profitability and competitiveness on the domestic market and the foreign one (in terms of economic efficiency).

The basic criterion in agriculture when assessing a technology level is the energy consumption, which should be the smallest per ton of product produced. The use of modern technologies involves the concentration of agricultural production. The concentration of agricultural production is manifested primarily through the reduction of the number of farms and the increase of their average surface.

Prices and Market

The rural household focuses on the use value, the usefulness of products for own consumption, prices and the market plays a minor role, few producers make calculations in terms of costs and yields. The commercial type of family farm targets specifically the use value for other parties, in order to obtain a trading value, a higher price and net income. For these producers, markets and prices play crucial role, the calculation of costs and yields is an essential condition in order to avoiding risk, to survive and develop. These circumstances induce a distinctive economical conduct, subordinated to income generation that manifests itself in the concern for the most rational allocation of resources and their use, in the sale of products, and in their aspiration to cope with the competition. Unlike the family farm, the individual non-familial household has as main characteristic features: conducting the business with hired agricultural labour force, exercise the management by the owner or assigned persons, specialized in this field, directing production for the market, the aim being to obtain profit.

Economic Efficiency

At farm level, results are expressed through the quality of the management act. These results depend on the degree of resources enrichment of the farm and management performance in conducting all activities and particularly in economic and financial plan, since the result of the decision taking act must be economic efficiency. A large farm is organized with the aim of achieving profit and a family farm is valid if it ensures the necessary income of family and can resume the production process under normal conditions.

To quantify the economic efficiency of the designed farm modules, the system of the level and structure indicators was used:

a. production indicators: average crop yield per hectare, the value of production per ha and the total farm production;

b. economic indicators: production costs per hectare, the structure of production costs, labour productivity (expressed both physical and as value) the production cost per unit, profit per unit of production (per hectare) and per unit of product (per ton), the degree of profitability etc.

General Management Characteristics for the Implementation of Mechanization Activities in Vegetal Crops Field

Intervention Points

The management practiced in agricultural crop farms must cover all technical-economical activities that go on in these farms and to consider all the aspects that determine the degree of economic efficiency and ensures the prosperity of the farmer and his family.

At the level of vegetal farm, the management should consider primarily the setting of the main objectives at the farm level and its components, such as the resources and the means necessary to achieve them.

The manager of a vegetal farm should permanently intervene over the conduct of the production process and select the best solutions on the supply with material and technical means, administration, management and coordination of the staff farm, carrying

out production activities in conformity with production goals also, the manager have to ensure the quality of production processes and products; the products sale, promotion and their distribution to the market, and the financial activities of the farm.

The management within a vegetal farm involves successive interventions on the technological links of the various crops grown in the farm, starting from the selection of cultivars and hybrids, seeding material, organic and mineral fertilizers to be used, the type and number of mechanical works to be carried out, estimating the manpower requirements, the crops maintenance activities by applying different pesticides and ending with the harvesting of the obtained crop yield.

The manager's intervention from the economical-financial point of view is made through the estimation of budgets for each crop, development of plans or programs that target the present and future farm activity, through calculating the obtained efficiency and setting the future production structure on the basis of this efficiency and the existing market trends.

Practicing an efficient management within a vegetal farm involves developing a strategy which would allow both obtaining favourable economical results as well as the farm development, by incorporating technical and technological progress in farm activities.

In formulating strategy the manager must start from the existing realities, namely to develop a diagnostic analysis that would identify weaknesses and strengths of the farm. Diagnostic analysis should be correlate with an analysis of the external farm environment, respectively with the factors affecting the activities in the farm (e.g. suppliers, customers, banks, competition).

Once these analyses completed, the manager can proceed to the development of long-term plans, plans that will contain the overall development objectives of the farm.

In order to achieve these objectives the farm manager takes into account the various alternatives for the production systems and finally drafts production plans for medium and short term.

Elaboration of the production plans is not sufficient to achieve the desired results at farm level. They must be accompanied by marketing, financial and control plans in order to enable the manager to select the best solutions and take the best decisions for the farm.

TECHNOLOGY FRAMEWORK

The production technologies applied in the vegetal farms vary depending on the existing material, human and financial resources, or the resources that can be obtained by the manager. An important role is played by the existing agro-pedological potential of the farm.

The crops structure is, in turn, dependent on the technical means available to the farm, meaning that units with high economic potential have a differentiated crops structure, which allows an uniform use of the technical means throughout the whole production year and a corresponding spread out of the income.

Building a technology framework in vegetal farms involves the setting up of a succession of activities which are carried out in the farm during the agricultural year, which begins with the selection of crops and cultivars that are best adapted to the agro-zone in which the farm is located, establishing the crop rotations within the farm and continues with specific production activities: application of fertilizers and amendments, carrying out soil works, special operations particular to sowing, crops maintenance works, the crop yield evaluation and finally harvesting the production obtained.

The crop location

The crop rotation is the only agro-technical method used in plant crop that does not require any investment. To the economic benefits additional ones are the improvement

of agrotechnics conditions relating to the reduction of weeding degree, reduction of land infestation with pathogens and maintaining the conservation state of the natural fertility of agricultural lands.

In the specific conditions of the country's plain area several types of crop rotations, depending on the crop systems used in farms are known. These types of crop rotations are grouped as follows:

Crop rotations for the plain areas and the South of the country:

1. yearly leguminous plants	1. successive cereal crops	1. yearly leguminous
2. successive cereal crops	2. technical plants	2. successive cereal crops
3. corn	3. corn	3. corn
4. corn – technical crops	4. corn	4. corn technical plants
5. cereals	5. yearly leguminous	5. cereals

Crop rotations for irrigated plain areas or lands with phreatic water:

1. corn	1. corn	1. corn
2. corn	2. corn	2. corn
3.soybeans + sunflower (sugar beet)	3. corn + sugar beetroot	3. soybeans
4. wheat + barley	4. wheat + barley	4. wheat + barley
	5. soybeans + sun flower	5. technical crops

Mixed crop rotations of field crops + fodder where less fodder is necessary:

1. corn	1. corn
2. corn	2.soybeans + sunflower
3. sunflower	3. wheat
4. wheat + barley	4. barley
5. fodder crops – perennial leguminous crops	5. Fodder crops - perennial leguminous crops

Mixed crop rotations of field crops + fodder crops where less fodder is necessary:

1. corn	1. corn
2. corn	2. corn
3. technical plants (soybean, sun flower, flax, sugar beet)	3. yearly fodder crops
4. wheat + barley	4. wheat + barley
5. yearly fodder crops - barley 70% from the plot of land + fodder beetroot 30% from the plot of land	5. lucerne - perennial leguminous crops
6. lucerne - perennial leguminous crops	

Crop rotations for plain area with non-irrigated lands – on normal soils:

1. corn	1. corn
2. corn	2. corn
3. wheat	3. wheat
4. technical plants (sun flower, flax)	4. barley
	5. fodder crops - perennial leguminous crops

Selecting the best precursory plants for the existing crop rotation within a rational crop rotation, together with complying with all the technological links that lead to the

attainment and the ensuring of the plants requirements for the vegetation factors, represents the main strategic tool to obtain constant and cost-effective production levels.

For irrigated conditions alongside the sequences above mentioned the production costs for the agricultural product increase depending on the irrigation water cost, the quantity of water used in the irrigation application, irrigation equipment type and labour used in the irrigation, costs incurred by the setting up of the irrigation system (liquidation of irrigation systems).

These crop rotations apply in farms with large surfaces - currently in associations; in individual households (family farms) there are usually use simple rotations of crops, suitable for the dispersion of land parcels. The future issue for all of farm land categories remains the need for large aggregation into large compact lands with as regular forms as possible, limited by the natural and constructed boundaries, having direct functional links with the communication means, villages and centres of production.

The production technologies used in projections have captured two of their main components: the technical and economic ones evaluated and interpreted in terms of economic efficiency.

Within the technical specification, the technical and economic components are limiting the means and the directional works in order to satisfy the plant requirements with the aim of obtaining the designed yields per area unit and product unit, the economical sector seeking to allocate and use economically the inputs to the maximum, in order to achieve the production with lowest costs per area unit and to obtain a higher profit on the crop, respectively per the farm.

As regarding the economic effort in implementing the technology, this has been quantified based on two elements:

a) items that require a low economic effort, in turn generating significant economic impacts;

b) elements that require substantial economic efforts from the farmer, but which have a major contribution in obtaining increased yields with reduced costs per area unit.

In the first category there are included: seed, fodder, plant density on area unit, the period of works, the works quality that are economically advantageous for those farms which also create or possess such assistance means, achieving thus the planned yields.

In the second category the mechanization work, phyto-sanitary measures and irrigation stand out. Relating to the agricultural mechanization work and therefore the level of the farms energy resource, the used technologies in module projections can test with economical discernment the ways of implementing them, in particular for this period in which there is a great turnover and an exacerbation of expenses incurred by the mechanization of agricultural work and also limited financial possibilities for the purchase and operation of tractors and agricultural machinery.

In selecting the production technologies used in the farms modules projection, should be taken into account the interpenetration and mutual conditioning of the influencing factors from the action point of view, namely: exogenous factors that influence economic activity outside the farm: market requirements, the degree of overall economic development of agriculture, development and restructuring of tractors and agricultural machinery industry and of the chemical industry.

TECHNICAL EQUIPMENT SUPPLY

Mechanization represents the replacement of manual and animal labour in the processes for agricultural production, with technical agricultural equipment performing the work and operations of the production processes.

The mechanisation is developed in order to increase goods production, labour productivity, to decrease costs per product unit and to lessen the human labour. It is one of the main directions of the introduction of technical progresses in all branches of material

production. The extension of mechanization into agriculture is conditioned also by the use of factors that assist to the agricultural production increase (fertilizers, herbicides, irrigations etc.) aiming to increase their economic efficiency.

A system of agricultural machines means all the types of technical equipments used for agricultural mechanization of all works in a production process. The mechanization system ensures that all agricultural machineries that are its components need to be correlated with each other in terms of technical, economic and organizational view points, in order to achieve maximum agricultural production with minimal cost.

The selection criteria for agricultural machinery in a mechanization system take into account:

- the area of mechanization, determined by land relief, soil resistance, the crops plan structure, available labour;
- possible technique to use, determined by the technical characteristics of machines, the means to satisfy the agro-technical requirements by their technical performance;
- economic efficiency, materialized through a reduced time period for the recovery of investment made in equipments.
- economic efficiency, which means to achieve the proposed objective with minimum costs, which is the purpose of each agricultural farm, actions or activities. The economic efficiency in agriculture, husbandry, machinery activities etc., is determined by knowing both the expenditure incurred and income that are achieved through them.

Economic profit, which is resulted from an activity, is the value of total income that remains after subtracting all costs, including repayments, taxes, insurance etc.

The ways to profit growth are clear: maximizing revenues and minimizing costs in agriculture, each of the two elements having specific complex aspects of a social, professional, technical, technological, managerial, regional nature, etc.

In the paper, to exemplify, we present a proposal for minimal supply with technical equipment for three representative modules of cereals and plants crops grown in irrigated system (Tables 1-3). Other equipment necessary for the implementation of the crop technologies with specific profile will be leased from the third parties.

Note that all technical equipment specified to be used, are produced locally and are manufactured by factories with tradition in this field.

In order to select and size the necessary technical equipment for the mechanization of agricultural work the following criteria have to be taken into consideration:

- the analyzed profile type (cereals and technical plants, field vegetables, trees, vines);
- the module size;
- high quality of the agricultural works, performed at the optimal moment;
- the technical equipment capacity;
- the technical equipment situation (in current production);
- the efficient increase of the farm.

Note that recently, in Romania, varied type-dimensional ranges of tractors and equipment are used, produced in the country or imported (over 40 types of tractors, over 30 types of ploughs, over 25 types of harrows etc.) .

In order to implement a management plan for the farm success, farmers can opt for any possible variant of equipment supply, but this must be based on feasibility studies. It is recommended that these feasibility studies to be prepared by field specialists (economists, agronomists, mechanical engineers) from research institutes.

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Table 1

Profile: Cereals and technical plants

System: irrigated conditions

MINIMAL SUPPLY WITH TRACTORS AND EQUIPMENTS OF AGRICULTURAL FARM - 20 ha -

Nr. crt.	Equipment name	Supply requirements (pieces)	Unit Price		Equipment value			
			RON	EURO	per farm		per hectar	
					RON	EURO	RON	EURO
1	Tractor U 683 with cab	**1**	62800	17690	62800	17690	3140	884,5
	Plough PP4 x 30 M	**1**	5202,67	1465,54	5202,67	1465,54	260,1335	73,277
3	Stelar Harrow GS 1.2	**1**	2023	569,85	2023	569,85	101,15	28,4925
4	Harrow with discs GD 3.2 ME	**1**	10704	3015,21	10704	3015,21	535,2	150,7605
5	Trailer 5 tons 2RB5AT-T	**1**	27346,2	7703,15	27346,2	7703,15	1367,31	385,1575
6	Cultivator CSC 7 B	**1**	7407,5	2086,61	7407,5	2086,61	370,375	104,3305
7	Aspersion irrigation installation with drum and hose IATF-350 with irrigation ramp	**1**	77487	21827,32	77487	21827,32	3874,35	1091,366
	TOTAL		**192970,4**	**54357,68**	**192970,4**	**54357,68**	**9648,519**	**2717,884**

Prices include VAT

1 EURO = 3.55RON

It is estimated that for 20 ha farms, the rest of the necessary technical equipments will be rented from third parties. The financial effort necessary for the acquisition is not justified.

Table 2

Profile: Cereals and technical plants
System: irrigated conditions

MINIMAL SUPPLY WITH TRACTORS AND EQUIPMENTS OF AGRICULTURAL FARMS -200 ha -

Nr. crt.	Equipment name	Supply	Unit price		Equipments value			
			RON	EURO	Per farm		Per hectar	
					RON	EURO	RON	EURO
1	Tractor T 045-4U with cab	**1**	54971	15484,78	54971	15484,78	274,855	77,4239
2	Tractor U 683 with cab	**3**	62800	17690	188400	53070	942	262,35
3	Plough PP4X30M	**3**	5202,67	1465,54	15608,01	4396,62	78,04	21,9831
4	Stellar Harrow GS 1.2	**3**	2523	710,7	7569	2132,1	37,845	10,6605
5	Harrow with discs GD 3.2 ME	**2**	10704	3015,21	21408	6030,42	107,04	30,1521
6	Trailer 5 tons 2RB5AT-T	**2**	27346,2	7703,15	54692,4	15406,3	273,462	77,0315
7	Tank trailer RCU- 4	**1**	35000	9859,15	35000	9859,15	175	49,29575
8	Herbiciding machine MIRA-500	**1**	5509,09	1551,85	5509,09	1551,85	27,54545	7,75925
9	Sowing machine SPC 8 M	**2**	14982	4220,28	29964	8440,56	179,82	42,2028
10	Sowing machine SUP 29 -0 BR	**1**	14595	4111,26	14595	4111,26	72,975	20,5563
11	Cultivator CSC 7 B	**1**	7404,5	2086,61	7404,5	2086,61	37,0375	10,43305
12	Combinator Vibromixt 321	**2**	11835	3333,8	23670	6667,6	118,35	33,338
13	Amendament distributor MA 3.5	**1**	19350,82	5450,93	19350,82	5450,93	96,7541	27,25465
14	Dislocator DSP 4	**1**	734,85	207	734,85	207	3,67425	1,035
15	Packaging press PPF OA -wire	**1**	28600	8056,33	28600	8056,33	143	40,28165
16	Compost spreading equipment MIG6A	**1**	36430,26	10262,04	36430,26	10262,04	182,1513	51,3102
17	Sprinkle and dusting Equipment 500	**1**	11900,6	3352,28	11900,6	3352,28	59,503	16,7614
18	Self-propelling combine DROPIA 1810	**1**	319515	90004,22	319515	90004,22	1597,575	450,0211
19	Reaping equipment for sun flower	**1**	39627	11162,53	39627	11162,53	198,135	55,81265
20	Reaping equipment for corn	**1**	63403,2	17860	63403,2	17860	317,016	89,3
21	Aspersion irrigation installation with drum and hose IATF-350 with irrigation ramp	**5**	77487	21827,32	387435	109136,6	1937,175	545,683
	TOTAL		**849921,2**	**239415**	**1365788**	**384729,2**	**6858,954**	**1920,646**

Prices include VAT

1 EURO = 3.55RON

Profile: Cereals and technical plants

System: irrigated conditions **MINIMAL SUPPLY WITH TRACTORS AND EQUIPMENTS OF AGRICULTURAL FARMS -1000 ha -** **Table 3**

Nr. crt.	Equipment name	Supply	Unit price		Equipments value			
			RON	EURO	Per farm		Per hectar	
					RON	EURO	RON	EURO
1	Tractor T 045-4U with cab	4	54971	15484,78	219884	61939,12	219,884	61,93912
2	Tractor U 683 with cab	12	62800	17690	753600	212280	753,6	212,28
3	Tractor „Zimbru 2200"	2	267176,8	75261	534353,6	150522	534,3536	150,522
4	Plough PP4 x 30 M	12	5202,67	1465,54	62432,04	17586,48	62,43204	17,58648
5	Plough PRS5M	2	30858,37	8692,5	61716,74	17385	61,71674	17,385
6	Stellar harrow GS 1.2	12	2523	710,7	30276	8528,4	30,276	8,5284
7	Harrow with discs GD 3.2 ME	6	10704	3015,21	64224	18091,26	64,224	18,09126
8	Grapă Supersonic NI VA 6,4	2	73431,37	20684,89	146862,7	41369,78	146,8627	41,36978
9	Trailer 5 tone 2RB5AT-T	6	27346,2	7703,15	164077,2	46218,9	164,0772	46,2189
10	Tank trailer RCU- 4	8	35000	9859,15	280000	78873,2	280	78,8732
11	Weeding maschine MIRA-500	2	5509,09	1551,85	11018,18	3103,7	11,01818	3,1037
12	Sowing machine SPC 8 M	6	14982	4220,28	89892	25321,68	89,892	25,32168
13	Sowing machine SUP 29 -0 BR	3	14595	4111,26	43785	12333,78	43,785	12,33378
14	Cultivator CSC 7 B	6	7407,5	2086,61	44445	12519,66	44,445	12,51966
15	Combinator Vibramixt 321	6	11835	3333,8	71010	20002,8	71,01	20,0028
16	Amendament distributor MA 3.5	5	19350,82	5450,93	96754,1	27257,65	96,7541	27,25465
17	Dislocator DSP 4	1	734,85	207	734,85	207	0,73485	0,207
18	Packaging press PPF OA -wire	4	28600	8056,33	114400	32225,32	114,4	32,22532
19	Compost spreading equipment MIG 6A	2	36430,26	10262,04	72860,52	20524,08	72,86052	20,52408
20	Sprinkle and dusting equipment MC 500	4	11900,6	3352,28	47602,4	13409,12	47,6024	13,40912
21	Self-propelled combine DROPIA 1810	5	319515	90004,22	1597575	450021,1	1597,575	450,0211
22	Sun flower reaping equipment	2	39627	11162,53	79254	22325,06	79,254	22,32506
23	Corn reaping equipment	2	63403,2	17860	126806,4	35720	126,8064	35,72
24	Aspersion irrigation installation de with drum and hose IATF-350 with irrigation ramp IATF-350	10	77487	21827,32	774870	218273,2	774,87	218,2732

	TOTAL		**1221391**	**344053,4**	**5488434**	**1546038**	**5488,434**	**1546,035**

INFLUENȚA MODULUI DE EXPLOATARE ŞI DURATEI DE REFACERE A VEGETAȚIEI ASUPRA PRODUCȚIEI PAJIŞTILOR TEMPORARE

INFLUENCE OF THE EXPLOITATION WAY AND VEGETATION REGROWTH LENGTH ON THE TEMPORARY MEADOWS YIELD

M. Miluț, A. Croitoru,

Keywords: temporary meadow; exploitation way; regrowth lenght; yield.

ABSTRACT

Alături de condițiile naturale şi modul de întreținere, modul de folosire al pajiştilor, precum şi durata de refacere a vegetației sunt factori ce conduc la sporirea producției şi calității pajiştilor semănate.

În medie pe trei ani, s-au obținut producții apropiate la pajiştile temporare exploatate prin păşunat simulat sau prin cosit. În ceea ce priveşte perioada de refacere, cele mai bune rezultate s-au înregistrat când intervalul dintre recoltări a fost mai mare, de 30 – 40 zile, în acest caz perioada de refacere a vegetației fiind optimă.

Beside natural conditions and maintenance way, the exploitation way of the meadows also the vegetation regrowth lenght are factors that lead to increasing of yield and quality of the sown meadows.

In average of three years, was obtained nearby yields on the temporary meadows exploited by simulated grazing or by mowing. Considering the regrowth lenght, best results was registered when the interval between harvests was bigger (30 – 40 days), in this case the vegetation regrowth lenght being optimum.

INTRODUCTION

Beside natural conditions and maintenance way, productivity of temporary meadows is much influenced by system and use way. From this point of view, meadows can be used as pasture, grassland or as mixed system.

Even if are many possibilities to increase production and quality of temporary meadows, all the efforts done for those amelioration may be much diminuated or even annulated in case of irrational use of meadows.

By rational use of meadows must be assured the obtaining of high quality forage, for a bigger number of animals, on the entire period of vegetation, with minimum losses of vegetal mass, without negative consequences on meadow production and vegetation.

The meadow exploitation way, especially in the first years, has a main influence on yeld and floristical composition. In the first year of vegetation temporary meadows must be used only by mowing, in this way being protected young plants and its ..... (infratire) (Ionescu I., 2003).

If the grass are frequently grazed or mowed, the reserves of nutritive substances are decreased, because of diminution of leafs number and surface. In these conditions the annealing of plants is disturbed, and in time plants perish, their place is taken by worthless species which are not consumed by animals.

Among the elements that must take in consideration on organizing and application of a rational exploitation way may be enumerated: plants height of graze, graze frequency, graze length and repose period, optimum period for grasses graze, optimum time for overture and end of graze, charging with animals.

Starting from previous mentioned, was taken in study the exploitation way and time interval for vegetation restoration of a temporary meadow, established in the hill area of Oltenia, to follow their influence on yield and persistence of vegetal carpet.

MATERIAL AND METHODS

The experience was established in spring of 2005 year, on Experimental Centre for Pastures Crop Preajba – Gorj and the field was plough from autumn of 2004 year.

Was sown a mixture consisted by: Dactylis glomerata 20 %, Phleum pratense 15 %, Festuca pratensis 15 %, Lolium perenne 10 % and Lotus corniculatus 40 %.

The experience was placed after split lots method, being taken in study two factors:

- A factor – way of exploatation, with two graduations:
  - a_1 = simulated grazing (first crop at apex 10 - 15 cm);
  - a_2 = grassland (first crop at earing).
- B factorul – interval between crops, with three graduations:
  - b_1 = 20 – 25 days;
  - b_2 = 30 – 35 days;
  - b_3 = 40 – 45 days.

The main fertilization in the spring of 2005 was done with 50 Kg/ha N, 50 Kg/ha P_2O_5 and 50 Kg/ha K_2O, in the same year, after uniformization mowing was applied 50 Kg/ha azote yet.

In the second, third and fourth year of vegetation (2006, 2007, and 2008) was applied uniform dose of 150 Kg/ha N with 50 Kg/ha P_2O_5 and 50 Kg/ha K_2O, as follow:

- at variants exploited by simulated grazing: N_{50} in springtime + N_{50} after first crop + N_{50} after second crop;
- at variants exploited by mowing: N_{100} in springtime + N_{50} after first crop.

The cropping was done by mowing, starting with second year of vegetation (2006), after a cropping diagram established in concordance with B factor graduations, and the results interpretation was done by variance analysis.

RESULTS AND DISCUSIONS

Analysis of separate influence of A factor – exploitation way – towards dry substance production was show that in average of three years (2006 – 2008) was obtained nearby productions at the bowth studied methods: simulated grazing and grassland (table 1).

Table 1.

Influence of the exploitation way on temporary meadow yield from Preajba – Gorj (t/ha dry substance, average 2006 – 2008)

No.	Variant	Yield (t/ha d.s.)	%	Difference	Significance
1	Simulated grazing	4,95	100	-	Mark
2	Grassland	5,79	117	0,84	-

DL 5 % = 1,07 t/ha d.s.
DL 1 % = 2,48 t/ha d.s.
DL 0,1 % = 7,91 t/ha d.s.

The variant used by simulated grazing was provide in average a production of 4,95 t/ha d.s., while at variant used as grassland was obtained a production of 5,79 t/ha d.s., with a positive difference of 0,87 t/ha d.s. The difference of 17 % for using by mowing show that if the temporary meadow is used as grassland give better productions in comparison with meadows used by grazing, but is insignificant. The relative scanty difference between two exploitation methods make a point the versatility in exploitation of temporary meadows and also the great possibilities of production capitalization by using different systems.

The second studied factor was the vegetation regrowth length after mown (table 2). Was obtained very close productions for the bigger regrouth periods, of 30 – 35 days ans 40 – 45 days, respectively 5,47 t/ha d.s. and 5,76 t/ha d.s.. At the variants harvested at 20

– 25 days, even if were obtained much many crops, the production of dry substance was fall way to 4,88 t/ha. This may be explained through plants exhaustion, that's because dense cropping.

Table 2.

Influence of cropping interval on temporary meadow yield from Preajba – Gorj (t/ha dry substance, average 2006 – 2008)

No.	Variant	Yield (t/ha d.s.)	%	Difference	Significance
1	20 – 25 days	4,88	100	-	Mark
2	30 – 35 days	5,47	112	0,59	*
3	40 – 45 days	5,76	118	0,88	**

DL 5 % = 0,41 t/ha d.s.
DL 1 % = 0,60 t/ha d.s.
DL 0,1 % = 0,91 t/ha d.s.

Comparing the influence of cropping interval, on the commision of use way, on temporary meadow production was observed that obtained results are relatively close, fact that estabilish the adaptability of sown vegetal carpet at diferent systems of use (table 3). Productions were between 4,50 – 5,33 t/ha d.s. at simulated grazing and between 5,26 – 6,19 t/ha d.s. at variants exploited by mowing regim.

Table 3.

Influence of cropping interval, dependent of use way on temporary meadow yield from Preajba – Gorj (t/ha dry substance, average 2006 – 2008)

No.	Variant		Yield (t/ha d.s.)	%	Difference	Significance
	Use way	Cropping interval				
1	Simulated grazing	20 – 25 days	4,50	100	-	Mark
2		30 – 35 days	5,01	111	0,51	-
3		40 – 45 days	5,33	118	0,83	*
4	Grassland	20 – 25 days	5,26	100	-	Mark
5		30 – 35 days	5,93	113	0,67	*
6		40 – 45 days	6,19	118	0,93	* *

DL 5 % = 0,59 t/ha d.s.
DL 1 % = 0,86 t/ha d.s.
DL 0,1 % = 1,28 t/ha d.s.

Was observed the rising tendency of dry substance production in case of longer repose intervals, that's because plants have bigger possibilities to store substances of reserve in adequate quantities for breeding resume. Thus, in case of simulated grazing, the harvest at an interval of 40 – 45 days give a significant production growth, by 0,83 t/ha d.s. towards variant where cropping interval was only 20 – 25 days. In case of using as grassland the production growth were 0,67 t/ha for the variant mown after 30 – 35 days and 0,93 t/ha d.s. for the variant mown after 40 – 45 days, these are statistic assured as significant and distinct significant towards mark (mown after 20 -25 days).

Considering the combined influence of two followed factors, is remarked bigger productions obtained at variants used as grassland, with significant growths towards mark variant – simulated grazing at an interval of 20 -25 days (table 4). The biggest production was obtained at variant used as grassland (mown), cropped at 40 – 45 days, which has surpass the mark with 38 %, followed by variant cropped at 30 – 35 days (32 %).

Table 4.

Influence of use way and cropping interval on temporary meadow yield from Preajba – Gorj (t/ha dry substance, average 2006 – 2008)

No.	Variant		Yield (t/ha d.s.)	%	Difference	Significance
	Cropping interval	Use way				
1	20 – 25 days	Pasture	4,50	100	-	Mark
2		Grassland	5,26	117	0,76	-
3	30 – 35 days	Pasture	5,01	111	0,51	-
4		Grassland	5,93	132	1,43	*
5	40 – 45 days	Pasture	5,33	118	0,83	-
6		Grassland	6,19	138	1,69	*

DL 5 % = 0,90 t/ha d.s.
DL 1 % = 1,65 t/ha d.s.
DL 0,1 % = 3,97 t/ha d.s.

CONCLUSIONS

On the strength of researches executed in 2005 – 2008 period at Experimental Centre Preajba – Gorj, may by formulate the following conclusions:

1. Degraded pastures from North Oltenia, with small productions and mediocre quality may be improved by transformation in temporary meadows with higher productivity.
2. Comparing the two use ways, is observing nearby yields, with some plus at variants used by mown, towards variants used by simulated grazing.
3. Better results are obtained when the interval between cropping is bigger, by 30 – 40 days, in this case the vegetation regrowth period being optimum.

On the basis of conclusions above mentioned, may be recommended the harvest of temporary meadows from North Oltenia at an interval of 30 – 40 days, indifferent if the exploitation way is by grazing or mowing.

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CERCETĂRI PRIVIND INFLUENȚA GERMINAȚIEI ŞI A MMB-ULUI ASUPRA PRODUCȚIEI DE GRÂU DE TOAMNĂ ÎN CONDIȚIILE DE LA SCDA ŞIMNIC

THE RESEARCH REGARDING WHEAT GERMINATION AND THOUSAND KERNELS WEIGHT INFLUENCE TO WINTER WHEAT YIELD IN ARDS SIMNIC AREA FIELD CONDITIONS

Ofelia Müller, Gabriela Paunescu, Mirela Paraschivu

Key words: wheat, yield, character, thousand kernels weight, germination

ABSTRACT

Timp de 3 ani (2006-2008) au fost testate la SCDA Şimnic, 50 de soiuri de grâu de toamnă româneşti şi străine pentru a stabili relația care există între germinația şi masa a 1000 de boabe a seminței folosite la semănat şi producția obținută. Au fost determinate şi alte caractere, după cum urmează: numărul de plante răsărite/mp, ritmul de creştere, talia plantei, zile de la 01.01 la înspicat, numărul de spice/mp, MMB-ul seminței obținute şi masa hectolitrică.

Rezultatele obținute au evidențiată faptul că în niciunul dintre anii de testare, MMB-ul seminței folosite la semănat nu a influențat producția ci doar masa a 1000 de boabe a seminței obținute, coeficienții de corelație având valori foarte semnificative: r = 0,740 în 2006; r = 0,512 în 2007 şi r = 0,385 în 2008. În fiecare dintre anii de experimentare, MMB-ul seminței obținute la semănat a înregistrat valori mai mari pe măsură ce a crescut valoarea MMB-ului seminței folosite la semănat.

În urma distribuției cultivarelor testate pe clase de MMB, s-a observat că în clasa cu cele mai multe cultivare testate (40-45g), valorile caracterelor studiate s-au situat în limitele: germinația: 96,8-97,5%; ritm de creştere: 1,4-3; talia: 61,4 – 82,6 cm (limita inferioară în anul secetos 2007); producția: 28,4 – 42,8 q/ha (limita inferioară, de asemenea în anul 2007); MMB-ul seminței obținute: 39,1 – 46,2 g; MH: 74,3 – 77,6 kg/hl.

Niciunul dintre caractere nu a fost corelat cu germinația seminței folosite, în ondițiile în care la baza experiențelor efectuate au stat cultivare care au avut germinație peste 85%, minimul admis de către standard.

During three years (2006-2008) to ARDS Simnic area have been tested fifty Romanian and foreign winter wheat varieties for establish the relationship among seed germination, 1000 kernels weight and yield. There were also studied other traits, as follows: seeding plants per square meter, growth rate, plant length, days till 01.01.to heading, spikes number per square meter, 1000 kernels weight, test weight.

The results emphasized that neither years nor 1000 kernels weight didn't influence yield and correlation coefficients recording very significant values: r = 0,740 in 2006, r = 0,512 in 2007 and r = 0,385 in 2008. In each of experimental years, seeding 1000 kernels weight recorded higher values according as the value of 1000 kernels weight of seed used one year before.

Using 1000 kernels weight criteria, the tested varieties were classified and it was observed that the traits values were normal for most of tested varieties (40-45 g): germination (96,8 – 97,5%), growth rate (1,4 – 3), plant length (61,4 – 82,6 cm), lowest limit in 2007 droughty year, 1000 kernels weight of obtained seed (39,1-46,2 g), test weight (74,3-77,6 kg/hl).

Neither trait wasn't correlated with seed germination even the tested varieties had up than 85% germination.

INTRODUCTION

The water content necessary for grain germination is 35-45% by its weight (Evans, 1987). The grain germination can occur between 4 and 37^{o}C with the optimum between 12 and 25^{o}C.

The seed size doesn't influence germination, but can affect the growth rhythm, plant development and yield level. A bigger seed has few significant advantages, comparatively with a smaller one, such as faster growth, high number of fertile tillers/plant and higher yield (Spide, 1989). A smaller seed advantage is evident when the plants are growing in stress conditions, especially drought. When the plants emerge the seed embryo has 3-4 primordial leaves and ½ of them are initiated. During germination process, the roots are the first which emerge, followed by coleoptiles, which lead to first leave. The coleoptiles length limits the sowing depth and is changed depending on the coleoptile which increases fast when the depth is higher (Kirby, 1993). The semi dwarf cereals have shorter coleoptiles than higher cereals. The germination corresponds to the active life of the seed when the embryo is growing. In favorable conditions after few days, the first root and the gemulla which surround the coleoptiles appear. The germination stages are grain imbibitions, the ridicule and coleoptiles emergence (Gabriela Paunescu, 2007).

MATERIAL AND METHODS

The present paper is focus on the quality of wheat seed, taking into account two important traits: germination and 1000 kernels weight (TKW) and also their interaction with yield and morphological and physiological characters. There were established two trails, the first one with Romanian wheat varieties and the other one with foreign wheat varieties which performed during three years (2005-2007). There were realized correlations among all three years to establish the influence of TKW to the yield and its main components: the plants number/m^2, the growth rhythm and days from 01.01 till heading, the spikes number /m^2, thousand kernels weight (TKW) and test weight (TW).

RESULTS AND DISCUSSION

Analyzing the results it can be easily observed than 1000 kernels weight of the resulted seed is strongly correlated with 1000 kernels weight of the previous sowing seed, highlighting the principle:" big grain for sowing, big grain for harvest". None element wasn't influenced by the grain size for all experimental years (table no. 1).

Table no.1

The correlation coefficients between 1000 kernels weight and yield components

Germ	Plant no.	Grow. rythm	Height	Days from 01.01 till heading	Drough note	Spikes/ m^2	Yield	TKW	TW
2006									
-0,396	**0,040**	**-0,088**	**0,188**	**-0,260**	**-**	**0,035**	**0,102**	**0,740**	**0,005**
2007									
-0,089	**-0,056**	**-0,230**	**0,199**	**-0,316**	**-0,341**	**0,343**	**0,039**	**0,512**	**0,012**
2008									
-0,071	**-0,005**	**-0,143**	**0,135**	**-0,154**	**-**	**0,120**	**0,203**	**0,385**	**0,189**

The graphs with significant correlations are presented, as follows:

In 2006 year a positive correlation between TKW of used seed and TKW of obtained seed was observed, thus for each 1 g increase of the first element the second element recorded an increase by 0,725 g (Fig.1).

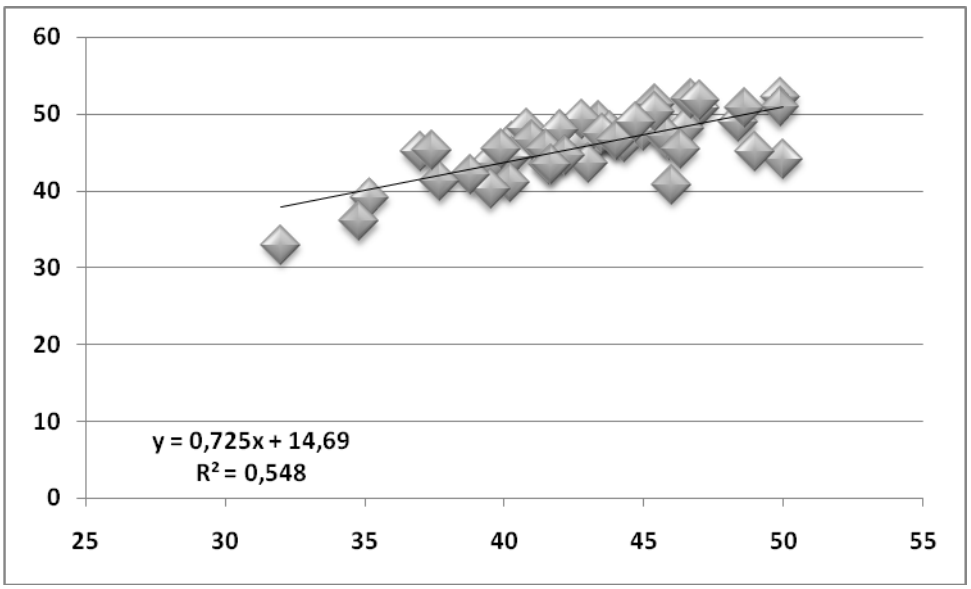

Fig.1 The correlation between 1000 kernels weight of used seed and 1000 kernels weight of obtained seed – Simnic 2006

In 2007 year a positive correlation between TKW of used seed and TKW of obtained seed was observed, thus for each 1 g increase of first element the second element recorded an increase by 0,417 g (Fig.2).

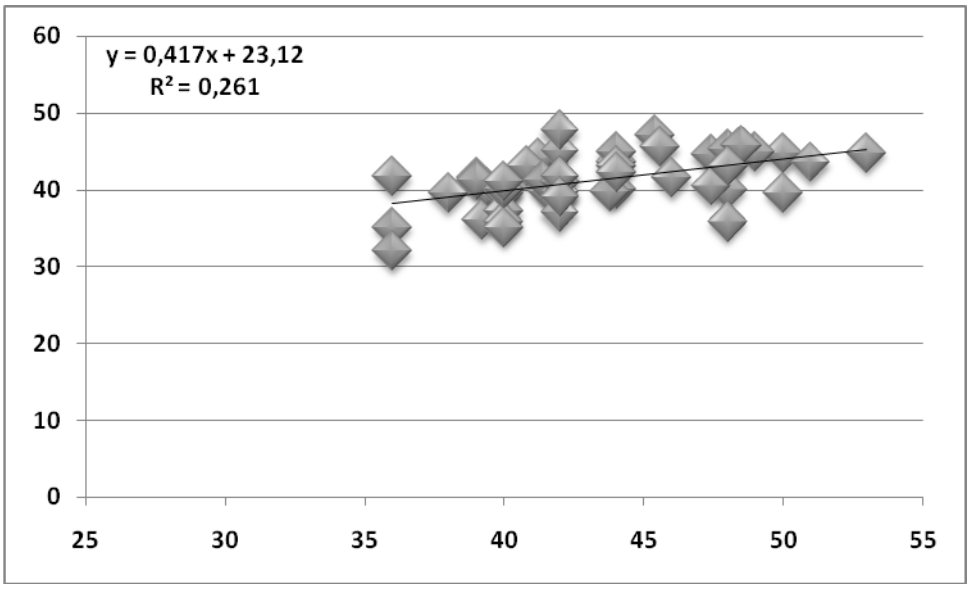

Fig. 2 The correlation between 1000 kernels weight of used seed and 1000 kernels weight of obtained seed – Simnic 2007

The grains analysis considering their size classification is represented in the following graphs. Sing TKW criteria it was observed than most varieties are classified into 40-45 g class and the character values ranged, as follows: germination (between 96,8-97,5%), growth rhythm (between 1,4-3), plant height (61,4-82,6 cm – the lowest value was recorded in the droughty year 2007), 1000 kernels weight of obtained seed (between 39,1-46,2 g), test weight (74,3 – 77,6 Kg/hl), the yield (28,4 -42,8 q/ha – the lowest value was recorded in the droughty year 2007).

For all fifty wheat varieties were calculated the correlation coefficients between germination and yield, as well as: germination and other wheat traits (Table no.2). None

trait wasn't correlated with the germination of the used seed. The trails were based on wheat varieties with up than 85% germination.

Table no.2

The correlation coefficients between germination and yield components

Plant no.	Grow. rythm	Height	Days from 01.01 till heading	Droughnote	Spikes/m^2	Yield	TKW	TW
Anul 2006								
0,127	**0,138**	**0,096**	**0,046**	**-**	**-0,035**	**-0,179**	**-0,379**	**0,085**
Anul 2007								
-0,111	**-0,093**	**0,095**	**-0,072**	**-0,045**	**-0,076**	**0,165**	**-0,031**	**0,064**
Anul 2007								
-0,051	**-0,092**	**0,175**	**-0,092**	**-**	**0,280**	**0,124**	**0,149**	**0,158**

CONCLUSIONS

The thousand kernels weight (TKW) of obtained seed is strongly correlated with TKW of used seed, highlighting the principle: "big grain for sowing, big grain for harvest". None trait wasn't influenced by the grain size for all three experimental years. The TKW of obtained seed recorded higher values gradually with the TKW of used seed. Similar aspects occurred also for the plants height and test weight, but not for all experimental years. For the class including majority of wheat cultivars, the studied traits values were: germination 96,8-97,5%, growth rhythm 1,4-3, plant height 61,4-82,6 cm,(the lowest value was recorded in 2007 year, a droughty year), yield 28,4-42,8 q/ha (the lowest value was recorded in 2007 year, a droughty year), 1000 kernels weight of obtained seed 39,1-46,2 g, weight test 74, 3 – 77,6 kg/hl. None trait wasn't correlated with the germination of used seed, even if the lower germination value for all tested varieties was 85%. Analyzing the traits division according as the germination values of used seed results than these characters are not influenced and their values are lower (97,5-100% for the last germination category).

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FAZELE DE CREŞTERE ŞI DEZVOLTARE A VIȚEI-DE-VIE ÎN VEDEREA ÎNTOCMIRII FENOCALENDARULUI VITICOL. METODA EXPERIMENTALĂ

PHASES OF VINE'S INCREASE AND DEVELOPMENT IN VIEW OF THE ELABORATION THE VITICULTURE FENOCALENDAR. METHOD EXPERIMENTAL

M. NICOLAE, Elena NICOLAE, A. DULUGEAC

Key words:daily bioritm, dried substance's acumulation, active temperature, fenophase, techological viticol optimized fenocalendar (FTVO).

ABSTRACT

Cercetările inițiate în Stațiunea Drăgăşani, în perioada 1977-1998 au urmărit cunoaşterea secvențială a bioritmului zilnic al acumulării substanței uscate pe butuc în dependența cu radiația calorică (observații, determinări şi analize: temperatura ordinară, temperatura activă şi temperatura eficace), la principalele fenofaze, stadii şi microstadii fenologice, pe de o parte şi elaborarea fenocalendarului tehnologic viticol optimizat (FTVO).

The researchs insided in the Viticol Research Center of Drăgăşani, since the 1977-1998 folowed up a sequencetial knowing of daily bioritm of the dried substance accumulationon the trunk which depends on thermal radiation (observations, remarks, determinantions, analyses: the ussualy temperature, the active temperature and the operative temperature) for the main fenophases, stades and the fenologichal microstades on a side and the elaboration techological viticol optimized fenocalendar(FTVO).

OBJECTIVES.MATERIAL AND METHOD

Deepening the knowledge processes of vegetative growth and training in viticulture crops has been in the last half-century target of intense research specialist in the world (Kondo 1955, Huglin 1958, Lazarevski 1961, black in 1964, Pouget 1963, 1965, Julliard 1966 Bouard, Pouget 1971, Conde, Ciolacu 1992) to achieve their dirijării through modeling and simulation (Conde and collaborators in 1992, Cazacu 1992) in order to numerical modeling and simulation and optimization technology culture vine by applying sequences agrofitotehnice at moments fenoclimatice optimal (Baggiolini 1952, Eichhorn, Lorenz 1977, Lancashire in 1991, Erez, Dejeu, 1995 and summoned Fregoni 1998).

Fenoclimatice studies and research have been conducted mainly on selected variety Crâmposie / Kober 5BB, and other vinifera varieties, aiming to accumulation of dried substance on the stump and developing technology fenocalendarului wine optimized (FTVO).

Processor pace of growth and dezvoltrare intramuguralã and extramuguralã was made across the biological cycle vegetative and reproductive periods, phases and stage phenology, as the research methodology established biofizice (fenoclimatice).

ECOSYSTEMS VITICOL

The interpretation in a new vision of experimental data older or newer from Drăgăşani resort, on accumulation by vine nutritional substance with a major role in NUTRISAM, allowed developing conceptual model of growth and vine-by rodirii -setting pace of life and daily storage in the butucului substance dried, nitrogen, phosphorus and potassium.

Exerting a permanent exchange of substances with natural or technological change through fizilogice and metabolic processes, vine appears as "ecological subsystem"

integrated ecosystem in the vineyard, but also as "bioenergetic system" open with "input-output "Energy.

- Variety vinifera / stock: Crâmpoşie selected / Kober 5BB, Victoria, Calin, Italy
- Leadership semihigh: Lenz Moser, the stem Guyot
- Plantation Age: 20 years (1978)
- The type of soil: eumezobazic brown and brown argiloiluvial pseudorendzinic
- An vineyard in 1997 / 1998
- Tmperatra daily average (7°°, 13°°, 19°°, 24°°)
  - Annual average temperature : 11,3 °C
  - Mimimal absolute temperature : -16,0 °C
  - Absolute maximum temperature : 37,7 °C
  - Annual Temperature : 1995 ore
  - Annual Precipitation : 664 mm

Results include:

- Bioclimatograma vineyard year 1997 / 1998
- Distribution and evolution of cumulative growth sprout
- Cumulative distribution and evolution of the substance stored in the dried-grape inflorescenses
- The relationship between biophysics heat rate asset or phenology evolution and accumulation of dried substance on the scion (wood, leaves, grapes)
- The evolution of the vine photo published on cycles, period, phase and stage phenology
- Original scoring systems and encoding stages and microstadiilor phenology contained in FENOCALENDARUL TECHNOLOGY VITICOL OPTIMIZE (FTVO).

Table no 1

Technology phases

Item	Phase / stage phenology	Period calendar	Morphophysiological dominant process	Dominant biochemical process
1	2	3	4	5
1	Bud Summer	May to October	Organogenesis germ primary (active, latent) Diferenger germ of the rod	Biosynthesis substances bioregulatoare growth (auxine or inhibitors)
2	Bud winter	November-December to March	Differentiation of germ rod Vital slowly process	
3	Preantheza	April toJjune	Vegetative growth of undergrowth and blooming Differentiation of florist	Biosynthesis plastic substances and energy
4	Antheza (florid)	June	Blooming flowers and related	Biosynthesis
5	Postantheza	June-July to August	Growth grapes and grains	Biosynthesis organic acids (protein substances)
6	Maturation of grapes and wood	July/August-October/November	Ripe grapes and aging Aging wood	Biosynthesis carbohydrate

Table no 2

Evolution relationship fenoclimatice during vegetation

Item	Phase and interphase	Morpho-physiological processes prevailing	Thermal threshold (limits Σ°C aggregate)	Average daily rate of accumulation SU (limits mg/ twig)
1	2	3	4	5
1	Crying	Start physiological, beginning movement seve	42-90	1-2
2	Bud	Growth intrabud	90-250	2-18
3	Unbud	Beginning Extra-start growth bud	250-287	18-30
4	Unbud-florid	The annual growth (phase I)	287-842	30-1040
5	Florid	Antheza	842-1217	1040-2080
6	Florid-mellow	The annual growth (phase II)	1217-1382	3100-980
7	Mellow-maturation	Maturation of grapes and wood	1382-3614	2940-200
8	Fall leaves	Migration reserve substances in the many years	3614-3660	200-100

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CERCETĂRI PRIVIND COMPORTAREA UNUI SET DE CULTIVARE DE GRÂU DE TOAMNĂ DE PROVENIENȚĂ KWS ÎN CONDIȚIILE ECOLOGICE DIN ZONA CENTRALĂ A OLTENIEI

THE RESEARCH REGARDING THE BEHAVIOUR OF A KWS WINTER WHEAT SET IN ECOLOGICAL CONDITIONS FROM OLTENIA CENTRAL AREA

Olaru L., Gabriela Păunescu, Oncică Fraga

Keywords: wheat, yield, fertilizing rate, ecological conditions

ABSTRACT

Patru soiuri de grâu de toamnă de proveniență KWS au fost testate alături alte soiuri de diverse proveniențe, într-o experiență la SCDA Şimnic, în perioada 2004-2008. Aceste soiuri au fost: Cordiale, Cubus, Meunier şi Exotic.

În medie pe 4 ani, în condiții de fertilizare normală, Cordiale a obținut o producție de 4329 kg/ha, Cubus – 4582 kg/ha, Meunier – 4051 kg/ha iar Exotic – 4909 kg/ha, aceasta fiind de fapt a treia producție medie dintr-un număr de 25 de soiuri de grâu de toamnă.

Producțiile maxime obținute de aceste soiuri au fost realizate în anul 2005, după cum urmează: Cubus – 7040 kg/ha, Meunier – 6050 kg/ha, Exotic – 7470 kg/ha iar Cordiale – 5970 kg/ha.

În condiții de fertilizare redusă cu azot, în medie pe 3 ani, soiul Cordiale şi-a diminuat producția cu 34%, Meunier cu 44%, Cubus cu 36% iar Exotic cu 41%.

A set of four KWS winter wheat varieties were tested in a trail during 2004-2008 in ARDS Simnic area, beside other varieties from other different sources. These varieties were: Cordiale, Cubus, Meunier and Exotic.

In normal fertilizing conditions, on four years average, these varieties recorded different yield values, as follows: Cordiale – 4329 kg/ha, Cubus – 4582 kg/ha, Meunier – 4051 kg/ha and Exotic 4909 kg/ha, the last one recording the third average yield from a twenty-five winter wheat set.

In 2005 year these varieties recorded the highest yields, as follows: Cubus – 7040 kg/ha, Meunier – 6050 kg/ha, Exotic – 7470 kg/ha and Cordiale – 5970 kg/ha.

In limited N fertilizing rate conditions, on three years average, the previous varieties recorded diminished yields: Cordiale – 34%, Meunier – 44%, Cubus – 36% and Exotic – 41%.

INTRODUCTION

As a result of genetic diversity and phenotypical and genotypical plasticity, wheat is growing worldwide. The wheat growing area is extended between 66^{o}32` north and 45^{o} south from sea to 3 000-5 000 m altitude. The factors which influence wheat crop are: environment, soil and economical conditions. According to the interactions complexity (plant-soil-environment) for each specific environmental factors correspond a different wheat genotype. The land and wheat yield evolution worldwide show that wheat growing surface ranged among 215 474 000 ha in 1994 year and 230 156 000 ha in 1996 year, while the yields ranged among 2451 kg/ha in 1994 and 2830 kg/ha in 2005, when it was recorded the highest global yield (624 510 000t).

The Romanian adhesion to European Union in 2007 year has favourized the entrance of 1000 wheat varieties on the romanian market. To avoid the spreading of these varieties the companies which insist to keep their good name, as KWS company, has decided to test its own material in different environmental conditions.

MATERIAL AND METHODS

During four years (2004-2008) have been tested different KWS, foreign and romanian wheat varieties to ARDS Simnic area field conditions, as follows: Cordiale, Cubus, Meunier and Exotic (KWS varieties), Dropia and Glosa (romanian varieties) and Aztec, Apache, Serina, Orion, Martina and Mariska (from different sources).

Below are presented the KWS varieties:

Table no.1

The KWS varieties yield values on four years average (2004-2008) under two fertilizing treatments

	Cultivar	N100P40		N40P40	
		Yield (kg/ha)	Dif+signif	Yield (kg/ha)	Dif+signif
1	Dropia	4071	0	2810	0
2	Glosa	4270	199	2729	-81
3	Aztec	4576	505	3372	562*
4	Apache	4241	170	3126	316
5	Serina	4285	214	3311	501*
6	Cubus	4540	469	2706	-104
7	Cordiale	4265	194	3077	267
8	Meunier	4516	445	2097	-713^{oo}
9	Exotic	4925	854**	2612	-199
10	Orion	4930	859**	2878	68
11	Martina	4615	544	2754	-56
12	Mariska	4411	340	2781	-30
			DL5% = 563 DL1% = 763 DL0,1% =1020		DL5% = 443 DL1% = 600 DL0,1% =803

Cubus is an awnless winter wheat, medium height (80-85 cm), hjgh tillering capacity, intermediate disease resistance, midseason in maturity, lodging resistant, 1000 kernels weight (40-44g), 45-46 grains/spike, 1,8-2 g/spike.

Cordiale is an awnless winter wheat, medium height (70-75 cm), intermediate tillering capacity, intermediate disease resistance, lodging resistant, 1000 kernels weight (36-40g), 45-46 grains/spike, 1,5-1,7 g/spike.

Meunier is an awnless winter wheat, medium height (75-80 cm), high tillering capacity, intermediate resistance to Septoria, intermediate to Fusarium, midseason in maturity, lodging very resistant, 100 kernels weight (36-40g), 47-50 grains/spike, 1,8-2g/spike.

Exotic is an awned winter wheat, medium height (75-80 cm), high tillering capacity, intermediate resistance to Septoria, early season in maturity, lodging resistant, 100 kernels weight (45-47g), 43-45 grains/spike, 1,7-2g/spike.

Technological aspects:

-pre-crop: pea

-Fertilizing treatment: 20-20-0 complex fertilizer at 200kg/ha rate
Urea at 150 kg/ha rate (applied in april).

-Weeds control: Peak at 20g/ha dose.

-Diseases control: Cypermetrin at 0,075 l/ha dose.

The yield was determined. There were calculated the limit differences.

RESUTS AND DISSCUTION

On four years average, the tested varieties recorded yields which ranged among 4265 kg/ha (by Cordiale) and 4930 kg/ha (by Orion) under fertilized treatment (N100P40). Comparatively with the romanian varieties Dropia nad Boema , only Exotic and Orion have realised statistical assured yields (table no.1). The KWS company has been started the seed multiplication for Exotic variety in Romania, but Orion wasn`t merchantable being remarked and promoted in ARDS Simnic collection.

Under low fertilizing treatment the following varieties were remwrkable: Aztec (France) and Serina (Hungary) with increases of 562 kg/ha, respectively 501 kg/ha. Meunier variety (Germany) has recorded a significant distinct decrease (-723 kg/ha) comparatively with the control variety, meaning that the yield level is influenced by fertilizing treatment. All the other varieties are to the control variety level (Dropia).

CONCLUSIONS

The wheat varieties tested by KWS company to ARDS Simnic area under normal fertilizing treatment were to the control variety level or even more (Exotic).Under low nitroge rate these varieties were to the control variety level, exceepting Meunier.

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INFLUENȚA ÎNTÂRZIERII SEMĂNATULUI AUPRA CARACTERELOR MORFOLOGICE ŞI FIZIOLOGICE LA GRÂUL DE TOAMNĂ ÎN CONDIȚIILE DE LA SCDA ŞIMNIC

THE SEEDING DELAY INFLUENCE TO WINTER WHEAT MORPHOLOGICAL AND PHYSIOLOGICAL CHARACTERS IN ARDS SIMNIC AREA FIELD CONDITIONS

Olaru L., Gabriela Păunescu, Oncică Fraga

Keywords: wheat line, *Rth* gene, yield, trait

ABSTRACT

Timp de 3 ani (2005-2007), au fost testate 120 de linii de grâu de toamnă ce posedă genele de reducere a taliei Rht1 şi Rht2, semănate în 2 epoci, la două săptămâni distanță.

În medie pe 3 ani, producția a scăzut de la 4220 kg/ha în condiții de semănat normal la 3820 kg/ha în condiții de semănat normal, dar în anul 2007, an extrem de secetos, producția a fost mai mare cu 5-7% atunci când s-a semănat târziu.

De asemenea în cei trei ani de experimentare, media numărului de plante răsărite/m^2 a cunoscut o scădere de 50 pl/m^2 de la normal la târziu; numărul de spice/m^2 a înregistrat o scădere de 140 pl/m^2 de la normal la târziu iar masa a 1000 de boabe a scăzut cu aproximativ 12% de la epocă la alta.

În cazul în care liniile de grâu au fost clasificate după perioada de vegetație şi s-a efectuat calculul statistic, s-a observat că nu au existat diferențe de producție asigurate statistic. Aşadar, indiferent de precocitatea liniilor, producția a fost mai mică atunci când s-a semănat târziu.

Liniile de grâu s-au diferențiat şi prin existența sau absența stratului de pruină pe aparatul foliar (cerozitate) date de prezența sau absența genei ,,waxy,,. Când s-a întârziat semănatul, liniile cu strat de pruină au obținut spor de producție asigurat statistic, față de cele la care stratul lipseşte, acestea fiind de 745 kg/ha atunci când semănatul s-a realizat la timp.

În funcție de prezența genei Rht, putem afirma că cea mai mare diferență de producție în funcție de data la care s-a efectuat semănatul s-a obținut la liniile semipitice ce au în componența lor genetică gena Rht8. În ceea ce priveşte talia, liniile înalte (cele cu gena rth) au prezentat o reducere a taliei cu 15,2% la întârzierea semănatului.

În concluzie putem evidenția faptul că întârzierea semănatului a redus producția cu 10 %, numărul de plante răsărite/m^2 cu 11%, numărul de spice/m^2 cu 20,5%, masa a 1000 de boabe cu 12%.

During three years (2005-2007) have been tested 120 winter wheat lines, carrying Rht1 and Rht2 –height reduction genes, seeded in two different data at two weeks time distance.

On three years average, the yield decreased from 4220 kg/ha obtained under normal conditions at 3820 kg/ha under delayed seeding, except 2007 a dry year when the yield was with 5-7% higher under delayed seeding conditions. During these three years also, the average of plants number per square meter recorded a decrease from normal to delay by 50 plants/m^2, the number of spikes/m^2 recorded a decrease by 140 spikes/m^2 from normal to delayed seeding and 1000 grains weight decreased with 12% from a data to another. At the classification of winter wheat lines after vegetation period and statistical calculation were not yield differences statistically assured. Thus, indifferently by lines earliness, the yield was lower at delayed seeding. Wheat lines were different after the present/absent of the leaves aspect given by the present/absent of waxy genes. At

delayed seeding the lines with waxy gene obtained a yield gain statistically assured comparatively with lines without this gene by 700 kg/ha. Depending on the presence of Rht gene and seeding data we can say that the highest yield difference was obtain by semidwarf lines carrying Rth8 gene. Regarding with plant height, those lines carrying rht gene recoded a size reduction with 15.2% at delayed seeding. We can conclude that at delayed seeding the yield was with 10% lower, the number of plants/m^2 with 11% less, the number of spikes/m^2 with 20.5% less and 1000 grains weight with 12% lower.

INTRODUCTION

Usually, the seeding delay has as effect the significant yield dicrease. The previous studies were especially focus on the seeding delay influence to the agronomic practices (seed rate, space betwwen rows, fertilizing, weeds control) and less to the morphological and physiological traits, yield and its main components.

Harrison et al. (1987) showed that the yield decrease with 363 kg/ha when the seeding is realised at the middle of December in South Louisiana.

The studies realised by Shah et al. (1994) in four locations showed that seeding delay decreased significantly the yield in 3 locations. The yield decreases ranged among 448 kg/ha and 1150 kg/ha. Similar yields decreases were observed in their trials by Darwinkel et al. (1977), McLeod et al.(1992).

The seeding delay lead also to the grain weight and the number of grains/spike decrease with 24%, respectively with 16% (Shah et al., 1994). The present paper determine seeding delay, especially in south of the country.

The present paper aim was to evaluate how the morphological and phisiological traits, yield and its main components were influenced by the seeding delay in specific conditions from ARDS Simnic area.

MATERIAL AND METHODS

During three years (2005-2007) have been tested 1200 winter wheat lines carring *Rth 1* and *Rth 2* – height reduction gene, seeded in two different data at two weeks distance.

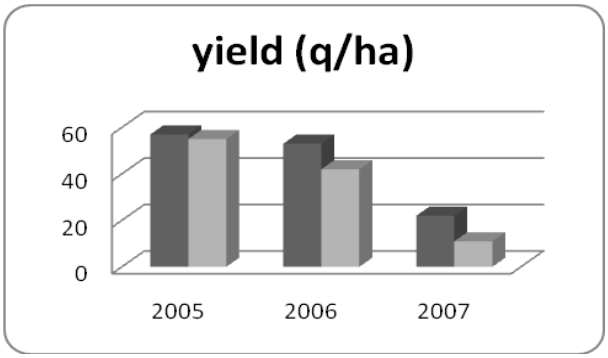
Table no.1

Location	Optimum seeding date	Year					
		2005		2006		2007	
		normal	delayed	normal	delayed	normal	delayed
Şimnic	1-15 oct.	15 oct	30 oct	9 oct	22 oct	12 oct	30 oct

For each seeding time every year were determined: the yield, the plants number /m ^{2}, the number of spikes/ m ^{2}, plants height, 1000 kernels weight. It was realised the variance analysis.

RESULTS AND DISCUSSION

The yield and its components studied in three different seeding times (normal and delayed) have recorded differences (Fig. no. 1.).



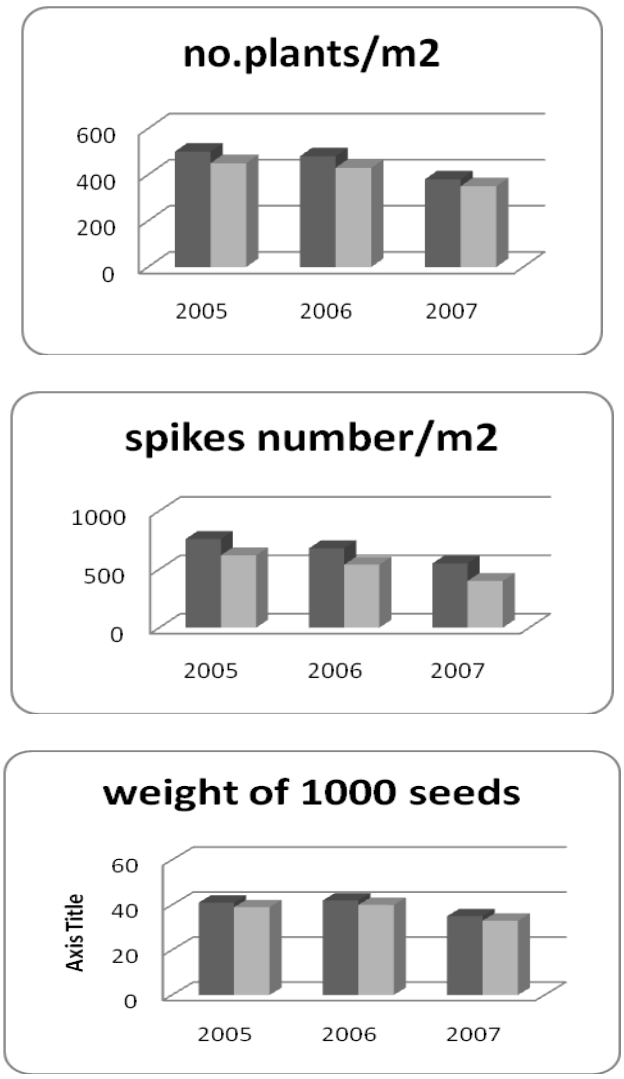


Fig.1. Yield and another characters in two seeding date during three years

On three years average the yield decreased from 4524 kg/ha recorded under normal conditions to 3562 kg/ha under delayed seeding. If in 2005 year the yield difference was insignificant, in 2006 and 2007 years it was 12q/ha. The yield components have been presented different values. During these three years also, the average of plants number per square meter recorded a decrease from normal to delay by 50 plants/m^2, the number of spikes/m^2 recorded a decrease by 140 spikes/m^2 from normal to delayed seeding and 1000 grains weight decreased with 12% from a data to another. The most affected trait was the spikes number/ m^2. In every experimental year this trait recorded very significant differences, statistical assured. At the classification of winter wheat lines after vegetation period and statistical calculation were not yield differences statistically assured. Thus, indifferently by lines earliness, the yield was lower at delayed seeding.

Table no.1

The seeding delay influence to the wheat lines yield depending on vegetation period

Factor A	Factor B	The average of yield kg/ha	Difference+significance
Vegetation period	Seeding date		
Early	Normal	4534,1	control
	Delay	3224,7	ooo
delayed	Normal	4184,3	control
	Delay	3244,1	ooo

DL5% = 264 kg/ha; DL 1% = 442 kg/ha; DL 0,1% = 827 kg/ha

Wheat lines were different after the present/absent of the leaves aspect given by the present/absent of waxy genes. At delayed seeding the lines with waxy gene obtained a yield gain statistically assured comparatively with lines without this gene by 745 kg/ha.

Table no. 2

The seeding delay influence to the wheat lines yield with or without waxy genes

Factor A	Factor B	The average of yield kg/ha	Difference+significance
wax	Seeding date		
With W gene	Normal	4445,0	mt
	Delay	3752,2	oo
With w gene	Normal	4298,2	mt
	Delay	3309,2	ooo

DL5% = 263 kg/ha; DL 1% = 483 kg/ha; DL 0,1% = 815 kg/ha

Depending on the presence of Rht gene and seeding data we can say that the highest yield difference was obtain by semidwarf lines carrying Rth8 gene (Table no.3).

Table no. 3

The seeding delay influence to the yield of wheat lines carring *Rth* genes

Factorul A	Factor B	The average of yield kg/ha	Difference+significance
Dwarfing genes	Seeding date		
rht	Normal	4585,9	mt
	Delay	3562,9	oo
Rht1	Normal	4683,8	mt
	Delay	3764,0	oo
Rht8	Normal	4247,3	mt
	Delay	3127,3	ooo
Rht1Rht8	Normal	3812,8	mt
	Delay	3357,8	o

DL5% = 486 kg/ha; DL 1% = 708 kg/ha; DL 0,1% = 1061 kg/ha

Excepting *Rth* gene carried by tested lines we can say that yield and plant height were influenced by seeding delay. The highest yield difference depending on the seeding time was recorded by semidwarf lines carrying *Rth* genes. Regarding plant height, those lines carrying *Rth* genes recorded a size reduction with 14,4% at delayed seeding.

Table no. 4

The seeding delay influence to the height wheat lines carring *Rth* genes

Factorul A	Factor B	Height (cm)	Difference+significance
Dwarfing genes	Seeding date		
rht	Normal	76,7	mt
	Delay	65,7	ooo
Rht1	Normal	71	mt
	Delay	61	ooo
Rht8	Normal	68	mt
	Delay	59	oo
Rht1Rht8	Normal	62	mt
	Delay	51,3	ooo

DL5% = 6,80 cm; DL 1% = 9,90 cm; DL 0,1% = 11,10 cm

All analised traits were affected by seeding delay. The numerous tested lines sudggest that seeding delay with two weeks lead to yield decreases due to the dicrease of plants number/ m^2 and the spikes number/ m^2.

CONCLUSIONS

The seeding delay decreased the yield with 22%. The plants number/ m^2 and the spikes number/ m^2 have recorded lower values with 11%, respectively 25% under delayed seeding conditions. 1000 kernels weight decreased on average with 7,3%. The waxy wheat lines recorded a decrease yield with 15,7% under delayed seeding conditions. The plant height was reduced with 14,5% under delayed seeding conditions.

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CERCETĂRI PRIVIND IDENTIFICAREA SURSELOR DE GRÂU DE TIP ,,ALTERNATIV,, ÎN CONDIȚIILE DIN ZONA CENTRALĂ A OLTENIEI

IDENTIFICATION RESEARCH REGARDING WHEAT „WINTER SPRING HABIT" TYPES SOURCES IN OLTENIA CENTRAL AREA CONDITIONS

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Key words: wheat, grain type, yield, sowing time

ABSTRACT

Un set de soiuri de grâu provenite din Israel, cunoscute ca grâne de tip ,,alternativ,, au fost evaluate timp de trei ani (2005-2007) în câmpul experimental de la SCDA Şimnic pentru a studia modul în care acest caracter se păstrează în condițiile din această zonă. Aceste soiuri au fost: Dariel, Galil, Shoham, Bash, Hazera 11, Hazera 13, Hazera 45 şi Hazera 307. Mai mult, pentru a depista şi alte surse din acest tip de grâne, au fost cultivate 25 de soiuri româneşti şi străine atât în octombrie 2007 cât şi în martie 2008.

Soiurile israeliene au fost mult mai productive atunci când s-au cultivat în toamnă (producția maximă fiind de 5500 kg/ha) față de rezultatele de producție obținute în primăvară (producția maximă – 2800 kg/ha).

Soiurile testate în primăvara anului 2008 au înregistrat producții în limitele: 1687 kg/ha la soiul Enesco şi 66 kg/ha la soiul Rustic. Diminuarea producției față de semănatul în toamnă a fost extrem de accentuată, limitele în aceste condiții fiind 4944 kg/ha la Aztec şi 2928 kg/ha la Meunier. Soiul Enesco semănat toamna a obținut o producție de 4422 kg/ha.

În concluzie putem evidenția faptul că soiurile testate, chiar dacă au parcurs întreaga perioadă de vegetație atunci când au fost semănate în primăvară, ele nu au atins potențialul productiv pe care l-au manifestat când semănatul s-a efectuat în toamnă. Se poate sugera cultivarea anumitor soiuri doar când intervin accidente, aşa cum a fost cel din toamna anului 2007 când nu s-a mai putut semăna de la 20 octombrie până în primăvara anului următor, ca urmare a condițiilor climatice.

During three years (2005-2007) to ARDS Simnic area conditions have been tested in field experiments a winter wheat set from Israel, known as ,,alternative,, type grains. The main objective was to study how this trait is mentained in these field conditions. These varieties were: Dariel, Galil, Shoham, Bash, Hazera 11, Hazera 13, Hazera 45 and Hazera 307.More, for identify also other ,,alternative,, sources there were seeding on oct. 2007 and march 2008 twenty-five romanian and foreign wheat varieties.

The israelite varieties were more productive when they were seeding in autumn (the highest yield was 5500 kg/ha) beside the results recorded in spring (maximum yield 2800 kg/ha).

The varieties tested in 2008 spring recorded yields ranged among: 1687 kg/ha (Enesco variety) and 66 kg/ha (Rustic variety). Spring seeding varieties recorded an accented yield decrease beside autumn seeding varieties yield values (among 4944 kg/ha by Aztec and 2928 kg/ha by Meunier). Enesco variety which was seeding in last autumn recorded 4422 kg/ha yield.

As a conclusion, even the tested varieties overcross all stages they didn't achive yield capacity that was recorded by autumn seeding varieties. We recommand to seeding these varieties only whean accidents are occured, such as 2007 year, when we couldn't seeding untill the 20th of November to next spring, due to environmental conditions.

INTRODUCTION

Spring wheat die if exposed to temperatures below –10°C for more than 12 hours. Winter and facultative wheat, however, need exposure to cold (2-10°C) for three to six weeks after they germinate, or they cannot produce grain. They start to grow before winter sets in, when they become inactive. Vernalization—a temperature response mechanism—ensures that winter wheat and other plants adapted to cold climates do not enter their reproductive growth stages prior to winter. The plants resume rapid growth in the spring as temperatures rise. Spring-habit wheat have a continuous growth cycle with no inactive period (***, 2003).

Facultative-habit wheat tolerate cold more than spring wheat and less than winter wheat but they do not require extended exposure to cold temperatures to reproduce. These wheat are found in transition zones between true spring and winter wheat regions.

Selecting the best variety for late or early sowing was one key factor.

Where growers still have wheat to plant, after a tricky planting season, it is not too late to sow most winter varieties.

"You will lose yield (compared to sowing earlier in the season), but it will still perform better than most spring wheat sown at this time of year."

The effect on yield of early sowing of wheat, and of sowing wheat with winter habit, was assessed from routine trials from 29 sites in south and central New South Wales from 1981 to 1990. Early-sown trials were largely sown from mid to late April and conventionally late trials from mid to late May. Entries in early trials consisted of winter wheat or photoperiod-sensitive spring wheat, while photoperiod-insensitive spring wheat were sown in late trials. There was a gradual change in trial entries over the period of study. Although more variable than the late-sown trials, the early-sown trials had high yields over a wider range of sowing times and displayed less risk of frost damage. On average, winter wheat had a 6% yield advantage over late-maturing spring wheat in early-sown trials. Trials yielded 15% more when sown early than late. In comparison with quick-maturing spring wheat, winter wheat did not appear to suffer a large yield penalty when sown late. Yield of early-sown trials declined with sowing before or after the optimum sowing time of late April. There was a large reduction in yield with sowings earlier than 20 April. Yield of spring wheat declined from early May almost linearly with delay in sowing date (Penrose, 1993).

The spring habit of growth was governed by three dominant genes, any one of which was able to inhibit the expression of the winter habit. Progress has been made in establishing relationships among several spring cultivars (Pugsley, 1971).

MATERIAL AND METHODS

A set of wheat varieties, known as alternative grains, with Israeli origin, has been performed during three years (2005-2007) in ARDS Simnic field conditions to observe their behaviour in this area. These varieties were: Dariel, Galil, Shoham, Bash, Hazera 11, Hazera 13, Hazwera 45 and Hazera 307. To identify other sources proceeded from this grain type, were seeded also romanian and foreign varieties in two different planting times (October 2007 and March 2008).

It was determined the yield for all varieties and was calculated the differences between yield value for both planting times.

RESULTS AND DISCUSSION

On three years average, for spring seeding varieties, the highest yield was recorded by Hazera 13 (3427 kg/ha), while the lowest yield was recorded by Hazera 45 (2085 kg/ha).

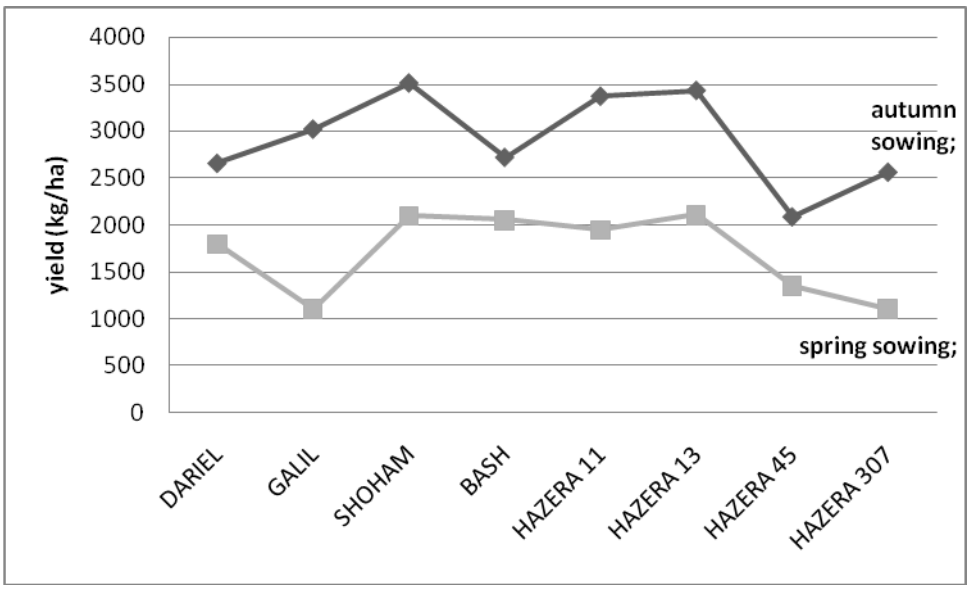

Fig.1 The yield values recorded by alternative wheat varieties in two different planting times

The yield values decreased with 50% when wheat varieties were seeded in spring (March). Thus, the highest yield value was recorded by Galil variety (1917 kg/ha), while the lowest yield value was recorded by Bash variety (667 kg/ha). The yield is correlated with the environmental factors. When the winter wheat varieties are seeded in spring they are extremelly affected, especially in the droughty spring. The „alternative" wheat type is more remarkable comparatively with the winter wheat seeded in spring. In this case, the differences were higher leading to 3782 kg/ha by Autan (Fig.2).

The romanian varieties recorded yields up than 1000 kg/ha for both planting times. Glosa variety recorded 1619 kg/ha and the lowest difference was -2281 kg/ha. Among foreign wheat varieties was remarkable the French variety Enesco with 1687 kg/ha.

CONCLUSIONS

As a conclusion, even the tested varieties overcross all stages they didn't achive yield capacity that was recorded by autumn seeding varieties. We recommand to seeding these varieties such : Dropia, Glosa, Flamura 85, Boema şi Enesco, only when accidents are occured, such as 2007 year, when we couldn't seeding untill the 20th of November to next spring, due to environmental conditions.

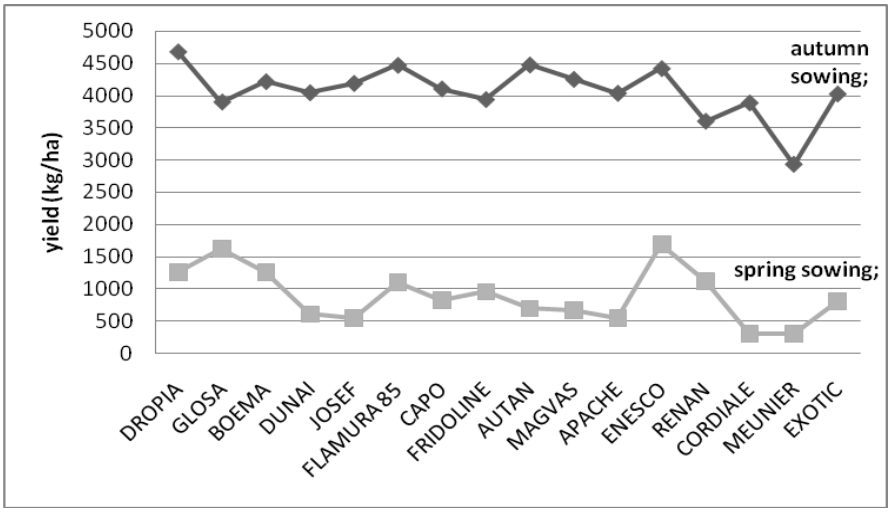

Fig.2 The yield values recorded by winter wheat varieties in two different planting times

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INFLUENȚA FERTILIZĂRII ASUPRA PRODUCȚIEI LA UN SET DE CULTIVARE DE GRÂU ÎN CONDIȚII CLIMATICE DIFERITE LA SCDA ŞIMNIC

THE FERTILIZING INFLUENCE TO A WINTER WHEAT SET YIELDS IN DIFFERENT ENVIRONMENTAL CONDITIONS TO ARDS SIMNIC AREA

Gabriela Păunescu, Gabriel Păunescu, Olaru Liviu

Keywords: wheat, fertilizing rate, yield, environmental conditions

ABSTRACT

Timp de 3 ani (2005-2007), 25 de soiuri de grâu româneşti au fost testate la SCDA Şimnic, în două condiții de fertilizare: $N_{100}P_{40}$ (fracționat toamnă + primăvară) şi $N_{40}P_{40}$ (numai toamna), în condiții climatice diferite.

În anul 2005, an normal din punct de vedere al precipitațiilor şi implicit normal pentru cultura grâului, 14 dintre soiuri au prezentat diminuări ale producției, celelalte 10 fiind la nivelul martorului, în condiții de fertilizare normală.

În condiții de fertillizare cu $N_{100}P_{40}$, producțiile obținute la soiurile româneşti au fost cuprinse între 4641 kg/ha (Fundulea 4) şi 7033 kg/ha (Alex) iar la fertilizarea redusă cu azot, între 4003 kg/ha (Fundulea 4) şi 6395 kg/ha (Dor).

La prima variantă de fertilizare, reduceri semnificative de producție au înregistrat soiurile: Şimnic 30 şi Izvor (634-680 kg/ha), reducere distinct semnificativă soiul Izvor (917 kg/ha) şi foarte semnificative la soiurile: Fundulea 4, Lovrin 34, Briana, Boema, Delabrad, Gruia, Jiana, Jupiter, Junona, Bezostaia şi linia F 89039 G5-1 (1049-2016 kg/ha).

În anul 2007, unul dintre cei mai secetoşi care s-au manifestat la Şimnic au fost înregistrate producții mult mai mici decât în anii anteriori. Astfel la varianta $N_{100}P_{40}$, minimul producției a fost obținut de soiul Lovrin 34 (2282 kg/ha) iar maximul de către soiul Alex (3405 kg/ha).

Sporuri semnificative au înregistrat soiurile Alex şi Glosa (627 kg/ha, respectiv 721 kg/ha). Restul soiurilor au fost la nivelul martorului.

S-a observat că majoritatea soiurilor au obținut producții egale la ambele condiții de fertilizare sau chiar mai mari la varianta $N_{40}P_{40}$, întrucât seceta instalată nu a permis valorificarea surplusului de azot administrat la prima graduare.

During three years (2005-2007), twenty-five Romanian wheat varieties have been tested to ARDS Simnic in different environmental conditions, using two fertilizer rates: $N_{100}P_{40}$ (autumn and spring divided) and $N_{40}P_{40}$ (applied only in autumn).

In 2005, a normal rainfall year, fourteen wheat varieties have recorded yield decreases beside to other 10 varieties yield values which were to the witness level, in normal fertilizing conditions. The Romanian varieties yields ranged among 4641 kg/ha (Fundulea) and 7033 kg/ha (Alex) in $N_{100}P_{40}$ fertilizing conditions and among 4003 kg/ha (Fundulea 4) and 6395 kg/ha (Dor) in half nitrogen rate conditions.

In $N_{100}P_{40}$ fertilizing conditions have been recorded a distinct significant yield decrease for following varieties: Simnic 30 and Izvor (634-680 kg/ha), a distinct significant yield decrease value to Izvor variety (917 kg/ha) and very significant values to Fundulea 4, Lovrin 34, Briana, Boema, Delabrad, Gruia, Jiana, Jupiter, Junona, Bezostaia, varieties and F89039 G5-1 inbred line (1049-2016 kg/ha).

In 2007 year, one of the driest years occurred to Simnic area, were recorded lower yields than previous years. Thus, in $N_{100}P_{40}$ rate condition, Lovrin variety recorded the lowest yield (2282 kg/ha) and Alex variety recorded the highest yield (3405 kg/ha).

Significant outputs have been recorded Alex and Gruia varieties (627 kg/ha and 721 kg/ha). The other varieties have been to the witness level value.

It was observed that most of varieties have been recorded equal yields in both fertilizing conditions or even higher yields for $N_{100}P_{40}$ rate, because the drought blocked first nitrogen rate absorption.

INTRODUCTION

The special interest for qualitative seed is linked with the desire to obtain high yields, independent of environmental conditions. The seed health and quality represent the guarantee for healthy crops which are able to grow in uncertain conditions from the beginning.

One of the technological practices which influence significantly the soil fertility is represented by fertilizing treatment. According with modern cropping systems the fertilizing importance is undoubtedly. The results obtained worldwide show that the fertilizing treatment increases the yield which is correlated with fertilizer rates. An adequate fertilizing treatment is necessary to highlight the yield capacity of the new cultivars created by geneticists and breeders (Nicolescu et al., 2007).

MATERIAL AND METHODS

During three years (2005-2007) were realized two trials with Romanian varieties under two fertilizing treatments: 20-20-0 complex fertilizer at 200 kg/ha rate basal applied in autumn and nitrogen fertilizer at 200 kg/ha applied on the top in spring. The second trial was only under fertilized treatment with 20-20-0 complex fertilizer at 200 kg/ha basal applied in autumn. The trials were situated in ARDS Simnic Breeding, Plant Protection and Seed Producer Laboratory. The agro technical practices were:

-pre-crop: pea

-tillage: ploughing – disking – combinatory

-split fertilizing treatment

-weeds control

-without pests and diseases control with a view to observe the differences among varieties

-harvesting

For every experimental year the yields were analyzed for both fertilizing treatments.

RESULTS AND DISCUSSION

In 2005 year, a normal year, 14 wheat varieties have been presented significant yield decreases, while other 10 varieties were to the control value under normal fertilizing treatment (table no.1).

Under N100P40 fertilizer rate the yields recorded by Romanian varieties were ranged among 4641 kg/ha (by Fundulea) and 7033 kg/ha (by Alex), while under low nitrogen rate these yields ranged among 4003 kg/ha (by Fundulea 4) and 6395 kg/ha (by Dor). Under first fertilizing treatment the lowest yields were recorded by: Simnic 30 and Izvor (634-680 kg/ha) with very significant distinct differences (Fundulea 4, Lovrin 34, Briana, Boema, Delabrad, Gruia, Jiana, Jupiter, Junona, Bezostaia and the line F89039 G5-1 (1049-2016 kg/ha). All varieties were equally affected by low nitrogen rate, thus the varieties Fundulea 4 and Bezostaia recorded similar yields values, while the varieties Junona and Jiana over crossed the control value with 200-300 kg/ha under N50P40 fertilizer rate.

Under N40P40 fertilizer rate were remarkable: Dor with very significant yield increase (1074 kg/ha) and Gruia with significant yield increase (605 kg/ha) comparatively with the control value (Dropia). Yield increases were recorded also by Fundulea 4, Lovrin 34, Izvor and Holda.

Table no.1

The Romanian wheat varieties yields recorded in 2005 year under two fertilizing treatments

No.	Cultivar	N100P40		N40P40	
		Yield (kg/ha)	Dif+signif	Yield (kg/ha)	Dif+signif
1	Flamura 85	6652	-5	5057	-264
2	Fundulea 4	4641	-2016^{ooo}	4003	-1318^{ooo}
3	Lovrin 34	5430	-1227^{ooo}	4205	-1116^{ooo}
4	Rapid	6558	-99	5444	123
5	Dropia	6657	0	5321	0
6	Alex	7033	376	5641	320
7	Simnic 30	6023	-634^{o}	5063	-258
8	Briana	5465	-1192^{ooo}	4802	-519
9	Romulus	6902	245	5782	461
10	Boema	5421	-1236^{ooo}	4909	-412
11	Crina	6247	-410	5594	273
12	Delabrad	5603	-1054^{ooo}	5026	-295
13	Dor	6824	167	6395	1074***
14	Faur	5977	-680^{o}	5384	63
15	Gloria	6894	237	5184	-137
16	Gruia	5608	-1049^{ooo}	5926	605*
17	Hambar	6333	-324	5203	-118
18	Holda	6346	-311	4350	-971^{ooo}
19	Izvor	5740	-917^{oo}	4655	-666^{o}
20	Jiana	5154	-1503^{ooo}	5381	60
21	Jupiter	5402	-1255^{ooo}	5971	650*
22	Junona	5018	-1639^{ooo}	5472	151
23	F 89039 G5-1	5450	-1207^{ooo}	5236	-85
24	F 98074 G5-2	6376	-281	5558	237
25	Bezostaia	4980	-1677^{ooo}	4950	-371
			DL5% = 552 DL1% = 749 DL0,1% =1003		DL5% = 525 DL1% = 711 DL0,1% =952

In 2006 year under N100P40 fertilizer rate the Romanian varieties yields ranged among 3775 kg/ha (by Fundulea 4) and 3476 kg/ha (by Simnic 30) (table no.2). Thus, for the second consecutive year Fundulea 4 is placed below the control value under both fertilizing treatments.

Table no. 2

The Romanian wheat varieties yields recorded in 2006 year under two fertilizing treatments

No.	Cultivar	N100P40		N40P40	
		Yield (kg/ha)	Dif+signif	Yield (kg/ha)	Dif+signif
1	Flamura 85	4552	284	3057	799***
2	Fundulea 4	3775	-493^{o}	1546	-712^{ooo}
3	Lovrin 34	4551	283	2610	352
4	Rapid	4256	-12	2646	388*
5	Dropia	4268	0	2258	0
6	Alex	4614	346	2542	284
7	Simnic 30	4495	227	3476	1218***
8	Catalin	3678	-590^{oo}	2302	44
9	Romulus	4688	420*	2516	258
10	Boema	4930	662**	2888	630**
11	Crina	5029	761***	3190	932***
12	Delabrad	5304	1036***	3305	1047***
13	Dor	4256	-12	2548	290
14	Faur	4959	691***	3450	1192***
15	Glossa	5172	904***	2753	495*
16	Gruia	4941	673***	3114	856***
17	Holda	4263	-5	2265	7
18	Izvor	4337	69	2331	73
19	Jiana	4332	64	2374	116
20	Jupiter	3861	-407^{o}	2536	278
21	Junona	4750	482*	2516	258
22	F98039G5-1	4022	-246	2372	114
23	F 0099 GP 2	5065	797***	2296	38
24	F96869 G 1-108	4578	310	2748	490*
25	Bezostaia	4532	264	2871	613**
			DL5% = 369,5 DL1% = 500,8 DL0,1% =670,6		DL5% = 370,8 DL1% = 502,5 DL0,1% =672,8

Under N100P40 fertilizer rate, eight varieties exceeded the control value, as it comes: Romulus (significant increase - 420 kg/ha), Boema (significant distinct increase – 662 kg/ha) and Crina, Delabrad, Faur, Glosa, Gruia and the line F0099GP2 (very significant increases among 673-1036 kg/ha).

Comparatively with the control value, the varieties Fundulea 4, Jupiter and Briana recorded statistical assured decreases (407-590 kg/ha).

Generally, similar values comparatively with the control value were recorded under N40P40 fertilizer rate with very significant yield increases (Flamura 85 and Simnic 30) and significant yield increases (Rapid and the line F96869 G1-108).

In 2007 year, one of the driest years in Simnic area, the lowest yields were recorded by the line F98062 G5-101 (2126 kg/ha) and Lovrin 34 (2282 kg/ha), while the highest yield values were recorded by the line F00628 G34-2 and Alex (3405 kg/ha) (Table no.3).

Table no. 3

The Romanian wheat varieties yields recorded in 2007 year under two fertilizing treatments

No.	Cultivar	N100P40		N40P40	
		Yield (kg/ha)	Dif+signif	Yield (kg/ha)	Dif+signif
1	Flamura 85	2960	182	2810	151
2	Fundulea 4	2460	-318	2437	-222
3	Lovrin 34	2281	-497	2477	-182
4	Rapid	2776	-2	2611	-48
5	Dropia	2778	0	2659	0
6	Alex	3405	627*	2608	-51
7	Simnic 30	2521	-257	2717	58
8	Catalin	2557	-221	2230	-429^{o}
9	Romulus	3000	222	2975	316
10	Boema	3065	287	3290	631*
11	Crina	3312	534	3044	385
12	Delabrad	2697	-81	2917	258
13	Dor	2624	-154	2433	-226
14	Faur	2482	-296	2450	-209
15	Glossa	3499	721*	3034	375
16	Gruia	3071	293	2640	-19
17	Holda	2912	134	2852	193
18	Izvor	2803	25	2450	-209
19	Jiana	2821	43	3120	461*
20	Jupiter	3041	263	2891	232
21	Junona	2126	-652^{o}	2614	-45
22	F98039G5-1	2471	-307	2524	-135
23	F 0099 GP 2	3026	248	2284	-375
24	F96869 G 1-108	3428	650*	3521	862**
25	Bezostaia	2456	-322	2716	57
			DL5% = 564,2 DL1% = 764,6 DL0,1% =1023,7		DL5% = 419 DL1% = 567,8 DL0,1% =760,3

Significant increases were recorded by Alex and Glosa (627 kg/ha, respectively 721 kg/ha). The other varieties were to the control level.

All varieties recorded low yields under both fertilizer rates, because the drought blocked the nitrogen assimilation.

Under low fertilizing rate were remarkable the following varieties: Boema (with significant increase – 631 kg/ha), Litera (with significant increase – 461 kg/ha) and Briana (with significant decrease – 429 kg/ha).

CONCLUSIONS

On three years average among 16 tested varieties in all experimental years only Glosa recorded a significant yield increase with 620 kg/ha, while the other varieties were to the control level under both fertilizing treatments. Only two tested varieties emphasized yield decreases, as follows: Briana (significant) and Fundulea 4 (very significant). These varieties are opposite according to their vegetative period.

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STABILIREA CRITERIILOR DE SELECȚIE PENTRU REZISTENȚA LA SECETĂ PE BAZA CORELAȚIILOR EVIDENȚIATE LA UN SORTIMENT DE GRÂU DE TOAMNĂ ÎN CONDIȚIILE DIN ZONA CENTRALĂ A OLTENIEI

THE ESTABLISHMENT OF DROUGHT RESISTANCE SELECTION CRITERIA PROCEEDING FROM A WINTER WHEAT SET CORRELATIONS IN OLTENIA CENTRAL AREA CONDITIONS

Gabriela Păunescu, Nicoleta Boghici, Olaru Liviu

Keywords: winter wheat, drought resistance, yield, selection

ABSTRACT

Luând în studiu datele obținute într-un an secetos, în cazul nostru 2007 – unul dintre cei mai secetoşi ani evidențiați la Şimnic, am analizat corelațiile ce s-au remarcat între anumite caractere determinate la un număr de 75 de soiuri de grâu de toamnă, româneşti şi străine.

Caracterele studiate au fost: talia, nota la secetă, % spice total sterile, % spice parțial sterile, număr plante răsărite/m^2, număr spice/m^2, număr boabe/spic, greutate boabe/spic, MMB, MH, zile da la 01.01. la înspicat şi producție.

Astfel s-a constatat că talia şi nota la secetă se corelează în proporție de 37,4%, existând o grupare destul de evidentă în jurul dreptei. Corelația este negativă, foarte semnificativă în sensul că pe măsură ce talia creşte, nota la secetă scade. Ecuația de regresie rezultată arată faptul că pentru fiecare creştere a taliei cu 10 cm, nota la secetă scade cu 0,7.

Notarea la secetă a fost corelată foarte semnificativ pozitiv cu procentul de spice parțial sterile, în sensul că pe măsură ce nota creşte cu atât creşte şi procentul de spice parțial sterile. Această corelație are la bază faptul că aspectul spicului face parte integrantă din notare. Coeficientul de determinație a fost în acest caz de 21,9%. Nota la secetă a fost corelată, de asemenea, foarte semnificativ dar negativ cu MMB. Notarea la secetă este foarte semnificativ negativ corelată cu producția. Ecuația de regresie ne arată că pentru fiecare creştere a notei cu o unitate producția scade cu 175 kg/ha.

O abatere destul de evidentă se constată la soiul Briana care deşi a fost notat cu 2 la secetă a obținut o producție de numai 2500 kg/ha. Acest fapt poate fi explicat prin perioada de vegetație extrem de redusă a acestui soi, el fiind expus secetei în plin proces de umplere a boabelor.

Corelația extrem de puternică, de această dată pozitivă a fost evidențiată între notarea la secetă şi perioada până la înspicat de la 01.01. Cu cât un soi este mai precoce cu atât nota la secetă este mai mică deci este mai rezistent. Creşterea notei la secetă implică în proporție de 51% creşterea perioadei de la 01.01. la înspicat cu 2,6 zile.(fig.5)

Abateri semnificative au prezentat soiurile Lovrin 34 şi soiul Galil – soi israelian.

Datele de mai sus sugerează că o determinare a procentului de spice total şi parțial sterile poate constitui un criteriu de selecție al soiurilor cu comportare bună la secetă.

With the results obtained during a dry year, 2007 in our case-one of driest years recorded at Simnic, we made analyze of correlations among several traits observed at 75 winter wheat varieties with different origins. Were studied the following characters: the height of plants, drought resistance note, the percentage of total sterile spikes, the percentage of partial sterile spikes, the number of plants/m^2, the number of spikes/m^2, the number of grains/spike, the grains weight/spike, 1000 grains weight, hectoliter weight, the number of days from 01.01 till heading and the yield. So that, the height of plants and

drought resistance note are correlated in percentage by 37.4% existing an obviously grouping around the line. The correlation is very significant negative, so when the height of plant is higher the note value is lower. The regression equation shows that for each increase of the height of plants with 10cm, the note for drought resistance decrease with 0.7. The note for drought resistance was very significant positive correlated with the percentage of partial sterile spikes, so that when the note has a higher value also the percentage of partial sterile spikes is growing.The determination coefficient was in this case by 21.9%. The note of drought resistance was, very significant negative correlated with 1000 grains weight and yield. The regression equation shows that for each increase with a unit of the note the yield decreases with 175 kg/ha. A very strong correlation was recorded between the resistance note and the period from 01.01 till heading time. When a variety has earliness the note for drought resistance is lower, so that the variety is more resistant. Increasing of the note for drought resistance involves in proportion by 51% the increase of the period from 01.01 till heading with 2.6 days. Significant deviations presented Lovrin34 and an Israeli variety Galil. We can conclude that a simple note for drought resistance based on a visual appreciation may lead us to a selection with good results concerning drought tolerance of the varieties.

INTRODUCTION

The stress determined by the water lack is one of the main yield costrainers. This factor causes various physiological and byochemical effects to the plants and represents also a serious problem worldwide in barley, wheat and other small grains growing areas (Quarrie et al., 1999). This phenomenon isn`t specific for aride and semiaride areas only, but it can occures also where the rainfalls are not uniform (Ribaut et. al.,1997).

The drought resistance is a very complex characteristic. Therefore, we must consider every different aspect which favour the selection for drought resistance, no matter how much importance they are.

MATERIAL AND METHODS

With the results obtained during a dry year, 2007 was one of the driest years recorded in Simnic area, we made analyze of corrections among several traits observed at 75 winter wheat varieties with different origins. The studied traits were: the height of plants, drought resistance note, the percentage of total sterile spikes, the percentage of partial sterile spikes, the number of plants/m^2, the number of spikes/m^2, the number of grains/spike, the grains weight/spike, 1000 grains weight, hectoliter weight, the number of days from 01.01 till heading and the yield. A correlation set were emphasised using the correlation and determintion coefficients. The significant ones were represented by graphs with a view to esatablish the selection criteria for drought resistance.

The present study suggests that the most important criteria were those focus on the note for drought resistance. This note represents a visualy evaluation of the plots under stress conditions, in our case after 40 days without rainfalls, followed by other 15 days when the drought stress is evident. The note for drought resistance represents a combination of the plants covering degree with the foliar sutface and the spikes general aspect. The notes started with 1- very resistant to 9 – very sensitive. The visual evaluation was realised comparatively taking as control the variants marked with 1 and 9, in our casethe variants marked with 2 and 8 and then were calculated the average values for three replications.

RESULTS AND DISCUSSION

The height of plants and drought resistance note are correlated in percetntage by 37,4% exisiting an obviously grouping around the line. The correlation is very significant negative, so when the height of plants is higher the note value is lower. A lower note for

drought resistance means a good drought tolerance. The regression equation shows that for each increase of the height of plants with 10 cm, the note for drought resistance decrease with 0,7 (Fig. no.1).

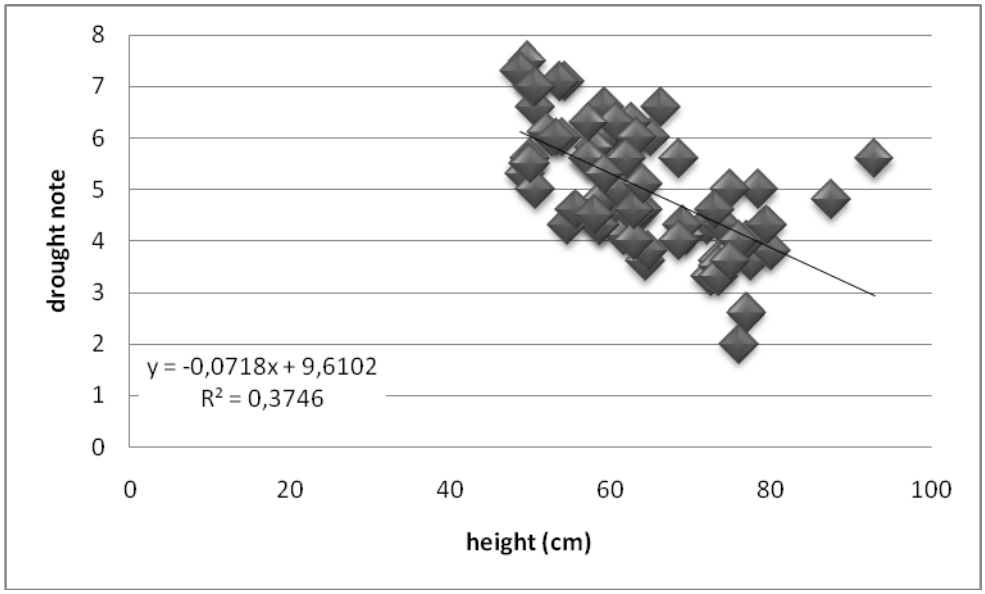

Fig. no.1 The relation between plants height and drought note for a winter wheat set during 2007 year

The most remote points around the line are represented by Bezostaia and Simnic 30 varieties (the highest from the experiment) and also by Briana and Glosa marked with 2, respectively 2,6 fro drought resistance.

Analyzing the results we can say that the height of plants is positive correlated with the drought resistance. The note for drought resistance was very significant positive correlated with the percentage of partial sterile spikes, so that when the note has a higher value also the percentage of partial sterile spikes is growing.The determination coefficient was in this case by 21.9%. It is remarkable that the points are remote around the line which means that the occuracy index (B) is lower and the points dispertion could be explained by the modification of sterile spikes percentage.

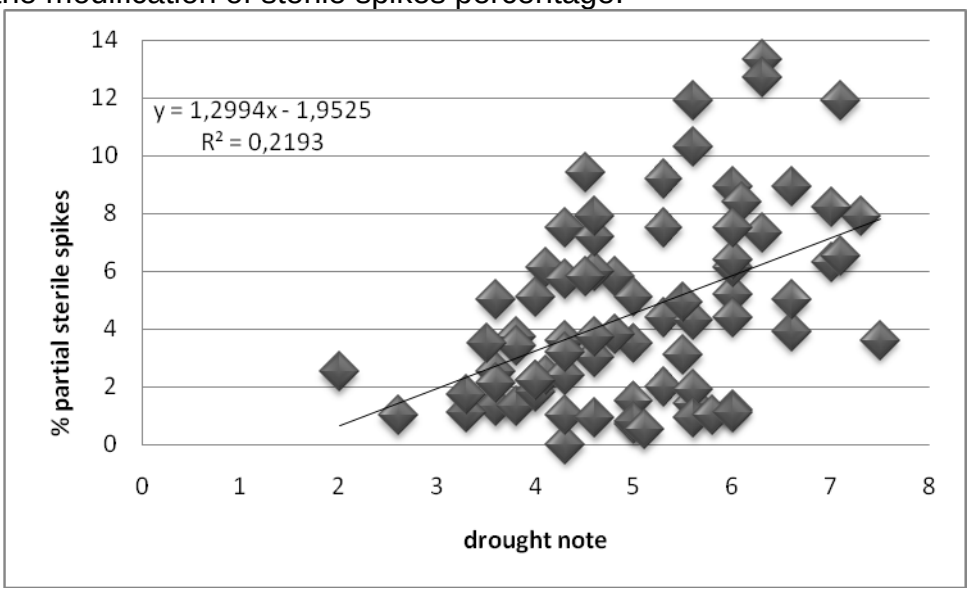

Fig. no.2 The relation between drought note and % of sterile plants for a winter wheat set during 2007 year

The note for drought resitance was very significant negarive correlated with 1000 kernels weight. Thus, for each decrease of 1000 kernels weight with 1,56 g, the note of drought resistance increase with one unit. Both characters are determined each other with 15% (Fig. no.3).

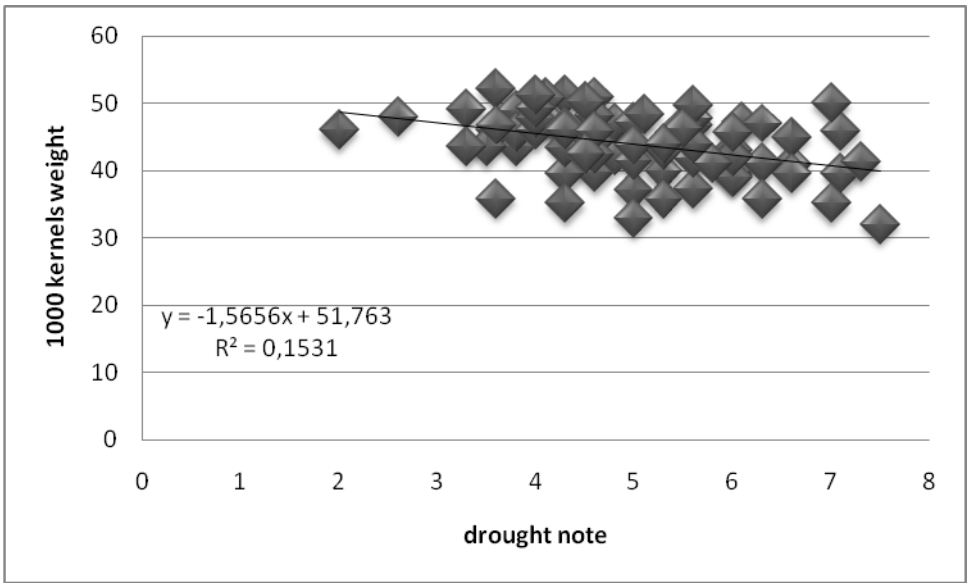

Fig. no.3 The relation between drought note and 1000 kernels weight for a winter wheat set during 2007 year

The note of drought resistance during 2007 year was very significant negarive correlated with yield. The regression equation shows that for each increase with a unit of drought note, the yield decreases with 175 kg/ha. An evident deviation was recorded by Briana, which realised 2500 kg/ha despite of the note for drought resistance (note 2). This phenomenon could be explained through its short vegetative period and the drought stress affected this variety especially in the grain filling stage (Fig. no.4).

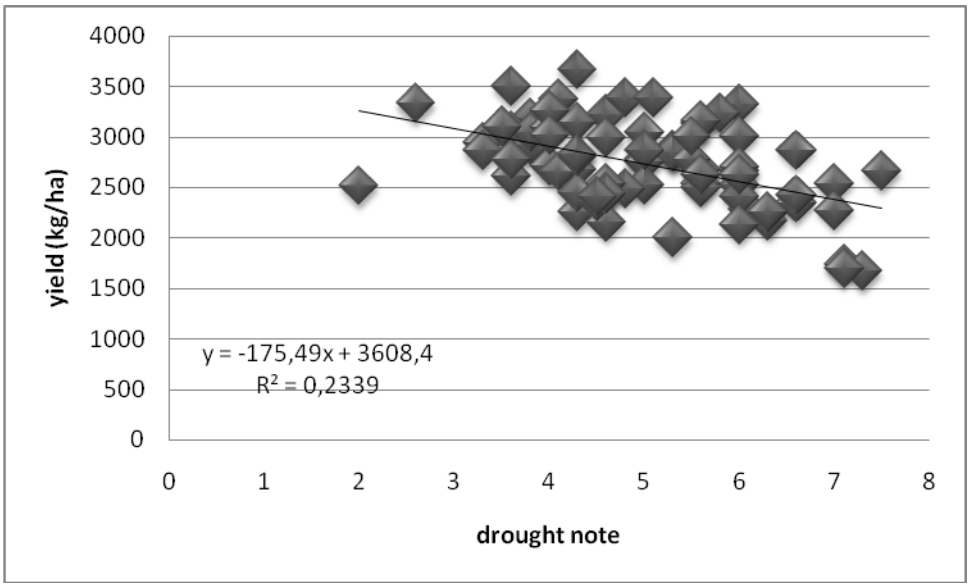

Fig. no.4 The relation between drought note and yield for a winter wheat set during 2007 year

A very strong correlation was recorded between the note for drought resistance and the period from 01.01. till heading stage. Whean a variety has earliness the note for drought resistance is lower, so that variety is more resistant. Increasing of the note for

drought resistance involves in proportion by 51% the increase of the period from 01.01. till heading satge with 2.6 days (Fig. no.5).

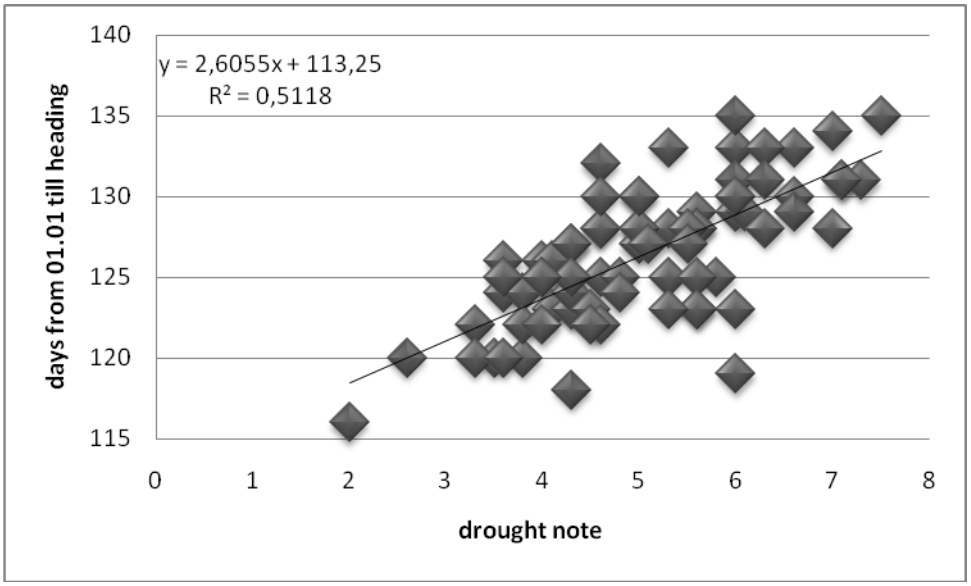

Fig. no.5 The relation between drought note and yield for a winter wheat set during 2007 year

Significant deviations presented Lovrin 34 and Israeli variety Galil.

CONCLUSIONS

We can conclude that a simple note for drought resistance based on a visual evaluation may lead to a selection with good results covering drought tolerance of the varieties.

The note for drought resistance represents a combination of the plants covering degree with the foliar sutface and the spikes general aspect.

When a variety has earliness the note for drought resistance is lower, so that variety is more resistant.

The note for drought resistance is very significant negarive correlated with 1000 kernels weight and yield.

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CERCETĂRI PRIVIND INFLUENȚA FERTILIZĂRII ASUPRA PRODUCȚIEI ŞI CALITĂȚII ACESTEIA LA CULTURA DE GRÂU
RESEARCH REGARDING THE INFLUENCE OF FERTILIZATION ON WHEAT PRODUCTION AND QUALITY

E. Petrescu, C. Roşculete, C. V. Popescu, E. Constantinescu, Florica Vilău

Keywords: wheat, fertilization, production, quality production

ABSTRACT

The establishing of a rational fertilization system, which shall positively influence the quantity and quality of yield, improving, at the same time, the potential fertility of the soil, is an important means of increasing economic efficiency.

Wheat is one of the main plants growing in the area. The research was conducted at the Caracal Agricultural Research and Development Station, on a chernozem soil, strong decarbonated. The applying of fertilizer led to obtain production increase between 4.9 - 58.8%. Nitrogen is the determinant element, influencing the level of production and the quality of yield.

INTRODUCTION

Fertilization is the main factor with high technological implications for plant growth and development. Application of fertilizers should be differentiated according to the requirements of each crop.

Rational use of mineral fertilizers leads to an improvement in the quality of the harvest (Popescu and colab., 1981), achieving the increased absorption of macro and micro-nutrients to plants.

To estimate the influence of the fertilizers on major agricultural crops, related to the development of fertility chernozem argilo-iluvial of Caracal, were executed experimental trials in the following rotation: soybeen- wheat - maize.

MATERIAL AND METHOD

The research was conducted at SCDA Caracal, on a chernozem soil, strong decarbonated, with good natural fertility, poorly supplied with total nitrogen, middle with phosphorus and a high content of changeable potassium.

Were studied the following factors:

A - doses of phosphorus: 0 - 40 - 80 - 120 kg / ha active ingredient ;

B – doses of potassium: 0 - 40 - 80 kg / ha active ingredient;

C - doses of nitrogen: 0 - 50 - 100 - 150 - 200 kg / ha active ingredient.

It was used the wheat variety BOEMA. Laboratory analysis on the quality of crops have been executed by ICPA Bucharest

RESULTS AND DISSCUSIONS

Regarding the influence of phosphorus on the production of wheat, it may be noted that, compared to phosphorus nonfertilized variant (A1), its implementation has led to increased production, as increased doses administered. Thus, the production has presented a growth of 12.9% when it was applied 40 kg phosphorus / ha, reaching 21.5% in case of application of 120 kg. On the 3-year average, production differences were between 4.37 - 7.28 q / ha, which is statistically assured (Table 1).

Table1

The influence of phosphorus fertilizers on wheat yield

FACTOR A Phosphorus fertilization (kg/ha a.i.)		Yield (q/ha)			Average 2006-2008 (q/ha)	Diference		Semnif.
		2006	2007	2008		q/ha	%	
A 1	**P 0**	**37,05**	**20,27**	**44,46**	**33,93**	**MT.**	**100**	
A 2	**P 40**	**43,95**	**20,70**	**50,26**	**38,30**	**4,37**	**112,9**	**xx**
A 3	**P 80**	**47,97**	**20,22**	**52,04**	**40,08**	**6,15**	**118,1**	**xxx**
A 4	**P 120**	**50,71**	**20,34**	**52,57**	**41,21**	**7,28**	**121,5**	**xxx**
DL 5%		2,01	2,90	1,65		2,19		
DL 1%		3,21	4,40	2,83		3,48		
DL 0,1%		5,62	7,06	5,12		5,93		

On average during the testing, application dose of potassium (Table 2) led to obtaining a difference of production of 1.8 q / ha when it was given 40 kg / ha potassium, it reached 2.7 q / ha for the application of a dose of 80 kg / ha. The increase of yield was between 4.9 - 7.3%. It is however much lower compared to the increase of crop obtained by applying fertilizer with phosphorus or nitrogen, differences in production are significant in the application of K40 and distinct significant in the K80 application.

Table 2

The influence of potassium fertilizers on wheat yield

FACTOR B Potassium fertilization (kg/ha a.i..)		Yield (q/ha)			Average 2006-2008 (q/ha)	Diference		Semnif.
		2006	2007	2008		q/ha	%	
B 1	**K 0**	**42,46**	**20,55**	**47,69**	**36,9**	**MT.**	**100**	
B 2	**K 80**	**47,15**	**19,70**	**51,85**	**39,6**	**2,7**	**107,3**	**xx**
B 3	**K 40**	**45,13**	**20,90**	**50,03**	**38,7**	**1,8**	**104,9**	**x**
DL 5%		2,08	1,02	1,95		1,68		
DL 1%		2,52	1,40	2,37		2,10		
DL 0,1%		3,89	1,93	3,72		3,18		

Autumn wheat react favorably to the mineral nitrogen fertilization, achieving significant production increase and improvement of grain quality, particularly the content of protein, technological indices of wheat flour and bread quality (Nedelciuc C et al., 2003).

As you can see, the application of nitrogen resulted in an average three years of experimentation, achieving harvest spor between 32.9% when 50 kg N / ha were applied and 58.8% in the implementation of 200 kg N / ha (Table 3).

By applying dose of 100 kg N / ha achieved a production increase of 50.8%. This is an optimum for growing wheat in the Oltenia Plain, giving favorable results even in years in which weather conditions are unfavorable for wheat (Nedelciuc C and colab., 1989).

Table 3

The influence of nitrogen fertilizers on wheat yield

FACTOR C Nitrogen fertilizers (kg/ha a.i..)		Yield (q/ha)			Average 2006-2008 (q/ha)	Diference		Semnif.
		2006	2007	2008		q/ha	%	
C 1	**N 0**	**31,37**	**21,92**	**29,09**	**27,46**	**MT.**	**100**	
C 2	**N 50**	**41,23**	**22,61**	**45,67**	**36,50**	**9,04**	**132,9**	**xxx**
C 3	**N 100**	**48,43**	**21,51**	**54,25**	**41,40**	**13,94**	**150,8**	**xxx**
C 4	**N 150**	**50,75**	**19,08**	**59,11**	**42,98**	**15,52**	**156,5**	**xxx**
C 5	**N 200**	**52,85**	**16,78**	**61,16**	**43,60**	**16,14**	**158,8**	**xxx**
DL 5%		5,7	0,9	5,5		4,0		
DL 1%		7,6	1,2	7,3		5,3		
DL 0,1%		9,9	1,5	9,5		7,0		

The content of nitrogen in the grain of wheat presented oscillations in the light of phosphorus fertilization. Thus, there is an increase in nitrogen content with increasing doses of phosphorus managed from 2.22% in the case of P0, to 2.47% in the case of fertilization with P120. The content of protein follows the same course, is between 13.87% in case of fertilization with P0 and 15.44% for P120 fertilization (fig. 1).

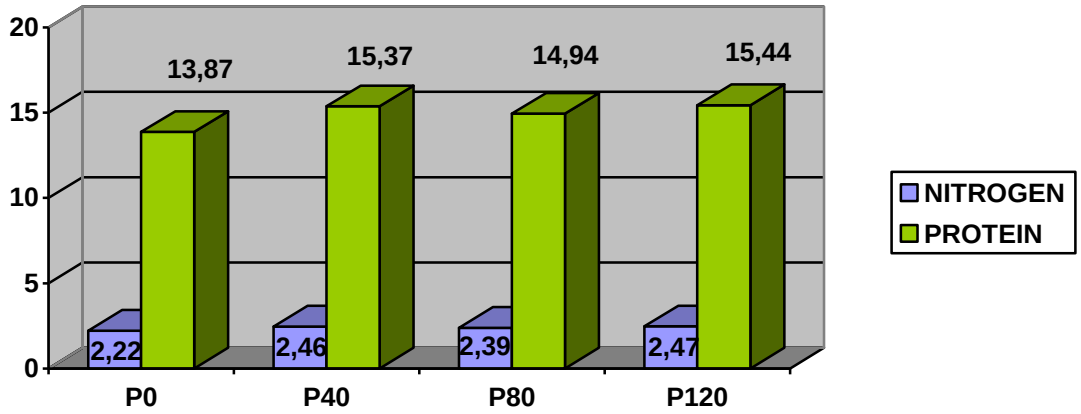

Fig. 1 - Nitrogen content (%) and protein (%) from the wheat grain depending on phosphorus fertilization – Caracal, 2007

Nitrogen fertilization increased the content of nitrogen in wheat grain, values were between 1.85% where fertilization with N0 and 2.86% for fertilization with N200. Protein content was between 11.56% (N0) and 17.87% (N200), (Fig.2).

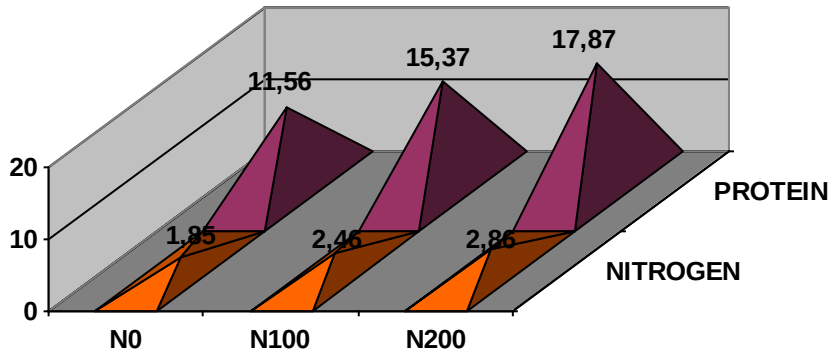

Fig. 2 – Nitrogen content (%) and protein (%)from the wheat grain depending on nitrogen fertilization – Caracal, 2007

The content of nitrogen in wheat grain according to fertilization with potassium introduced value of 2.42% for fertilization with K0 and 2.36% for fertilization with K80, observing a slight decrease. Protein was 15.12% (K0) and 14.75% (K80), (fig.3).

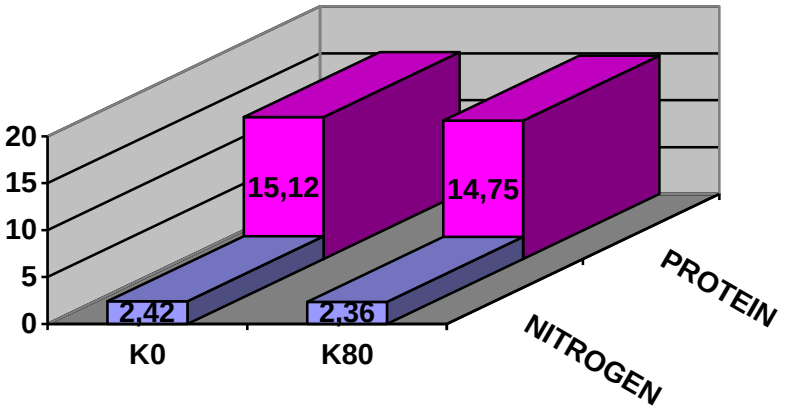

Fig. 3 – Nitrogen content (%) and protein (%)from the wheat grain depending on potassium fertilization – Caracal, 2007

CONCLUSIONS

- ✓ Application of phosphorus in wheat has led to production increased, as increased doses administered. Production has presented an increase of 12.9% when 40 kg phosphorus / ha were applied, reaching 21.5% in case of application of 120 kg/ha;
- ✓ Application of the potassium dose led to obtaining a difference of production of 1.8 q / ha when 40 kg / ha potassium were administered. It reached 2.7 q / ha when a dose of 80 kg / ha was applied;
- ✓ Application of nitrogen has resulted in achieving of harvest increase between 32.9% at 50 kg N / ha and 58.8% for the application of 200 kg N / ha.
- ✓ The combination of nitrogen fertilization with the phosphorus allowed more efficient recovery of nitrogen from the soil, resulting in increasing nitrogen and protein content in the grain of wheat;

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RESEARCHS ON THE INFLUENCE OF PINCHING AND THINNING OUT ON THE PRODUCTION OF VIRGINIA TOBACCO, ON THE CONDITIONS SOIL AND CLIME MÎRŞANI – DOLJ

Prioteasa I.A., Prioteasa Marilena-Alina, Iancu D., Paniță O.

Key words: sandy soil, tobacco, fertilization, productions, irrigation

ABSTRACT

Prin efectuarea lucrărilor de cârnit şi copilit se încearcă să se dea un răspuns la întrebarea cât de mult creşte producția de frunze, în urma efectuării acestor lucrări în condițiile locale de mediu.

Rezultatele de producție obținute arată că față de metoda recomandată de a efectua eliminarea inflorescenței cât mai devreme posibil (la apariția butonilor florali - a_1), celelalte variante, respectiv: a_2 (cârnit la începutul înfloritului) şi a_3 (cârnit la plin înflorit), se comportă diferit şi oarecum ilogic greu de explicat.

Astfel, în timp ce a_2 dă un minus de producție de cca. 130 kg/ha, față de varianta martor, deficit ce ar trebui pus pe seama întârzierii efectuării lucrării de cârnit până la începerea înfloririi, la a_3, când întârzierea efectuării lucrării a fost şi mai mare şi ar fi trebuit să ducă la un deficit de producție pe măsura întârzierii, s-a obținut nu un minus, ci chiar un plus de producție de 271 kg/ha.

Through the work of flesh and thinning out try to give an answer to the question of how much increased production of leaves, after carrying out these works in the local environment.

Results obtained show that production to the method recommended to make the elimination inflorescences as early as possible (the emergence of floral button – a_1), other variants, respectively a_2 (pinching at the beginning) and a_3 (pinching in full bloom), is different and somewhat illogical hard to explain.

Thus, for a_2 gives a less production of about 130 kg/ha, compared to variant witness, that deficit should be delayed on account of performing the work of pinching to start flowering, and a_3, when the delay was performing work and higher and should lead to a shortage of production as of late, has not won a minus but a plus yield producing 271 kg/ ha.

INTRODUCTION

Cultivation of tobacco type on the sands Virginia proved to be very profitable, with a large suitability under irrigation, which requires deeper research on which to determine the influence of works of pinching and baby food on the conditions soil and clime of sandy land left Jiu from Mîrşani – Dolj.

MATERIAL AND METHOD

On sandy soil typical of Mîrşani – Dolj has placed an experience with 3 factors as subdivided parcels, with four repetitions.

A factor (when performing pinching) with 2 sub factors: a_1 - pinching from the appearance floral button (Mt.), a_2 = pinching beginning Thriving, a_3 - pinching from inflorescence maximum.

Factor B (depth of pinching) with 2 sub factors: b_1 = inflorescence plus 2 leaves, and b_2 = inflorescence plus 4 leaves (Mt.).

Factor C (method of thinning out) with 2 sub factors: c_1 = thinning out manually (Mt.) and c_2 - chemical thinning out.

Achieving practice on the field experience consisted of the following works:

- plow deep (28 - 30cm) in the autumn, after the plant before wheat;
- he applied a uniform fertilization with N.P.K. in quantities of 80 kg s.a. per hectare.;

- incorporation of fertilizers and weed destruction dawn by two passages with disk harrow;

- planting, each plant received 0.5 – 1 l water;

- during vegetation were carried out 2 rear and 2 rear mechanical manuals, and a third breeding was carried out only in spots man who appeared in the East late weeds or perennial

- difficulties to fill water from the soil were performed with watering rules 300m^3/ ha and 600 m^3/ ha, depending on the vegetation and rainfall fell;

- the distance between ranks of the plants was 90 cm;

- the number of plants harvested in the parcel was 36;

- number of repetitions was 4;

- land parcel was harvested 16.2 m^2.

RESULTS AND DISCUSSION

Results of production (table 1) show that the elimination inflorescence as early as possible (the emergence floral button - a_1) in comparison with other options, namely: a_2 (pinching at the beginning blossom) and a_3 (pinching in full bloom), behave different and difficult to explain. Thus while a_2 give a less production of about 130 kg/ha, compared to variant witness, that deficit should be delayed on account of performing the work of pinching to start flowering, to a_3, when the delay was performing work and large and should lead to a shortage of production as of late, has not won a minus, but even more production of 271 kg / ha.

Table 1

Production of dried leaves according to the factor A (when performing pinching) in 2005

A factor (when performing pinching)	Production			The significance
	Kg/ha	%	d	
a_1 - pinching apparition floral button	2009	100.0	Mt.	
a_2 - sausage at the beginning blossom	1879	93.5	-130	
a_3 - pinching flourishing maximum	2280	113.5	271	x

DL 5% 190.4 kg/ha
DL 1% 288.3 kg/ha
DL 0,1% 463.2 kg/ha

We consider that a reason for getting more production of 271 kg/ha has uneven because in the vast land in terms of fertility and other characteristics of the soil.

The second factor taken in this study in depth experience and that of pinching (factor B) shows the production obtained (table 2), as land poor in nutrients above, pinching must be more profound, eliminating a larger number of top leaf with inflorescent.

Table 2

The dry leaves yield in function of the B factor (pinching depth) in 2005

B factor (pinching depth)	Production			The significance
	Kg/ha	%	d	
b_1 - inflorescence plus 2 leaves	1979	92.8	- 154	0
b_2 - inflorescence plus 4 leaves	2133	100.0	Mt.	

DL 5% 150.4 kg/ha
DL 1% 216.2 kg/ha
DL 0,1% 318.1 kg/ha

The third factor (C) taken in the study is about how to eliminate thinning out (manual or chemical-c_1 with Royal 4% - c_2).

Results of production (table 3) shows that between the two methods of thinning out there are no differences, production were virtually equal, 2046 - 2066 kg/ha.

Table 3

Production of dried leaves according to the factor C (method of thinning out) in 2005

C factor (method of thinning out)	Production			The significance
	Kg/ha	%	d	
b_1 - thinning out manually	2046	100.0	Mt.	
b_2 - chemical thinning out	2066	101.0	20	

DL 5% 123.4 kg/ha
DL 1% 186.1 kg/ha
DL 0,1% 235.3 kg/ha

But there is a difference regarding the amount of green mass eliminated by pinching (table 4) and the number of manual work to be done to eliminate thinning out.

Thinning out to such manual was required in three passages within a month (9 - July - Aug 12), and the amount of total mass of green has been eliminated big enough (3189 - 3486) kg/ha, compared with chemical variants thinning out, where it was needed only one paper (Aug. 12), and the amount of green mass eliminated was reduced to about one third (1204 - 1250 kg/ha).

Table 4

The amount of green mass eliminated by the works of pinching and thinning out

Factors investigation		Method of thinning out						
A (phase pinching)	B (depth of pinching)	C_1 (thinning out manually – Mt.2)			Kg/ha	C_2 (chemical thinning out)		Kg/ha
		09.07. I	20.07. II	12.08. III		12.08.	% $Mt._2$	
a_1- apart from floral button ($Mt._1$)	b_1 – inflorescent + 2 leaves	137	130	2685	2952	988	33.4	123
	b_2 - inflorescent + 4 leaves	145	132	3148	3425	1420	41.4	143
Media a_1		141	131	2917	3189	1204	37.4	133
a_2 - at the beginning of flowering	b_1 - inflorescent + 2 leaves	11	128	2716	2955	576	19.5	260
	b_2 - inflorescent + 4 leaves	145	130	3220	3495	659	26.4	270
Media a_2		128	129	2968	3225	617	23.0	265
a_3 - in full flourish	b_1 – inflorescent + 2 leaves	169	135	2376	2680	1219	45.5	469
	b_2 - inflorescent + 4 leaves	219	126	3948	4293	1281	38.9	543
Media a_3		194	130	3162	3486	1250	42.2	506

CONCLUSIONS

1. Virginia-type tobacco planted on the sand in terms of irrigation and fertilization balanced not differentiate the production, following the works of pinching and thinning out;
2. Getting an extra production of 271 kg/ha through the work of pinching at their peak are flourishing because of uneven in the vast land in terms of fertility and other characteristics of the soil.
3. The quality of tobacco is not sensitive influential pinching and thinning out;
4. On sandy soil poor in nutrients pinching must be more profound, because by removing a larger number of top leaf with inflorescent, the lower leaf remained benefit from greater resources develop better.
5. Thinning out between manual and chemical thinning out there are no differences of harvest production were virtually equal.

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INFLUENȚA FERTILIZĂRII PE TERMEN LUNG ASUPRA PRODUCȚIEI ŞI CALITĂȚII PORUMBULUI

THE INFLUENCE OF LONG TERM FERTILIZATION ON MAIZE YIELD AND QUALITY

C. ROŞCULETE, E. PETRESCU, N. VILĂU, GH. MATEI, C. V. POPESCU

Keywords: maize, fertilization, production, yield quality

ABSTRACT

The paper surveys some results obtained in maize in a long term experiment from the Caracal Agricultural Research Station. The application of progressive N, P and K rates influenced the yield and its quality. The application of nitrogen fertilizers ($N_{150-180}$) is a decisive factor in achieving high and superior yield.

INTRODUCTION

Maize is one of the main plants growing in the Caracal Plain. To estimate the influence of the fertilizers on yields crops at the major agricultural crops, related to the development of chernozem argilo-iluvial fertility from Caracal, were executed experimental trials since the autumn of 1965.

MATERIAL AND METHOD

Trials were effectued at CARDS Caracal. The soil is a chernozem with a good natural fertility, poorly supplied with total nitrogen, middle in phosphorus and with a hight content of changeable potassium.

The experimental factors were:

Factor A: doses of phosphorus - 0 – 40 -80 -120 kg/ha active ingredients;

Factor B: doses of potassium –0 – 40 – 80 kg/ha active ingredients;

Factor C: doses of nitrogen–.0 – 60 – 120 – 180 – 240 kg/ha active ingredient.

RESULTS

Following the results obtained by applying phosphorus fertilizers, with progressive doses on maize production, there is an increase in maize yields with these doses. Thus, crop growth was on average of 8.1% for the application of 40 kg P / ha, reaching to 11.7% for a dose of 120 kg P / ha.

By applying annual increase doses of phosphorus, the difference is diminishing as a result of the phosphorus presence, mobilizing in this case less reserves existent in the soil (*Ionescu Şt. et al., 1991*). For P 120 doses, yields achieved, although growing, present small differences and we consider non-economic side of expenditure is made with increases of applied phosphorus.

Of the four doses of phosphorus applied, for the Caracal Plain conditions at the maize culture under irrigation conditions, can appreciate that the dose of 80 kg / ha P2O5 applied annually is, in terms of yields, the most appropriate, it promotes recovery by plants the nitrogen dose administered too (*Ionescu Şt. et al., 2001*) (Table 1).

Table 1

Effect of phosphorus fertilizers on maize yield

FACTOR A Phosphorus fertilization (kg/ha a.i.)		Average yield 2006-2008 (q/ha)	Diference		Semnif.
			q/ha	%	
A 1	**P 0**	**54,13**	**MT**	**100**	
A 2	**P 40**	**58,51**	**4,38**	**108,1**	**xx**
A 3	**P 80**	**59,66**	**5,53**	**110,2**	**xx**
A 4	**P 120**	**60,49**	**6,36**	**111,7**	**xx**

DL 5% 2,3
DL 1% 4,2
DL 0,1% 9,0

Applying fertilizer with potassium (Table 2) leads to obtain, on average, a difference of production low. They ranged from 1.6 q / ha where a dose of 40 kg potassium / ha and 2.3 q/ha increase in the dose to 80 kg potassium / ha.

Table 2

Effect of potassium fertilizers on maize yield

FACTOR B Potassium fertilization (kg/ha a.i.)		Average yield 2006-2008 (q/ha)	Diference		Semnif.
			q/ha	%	
B 1	**K 0**	**56,90**	**MT**	**100**	
B 2	**K 80**	**59,20**	**2,3**	**104,0**	**xxx**
B 3	**K 40**	**58,52**	**1,6**	**102,8**	**xx**

DL 5% 1,0
DL 1% 1,4
DL 0,1% 2,2

Maize culture responds very well to nitrogen fertilization. Yields increase with increasing dose administered. As noted, fertilization with progressive doses of nitrogen led to obtain some very significant differences, between 8.44 q / ha in the application of 60 kg N / ha and 21.21 q / ha when applied dose of 240 kg N / ha (Table 3).

Table3

Effect of nitrogen fertilizers on maize yield

FACTOR C Nitrogen fertilization (kg/ha a.i)		Average yield 2006-2008 (q/ha)	Diference		Semnif.
			q/ha	%	
C 1	**N 0**	**45,84**	**MT**	**100**	
C 2	**N 60**	**54,28**	**8,44**	**118,4**	**xxx**
C 3	**N 120**	**60,57**	**14,73**	**132,1**	**xxx**
C 4	**N 180**	**63,39**	**17,55**	**138,3**	**xxx**
C 5	**N 240**	**67,05**	**21,21**	**146,3**	**xxx**

DL 5% 1,6
DL 1% 2,1
DL 0,1% 2,8

Perfecting the technology of growing maize under irrigation has helped to optimize growth factor, is achieving new levels of production. With this, increased the amount of nitrogen exported with the harvest, causing it to use higher doses of nitrogen (*Petrescu E. et al., 2007*).

The content of protein. Depending on phosphorus fertilization, the highest protein content of maize grain is recorded when given 40 kg phosphorus / ha (fig.1).

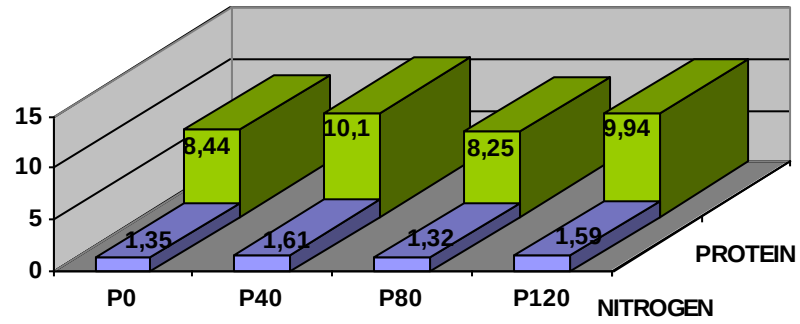

Fig. 1 - Nitrogen content (%) and protein (%) from the maize grain depending on phosphorus fertilization – Caracal, 2007

Differential administration of nitrogen led to the highest protein content (11.06%) where the maximum dose of 240 kg / ha nitrogen were applied (fig.2).

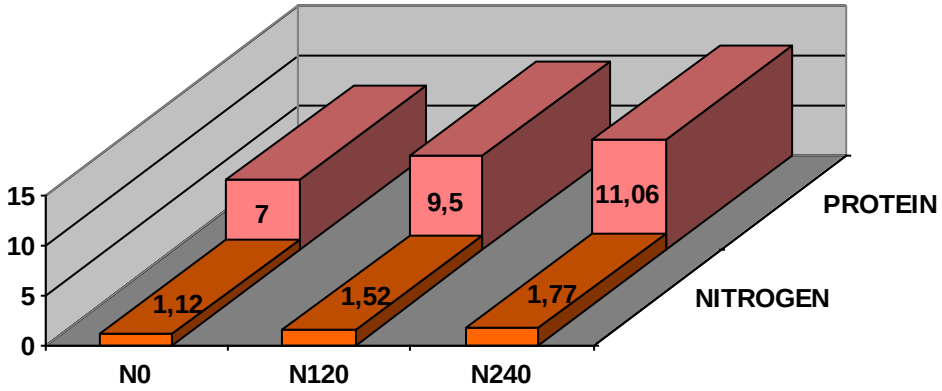

Fig. 2 - Nitrogen content (%) and protein (%) from the maize grain depending on nitrogen fertilization – Caracal, 2007

The percentage of protein was less influenced by the administration of potassium (fig. 3), it reached the maximum in the case of 80 kg / ha potassium, but differences over unfertilized variant are very low (9.31% versus of 9.06% for potassium un-application).

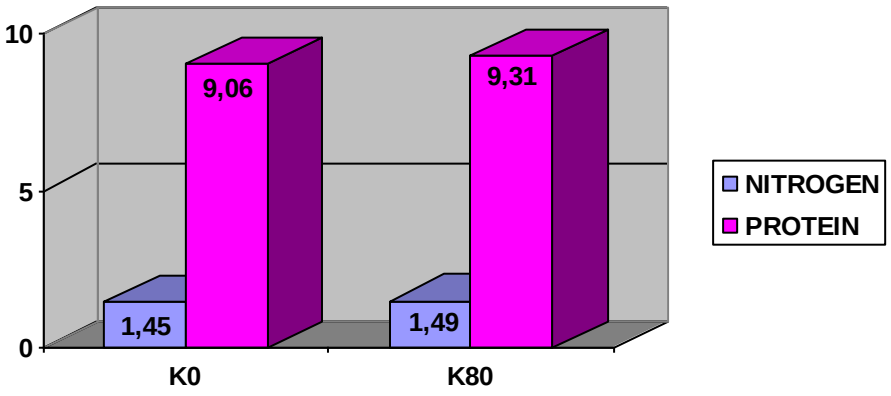

Fig. 3 - Nitrogen content (%) and protein (%) from the maize grain depending on potassium fertilization – Caracal, 2007

CONCLUSIONS

- By applying progressive doses of fertilizers with phosphorus is an increase in maize yields with these doses. Increase crop was on average 8.1% in the application of 40 kg P / ha, reaching the amount of 11.7% for a dose of 120 kg P / ha;
- Apply fertilizer with potassium leads to specific differences of production low, ranging between 1.6 q / ha where a dose of 40 kg potassium / ha and 2.3 q / ha increase in the dose of 80 kg potassium / ha ;
- Progressive fertilization with nitrogen doses led to specific differences in production very significant, ranging from 8.44 q / ha in the application of 60 kg N / ha and 21.21 q / ha when were applied dose of 240 kg N / ha;
- The supplement dose of phosphorus is a noted increase in the phosphorus content of the maize beans;
- Differential administration of nitrogen led to the highest protein content (11.06%) where the maximum dose of 240 kg / ha nitrogen were applied;
- Long-term fertilization arrangements did not influence the potassium from the maize plants, there is not changes in the potassium content of the maize beans;

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RESEARCHES REGARDING THE CHANGES OF THE OXIDATIVE STATUS OF GRAPEFRUITS JUICE AFTER SWEETENING TASK

CERCETARI CU PRIVIRE LA MODIFICARILE STARII OXIDATIVE LA SUCUL DE GRAPEFRUIT DUPA INDULCIRE

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Keywords: Grapefruits juice, sweetener, $NAD^+/NADH+H^+$ ratio, $FMN/FMNH+H^+$ ratio

ABSTRACT

Prezenta lucrare face parte dintr-un studiu complex cu privire la efectele indulcitorilor naturali si sintetici asupra unor tipuri de alimente lichide. Astazi, ca urmare a cresterii consumului de suc de grapefruit este necesar sa cunoastem efectele pe care indulcirea le exercita asupra corpului omenesc pentru a putea proba si promova cel mai bun edulcorant. Variantele experimentale de suc de grapefruit au fost indulcite folosind cei mai utilizati edulcoranti din Romania iar schimbarile starii de oxidabilitate au fost monitorizate. Monitorizarea aceasta poate fi utilizata pentru a putea promova cel mai bun indulcitor si pentru a stabili cel mai bun timp de pastrare al acestei categorii de sucuri.

The work paper is a side of complex study regarding the effects of natural and synthetic edulcorants on the lot of liquid foods. Follow the increased consume for the grapefruit juice in present time it is necessary to knowing the effects of sweetening task on the consumers' human bodies for prove and promote the best edulcorant. The grapefruit juice experimental variants were prepared and sweetened with most used edulcorants for Romania and the changes of the oxidative status of juice were monitories. The monitoring can be use for promote the healthy edulcorant and for establish the best time of preserve for this juice.

INTRODUCTION

The grapefruit juice is very important for the variety chemical composition: lot of hydro soluble vitamins, potassium, phosphorus, 1-p-menthene-8-thiol, nootkatone. Trace of hydrogen sulphide and dimetyl sulphide are present in grapefruit juice and also contribute to their aromas. Grapefruit juice is more different like another citrus juice through the action across the antibiotic compounds, this juice is able to inactivate the active principles of antibiotic and another drugs [Leonte M., Florea T.].

In 1989, a group of Canadian researchers studying a blood pressure drug were astonished to discover that drinking a glass of grapefruit juice dangerously increased the drug's potency [Bakalar, Nicholas]. Grapefruit juice, and grapefruit in general, is a potent inhibitor of the Cytochrome-P450 enzyme CYP3A4, which can impact the metabolism of a variety of drugs, increasing their bioavailability [He K; Iyer KR and col.]. In some cases, this can lead to a fatal interaction with drugs like Astemizole [Belitz E., Grosch M.]. The effect of grapefruit juice with regard to drug absorption was originally discovered in 1989. However, the effect became well-publicized after being responsible for a number of deaths due to overdosing on medication.[Bailey DG and col.]

Nicotinamide adenine dinucleotide, abbreviated NAD^+, is a coenzyme found in all living cells. The compound is a dinucleotide, since it consists of two nucleotides joined through their phosphate groups: with one nucleotide containing an adenosine ring, and the other containing nicotinamide. In metabolism, NAD^+ is involved in redox reactions, carrying electrons from one reaction to another. [Dawson MC].

After use the natural or synthesis edulcorants the grapefruit juice composition will be changed and this change can be proved using the UV-Vis spectroscopy (like as cheapest analysis method). We can considered that the best edulcorant for grapefruit juice is the edulcorants that induce the minimally effects than unsweetened grapefruit juice (prove through the changes of molecular spectra at maximal points for the sweetening variants pertain to simile molecular spectra for unsweetening variant)

Flavin mononucleotide (FMN), or riboflavin-5′-phosphate, is produced from riboflavin (vitamin B_2) by the enzyme riboflavin kinase and functions as prosthetic group of various oxidoreductases including NADH dehydrogenase. During catalytic cycle, the reversible interconversion of oxidized (FMN), semiquinone ($FMNH^{\bullet}$) and reduced ($FMNH_2$) forms occurs. FMN is a stronger oxidizing agent than NAD and is particularly useful because it can take part in both one and two electron transfers [Massey V.].

MATERIAL AND METHODS

For to quantify into the changed juice the NAD^+ / $NADH+H^+$ ratio content and the FMN^+ / $FMNH+H^+$ ratio content on sweating task with natural and synthetic's edulcorants it is constituted nine experimental variants.

From unsweetened variant of natural grapefruit juice V_0 it is obtained through sweetness task the follow experimental variants:

-V_0 – the unsweetened variants of natural grapefruit juice,

-V_1 – the sugar sweetened variant of natural grapefruit juice,

-V_2 – the honey sweetened variant of natural grapefruit juice,

-V_3 – the saccharine sweetened variant of natural grapefruit juice,

-V_4 - the natural glucose sweetened variant of natural grapefruit juice,

-V_5 – the variant of natural grapefruit juice that has been sweetened with Flix,

-V_6 – the variant of natural grapefruit juice that has been sweetened with Equal,

-V_7 – the variant of natural grapefruit juice that has been sweetened with Clio,

-V_8 – the variant of natural grapefruit juice that has been sweetened with Edulciclam,

-V_9 – the variant of synthesis grapefruit juice.

The used sugar for V_1 has a concentration of 2.50g/50mL natural grapefruit juice concentration. The sodium saccharine has proved in to V_3 a 25 mg/50mL natural grapefruit juice and the longer solvated time. The used honey for the V_2 has 4g/50mL and it is from acacia honey type. For the V_4 it was used the pharmaceutical natural glucose (5%) obtained though the separation- concentration task. For to obtain the V_5 was used Flix (one pills was composed by lactose 1mg, saccharine 8mg, aspartame 3mg, excipients E468 and E641).

Equal was a synthetic edulcorants (with aspartame) and was used for V_6.

Edulciclam was a synthetic sweetener (sodium cyclamate) and was proved a 25mg/50mL natural grapefruit juice into V_8.

The synthesis grapefruit juice was constituted by: citric acid E330, maltodextrine E140, sodium cyclamate E952, sodium saccharine E954, aspartame E951, ascorbic acid E300, tartrazine E102, the grapefruits flavour, and was constituted the V_9. The „Clio" contain the sodium cyclamate (57.8%), saccharine (15.5%), sodium bicarbonate (13.7%), mono-sodium citric acid (13%) and was used for V_7.The samples were cleaned and spectrophotometered in the nearly UV ranges. The variations of molecular absorption spectra were recording in report by the wave-length. Then, these molecular absorption spectra were analysed, help by the statistical soft „SPSS for Windows 11.0", the deviation from the base variant, for the obtain data and establish mathematic what is the best sweetening variant for the natural grapefruit juice. Before the spectrometry task the samples were prepared in the same conditions of temperature, pressure and for

spectrometry task it used an digital spectrophotometer UNICAM 2 UV-Vis, with 1cm cuvette broad and the automatically change of deuterium lamp with tungsten lamp at 325nm.

Both NAD^+ and NADH absorb strongly in the ultraviolet due to the adenine base. The peak absorption of NAD^+ is at a wavelength of 259 nanometers (nm), with an extinction coefficient of 16,900 $M^{-1}cm^{-1}$. NADH also absorbs at higher wavelengths, with a second peak in UV absorption at 339 nm with an extinction coefficient of 6,220 $M^{-1}cm^{-1}$. This difference in the ultraviolet absorption spectra between the oxidized and reduced forms of the coenzymes at higher wavelengths makes it simple to measure the conversion of one to another in enzyme assays – by measuring the amount of UV absorption at 340 nm using a spectrophotometer.[Dawson MC]

The FMN and $FMNH+H^+$ ratio contents in to grapefruits juice were determined through use the spectroscopy in to Visible range (400-700 nm) and the maximal molecular absorption spectra were determined by only add pure analysis substances method.

For determine of molecular absorption spectra was used an UV/Vis spectrophotometer UNICAM 2 type – with 2nm strip width. From soft, the Deuterium lamp was automatically changed with the Tungsten at 325 nm. The used cuvettes were from quartz and proved 4.5mL capacity and 10nm width. For decreasing the limits of errors, the obtained results were replayed in to auto- retracking and save in to files .qnt format and convert with the soft Visio ver.2.0.

RESULTS AND DISCUSSIONS

Result as the analysis were obtained the $NAD^+/NADH+H^+$ and the FMN/ $FMNH+H^+$ ratio contents from grapefruit juice for the experimental variants like as the figures 1 and 2.

The greatest NAD^+ content were registered at the experimental variants of sweetenered grapefruits juice that use the saccharine (V3 -only or in the combination like as Flix-V5 and Clio-V7). The experimental variant that use the saccharine (V3) are registered the greatest value of NAD^+ content. The saccharine added in to V3 are influenced the $NADH+H^+$ greatest content and this variant are the total unrecommended variant.[Savescu P.].

The synthetic grapefruits juice are unrecommended for consummers, the $NAD^+/NADH+H^+$ ratio was greatest, the oxidise status can be installed and the consummer metabolism can be affected (figure 1).

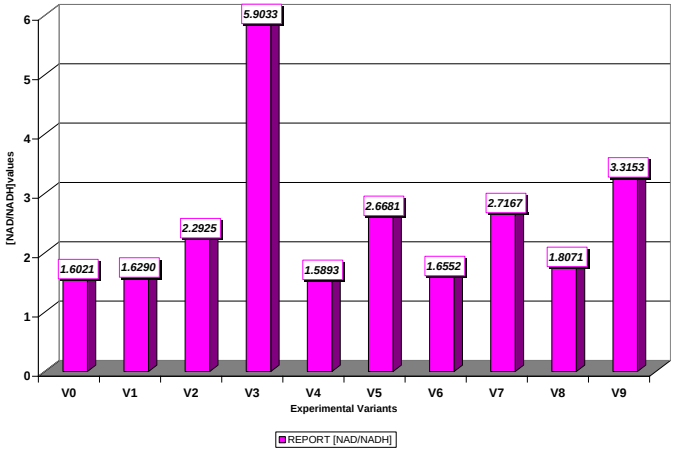

Fig.1 – The $NAD^+/NADH+H^+$ ratio content in the experimental variants

The greatest FMN/ $FMNH+H^+$ ratio contents from grapefruits juice are registred (after minimally time) at the V9 synthesis grapefruits juice. This experimental variant are proved proved the unrecommended variant for the consummers.

The smaller FMN/ $FMNH+H^+$ ratio contents from grapefruits juice are registered for the V4 (the variant that use the natural glucose like as edulcorant).

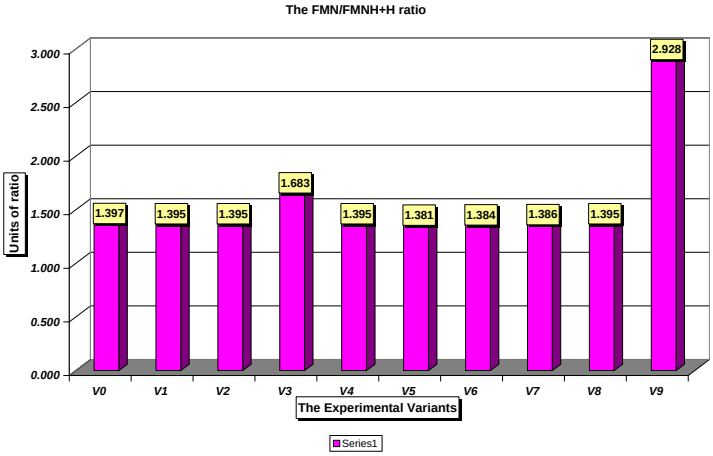

Figure 2. – The FMN/FMNH+H^+ ratio content in the experimental variants

The good results were proved (from the point of view of FMN/ FMNH+H^+ ratio contents) at the variants that use the sugar (V1), Honey (V2), Edulciclam (Sodium Cyclamate-V5) .

CONCLUSIONS AND RECOMMENDATIONS

- The method of analysis that use the UV VIS spectrometry can be a good and cheaper method of analyse than HPLC methods for determinate the concentration and effect of sweeteners, the UV- VIS optical methods can be used for to determinate the best edulcorants for the natural grapefruit juice and can be complete with FTIR spectrometry (for analysis the any isomers derivate from compounds of base);

- For the natural grapefruit juice and for the any thermal solvated conditions *the sugar* (V_2) was the best natural edulcorant, the curve of the molecular absorption spectra (especially in to near UV range) for this sweetener has showed the minimum changes from the simile basis curve of the unsweetened natural grapefruit juice;

- For the people that have some digestive aches or cardiac problems, who cannot use sugar in there consumption, have an alternative with *Edulciclame* (*sodium cyclamate*).

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CERCETARI CU PRIVIRE LA MODIFICARILE STARII OXIDATIVE LA SUCUL DE LAMAIE DUPA INDULCIRE

RESEARCHES REGARDING THE CHANGES OF THE OXIDATIVE STATUS OF LEMON JUICE AFTER SWEETENING TASK

P. Savescu, Maria Dinu

Keywords: Lemon juice, sweetener, $NAD^+/NADH+H^+$ ratio, $FMN/FMNH+H^+$ ratio

ABSTRACT

Prezenta lucrare face parte dintr-un studiu complex cu privire la efectele indulcitorilor naturali si sintetici asupra unor tipuri de alimente lichide. Astazi, ca urmare a cresterii consumului de suc de lamaie este necesar sa cunoastem efectele pe care indulcirea le exercita asupra corpului omenesc pentru a putea proba si promova cel mai bun edulcorant. Variantele experimentale de suc de lamaie au fost indulcite folosind cei mai utilizati edulcoranti din Romania iar schimbarile starii de oxidabilitate au fost inregistrate. Monitorizarea aceasta poate fi utilizata pentru a putea promova cel mai bun indulcitor si pentru a stabili cel mai bun timp de pastrare al acestei categorii de sucuri.

The work paper is a side of complex study regarding the effects of natural and synthetic edulcorants on the lot of liquid foods. Follow the increased consume for the lemon juice in present time it is necessary to knowing the effects of sweetening task on the consumers' human bodies for prove and promote the best edulcorant. The lemon juice experimental variants were prepared and sweetened with most used edulcorants for Romania and the changes of the oxidative status of juice were monitories. The monitoring can be use for promote the healthy edulcorant and for establish the best time of preserve for this juice.

INTRODUCTION

Lemon juice is widely known as a diuretic, antiscorbutic, astringent, and febrifuge. In Italy, the sweetened juice is given to relieve gingivitis, stomatitis, and inflammation of the tongue. [www.middlepath.com.au].Citrus juices (especially lemons juice) are heat-treated to inactivate the endogenous pectin esterase, which would otherwise provide pectic acid which can aggregate and flocculate in the presence of Ca^{2+} ions. However, since heat treatment damages fruit aroma, the use of polygalacturonase is preferred. This enzyme degrades the pectic acid to such an extent that flocculation does not occur in the presence of divalent cations [Belitz E].

Nicotinamide adenine dinucleotide, abbreviated NAD^+, is a coenzyme found in all living cells. The compound is a dinucleotide, since it consists of two nucleotides joined through their phosphate groups: with one nucleotide containing an adenosine ring, and the other containing nicotinamide. In metabolism, NAD^+ is involved in redox reactions, carrying electrons from one reaction to another. The coenzyme is therefore found in two forms in cells: NAD^+ is an oxidizing agent – it accepts electrons from other molecules and becomes reduced, this reaction forms NADH, which can then be used as a reducing agent to donate electrons. These electron transfer reactions are the main function of NAD^+[Dawson MC].

Flavin mononucleotide (FMN), or riboflavin-5′-phosphate, is produced from riboflavin (vitamin B_2) by the enzyme riboflavin kinase and functions as prosthetic group of various oxidoreductases including NADH dehydrogenase. During catalytic cycle, the reversible interconversion of oxidized (FMN), semiquinone ($FMNH^{\bullet}$) and reduced ($FMNH_2$) forms occurs. FMN is a stronger oxidizing agent than NAD and is particularly useful because it can take part in both one and two electron transfers [Leonte M., Florea T.].

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-V_4 - the natural glucose sweetened variant of natural lemon juice,
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The used sugar for V_1 have proved a concentration of 2.50g/50mL natural lemon juice concentration. The sodium saccharine has proved in to V_3 a 25 mg/50mL natural lemon juice and the longer solvated time. The used honey for the V_2 has 4g/50mL and it is from acacia honey type. For the V_4 it was used the pharmaceutical natural glucose (5%) obtained though the separation- concentration task. For to obtain the V_5 was used Flix (one pills was composed by lactose 1mg, saccharine 8mg, aspartame 3mg, excipients E468 and E641).

Equal was a synthetic edulcorants (with aspartame) and was used for V_6. Edulciclam was a synthetic sweetener (sodium cyclamate) and was proved a 25mg/50mL natural lemon juice into V_8.

The synthesis lemon juice was constituted by: citric acid E330, maltodextrine E140, sodium cyclamate E952, sodium saccharine E954, aspartame E951, ascorbic acid E300, tartrazine E102, the lemon flavour, and was constituted the V_9. The „Clio" contain the sodium cyclamate (57.8%), saccharine (15.5%), sodium bicarbonate (13.7%), mono-sodium citric acid (13%) and was used for V_7.The samples were cleaned (for the interference substances) and were spectrophotometered in the nearly UV ranges. The variations of molecular absorption spectra were recording in report by the wave-length. Then, these molecular absorption spectra were analysed, help by the statistical soft „SPSS for Windows 11.0", the deviation from the base variant, the analysis of the mean square for the obtain data and establish mathematic what is the best sweetening variant for the natural lemon juice. Before the spectrometry task the samples were prepared in the same conditions of temperature, pressure and for spectrometry task it used an digital spectrophotometer UNICAM 2 UV-Vis, with 1cm cuvette broad and the automatically change of deuterium lamp with tungsten lamp at 325nm (this mechanism was set up before analysis).

Both NAD^+ and NADH absorb strongly in the ultraviolet due to the adenine base. The peak absorption of NAD^+ is at a wavelength of 259 nanometers (nm), with an extinction coefficient of 16,900 $M^{-1}cm^{-1}$. NADH also absorbs at higher wavelengths, with a second peak in UV absorption at 339 nm with an extinction coefficient of 6,220 $M^{-1}cm^{-1}$. This difference in the ultraviolet absorption spectra between the oxidized and reduced forms of the coenzymes at higher wavelengths makes it simple to measure the conversion of one to another in enzyme assays – by measuring the amount of UV absorption at 340 nm using a spectrophotometer.[Dawson MC]

The FMN and FMNH+H^+ ratio contents in to lemon juice were determined through use the spectroscopy in to Visible range (400-700 nm) and the maximal molecular absorption spectra were determined by only add pure analysis substances method.

For determine of molecular absorption spectra was used an UV/Vis spectrophotometer UNICAM 2 type – with 2nm strip width. From soft, the Deuterium lamp was automatically changed with the Tungsten at 325 nm. The used cuvettes were from quartz and proved 4.5mL capacity and 10nm width. For decreasing the limits of errors, the obtained results were replayed in to auto- retracking and save in to files .qnt format and convert with the soft Visio ver.2.0.

RESULTS AND DISCUSSIONS

Result as the analysis were obtained the NAD^+ /NADH+H^+ and the FMN/ FMNH+H^+ ratio contents from lemon juice for the experimental variants like as the figures 1 and 2.

The greatest NAD^+ content were registered at the experimental variants of sweetenered lemon juice that use the saccharine (only or in the combination like as Flix and Clio). The experimental variant that use the Clio (saccharine with cyclamate and Natrium bicarbonate) are registered the greatest value of NAD^+ content. The saccharine added in to V3 are influenced the NADH+H^+ greatest content (Savescu P.).

The synthetic lemon juice are unrecommended for consummers, the NAD^+/NADH+H^+ ratio was greatest, the oxidise status can be installed and the consummer metabolism can be affected (figure 1)[F.N.B.I.M].

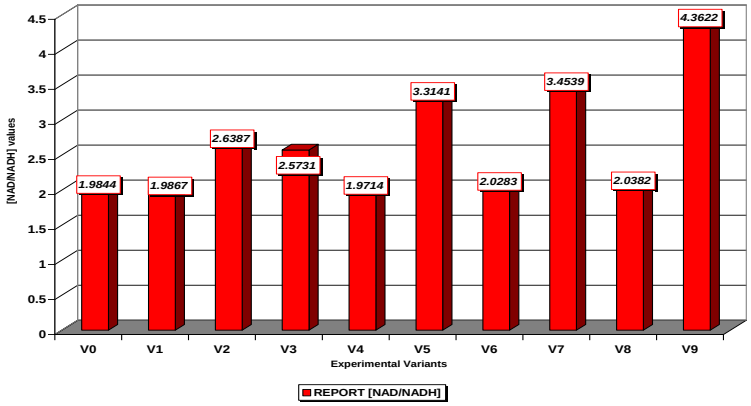

Fig.1 – The NAD^+/NADH+H^+ ratio content in the experimental variants

The greatest FMN/ FMNH+H^+ ratio contents from lemon juice are registred (after minimally time) at the V9 synthesis lemon juice. This experimental variant are proved proved the unrecommended variant for the consummers.

The smaller FMN/ FMNH+H^+ ratio contents from lemon juice are registered for the V4 (the variant that use the natural glucose like as edulcorant).

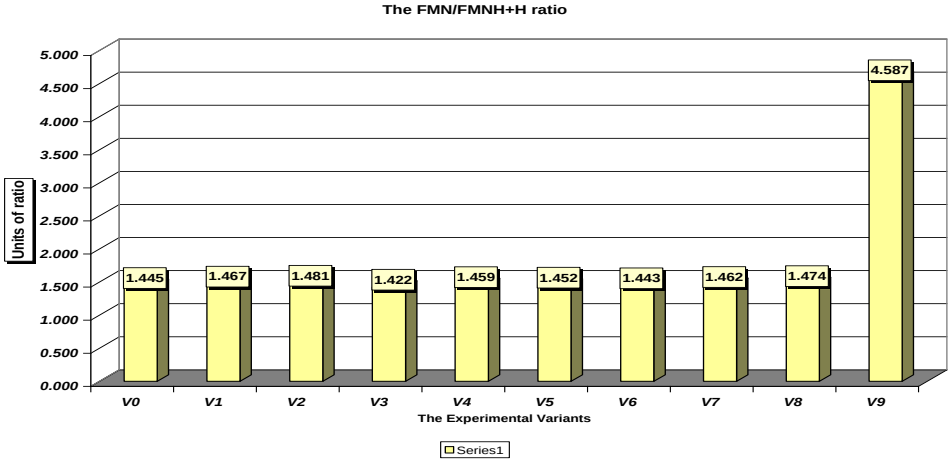

Figure 2. – The FMN/FMNH+H^+ ratio content in the experimental variants

The good results were proved (from the point of view of FMN/ $FMNH+H^+$ ratio contents) at the variants that use the Edulciclam (Sodium Cyclamate-V5) or Equal (V6) .

CONCLUSIONS AND RECOMMENDATIONS

- The method of analysis that use the UV VIS spectrometry can be a good and cheaper method of analyse than HPLC methods for determinate the concentration and effect of sweeteners, the UV- VIS optical methods can be used for to determinate the best edulcorants for the natural lemon juice and can be complete with FTIR spectrometry (for analysis the any isomers derivate from compounds of base);

- For the natural lemon juice and for the any thermal solvated conditions *the natural glucose* (V_4) was the best natural edulcorant, the curve of the molecular absorption spectra (especially in to near UV range) for this sweetener has showed the minimum changes from the simile basis curve of the unsweetened natural lemon juice;

- For the people that have some digestive aches or cardiac problems, who cannot use sugar in there consumption, have an alternative with *Edulciclame* (*sodium cyclamate*).

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PRODUCTIVITATEA UNOR SOIURI DE LUCERNĂ STRĂINE SUB INFLUENTA ÎNGRĂŞĂMINTELOR ORGANICE ŞI A BIOSTIMULATORILOR ÎN PARTEA DE VEST A ȚĂRII

THE PRODUCTIVITY OF SOME FOREIGN ALFALFA VARIETIES UNDER THE INFLUENCE OF ORGANIC FERTILIZERS AND BIOSTIMULATORS IN WESTERN ROMANIA

Camelia Maria ŞTEFAN, A. MOISUC

Key words: yield, fertilisation, growth regulators, alfalfa.

ABSTRACT

În acest studiu au fost analizate trei soiuri sârbeşti de lucerna, fertilizate cu doze diferite de îngrăşământ organic (gunoi de grajd) şi la care au fost aplicați foliar trei biostimulatori. Soiurile luate în studiu sunt: Novosadanka-H11, Rasinka şi Tisa. Dozele de îngrăşământ organic sunt de 20 t/ha şi respectiv 40 t/ha gunoi de grajd, iar biostimulatorii aplicați sunt Cropmax 1 l/ha, Atonik 0,5 l/ha şi Bionat 2 l/ha. Producțiile cele mai ridicate de masă verde s-au înregistrat la coasa a doua la toate cele trei soiuri de lucerna fertilizate cu 40t/ha gunoi de grajd, existând diferențe mai mici de 5 t/ha masa verde față de variantele martor. Dintre biostimulatorii aplicați, cel mai reprezentativ din punct de vedere productiv este Cropmax, înregistrându-se creşteri de producție la toate cele trei soiuri, cât şi la toate coasele efectuate.

In this research we have studied three Serbian varieties of alfalfa fertilised with different doses of organic fertiliser (manure) and there where applied on leaves three growth regulators. The varieties studied here are: Novosadanka-H11, Rasinka and Tisa. The organic fertiliser doses are 20 t/ha manure and respectively 40 t/ha, and the applied growth regulators are Cropmax 1 l/ha, Atonik 0.5 l/ha, and Bionat 2 l/ha. The highest yields of fresh fodder are registered in the case of the second cut for all three alfalfa varieties fertilised with 40 t/ha manure there being differences lower then 5 t/ha of fresh fodder in comparison with the tester. Comparing the applied growth regulators the most representative from the yield point of view is Cropmax, in its case being registered yield increases for all three alfalfa varieties, and for all the cuts realised.

INTRODUCTION

When fertilizer first became readily available in the 1930s, university researchers began to conduct field studies, develop soil tests and make fertilizer recommendations. One of the early publications in the tri-state region was "How to Fertilize Corn Effectively in Indiana" by G.D. Scarseth, H.L. Cook, B.A. Krantz and A.J. Ohlrogge, Bulletin 482, 1944, Purdue University, Agricultural Experiment Station. Since that time, many soil fertility scientists have made significant contributions to our understanding of plant nutrition and the development of fertilizer recommendations. The foliar fertilisation proved to be an excellent method that completes the necessary micro and macronutrients during the critical stages of plants' growth (**VITOSH *et al.*,** 2008).

The foliar fertilisation is a good method to improve the yield and quality of alfalfa crop, and is done through spraying, this being an efficient method for the applying of the small amount of fertilisers (**JOHNSON**, 2008).

Traditionally those nutrients are provided to the plants applying manure. But, in the last time the specialised companies are producing liquid fertilisers and growth regulators that are applied directly on the alfalfa's leaves. Those fertilisers are completing or replacing the use of the traditional fertilisers (**HALL *et al.***, 2002).

The foliar applying of the micro and macronutrients alone or in combination with organic fertilisers presents now a method used for the improvement of the yield and quality of the fodder. Thus, the pieces of information concerning the effectiveness and profitability of these products are limited and not well scientifically supported (**HALL *et al.***, 2002).

MATERIAL AND METHOD

The experimental plot is set in the area of the Didactic Station of Banat's University of Agricultural Sciences and Veterinary Medicine from Timişoara in 2007.

The seeding is realised in 15 April 2007, the distance between rows is 12.5 cm and the plants density on 1 m^2 is 950-1100 seeds, this corresponding to 20-22 kg/ha.

The experience comprises three Serbian alfalfa varieties: Tisa, Rasinka and Novosadanka H-11 set in three variants with three replicate plots.

The features of the studied alfalfa varieties described by the variety authors are presented as it is following.

Tisa is a synthetic alfalfa variety created at the Agriculture and Horticulture Institute from Novi Sad (Serbia) recognized by the Union Commission in 1996. It is distinct through a great accommodation of the yield in different growing conditions. The average plant's height is 65-70 cm. he genetic potential for yield is to 20 t/ha dry matter. It is resistant to falling dawn and tolerant to drought. This variety is medium resistant to black leaf spot, rust, and other diseases. The average content in crude protein from the dry matter is 19.6 %, and the cellulose 21.6 %. This variety valorises well the irrigated crop system.

Rasinka is a synthetic alfalfa variety created at the Agriculture and Horticulture Institute from Novi Sad (Serbia) and recognized Union Commission in 1997. This variety is resistant to falling dawn and to the main alfalfa diseases. It grows well after cutting, resists well to low temperatures and is resistant to drought. This variety is distinct through good adaptability and stable production in different agro-ecological conditions. This variety has greater yields of crude protein in comparison with the standard varieties. It can be used in economic condition 4-6 years.

Novosadanka H-11 is a hybrid alfalfa variety between *Medicago sativa L.* and *Medicago falcate L.*, this has been recognized in 1988. This synthetic variety is composed from 15 hybrid alfalfa clones. The plants are semi-erect, with many offshoots per plant. This variety is resistant to falling down, to frost, to drought and to the main alfalfa's diseases. This variety can be cut 4-5 times during a year in rainfed system. The genetic production potential of this alfalfa variety is 20 t/ha dry matter content. It is proper to be cultivated in low lands.

Some chemical features of the soil from the experimental plot are represented in Table 1, and show the pH, humus (%), total nitrogen (%), phosphorus (ppm), recalculated phosphorus (ppm), and potassium (ppm) at 0-20 cm depth, and 20-40 cm depth.

Table 1

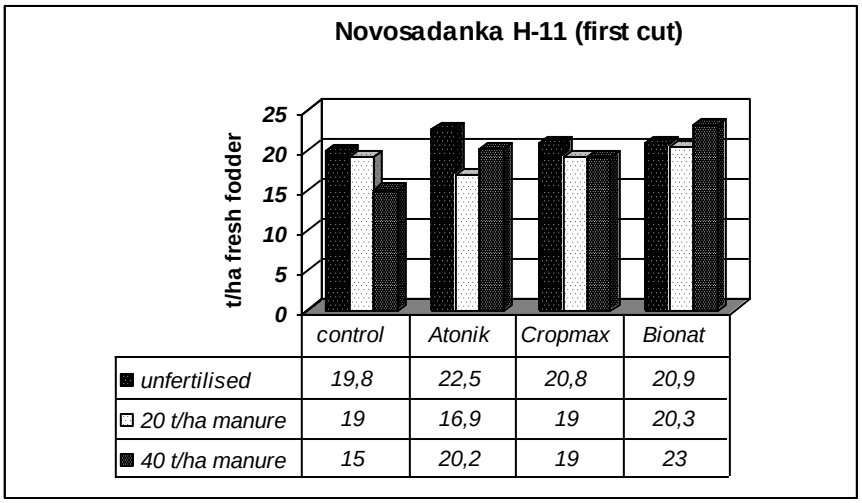
Some chemical features of the soil from the experimental plot at 0-20 cm depth, and 20-40 cm depth

Soil depth	pH	Humus (%)	N total (%)	P (ppm)	Recalc. P (ppm)	K (ppm)
0 – 20 cm	8.02	3.34	0.31	34.2	16.79	110
20 – 40 cm	7.96	2.41	0.20	20.0	10.32	103

There are collected data regarding the yield obtained during three harvests. These are collected for every alfalfa variety and for the variants fertilised with manure, with growth regulators and both.

RESULTS AND DISCUSSIONS

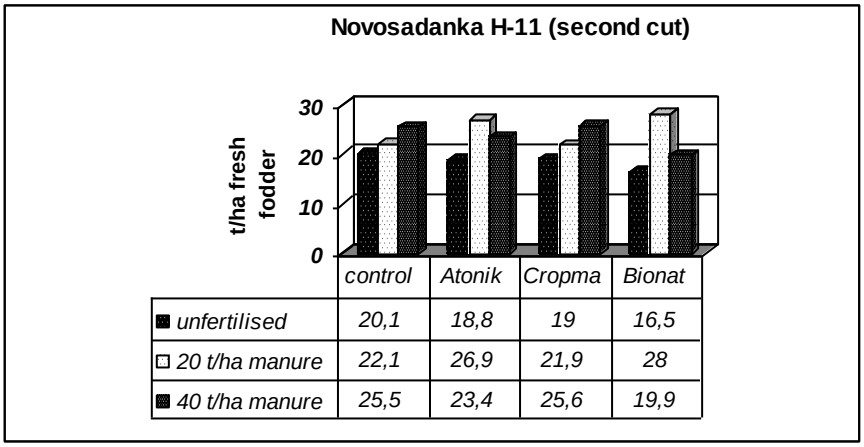
In figure 1 is represented the fresh fodder yield obtained for Novosadanka H-11 alfalfa variety in the first cut. The best yield is obtained for the variant unfertilized with manure and where was applied the product Atonik (22.5 t/ha). The lowest yield is found in the variant fertilized with 40 t/ha manure when they have obtained 15 t/ha of alfalfa fresh fodder.



	control	Atonik	Cropmax	Bionat
unfertilised	19,8	22,5	20,8	20,9
20 t/ha manure	19	16,9	19	20,3
40 t/ha manure	15	20,2	19	23

Fig. 1. Fresh fodder yield obtained for Novosadanka H-11 alfalfa variety in the first cut

In figure 2 is represented the fresh fodder yield obtained for Novosadanka H-11 alfalfa variety in the second cut. The best yield is obtained for the variant fertilized with 20 t/ha manure and where was applied the product Bionat the yield obtained being 28 t/ha fresh fodder. The lowest yield is found in the variant unfertilized and where was applied the same growth regulating product, Bionat when they have obtained 16.5 t/ha of alfalfa fresh fodder. In figure 3 is represented the fresh fodder yield obtained for Novosadanka H-11 alfalfa variety in the third cut. The best yield is obtained for the variant fertilized with 40 t/ha manure and where was applied the product Cropmax the yield obtained being 26.8 t/ha fresh fodder. The lowest yield is found in the variant unfertilized and where was applied the product Atonik when they have obtained 19 t/ha of alfalfa fresh fodder. In figure 4 is represented the fresh fodder yield obtained for Rasinka alfalfa variety in the first cut. The best yield is obtained for the variant fertilized with 40 t/ha manure and where was applied the product Cropmax the yield obtained being 21.5 t/ha fresh fodder. The lowest yield is found in the variant unfertilized and where was applied the product Atonik when they have obtained 14.5 t/ha of alfalfa fresh fodder.



	control	Atonik	Cropma	Bionat
unfertilised	20,1	18,8	19	16,5
20 t/ha manure	22,1	26,9	21,9	28
40 t/ha manure	25,5	23,4	25,6	19,9

Fig. 2. Fresh fodder yield obtained for Novosadanka H-11 alfalfa variety in the second cut

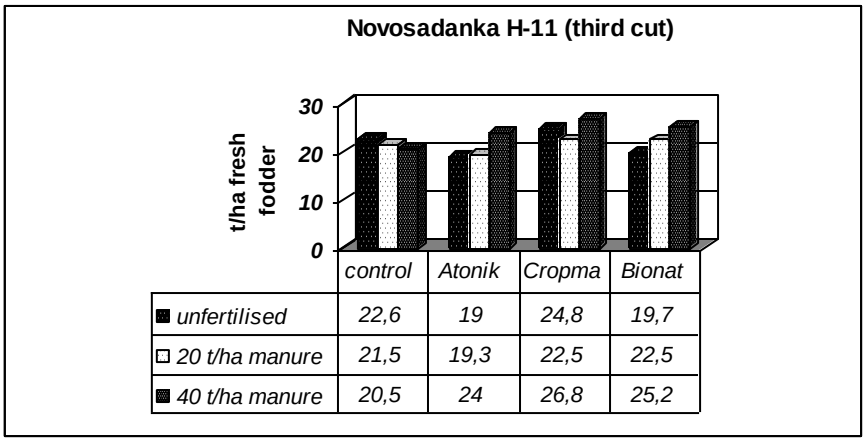


Fig. 3. Fresh fodder yield obtained for Novosadanka H-11 alfalfa variety in the third cut

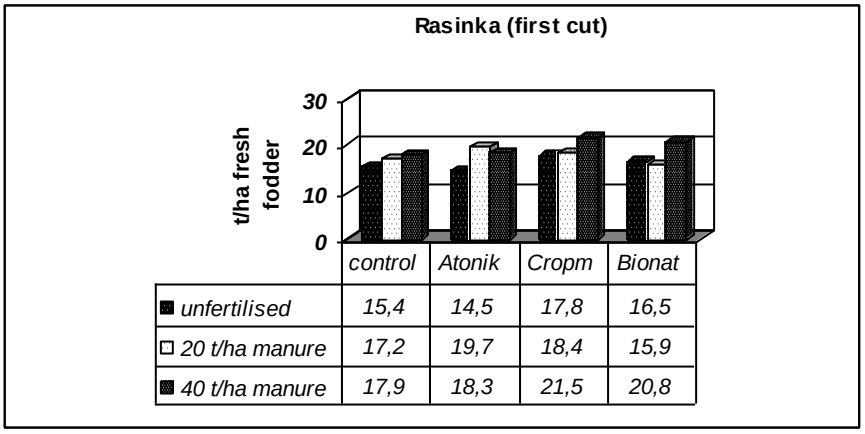


Fig. 4. Fresh fodder yield obtained for Rasinka alfalfa variety in the first cut

In figure 5 is represented the fresh fodder yield obtained for Rasinka alfalfa variety in the second cut. The best yield is obtained for the variant fertilized with 40 t/ha manure, the yield obtained being 25.7 t/ha fresh fodder. The lowest yield is found in the variant unfertilized and where was applied the product Cropmax when they have obtained 17.3 t/ha of alfalfa fresh fodder.

In figure 6 is represented the fresh fodder yield obtained for Rasinka alfalfa variety in the third cut. The best yield is obtained for the variant fertilized with 40 t/ha manure and where was applied the product Cropmax the yield obtained being 20 t/ha fresh fodder. The lowest yield is found in the variant unfertilized and where was applied the product Atonik when they have obtained 13.3 t/ha of alfalfa fresh fodder.

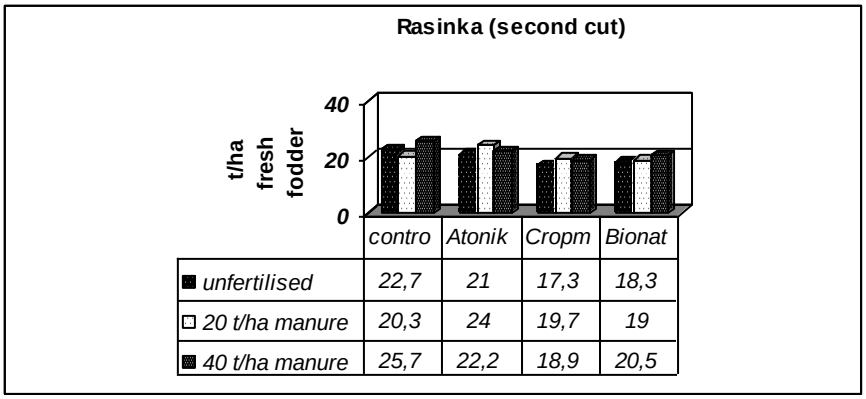


Fig. 5. Fresh fodder yield obtained for Rasinka alfalfa variety in the second cut

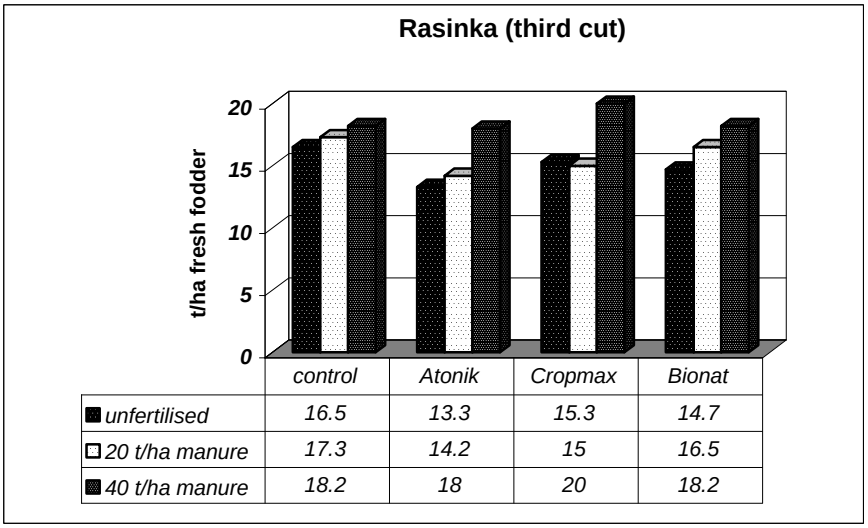


Fig. 6. Fresh fodder yield obtained for Rasinka alfalfa variety in the third cut

In figure 7 is represented the fresh fodder yield obtained for Tisa alfalfa variety in the first cut. The best yield is obtained for the variant unfertilized with manure and where was applied the product Atonik the yield obtained being 18 t/ha fresh fodder. The lowest yield is obtained for the variant unfertilized and where wasn't applied any growth regulating product the yield obtained being 13.5 t/ha fresh fodder.

In figure 8 is represented the fresh fodder yield obtained for Tisa alfalfa variety in the second cut. The best yield is obtained for the variant fertilized with 40 t/ha manure and where wasn't applied any growth regulating product the yield obtained being 26 t/ha fresh fodder. The lowest yield is obtained for the variant fertilized with 20 t/ha manure and where was applied the product Bionat the yield obtained being 14 t/ha fresh fodder.

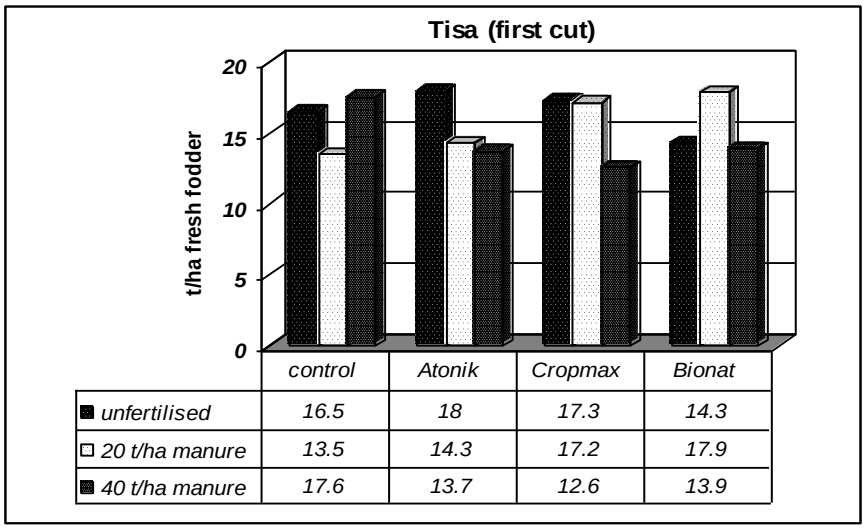


Fig. 7. Fresh fodder yield obtained for Tisa alfalfa variety in the first cut

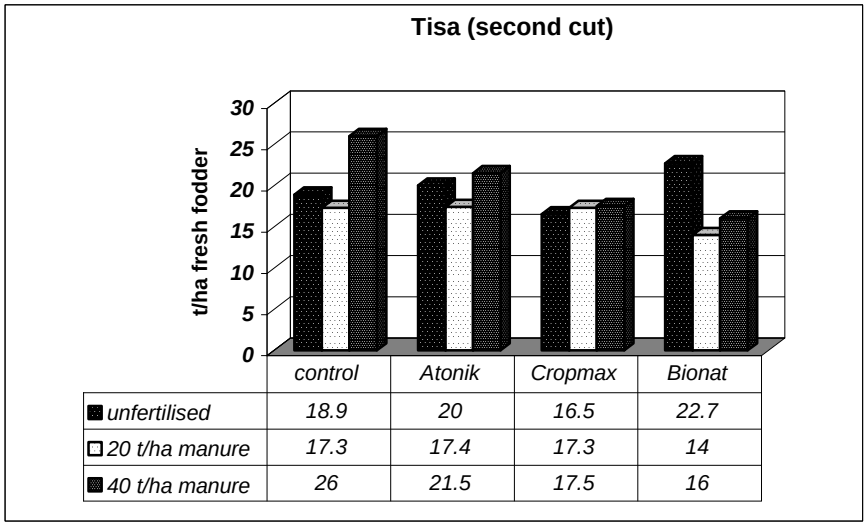


Fig. 8. Fresh fodder yield obtained for Tisa alfalfa variety in the second cut

In figure 9 is represented the fresh fodder yield obtained for Tisa alfalfa variety in the third cut. The best yield is obtained for the variant fertilized with 40 t/ha manure and where was applied the product Atonik the yield obtained being 18.3 t/ha fresh fodder. The lowest yield is obtained for the variant fertilized with 20 t/ha manure and where was applied the product Atonik and the one fertilized with 40 t/ha manure and where was applied the product Cropmax the yield obtained being 10.8 t/ha fresh fodder.

Analysing the total yields obtained comparing those alfalfa varieties among them, the greatest values were obtained for most of the variants, even in the case weren't applied fertilisers and growth regulators is for Novosadanka H-11 (table 2), the values obtained being comprised between 57.1 t/ha and 71.4 t/ha representing the sum of three harvests.

The lowest fresh fodder yields were obtained in the case of Tisa variety (table 2) where the yields were comprised between 40.9 t/ha and 59.9 t/ha representing the sum of three harvests.

The values of the yields registered for the alfalfa variety Rasinka are between those obtained for Novosadanka H-11 and Tisa varieties. The yields for the variants of the Rasinka variety (table 2) are comprised between 48.8 t/ha and 61.8 t/ha representing the sum of three harvests.

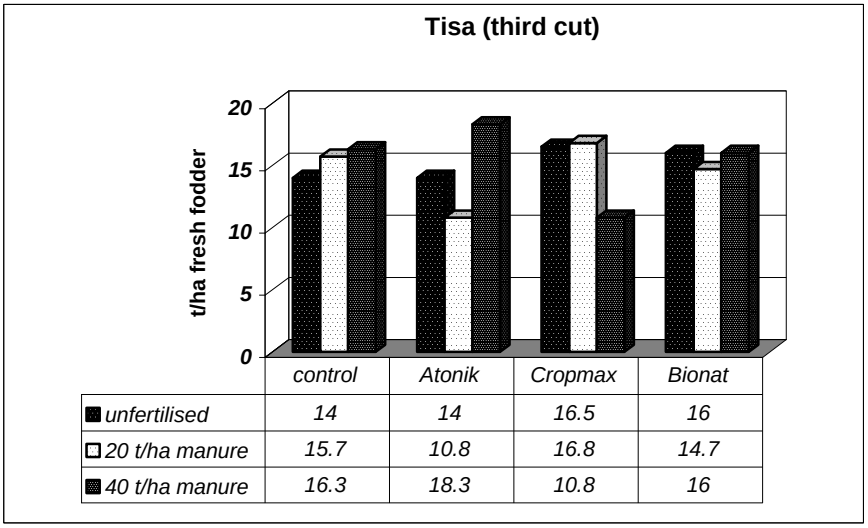


Fig. 9. Fresh fodder yield obtained for Tisa alfalfa variety in the third cut

Table 2

The total yields obtained in the analyzed alfalfa varieties

NOVOSADANKA H-11				
Product / ***Dose***	***control***	***Atonik***	***Cropmax***	***Bionat***
unfertilised	66.1	60.3	64.6	57.1
20 t/ha manure	66.3	63.1	63.4	70.8
40 t/ha manure	70.4	67.6	71.4	68.1
RASINKA				
Product / ***Dose***	***control***	***Atonik***	***Cropmax***	***Bionat***
unfertilised	54.6	48.8	50.4	49.5
20 t/ha manure	54.8	57.9	53.1	51.4
40 t/ha manure	61.8	58.5	60.4	59.5
TISA				
Product / ***Dose***	***control***	***Atonik***	***Cropmax***	***Bionat***
unfertilised	49.4	52	50.3	53
20 t/ha manure	46.5	42.5	51.3	46.6
40 t/ha manure	59.9	53.5	40.9	45.9

CONCLUSIONS

Analysing the data obtained from the study of three Serbian alfalfa varieties (Novosadanka H-11, Rasinka, and Tisa) under the influence of organic fertilisers (manure) and growth regulators (Atonik, Cropmax, and Bionat) and their combined action we can conclude as it follows:

- the greatest yields are registered for the alfalfa variety Novosadanka H-11, those being high in the case of the three harvests;
- the action of the growth regulators is similar, all of them increasing the yield, but not in all the variants;
- sometimes the combined action of the fertilisers and growth regulators isn't effective in some variants leading to the decrease of the yield in comparison with the control;
- the alfalfa variety Novosadanka H-11 has the best yield without applying of fertilizers and growth regulators in the ecological conditions of the West Plain.

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COMPORTAREA UNOR SOIURI DE GRÂU ÎN FUNCȚIE DE AGROFOND ÎN CONDIȚIILE SOLULUI BRUN-ROŞCAT (PRELUVOSOL ROŞCAT) DIN ZONA CENTRALĂ A OLTENIEI

FIELD RESULTS OF SEVERAL WHEAT VARIETIES IN FUNCTION OF THE FERTILIZER BACKGROUND ON THE REDDISH PRELUVOSOIL FROM THE CENTRAL OLTENIA

M. ŞTEFAN

Keywords: wheat varieties, fertilizer background, yields, reddish preluvosoil

ABSTRACT

Intre anii 1996-2000, la SDE Banu Mărăcine din cadrul Universității din Craiova, pe un sol brun-roşcat (preluvosol roşcat) s-a urmărit după porumb, cultură comparativă cu soiuri de grâu, pe agrofonduri, cu 2 factori, în 4 repetiții.

Cele mai mici producții s-au realizat la toate soiurile de grâu pe agrofondul N50P30 (3720 kg/ha) iar cele mai mari producții, pe agrofondul a3(N150P90), respectiv de 4375 kg/ha grâu. Pentru cele 4 soiuri de grâu urmărite în experiențe, agrofondul a3(N150P90) şi a4(N50P30 + 20 t/ha gunoi de grajd) au realizat cele mai mari producții.

Within the 1996-2000 period, at the DES Banu Maracine, on a brown-reddish (reddish preluvosoil) soil after corn, there were researched as comparative crop of wheat, several varieties on two fertiliyer backgrounds, with two factors in 4 replications.

The lowest yields have been obtained with the wheat varieties on the N50P30 fertilizer background (3,720 kg/ha) and the highest yields on the a3(N150P90), fertilizer background, respectively, 4,375 kg/ha. For all 4 wheat varieties, the a3(N150P90) and a4(N50P30 + 20 t/ha manure) have given the highest yields.

INTRODUCTION

Within the 1996-2000 period, at the DES Banu Maracine, on a brown-reddish (reddish preluvosoil) soil after corn, there were researched as comparative crop of wheat, several varieties on two fertiliyer backgrounds, with two factors in 4 replications.

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MATERIAL AND METHOD

The researches have been carried out on a brown-reddish (reddish preluvosoil) soil from DES of the Universitz of Craiova that is located in the central zone of Oltenia, within the 1994-2000 period, the present paper presenting the results of 1996-2000 period.

The brown-reddish soil (reddish preluvosoil) where the experiment took place is characterized by a low humus content (2.2%), 0.096% total nitrogen, 4.4 mg/100 g soil P2O5, 13.80 mg/100 g soil K2O, pH= 5.6-5.8.

The annual average temperature on a 60 years period is about 11.5^0C that is favorable for most crops, the average rainfall was of 618 mm and the relative moisture of air of 80%.

The experiment was located using the subdivided plot method with two factors in rainfed conditions.

The A factor, the fertilizer background, with the following graduations:

- a1= N50P30
- a2=N100P60
- a3=N150P90

- a4=N50P30 + 20 t/ha manure

The B factor, wheat varieties, with the following graduations:

- b1= Simnic 30
- b2=Fundulea 4
- b3=Flamura 80
- b4=Rapid

The field look after works consisted of usual ones for the central zone of Oltenia for the brown-reddish soil, the interpretation of the experimental data was made after the analysis of variance.

RESULTS AND DISCUSSIONS

In the experiment that was unfold on the brown reddish soil from the central zone of Oltenia, the lowest yields were given by all wheat varieties that were grown on N50P30, respectively, of 3,720 kg/ha and the highest ones on the a3 fertilizer background (N150P90), respectively, 4,375 kg/ha.

In comparison with the control variant taken as a1 fertilizer background (N50P30), the wheat varieties on the a2 (N100P60) fertilizer background have over passed the control by 282 kg/ha, the yield being of 4002 kg/ha, on a3 fertilizer background (N150P90) the yield output was the highest, of 655 kg/ha (4,375 kg/ha on a3 N150P90 fertilizer background) and on organic mineral fertilizer background a4 (N50P30+20 t/ha manure), the yield output has been of 479 kg/ha in comparison with the control a1 (N50P30 – 4,199 -3,720 kg/ha).

Taking as control the a2 (N100P60) fertilizer background, the wheat yield on the a3 (N150P90) fertilizer background has over passed the control by 373 kg/ha (4,375-4,002 kg/ha).

The yields on a3 and a4 (N150P90), N50P30+20t/ha manure) have been very close each other, the differences were low and nor statistically ensured.

Table 1

The wheat yields, differences and its significances under the influence of fertilizer background

The combination	Average 1996-2000		
	Yield kg/ha	Diff. kg/ha	Significance
a2-a1	4002-3720	282	Xx
a3-a1	4375-3720	655	Xxx
a4-a1	4199-3720	479	Xxx
a3-a2	4375-4002	373	Xx
a4-a2	4199-4002	197	
a4-a3	4199-4375	-176	

DL 5%=220 kg/ha
DL 1%=290 kg/ha
DL 0.1%=438 kg/ha

From the table 1 there results that for all 4 wheat varieties, the a3 (N150P90) fertilizer background and a4 (N50P30+20 t/ha manure) have given the highest yields, of 4,375 kg/ha, respectively, 4,199 kg/ha.

Table 2

The wheat yields, differences and their significances under the influence of the B factor (wheat varieties

The combination	Average 1996-2000		
	Yield kg/ha	Diff. kg/ha	Significance
b2-b1	4403-3956	447	Xxx
b3-b1	4258-3956	302	Xx
b4-b1	4054-3956	98	
b3-b2	4258-4403	-145	
b4-b2	4054-4403	-349	Xxx/b2
b4-b3	4054-4258	-204	x/b3

DL 5%=208 kg/ha
DL 1%=298 kg/ha
DL 0.1%=347 kg/ha

From the table 2 data, where there are presented the influence of the wheat varieties cropped on all four fertilizer background at DES Banu Maracine, from the central zone of Oltenia, there results that on a1 fertilizer background (N50P30), almost all varieties have given close yields to the control, Simnic 30. Only the b2 (Fundulea 4) and b3 (Flamura 85) have given outputs of 302 kg/ha and, respectively, 447 kg/ha).

In comparison with the Simnic 30 variety taken as control, the Rapid variety has given a yield output of 98 kg/ha that is not statistically ensured.

In comparison with the yield of the b2 variety, (Fundulea 4), the Flamura 85 variety has given an output of 145 kg/ha , so the Fundulea 4 variety has given a zield output of 145 kg/ha in comparison with the Flamura 85 variety that is not statistically ensured.

The Rapid variety has given, in comparison with the Fundulea 4 an output of 349 kg/ha, so it is very significant and Flamura 85 has given an output of 204 kg/ha over the Rapid variety. From the same table 1 there results that the most valuable varieties are Fundulea 4 and Flamura 85, followed by Rapid and Simnic 30.

CONCLUSIONS

1. In the clime and soil conditions of the researching years, on the brown – reddish soil (reddish preluvosoil) from the central zone of Oltenia the lowest yields have been obtained with the wheat varieties on the N50P30 fertilizer background (3,720 kg/ha) and the highest yields on the a3(N150P90), fertilizer background, respectively, 4,375 kg/ha.
2. Good yields were also given by a2 (N100P60) and a4 (N50P30 + 20 t/ha manure), 4002-4199 kg/ha.
3. The yields that were obtained on a3 and a4 fertilizer background (N150P90, N50P30 + 20 t/ha manure) have been very close, the differences were not statistically ensured (4375-4199).
4. On a1(N50P30) fertilizer background, almost all varieties have given close yields to the control variant, the Simnic 30 variety yet only b2 (Fundulea 4) and b3 (Flamura 85) have given outputs of 302 kg/ha and, respectively, 447 kg/ha.
5. The most valuable varieties for the 1996-2000 period have been Fundulea 4 and Flamura 85 with yields of 4403 kg/ha and 4258 kg/ha, followed by Rapid and Simnic 30 (4054 kg/ha and 3956 kg/ha)

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INFLUENTA AGOFONDULUI SI A ROTATIEI DE SCURTA DURATA ASUPRA PRODUCTIEI DE GRÂU IN CONDITIILE CULTIVARII ACESTUIA PE SOLUL CERNOZIOMIC TIPIC DIN PARTEA DE SUD A OLTENIEI

THE INFLUENCE OF SHORT CROP ROTATION ON WHEAT YIELD CROPED ON TYPICAL CHERNOZEM FROM THE SOUTHERN PART OF OLTENIA

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Cuvinte cheie: agrofond, rotație, producții de grâu, cernoziom.

REZUMAT

Experiențele au fost efectuate pe un sol cernoziomic tipic în condiții de neirigare, între anii 2001 – 2006, în locația Portăreşti – Segarcea, unde a fost urmărită influența agrofondului şi a asolamentului de scurtă durată asupra producției de grâu, rezultatele mai importante fiind rezumate astfel:

Pe agrofondul a_1 (N_{100} P_{50}) s-a înregistrat cea mai mică producție de grâu şi anume de 4804 kg /ha, pe agrofondul a_2 (N_{150} P_{100}) producția de grâu a fost de 5101 kg/ha iar pe agrofondul a_3 (N_{200} P_{150}) de 5442 kg/ha.

Monocultura de grâu a înregistrat cea mai mică producție de grâu, de 3739 kg/ha, rotația de 2 ani (grâu-porumb) a realizat 3881 kg/ha, rotația de 3 ani (lupin grâu porumb) a realizat 4155 kg/ha iar rotația de 4 ani (lupin - grâu - porumb - floarea soarelui) a înregistrat producția de 4198kg/ha.

ABSTRACT

The trials have been carried aut on a typical chernozem in rainfed conditions between 2001 and 2006 in Portaresti - Segarcea location, where there were researched the influence of the fertilizer background and the short term crop rotation on the wheat yield, the more important results being as follows:

On the a1 (N100P50) fertilizer background, the lowest wheat yield, of 4,804 kg/ha, on a2 (N150P100) the wheat yield was of 5,101 kg/ha an don the a3 background (N200P150), the yield was of 4,198 kg/ha.

The wheat monoculture has recorded the lowest yield, of 3,739, with the two years crop rotation (wheat - corn), of 3,881 kg/ha, with the three years crop rotation (lupinus, wheat, corn) of 4,155 kg/ha and with the four years crop rotation (lupinus, wheat, corn, sunflower), of 4,198 kg/ha.

MATERIAL AND METHOD

The researches have been carried aut on a typical chernozem from the southern part of Oltenia, Portaresti-Segarcea zone, 30 km south of Craiova, during 2001-2006. In the present paper there are written the results of these years. The typical chernozem where the researches took place has 3.10% humus, 0.45 N total, 7 mg/100 g soil P2O5, 18.2 mg/100 g soil K2O, pH=6.25. The average temperature on 60 years has been of 11.5 ^{0}C, that is favorable for most crops, the average rainfall was of 612 mm and the relative humidity of air has been 80%.

The experiment was located after the subdivided plots method, with two factors:

- the A factor = fertilizer background with the following graduations: A1 = N100P50; A2 = N150P100; A3 = N200P150
- the B factor = crop rotation with the following graduations: B1 = wheat monoculture; B2 = wheta - corn; B3 = lupine - wheat - corn; B = lupine - wheat - corn - sunflower.

The works have been the specific ones to the corn crop for the Southern part of Oltenia, the interpretation of the results has been made by the variance analysis method.

RESULTS AND DISCUSSIONS

In the short term crop rotation, on the typical chernozem from the southern part of Oltenia, on the a1 (N100P50) there was recorded the lowest yield of wheat, namely, of 4.804 kg/ha, on the fertilizer background a2 (N150P100) the wheat yield has been of 5.101 kg/ha and on a3 = (N200P150) of 5.542 kg/ha (tab. 1).

Table 1

The wheat yields, differences and their significances under the influence of fertilizer background

Factors combination	The average of 2002-2006 years		
	The yield kg/ha	Difference kg/ha	Significance
$a_2(N_{150}P_{150})$-$a_1(N_{100}P_{150})$	5101-4804	297	XX
$a_3(N_{200}P_{150})$-$a_1(N_{100}P_{50})$	5442-4804	638	XXX
$a_3(N_{200}P_{150})$-$a_2(N_{150}P_{100})$	5442-5101	341	XX

DL 5% = 145 kg/ha
DL 1% = 236 kg/ha
DL 0.1% = 368 kg/ha

On the a2 (N150P100) fertilizer background there was obtained an yield of 5.101 kg/ha, the yield output over the a1 fertilizer background (N100P50) taken as control was of 297 kg/ha, it was statistically ensured.

On the a3 fertilizer background (N200P150) the yield output of 638 kg/ha, has been very significant in comparison with the control variant, a1. If we compare the yields of a3 (N200P150) with the ones that were given by the a2 (N150P100), there results a distinctive significant output of 341 kg/ha in favor of richer fertilizer background. In conclusion, with the climatical conditions of 2002-2006 years, on the typical chernozem from southern Oltenia, the Portaresti-Segarcea zone, the fertilizer doses N150P100 and N200P150 have been given the highest yields after several previous crops.

Table 2

The wheat yields and their differences under the influence of crop rotation

The factors combination	The average of 2002-2006 years		
	The yield kg/ha	Difference kg/ha	Signifficance
$b_2 - b_1$	3881 - 3739	142	
$b_3 - b_1$	4155 - 3739	416	XXX
$b_4 - b_1$	4198 - 3739	459	XXX
$b_3 - b_2$	4155 - 3881	274	XX
$b_4 - b_2$	4198 - 3881	317	XXX
$b_4 - b_3$	4198 - 4155	43	

DL 5% = 155 kg/ha
DL 1% = 216 kg/ha
DL 0.1% = 295 kg/ha

In the second table there are presented the yields obtained under the influence of crop rotation, they emphasizing the following important issues:

- the wheat monoculture has given the lowest yield, of 3.739 kg/ha, with the two years crop rotation (wheat - corn), of 3,881 kg/ha, with the three years crop rotation (lupinus, wheat, corn) of 4,155 kg/ha and with the four years crop rotation (lupinus, wheat, corn, sunflower), of 4,198 kg/ha.
- The wheat monoculture and the two years crop rotation has given very close yields, the difference being low and not statistically ensured (142 kg/ha), respectively 459 kg/ha.
- The three and four years crop rotation have given statistically ensured outputs both over the wheat yield in the two years crop rotation, respectively 274 kg/ha and 317 kg/ha.
- The three and four years crop rotations have given very close yields, the difference of yield being low and not statistically ensured, of 43 kg/ha.

  In conclusion, from the table 2 there results that the three years crop rotation (lupine - wheat - corn) and the four years one (lupine-wheat-corn-sunflower) has given, on average on the experimenting years on the typical chernozem from the southern Oltenia, Portaresti - Segarcea zone, the highest wheat yields.

CONCLUSIONS

1. In the clime conditions of the experimenting years, on the typical chernozem from the southern Oltenia, the N150P100 and N200P150 have ensured the highest wheat yields after several previous plants of 5.101 kg/ha and 5.442 kg/ha.
2. The yield output obtained in variants that received N200P150 over the variant that received N150P100 has been of 341 kg/ha that was statistically ensured.
3. The three years crop rotations (lupine - wheat - corn) and four years (lupine - wheat - corn - sunflower) have given the highest wheat yields, of 4.155 kg/ha and 4.198 kg/ha.
4. The yield output given by the three and four years have been very significant, of 416 kg/ha, respectively 459 kg/ha.
5. The and four years have given very close yields each other, the yield difference being low and not ensured statistically.

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CERCETĂRI PRIVIND INFLUENȚA DISTANȚEI DINTRE RÂNDURI ŞI A DENSITĂȚII CULTURII ASUPRA PRODUCȚIEI DE SEMINȚE ŞI CALITĂȚII ACESTEIA, LA SPECIA *CHENOPODIUM QUINOA* IN CONDIȚIILE DIN PARTEA CENTRALĂ A CÂMPIEI ROMÂNE

RESEARCH REGARDING THE INFLUENCE OF DISTANCE BETWEEN ROWS AND SOWING DENSITY ON GRAIN YIELDS AND YIELD QUALITY AT *CHENOPODIUM QUINOA* SPECIES IN THE CENTRAL PART OF ROMANIAN PLAIN

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Key words: *Chenopodium quinoa*, new agricultural crop, distance between rows, crop density, yield quality.

ABSTRACT

The focus of our research was the study of a new species of agricultural crop – quinoa (Chenopodium quinoa), from the point of view of productivity and yield quality.

The trials were performed in the years 2006-2007 in the Experimental Field Moara Domneasca belonging to the Field Crops Department, Bucharest Faculty of Agriculture.

After 2 experimental years, it resulted that quinoa plants present resistance to a dry and warm climate; the grains yields were between 17.8 and 25.4 q/ha in the year 2006 and between 12.00 and 20.95 q/ha, in the less favourable year of 2007.

The average chemical composition of quinoa grains was the following: moisture between 12.30 and 13.61%; dry matter content between 86.39 and 87.70%, out of which: proteins between 14.70 and 16.71% (superior to cereals); starch between 60.40 and 65.44%; lipids between 5.31 and 5.80%; cellulose between 2.11 and 2.18%; ash between 2.09 and 2.89%.

Quinoa plants had a vegetation period comprised between 146 and 157 days and the full maturity of grains took place after having accumulated 750-775 GDD (Σt> 15°C).

On the basis of these results, it is recommended the extension of research and demonstration plots with Chenopodium quinoa. On the other hand, it is recommended and the sowing at a distance of 50 cm between rows with densities of 100 thou plants/ha.

INTRODUCTION

In the present world agriculture and feeding framework, specialists focus on other less popular and less used crops such as pseudocereals (amaranth, quinoa, buckwheat, wild rice), which may become an alternative to classical cultivated crops.

Chenopodium quinoa species (quinoa) has been cultivated in South American Andes since at least 3,000 B.C. and has been a staple food of millions of native inhabitants. The ancient Incas called quinoa the "*mother grain*" and revered it as sacred (Karen Reiley, 2007). Quinoa was used to sustain Incan armies, which frequently marched for many days eating a mixture of quinoa and fat, known as "war balls." Beginning with the Spanish conquest in the 1500s, there was a decline in the production of quinoa. It became a minor crop at that time and was grown only by peasants in remote areas for local consumption. Today, this species become important crops from point of view of chemical composition, nutrition value of food, high contents in proteins and amino acids, mineral elements, lipids. On the other hand, quinoa and from the fact that they do not have claims concerning crops conditions, presenting tolerance to diseases and pest, and being able to survive in some harsher climates.

The quinoa seed is high in protein, calcium and iron, a relatively good source of vitamin E and several of the B vitamins. It contains an almost perfect balance of all eight essential amino acids needed for tissue development in humans. It is exceptionally high in lysine, cystine and methionine-amino acids typically low in other creagrains. It is a good complement for legumes, which are often low in methionine and cystine. Some types of wheat come close to matching quinoa's protein content, but grains such as barley, corn, and rice generally have less than half the protein of quinoa. Quinoa is 12% to 18% protein and four ounces a day, about 1/2-cup, will provide a childs protein needs for one day. The 6-7% fat of quinoa is relatively high when compared to other grains, but it boasts low sodium content and also provides valuable starch and fiber. Quinoa also contains albumen, a protein that is found in egg whites, blood serum, and many plant and animal tissues. The seeds are gluten-free which makes this a nutritious and flavorful alternative cereal grain for those with gluten sensitivity. Quinoa would be a worthy addition to anyone's diet, supplying variety as well as good nutrition. The seed is also excellent feed for birds and poultry and the plant itself is good forage for cattle (National Research Council, 1989)

MATERIAL AND METHOD

The focus of our research was the study of a new species of agricultural crop – quinoa (*Chenopodium quinoa*), from the point of view of productivity and yield quality.

The trials were performed in the years 2006-2007 in the Experimental Field Moara Domneasca belonging to the Field Crops Department, Bucharest Faculty of Agriculture. There were organized experiments in four replications using ecological seeds of Slovenian origin, with distances between rows (50 and 70 cm) and sowing densities (40, 60, 80, 100 thou plants/ha).

The sowing time was established at 15^{th} -20^{th} of April, respectively when it was realized the minimum germination temperature of quinoa grains (+15^{0}C); the sowing depth was of 0.5 -1 cm.

During on the experiment were effected observations and measurements concerning the moment of emergence, the dynamics of plants height, the dynamics of leaves, floral buds, flowers and the seeds formation, the stages of maturity, productivity elements and grains yield.

Finally, we achieved the analysis of the chemical composition (proteins, starch, lipids, cellulose and ash) for the yield.

RESULTS

In our research, the *Chenopodium quinoa* species demonstrated a good adaptability to the climate context in the Experimental Field Moara Domneasca, under preluvosoil conditions.

Under the phenological aspects, quinoa plants had a vegetation period comprised between 146 and 157 days and the vegetation final stage (full maturity) took place after having accumulated 750-775 GDD (Σt> 15ºC).

Plants were characterized by the following morphological elements: 81.8-98.9 cm average plants height; main stalk made of 8 knots, where formed about 28-30 leaves and a top inflorescence with a average length of 21.7 cm. As consequence of great density, the quinoa plants formatted a short stem and inflorescence on the 100 thou grains/ha density by comparison with 40 thou grains/ha (figure 1 and 2).

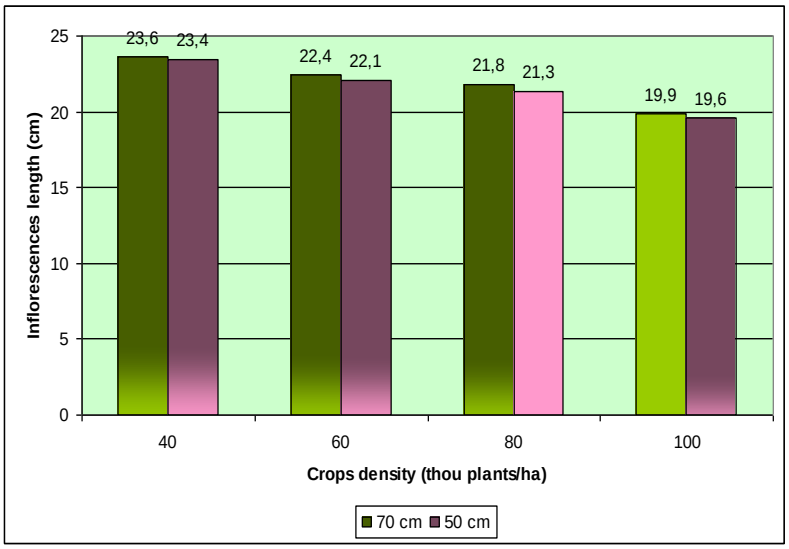

Figure 1. *Chenopodium quinoa* inflorescences length, depending on sowing density (Moara Domnească Experimental Field, 2006)

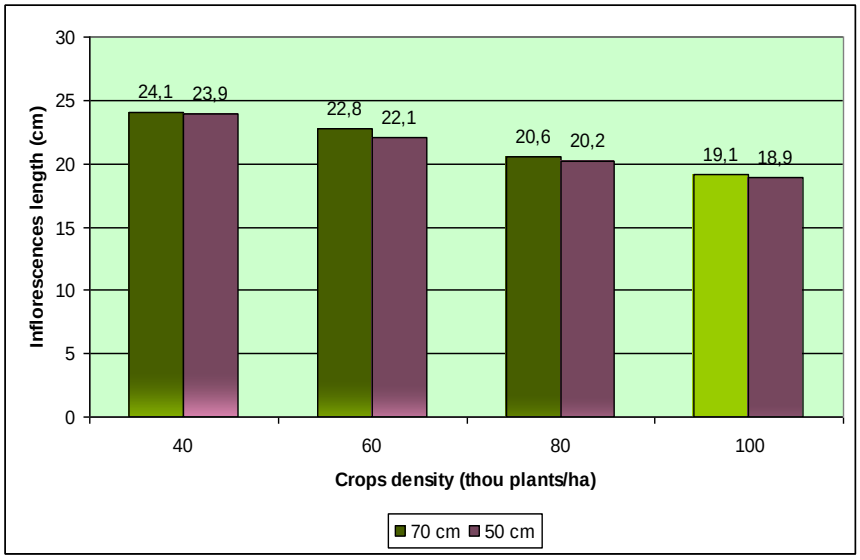

Figure 2. *Chenopodium quinoa* inflorescences length, depending on sowing density (Moara Domnească Experimental Field, 2007)

The productivity of quinoa species, was illustrated by 22.2 g seeds mass per plant and 3.10 g TGW value, with the low values at high density (table 2). The average yields were 21.1 q/ha, data which mirror an important adjustment capacity to the cropping condition in the area and resistance to drought and high temperatures (table 3).

The influence of sowing parameters upon productivity was obvious. On account of the achieved results, it is recommended *Chenopodium quinoa* crops sowing at distance of 50 cm between rows, with densities of 100 thousand plants/ha.

The average chemical composition of quinoa grains was the following: moisture between 12.30 and 13.61%; dry matter content between 86.39 and 87.70%, out of which: proteins between 15.42 and 15,45% (superior to cereals); starch between 60.40 and 60.63%; lipids between 5.31 and 5.80%; cellulose between 2.14 and 2.18%; ash between 2.34 and 2.37%.

The influence of sowing parameters (density and distances between rows) influenced less the chemical composition of grains.

Table 2

***Cheopodium quinoa* grains yields per plant and TGW, depending on distance between rows and sowing density**
(Moara Domnească Experimental Field, 2006-2007)

Distance between rows (cm)	Crop density		2006				2007			
	Sowing (thou/ha)	Harvesting (thou/ha)	Grains yields (g)	Difference (g)	TGW (g)	Difference (g)	Grains yields (g)	Difference (g)	TGW (g)	Difference (g)
50	**40**	38	25.6	Control	3.36	Control	21.6	Control	1.34	Control
	60	57	22.9	-2.7^{ooo}	3.24	-0.12	19.3	-2.3^{oo}	1.30	-0.04
	80	78	21.1	-4.5^{ooo}	3.13	-0.23	17.1	-4.5 ^{ooo}	1.21	-0.13^{o}
	100	98	19.8	-5.8^{ooo}	2.91	-0.45^{o}	15.9	-5.7^{ooo}	1.16	-0.18^{oo}
	Average		**22.3**		**3.16**		**18.4**	-	**1.25**	**-**
70	**40**	37	24.8	Control	3.22	Control	21.1	Control	1.31	Control
	60	58	23.0	-1.8^{oo}	3.14	-0.08	18.9	-2.2^{oo}	1.28	-0.03
	80	79	21.4	-3.4^{ooo}	2.93	-0.29	16.2	-4.9^{ooo}	1.18	-0.13^{o}
	100	98	19.5	-5.3^{ooo}	2.87	-0.35	14.8	-6.3^{ooo}	1.13	-0.18^{oo}
	Average		**22.1**	-	**3.04**		**17.7**	-	**1.22**	**-**
	Average		**22.2**	-	**3.10**		**18.05**		**1.23**	
DL 5%			**0.97 g**		**0.38 g**		**1.26 g**		**0.104 g**	
DL 1%			**1.38 g**		**0.54 g**		**1.77 g**		**0.147 g**	
DL 0,1%			**2.00 g**		**0.78 g**		**2.54 g**		**0.213 g**	

Table 3

***Chenopodium quinoa* grains yields depending on distance between rows and sowing density**
(Moara Domnească Experimental Field, 2006-2007)

Distance between rows (cm	Crops density		2006				2007			
	Sowing (thou/ha)	Harvesting (thou/ha)	Grains yields	(%)	Difference (g)	Significance	Grains yields (q/ha)	(%)	Difference (g)	Significance
70	**40**	38	17.8	100	Control	-	12.0	100	Control	-
	60	57	19.7	110.6	1.9	-	14.3	119.1	2.3	*
	80	78	21.6	121.3	3.8	**	16.9	140.8	4.9	***
	100	98	23.2	130.3	5.4	***	18.7	155.8	6.7	***
	Average		**20.5**	-	-	-	**15.4**	**18.0**	-	-
50	**40**	37	18.0	100	Control	-	14.0	100	Control	-
	60	58	20.5	113.8	2.5	*	16.2	115.7	2.2	*
	80	79	23.6	131.8	5.6	***	18.6	132.8	4.6	***
	100	98	25.4	141.1	7.4	***	20.9	149.2	6.9	***
	Average		**21.8**	-	-	-	**17.4**	**19.3**	-	-
	Average		**21.1**	-	-	-	**16.4**	-	-	-
DL 5%			**1.95 q/ha**				**1.96 q/ha**			
DL 1%			**2.77 q/ha**				**2.79 q/ha**			
DL 0,1%			**4.02 q/ha**				**4.04q/ha**			

Table 4

Proteins, starch, lipids, cellulose and ash contents of *Chenopodium quinoa* grains (% d.m.)
(Moara Domnească Experimental Field, 2006-2007)

Distance between rows (cm	Crops density		2006					2007				
	Sowing (thou/ha)	Sowing (thou/ha)	Proteins	Starch	Lipids	Cellulose	Ash	Proteins	Starch	Lipids	Cellulose	Ash
70	40	37	15.42	60.62	5.81	2.17	2.36	15.92	65.11	5.80	2.15	2.47
	60	58	15.41	60.45	5.78	2.16	2.34	16.26	64.92	5.76	2.14	2.52
	80	77	15.43	60.52	5.79	2.14	2.36	16.38	65.01	5.73	2.14	2.56
	100	98	15.45	60.54	5.79	2.16	2.35	16.55	65.23	5.71	2.11	2.57
	Average		**15.42**	**60.53**	**5.79**	**2.15**	**2.35**	**16.27**	**65.06**	**5.75**	**2.13**	**2.53**
50	40	38	15.42	60.65	5.80	2.18	2.37	15.98	64.81	5.31	2.18	2.61
	60	58	15.43	60.63	5.80	2.16	2.36	16.40	65.11	5.52	2.15	2.63
	80	78	15.44	60.42	5.78	2.18	2.38	16.56	65.13	5.68	2.17	2.62
	100	99	15.46	60.47	5.79	2.17	2.36	16.71	65.44	5.74	2.14	2.64
	Average		**15.43**	**60.54**	**5.79**	**2.17**	**2.36**	**16.41**	**65.12**	**5.56**	**2.16**	**2.62**
	Average		**15.42**	**60.53**	**5.79**	**2.16**	**2.35**	**16.34**	**65.09**	**5.65**	**2.14**	**2.57**

CONCLUSIONS

1. As a consequence of research, it resulted that quinoa plants present resistance to a dry and warm climate, so that in Moara Domneasca condition and without irrigation, the seeds production oscillated between 17.8 and 25.4 q/ha in the year 2006 and between 12.00 and 20.95 q/ha, in the less favourable year of 2007.

2. On the basis of the experimental results, it is recommended the sowing of quinoa crop at a distance of 50 cm between rows with densities of 100 thousand plants/ha.

3. Research emphasized the important influence of experimental year weather conditions on grains chemical composition. In this way, in 2007, an extremely droughty year, with high temperatures, quinoa grains accumulated more protein and starch.

4. There are remarked the superior values of the content in protein (over 14.3%) and over 16% for the best variants, in comparison with cereals (10-14%).

5. As a consequence of the research, it was issued the conclusion that the *Chenopodium quinoa* species find favourable conditions in the area of the reddish preluvosoil area from the central part of Romanian Plain.

In conclusion, this species, strongly promoted by scientific trends which support biodiversity and ecological agricultural system may contribute to the diversification of agricultural crops and of agroalimentary products, with a source of aliments rich in protein of superior quality.

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CERCETÃRI PRIVIND METODE ÎMBUNÃTÃȚITE DE OBȚINERE A RÃSADURILOR CU INFLUENȚÃ ASUPRA CREŞTERII ŞI DEZVOLTÃRII TOMATELOR

RESEARCH CONCERNING IMPROVED METHODS OF OBTEINING THE SEEDLING WITH INFLUENCE ON GROWTH AND DEVELOPMENT OF TOMATOES

ULEANU FLORINA, STREINU ADRIANA, TIȚA I..

Keywords: tomato, seedling, pot type, growth, development

ABSTRACT

Prezenta lucrare se referã la rezultatele obținute în anul 2007 intr-un experiment asupra tomatelor. Pentru a spori calitatea este absolut necesar sã îmbunãtãțim metodele de obținere a rãsadurilor. Astfel, am studiat comportamentul rãsadurilor de tomate cultivate în diferite tipuri de ghivece.

Experimentele au fost fãcute în în serã rece la Institutul Național de Cercetare-Dezvoltare pentru Biotehnologii în Horticulturã Ştefãneşti- Argeş.

Am folosit trei hibrizi de tomate: Pablo, Notorius şi Heinz, primul cu creştere nedeterminatã şi ceilalți cu creştere determinatã. Variantele experimentale au fost: V_1- rãsaduri transplantate în ghivece din plastic de 450 cm^3, V_2- rãsaduri transplantate în ghivece din plastic de 300 cm^3, V_3- rãsaduri transplantate în jiffy- poturi de 150 cm^3 şi V_4- rãsaduri nerepicate.

The present work refers to the results obtained in 2007 in an experiment on tomatoes. To increase the quality is absolutely necessary improving the methods of obtaining the seedlings. Thus, we studied the behavior of tomatoes seedlings cultivated in different pots types.

The experiments were done in cold glass house at the National Research & Development Institute for Biotechnology in Horticulture – Ştefãneşti – Argeş.

We used three tomatoes hybrids: Pablo, Notorius and Heinz, first with indeterminate growth, and the other with determinate growth. The experimental variants were: V_1- seedling transplanted in plastic pots of 450 cm^3, V_2- seedling transplanted in plastic pots of 300 cm^3, V_3- seedling transplanted in jiffy-pots of 150 cm^3 and V_4- seedling without transplantation.

INTRODUCTION

The tomatoes have made the object of some vastest studies being an important chapter to all the specialists. This paper was made as a comparative study of the tomato seedlings obtaining methods (in different types of pots) concerning they recommendation in to the small, medium and big farms. The purpose of this subject is the prominence of the differences of the tomato seedlings obtaining methods for the protected seedlings culture.

In the lastest years were made researches for finding new, moderne solutions regarding the economic efficiency insurance, an optimum seeds germination, the reduction of seeds lost, early crop, the eliminatin of some costs, the reduction of hand work.

MATERIALS AND METHODS

For the realization of experimental model we wised seeds from three tomatoes hybrids: Pablo, Notorius and Heinz, first with indeterminate growth, and the other with determinate growth.

Notorius F_1- a very early tomatoes hybrid with determinate growth recommended for plastic greenhouses and outdoor growing. The fruits are rounds, uniforms as size and they can have 170 g weight. The plant is very productive and it doesn't exceed 1 m height. The seeds wore treated with Thiram.

Pablo F_1- determinate growth tomato hybrid, medium early to mature, producing high yields and commercial aspect of crop. The average fruit weight is 140- 180 g. It's recommended for glasses greenhouses, plastic greenhouses and outdoor growing.

Heinz 2275- tomato field variety, medium tardy to mature, intended also for industrialization. The plant is vigorous habit with rich, sweet flavor, round fruits that can have medium 170-180 weight. With Fusarium and Verticillium disease resistance.

The seeds were sown in mixture substrate and then either were transplanted in plastic pots of 450 cm^3, in plastic pots of 300 cm^3, in jiffy-pots of 150 cm^3 or seedling without transplantation, planted straight from the tray where they were sown where the density at sown were reduce up to 1:5. At the planting, each row represents one repetition, each hybrid it's cultivated in three repetitions. The experimental variants are represented each by 20 plants and those are disposed in this order regarding the length of the glass house (30 m): V_1- seedling transplanted in plastic pots of 450 cm^3, V_2 - seedling transplanted in plastic pots of 300 cm^3, V_3- seedling transplanted in jiffy-pots of 150 cm^3, and V_4 - seedling without transplantation, was planted in a apposite row. Because we wanted the measurements to represents the correct period of stagnation and the period of grow restarting was established a marker by the mounting of some pieces of glass on the soil, beside the tomatoes stem base, so that each measurement to be made from the same level.

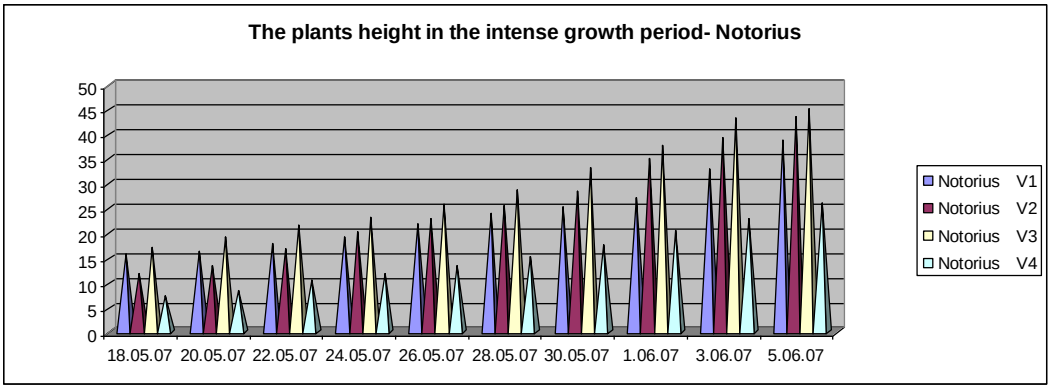
RESULTS AND DISCUSSION

In planting period the water stress was different to experimental variants, being a direct correlation between seedling without transplantation and transplanted seedling. The without transplantation seedling were partly peaky from the planting.

The measurements were made every other day, at 9 in the morning, a period of 20 days, between 18.05 and 10.06.2007. In this period we observe that for every hybrid the growth was least in seedling without transplantation case.

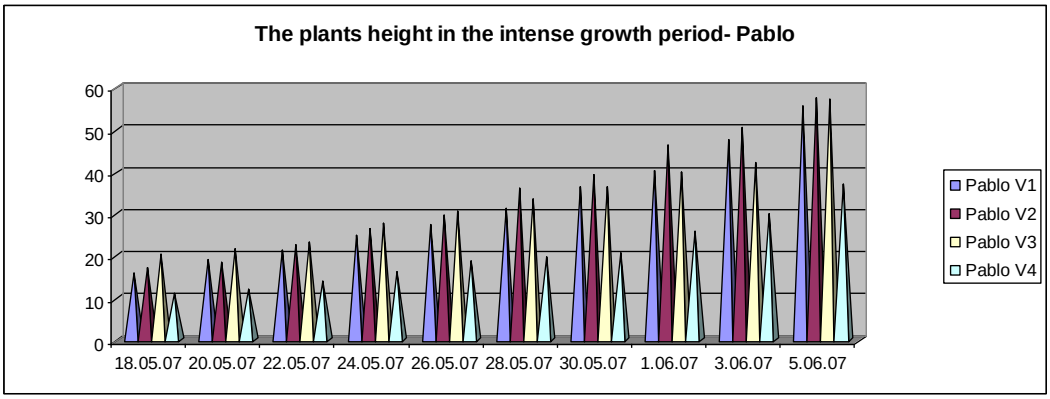
For Notorius (figure 1) the growth was intense at the beginning for V_1, but ulterior V_2 and V_3 exceed V_1. At the end of the determination V3 had the biggest values. The PVC pots volume is not influencing the growth of Notorius seedlings.

Figure 1



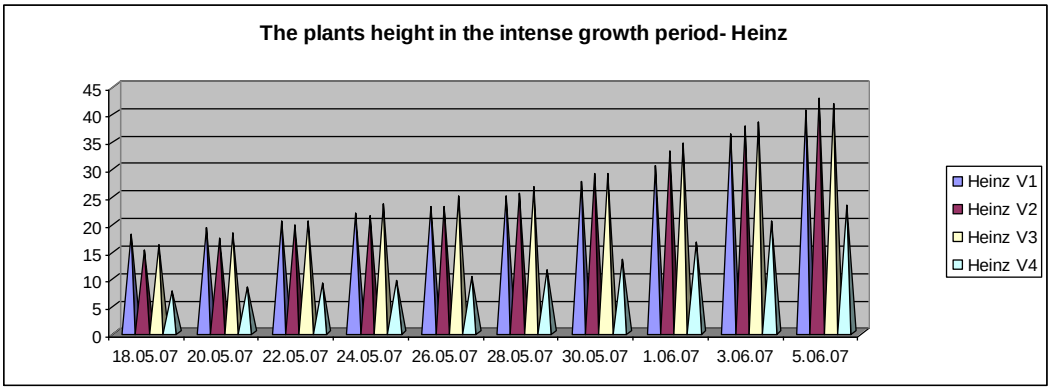
In Pablo case (figure 2) we can see that V_2 had the biggest values and then V_3, we can see also a race between V_1 and V_3.

Figure 2



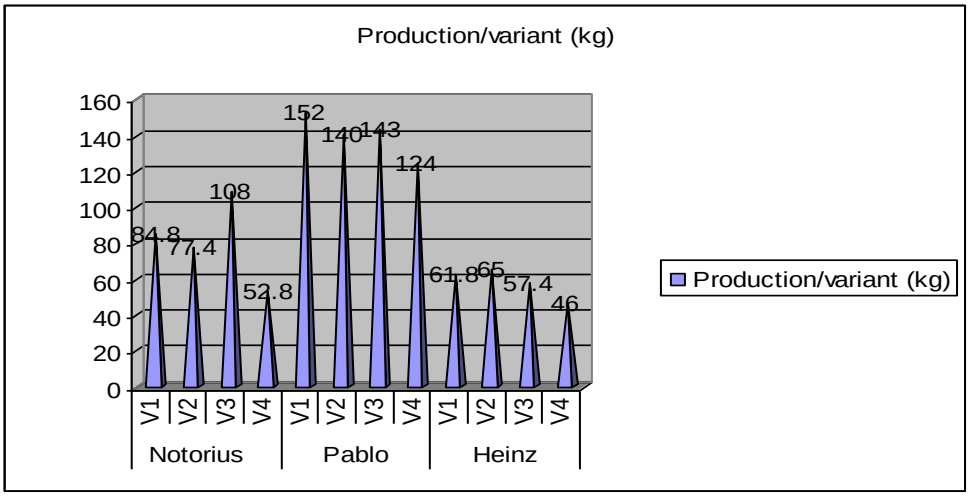
In Heinz case (figure 3) V_2 had the biggest values and then V_3 and V_1.

Figure 3



We consider necessary to study the plants production. So in figure 4 is illustrated the productions/variants.

Figure 4



Pablo had the biggest productions, and then Notorius. Heinz had the leases productions. In Notorius case the biggest production had V_3, in Pablo case V_1, and in Heinz case V_2. Between the experimental variants V_4 is the less profitable because of the small production.

CONCLUSIONS

- The stress of the planting is different concerning the pots volume
- The jiffy-pots assure the seedling uniformity and reduce to zero the transplantation stress.

- The growths were pick up faster in jiffy-pots (V_3), because the roots were in al the pot, then in plastic pots of 300 cm^3, in plastic pots of 450 cm^3.
- The soil volume is not very important in elimination of planting stress.
- The growth speed after planting depends of the hybrid vigor and the conditions from the establishing of the culture.
- The plants development and the early crop depend of the growth speed after planting and the planting stress reducing.
- The plant growths influence the production.
- Pablo is a valuable hybrid, productive, with good fruits.
- The PVC pots volume is not very important for the researches that we made.
- The transplanted variants had elder values of the studied characters than no transplanted variants.
- The experimental variant V_4 is the less profitable because of the small production.
- The pots volume is not justifying the big production and the early productions.
- The most profitable culture is the one of Pablo and then the one of Notorius and Heinz.

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STUDIES CONCERNING RELATION BETWEEN SLAUGHTERING WEIGHT AND GRADING CARCASES CLASSIFIED IN „EUROP" SYSTEM AT PIGS WITH DIFFERENT PROVENANCE

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Keywords: pigs, carcase, grading, EUROP, abatoir, fat, meat.

ABSTRACT

Clasificarea carcaselor de porcine în România se face în baza normelor stabilite prin Ordin 457/2004 al MADR şi se aplică tuturor carcaselor de porcine în greutate de 50-120 kg cu excepția animalelor de reproducție, nefiind obligatorie pentru fermele care cresc purcei obținuți în cadrul fermei pe care îi sacrifică şi tranşează.

Carcasele de porci se clasifică în momentul cântăririi, pe carcasa caldă (la max. 45 min. de la sacrificare), în funcție de conținutul estimat de țesut muscular. Valoarea comercială a carcaselor se determină prin conținutul estimat de țesut muscular (raportul dintre greutatea ansamblului de muşchi roşii striați şi greutatea carcasei), în funcție de greutatea carcasei.

Rezultatele clasificării şi prețul corespunzător se înscriu pe raportul de clasificare, întocmit în 3 exemplare dintre care un exemplar este dat deținătorului de animale, unul abatorului şi unul rămâne la clasificator.

In Romania, the pigs carcase grading is maked in the basis of the regulations established through Order 457/2004 of MARD and is applied to all pigs carcase weiging 50-120 kg exempt the reproduction animals. Carcase grading it is not obligatory for the farms which obtain and grow piglets which is sacriffied and carved inside of the own farm.

The pig carcase is graded in the moment of weighing, on warm carcase (max. 45 min. from slaughtering), considering the muscle tissue estimated content. The commercial value of the carcase is determided through the muscle tissue estimated content (ratio between weight of the red muscle ensembly and the weight of the carcase), considering the weight of the carcase.

The results of grading and the dully price is listed in the grading report which is drawn up in tree copy from which one is given to the animal owners, one for the abatoir and one reste to the clasifficator.

INTRODUCTION

Grading is the quality carcase evaluation operation, considering the 3 majours components of this: meat, fat and bones.

In the pigs case grading consist in the percentage estimation of meat content of the carcase and have the next main objectives: fair payements of the meat producers, the necessary standardization in the international meat commerce, ensuring of a loial concurency between the slaugthering units, ensuring the transparency of the meat market, ensuring the adequate monitoring of the meat market situation, support producers for to eliorate the carcase quality and support the abatoirs and the meat processors for to sort the meat as the feed matter.

EU was establish a common procedure for to evaluate the carcase quality, respective the EUROP system which is enacted through the CEE 3220/1984 Regularion which is defined from the same parameters on all member states.

Starting the year 2001 a work commission begining the implementation of the EUROP system in Romania.

The carcases grading commission was setting up in 2004 having as the prime objective elaboration of national legislation according with the european regulations.

The national commission intergrate as members representatives of the private operators which activate in the meat domain: producers, processors, traders together with the representatives of the authorityes. In this kind, the neutrality and the objectivity of the commision is guarantee.

In Romania, the effective grading of the pigs carcases was started in 2006, taking into account the Order 457/2004 of the Ministry of Agriculture and Rural Developement which transpose in the national legislation the provisions of the CEE 3220/1984 Regulation.

After the meat percent is measured, periodicaly is established the national average of this indicator which ulterior is used as national reference level. His value is mostly dependent to the genetics of the livestock and to the slughtering weigh.

The administration representatives establish a prices grid which award every percent over the reference level and penalty every percent below this.

The meat price for the reference level (establish through the market suply and demand) is permanent negociated between abatoir and producers at the national, regional or local level. In the same time, the reference level for the carcases and the reference price above mentioned (yearly negociated between the representatives of inter-professional organisations of the animal breeders and the meat industry) remain the same.

After grading, the carcases is marked using authorized methods (non-toxic ink, label etc.) with the caps letter corresponding to the commercial grade or with the percent of the estimated muscle tissue content.

MATERIAL AND METHOD

The present study was performed at SC ATHOS-GARANT, Târgu-Jiu - Gorj durring the year 2008.

The purpose of the study is to determine if exist a correlation between the slaughteried carcases weigh and the quality grade of this.

The measurements was performed on two lotes slaughtered, one originate on to a pigs farm named SC Suinprod from Bumbesti and the second being compose from animals acquisite from the nearby small farms.

The slaughtered animals was PIC crosbred growed in intensive-industrial system for the first lot and pigs with unknown genetics and growing system (considerated as extensive system), acquisited from different farmers for the second lot.

The both lotes was contain pigs weighing between 85 and 130 kg/head.

Fort to study the relations between weight of the animal and the EUROP system, the lotes was studyed on groups of weight established on intervals of 5 kg each.

The animals was subject of general slaughtering technology recomended procedures concerning the slaughtering preparation and the slaughtering.

On the practice is used 3 methods of carcase grading: by hand (ruler, caliper etc.), semi automatic (ultra-sounds, optical wawes, data being introduce for processing on computer applications) and automatic (use of automatic means for to determin the percents and having specialyzed software for to process the obtained dates).

Following the determinations, the carcases is graded in one of the 5 quality grades (Table 1).

In the present study the determinations was performed at less than 30 minutes from slaughtering (on warm carcase) using the OGP optical tester. The results was interpreted through „FAT-O-MEATER” method.

This is a semi automate grading method based on the measurements realised with FAT-O-MEATER testers, authorised for to be used at national level starting 2005 january in the slaughteryes where was sacriffied an average of over 200 pigs weekly in the past year (2004).

Table 1

Quality grades for pigs carcases in applyed in EUROP system in Romania (O. 457/2004)

Percent of muscle tissue from carcase weight	Grade
55% and over	E
50% or more but less than 55%	U
45% or more but less than 50%	R
40% or more but less than 45%	O
below 40%	P

The muscle tissue percent of an carcase is calculate on the basis of the next formula:

Y = 52,2925 - 0,5252 x G1 + 0,1837 x F1 , where:

Y: the estimated percent of the muscle tissue in carcase;

G1: thickness of the bacon between the third and the fourth last rib at 7 cm from the median line;

F1: thickness of the *Longissimus dorsi* muscle between the third and the fourth last rib at 7 cm from the median line.

RESULTS OF RESEARCHES

Following the analyse of the weight values recorded before and after slaughtering, the average efficiency at slaughtering was 78,3% for the booth lotes (Tables 2 and 3)

Table 2

The carcases weight and meat percent in carcase at the first lot

Crt. no.	Weight groupes (kg)	Average of weight/head (kg)	Average of weight of carcases (kg)	Carcases (%)	Meat average (%)
1	90-95	93,23	73,00	2,50	60,80
2	95-100	98,34	77,00	5,00	59,95
3	100-105	102,81	80,50	10,00	59,99
4	105-110	108,05	84,60	18,75	60,23
5	110-115	112,52	88,10	12,50	59,87
6	115-120	116,73	91,40	12,50	58,71
7	120-125	122,31	95,77	16,25	60,73
8	125-130	125,66	98,39	22,50	59,78
Total		**-**	**-**	**100,00**	**-**

On the framework of the first lot which was growin intensive-industrial system, the minimum weight/head was 93,23 kg and the maximum was 126,44kg. Considering that, the lote was split in 8 weight groups.

As can be observe, exist a relative high uniformity of the animals weight, 92,5% having weight over 100 kg.

The meat percent in carcase have values over 58% and vary very few, the variation amplitude being only 2,09%.

The most little percent of carcase meat content is recorded on the 115-120 kg weight group (58,71%), the bigger beeing recorded at the 90-95 kg group (60,80%)

The animals from the second lot was less weight, only 37,6% having over 100 kg, the corporale weight limits being 85,57 - 124,5 kg.

This lot was split also in 8 weight groups but, comparative with the first lote, these start and over with one interval less.

The average of meat percent is also more reduce than the anterior lot having values between 55,7 and 58,92%, with an amplitude of 2,59%.

Table 3

The carcases weight and meat percent in carcase at the second lot

Crt. no.	Weight groupes (kg)	Average of weight/head (kg)	Average of weight of carcases (kg)	Carcases (%)	Meat average (%)
1	85-90	87,55	68,56	7,20	56,12
2	90-95	92,10	72,11	7,20	57,40
3	95-100	98,08	76,80	12,00	56,49
4	100-105	102,70	80,42	9,60	57,48
5	105-110	107,88	84,47	13,60	57,00
6	110-115	112,97	88,45	8,80	58,29
7	115-120	117,50	92,00	2,40	55,70
8	120-125	123,72	97,25	3,20	56,53
Total		-	-	**100,00**	-

The individuals dates recorded in the grading reports was statisticaly treat according wit the EUROP system, the results beeing desribed in the Figures 1 and 2.

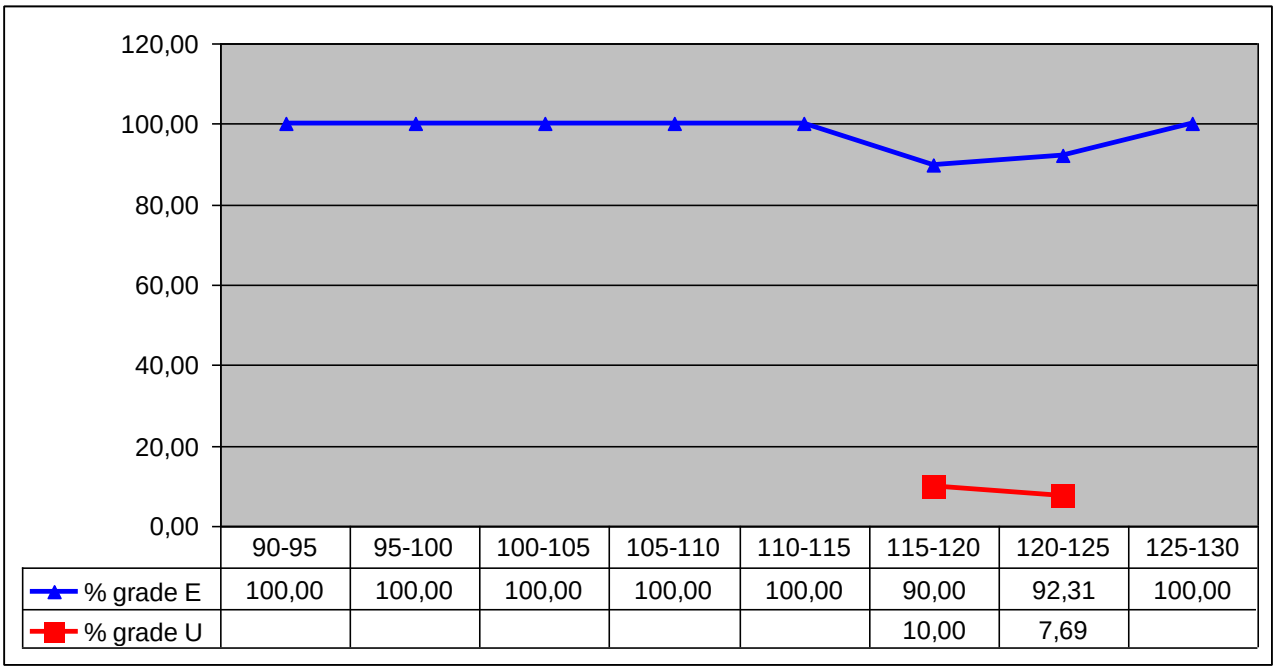
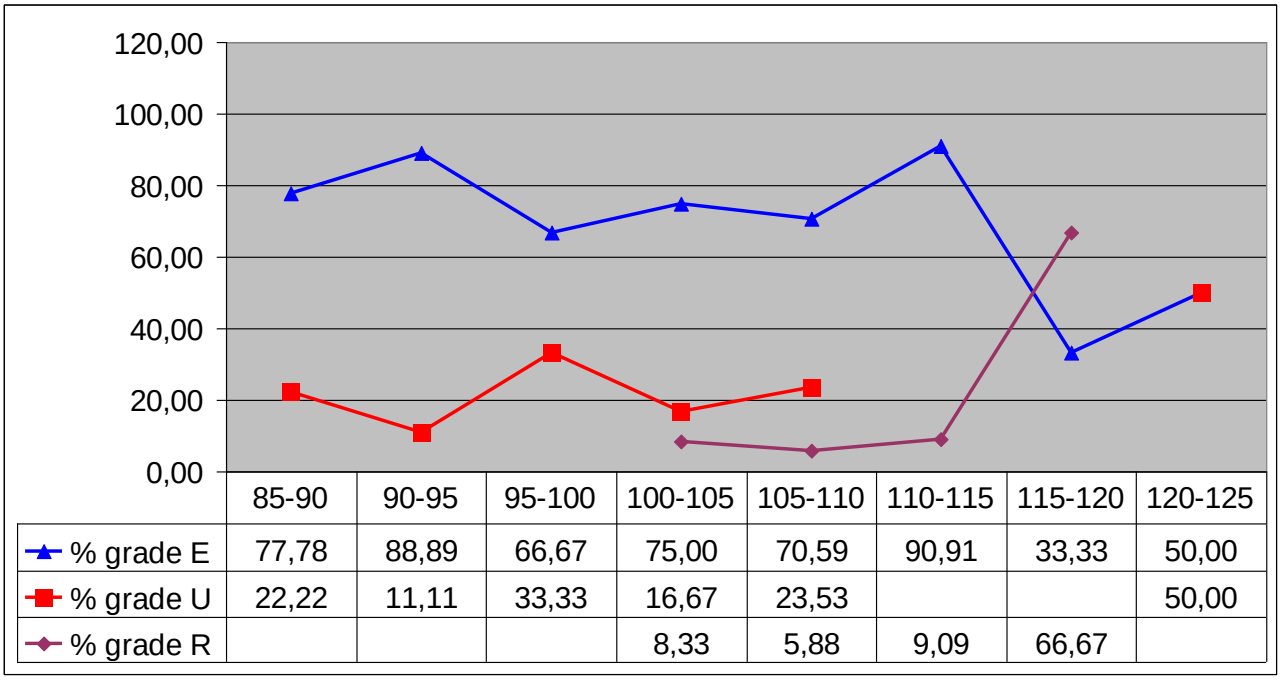


Fig. 1 – The distribution of the carcases quality grades obtained on living weight on the first lot

On the lot 1 originated on one specialyzed pigs farm was obtained homogenous carcase from qualitative point of view, with a big content of meat in carcase fact which that permitted inclusion of mostly of this carcases in the „E" grade.

Only a small part of carcases obtained from this lote, from the weight groups 115-120 and 120-125 kg was have 10,00 respective 7,69% carcases graded in „U" grade, represented 2,50% of total lote.

We can conclude that in the lotes formed from animals with a good genethics found, which was corespondind growed and slaughtered in the moment of toching a coresponding weight (90-130 kg/head) is possible to obtain carcases with verry good and good, which permit to be awarded over the reference price, generating good financial results.



	85-90	90-95	95-100	100-105	105-110	110-115	115-120	120-125
% grade E	77,78	88,89	66,67	75,00	70,59	90,91	33,33	50,00
% grade U	22,22	11,11	33,33	16,67	23,53			50,00
% grade R				8,33	5,88	9,09	66,67	

Fig. 2 – The distribution of the carcases quality grades obtained on living weight on the second lot

On graphical obtained results obtained after slaughtering the lot 2 of animals, which is heterogenous from point of view of provenance, genethics, nourishment system, growing conditions and ages of the animals, we can observe that exist a more large variation of the obtained carcases quality.

The maximum percent of „E" grade carcases was obtained through slaughtering the animals from the 110-115 kg group (90,91%) closly followed by the 90-95 kg group (88,89%). The lowest percentages was registered at the last 2 groups of weight (33,33% respective 50,00%).

Also, on this lot was recorded and carcases of „U" grade. The biggest percentage of this grade was recorded on the last and the third weight groups, having 50,00% respective 33,33% values. The „U" grade carcase was not obtain from the pigs from the 110-115 and 115-120 kg groups.

After slaughtering animals weighing over 100 kg was obtained also „R" grade carcases which finally caused saling them at a lower price, this grade of carcase beeing not supplementary awarded. The percents of „R" carcases obtained from this lot is between 5,88% on the 105-110 kg group and 66,67% on the 115-120 kg. In the same time, as we can determine, in the first 3 and in the last groups was not recorded „R" grade carcases.

CONCLUSIONS

Based on the results the following conclusions could be drawn:

1. The EUROP system for carcases grading establish an unitary set of rules allover inside border of the European Union having as the main objectives: fair payements of the meat producers, the necessary standardization in the international meat commerce, ensuring of a loial concurency between the slaugthering units, ensuring the transparency of the meat market, ensuring the adequate monitoring of the meat market situation, support producers for to eliorate the carcase quality and support the abatoirs and the meat processors for to sort the meat as the feed matter.

2. In this system, the weight of the animals or the weight of the carcases it is not the principal financial indicators due when the price of carcase is establish the accent is on the quality of this.

3. In the industrial-intensive growing system is obtained homogenous animal lotes (age, genethics, weight) which after slaughtering was respected the quality conditions for

to be graded in the „E” grade. Only in the weight interval 115-125 kg (two groups) was obtained a small percent of „U” grades carcase, represented only 2,50% of totale lot.

In this system, the economical results is the best possible due the award of every percent above the national reference level.

4. In the extensive growing system characterized by a very large heterogenity is obtained large variation of the carcases grades: 20% of the total lot beeing graded as „U” and 6,25% as „R” remaining only 73,75% carcases graded as „E”.

This is due to the differences which intervene in the framework of the animal from the lot concerning the provenance, genethics, nourishment system, growing conditions and ages.

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STUDII COMPARATIVE PRIVIND SITUAȚIA ÎNSĂMÎNȚĂRILOR ARTIFICIALE LA EFECTIVELE DE TAURINE DIN OLTENIA

COMPARATIVE STUDIES CONCERNING THE ARTIFICIAL INSEMINATION AT THE TAURINE EFFECTIVE FROM OLTENIA

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Keywords: artificial insemination, cows, heifers, progeny, reproducers effective.

ABSTRACT

Taurinele ocupă un loc prioritar în zootehnia națională şi mondială, deținând ponderea principală în producția de lapte (peste 90% din laptele de consum) şi locul al II - lea în producția de carne (peste 35% din carnea de consum). Una din verigile de bază pentru sporirea numerică şi calitativă a efectivelor de taurine o constituie reproducția.

Însămânțarea artificială este larg răspândită la noi în țară şi se prevede extinderea acestui sistem la 85% din efectivul total de vaci.

The taurines detain a prioritary position in the national and global livestock having the major balance on milk production (over 90% of the consumption milk) and the second place on meat production (over 35% of the consumption meat). Reproduction is one of the cardinal points for the numerical and quality taurines effective increase.

The artificial insemination is wide-spread in our country and is scheduled that this system to be extended to 85% of the total national cows effective.

INTRODUCTION

The reproduction technology is based on the next activityes realize: tracking down the heat females, establish the optimum moment for insemination, executing the natural mate or artificial insemination and pregnancy observation.

The animals reproduction is a very important activity having as the main scope the rationale use of the reproduction material genetical ameliorate through appliyng modern directional reproduction technologies.

In the actual national conditions the artificial insemination biotechnologies is the main instrument for to intensify and to diseminate the genetic progress through using for reproduction only the most valuable reproducers for the purpose to obtain high productions.

Due restructuration of some activityes starting with 1997 the bugetary personnel from the national reproduction and selection network was dramaticaly reduced generating some difficultyes in amelioration and reproduction activityes in teritory.

Through personnel reducing a part of activityes was droped-down (eg. the official control of husbandry performances, reproduction, and the male reproducers testing). In the past few years this activity was developed with big efforts mainly through extension of husbandry performances control in the private sector and also through include a larger number of females in the artificial insemination programme.

On the EU countryes the taurines artificial insemination is generalisated. In Romania, this practice is in an extension process, the target for the immediate future beeing to attain a percent of 85%.

Reporting to the national programme concerning the realize of reproduction indicatives for the taurine durring the zear 2007 the obtained results was 135,7% for the freshened females, 71,5% for the artificial insemination number, 102,8% for the total descendents obtained and 97,2% for descendents obtained through artificial insemination (source: ANARZ statistics 2007).

MATERIAL AND METHOD

This research is a statistical analysis of the Oltenia regionale taurine effectives and of the artificial insemination actual situation.

The primary dates concerning the effectives from region Oltenia were obtained from The National Husbandry Amelioration and Reproduction Agency (ANARZ).

The researches were developed durring the period 01.01.-31.12.2007.

RESULTS OF RESEARCHES

The official records centralized to ANARZ indicate that the total femal effective recorded to the taurine species was 2.158.456 heads from which 1.809.832 heads representing the female reproducers effective (Table 1).

In the year 2007, from the national female reproductive effective, 837.087 (46,26%) females were artificial inseminated the reste of 972.745 (53,74%) being natural freshened.

From the national female reproducers effective 183.771 cows is breded in Oltenia, representing 10,15%. Durring the year 2007 a number of 60.542 heifers was artificial inseminated (**AI_1**), representing 7,24% of the national artificial inseminations at this species which correspond to a balance of 32,94% of the Oltenia region reproducers cows and heifers effective.

Table 1

The number of the taurine artificial insemination situation, realized in the interval 1.01 – 31.12. 2007

Crt. no.	County	Total husbandry	
		Reproducers effective 1.01.2007	No. females AI_1
1	Dolj	34.701	12.004
2	Gorj	38.408	9.114
3	Mehedinți	26.579	6.856
4	Olt	43.441	16.905
5	Vâlcea	40.642	15.663
Total Oltenia		**183.771**	**60.542**
Total national		**1.809.832**	**837.087**

Concerning the regional balance of the artificial insemination situation at the cows, we can observe that the regional average of this is below the national average with about 13,5% which is not a good indicator (Figure 1).

On the countyes, the smallest number of the artifficial insemination is recorded in Gorj where the recorded percent was only 23,7% representing a half of national average and 2/3 comparative with the Oltenia average with a negative difference of almost 10%.

At the opposite pole, the best results concerning the artificial insemination were recorded in Olt and Vâlcea countyes. In Olt, the percent is only with 7,5% less than the national recorded average but is with 6% over the Oltenia average.

The Oltenia artificial insemination situation durring the year 2007 shows that the countyes Gorj and Mehedinți register the smallest values with an average with close to 10% less than the national average. At the same time, the countyes Olt, Vâlcea and Dolj have values more close to the national average.

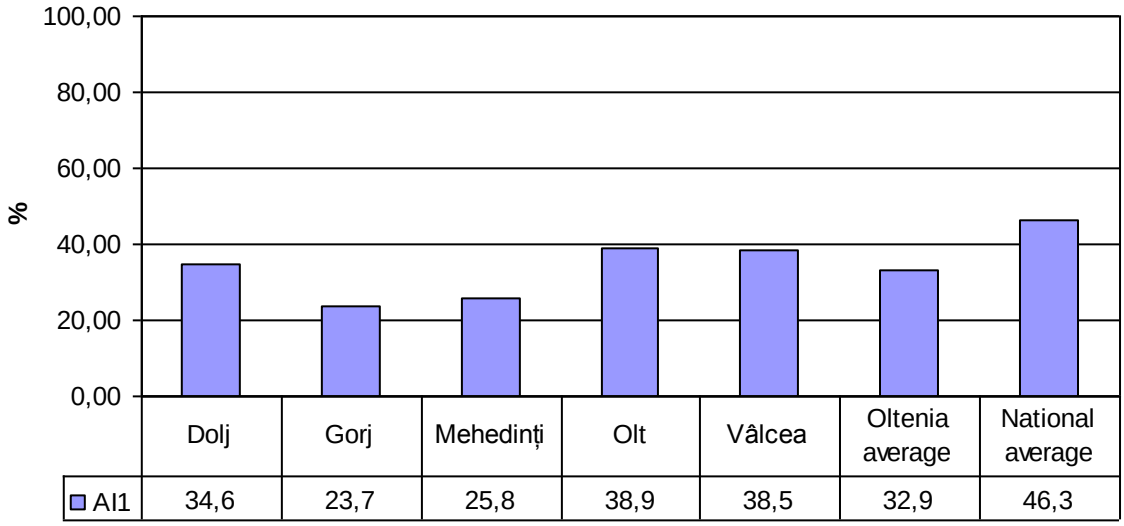


Fig. 1 – The comparative percentage of the taurine artificial insemination, realized in the interval 1.01 – 31.12. 2007

Concerning the female reproducers artificial inseminated structure on categoryesdurring 2007, from the total national level of 837.087, 737.003 were cows, the reste of 100.084 being heifers (Table 2).

A total number of 60.542 artificial inseminations was realised on Oltenia from which 55.233 over cows and the reste of 5.309 over heifers.

Table 2

The taurines artificial insemination situation, on animal categoryes for the interval 1.01 – 31.12. 2007

Crt. no.	County	Total husbandry		
		Total females AI_1	Cows AI_1	Heifers AI_1
1	Dolj	12.004	10.911	1.093
2	Gorj	9.114	8.355	759
3	Mehedinți	6.856	6.006	850
4	Olt	16.905	15.354	1.551
5	Vâlcea	15.663	14.607	1.056
Total Oltenia		**60.542**	**55.233**	**5.309**
Total national		**837.087**	**737.003**	**100.084**

The percentage of cows artificial inseminated was 88,04% at the national level, the regional average being 91,23% (Figure 2).

On the hiefers case, the national average of artificial insemination is bigger with 3,19% than the regionale average which is 8,77%.

The Mehedinți county is the only one in the Oltenia where the percentage of the heifers artificial insemination is over the national average all the reste of countyes of region recording less averages.

Concerning the average of cows artificial insemination, Mehedinți county is the only one in region with values less than the national average, the biggest value of this indicator being registered in the Vâlcea county.

As can be viewed in the corresponding chart, the percentages of cows and heifers artificial inseminated is not quite so different with the national average the differences being situated for each of the two indicators in a domain of ±5%. The situation is the same and for the Oltenia regionale situation and the countyes averages.

It is necessary to increase the number of heifers artificialy inseminated at a minimum level of 20% from the artificial insemination average in order to ensure the livestock corresponding rotation.

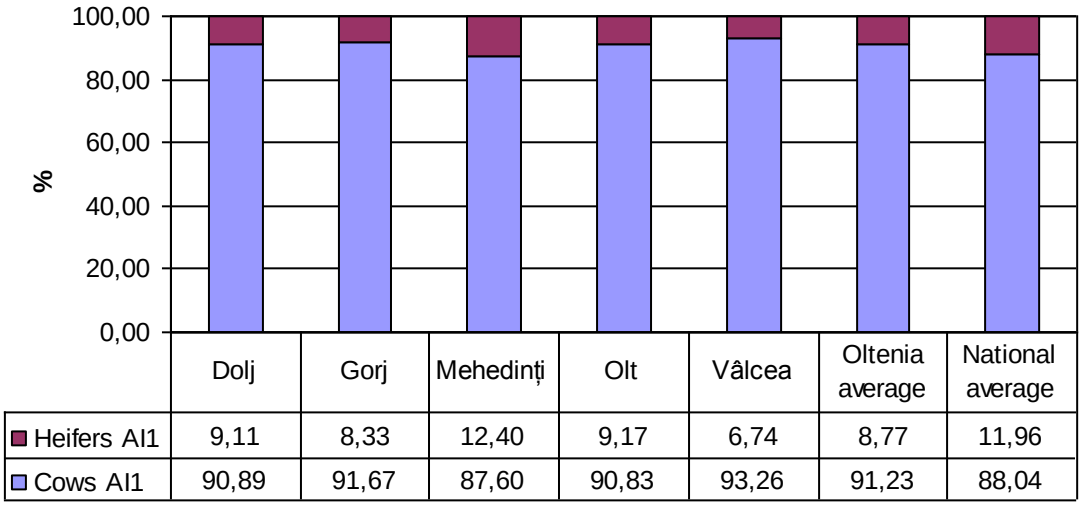


Fig. 2 – The comparative situation of taurines artificial insemination, on animal categoryes for the interval 1.01 – 31.12. 2007

The number of descendents obtained in the year 2007 from gestation of the taurine females artificial inseminated is presented in the Table 3.

As can be observed, from a national total descendents of 827.492, 715.730 was obtained from cows and the reste of 111.762 from heifers.

About 8 percents of this number was obtained in Oltenia region exempt the heifers decendents which representing only 5,7% with a number of 6.380.

Table 3

The taurine descendents obtained through artificial insemination, on the interval 1.01 – 31.12. 2007

Crt. no.	County	Descendents obtained through AI		
		Total	From cows	From heifers
1	Dolj	13.584	12.198	1.386
2	Gorj	9.610	8.477	1.133
3	Mehedinți	7.511	6.637	874
4	Olt	18.730	16.753	1.977
5	Vâlcea	14.018	13.008	1.010
Total Oltenia		**63.453**	**57.073**	**6.380**
Total national		**827.492**	**715.730**	**111.762**

The smallest number of descendents obtained from heifers through heifers artificial insemination was recorded in Mehedinți county with only 874. In the same time, the largest number of descendents artificial insemination obtained from cows was recorded in Olt county with a number of 18.730.

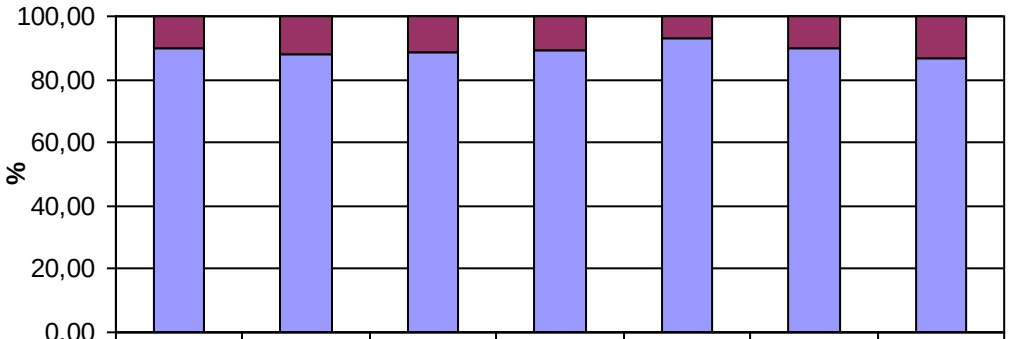
Reported to percentual national average of descendents obtained through taurines artificial insemination (86,49%), the Oltenia situation is good due the value of 89,95% (Figure 3).

Concerning the countyes situation, as in the case of artificial insemination situation, the number of descendents varying in a small inteval of about 3%.

As in the case of artificial insemination situation the descendents of heifers in Oltenia is below the national average and is necessary to be increased.

Is relevant to observe that in the Vâlcea county in 2007 was recorded the smallest percent of descendents from heifers with a negative difference of 6,3% reported to the national average and almost 3% over the Oltenia average.

In the same time, the biggest value of this indicator was obtained in Gorj county being 11,79% of the descendents obtained through artificial insemination.



	Dolj	Gorj	Mehedinți	Olt	Vâlcea	Oltenia average	National average
From heifers	10,20	11,79	11,64	10,56	7,21	10,05	13,51
From cows	89,80	88,21	88,36	89,44	92,79	89,95	86,49

Fig. 3 – The comparative percentage of taurine descendents obtained through artificial insemination, on the interval 1.01 – 31.12. 2007

On cows descendents case, the limit values for the researched interval was obtained in Vâlcea (92,79%) for the maximum respective Gorj (88,21%) for the minimum.

Due the presented situaton and taking into account the national taurine reproducing programme, it is necesary to implement some actions in order to improve the results of this sector which can be:

- subsidy for seminal frozen material and of the cryogenic material (liquid nitrogen);
- subsidy for the descendents obtained through artificial insemination;
- subsidy for cryogenic assets in the OARZ (deposit tanks, portable tanks, tanks for liquid nitrogen etc.);
- stoping the clandestine naturale mates and using the directed freshened for all the females which can not be artificial inseminated;
- better popularization and visibility of the nationale reproduction programme advantages through mass-media campaign.

CONCLUSIONS

Reporting to the national programme concerning the realize of reproduction indicatives for the taurine durring the zear 2007 the obtained results was 135,7% for the freshened females, 71,5% for the artificial insemination number, 102,8% for the total descendents obtained and 97,2%for descendents obtained through artificial insemination.

The official records centralized to ANARZ indicate that the total femal effective recorded to the taurine species was 2.158.456 heads from which 1.809.832 heads representing the female reproducers effective.

The regional balance of the artificial insemination situation at the cows, we can observe that the regional average of this is below the national average.

About 8% of the descendents obtained in the year 2007 from gestation of the taurine females artificial inseminated was obtained in Oltenia.

The number of descendents obtained in Oltenia comparative for the countyes is varying in a small inteval of about 3% being close to the national average of this indicator.

It is necesary to implement some actions in order to improve the results of the national programme for taurines reproduction.

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INFLUENȚA ERBICIDĂRII SUPRA GRADULUI DE ÎMBURUIENARE ŞI PRODUCȚIEI LA CULTURA DE GRÂU DE TOAMNĂ

ON THE IMPACT OF HERBICIDE APPLICATIONS ON WEEDING DEGREE AND YIELD IN WINTER WHEAT CROP

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Keywords: natural weeding, herbicides, weeding degree, yield level

ABSTRACT

Cercetările şi–au propus să monitorizeze influența unor erbicide asupra gradului de îmburuienare şi producției la soiul de grâu de toamnă Alex, în condițiile pedoclimatice ale Stațiunii Didactice Timişoara. Temperatura este un factor de vegetație cu influență directă în creşterea şi dezvoltarea plantelor. În anii agricoli 2004–2005 şi 2005–2006 s-au înregistrat oscilații mici ale temperaturii medii lunare, excepție făcând luna iulie a anului 2006, uşor excedentară față de media multianuală. Anul agricol 2006–2007 a fost deosebit de călduros, valoarea mediei lunare fiind de 11,71 ºC.Regimul precipitațiilor are însă un caracter neregulat, cu ani mult mai umezi decât media şi ani cu precipitații foarte puține. Asfel în lunile aprilie şi august 2005 precipitațiile căzute au atins valori de 154,4 mm, respectiv 142,4 mm. De asemenea în anul 2007, în luna aprilie s-au înregistrat doar 4,4 mm, întreaga zonă a Banatului fiind afectată de secetă. În perioada cercetărilor, între 2005 şi 2007, starea naturală de îmburuienare la soiul de grâu de toamnă Alex a avut media 101,94 buruieni/m^2. S-a luat în studiu 9 erbicide, cele mai utilizate în practica agricolă şi anume Aim Plus, Derby 175 SC, DMA 6, Icedin super, Lancet RV, Lintur 70 WG, Mustang, Oltisan extra şi Sekator.Tehnologia aplicată a fost cea specifică pentru zona de cernoziom din Câmpia de Vest cu precizarea că planta premergătoare a fost soia.Toate variantele experimentale au fost fertilizate cu îngrăşăminte chimice complexe corespunzătoare unei doze de $N_{100}P_{45}K_{45}$. Aplicarea erbicidelor postemergente a determinat o diminuare(media 2005–2007) a gradului de îmburuienare, acesta având valori între 71,49% (DMA 6 1 l/ha) şi 90,47% (Icedin super 1 l/ha). Producțiile obținute la soiul de grâu de toamnă Alex sunt corelate direct cu gradul de combatere, astfel cele mai ridicate producții de grâu s–au obținut în variantele în care gradul de combatere a buruienilor a fost maxim. Producția a înregistrat valori cuprinse între 34,97 q/ha(varianta netratată) şi 44,56 q/ha(Icedin super 1 l/ha).

Our research aimed at monitoring the impact of some herbicides on weeding and yield in winter wheat Alex cultivar, in the soil and climate conditions of the Didactic Station

Timişoara.Temperature is a vegetation factor with direct impact on plant growth and development. In the agricultural years 2004-2005 and 2005-2006 there were small oscillations of the monthly average temperature, except for July 2006 which was slightly hotter than the multi-annual average. The agricultural year 2006-2007 was particularly hot, with an average value of 11.71º C.Rainfall regime is irregular in pattern, with years moister than the average and very little rainfalls. Thus, in April and August 2005, rainfalls totalled 154,4 and 142,4 mm, respectively. Likewise, in April 2007, there were only 4,4 mm, the entire Banat area being affected by drought.During the trial period, between 2005 and 2007, the natural weeding state in winter wheat Alex cultivar had the average 101,94 weeds/m^2 . We tested 9 herbicides, the most used in agronomic practice: Aim Plus, Derby 175 SC, DMA 6, Icedin super, Lancet RV, Lintur 70 WG, Mustang, Oltisan extra and Sekator. The technology applied was specific to the chernozem area in the Western Plain, with the mention that the pre-emergent crop was soy . All the trial variants were fertilized with complex chemical fertilizers corresponding to a dose of $N_{100}P_{45}K_{45}$. The impact of the postemergent herbicides results in a diminution (the average 2005-2007) of the weeding degree, between 71,49%(DMA 6 1 l/ha) and 90,47%(Icedin super 1 l/ha).The yields obtained in winter wheat Alex cultivar are directly correlated with the weeding degree, i.e. higher in the variants in which weed control degree was maximal. The productivity had the values between: 34,97q/ha(non-treated) and 44,56 q/ha(Icedin super 1 l/ha).

INTRODUCTION

At present, plant protection is a field of importance in agriculture because of the dramatic limitations of agricultural yields caused by disease, pests, and particularly, weeds (Manea D., 2006). Thus, chemical control is the main means agricultural practice can rely on in diminishing losses. As for weed control, agriculturists nowadays can rely on a wide range of herbicides that can manage most of the problems caused by weeds (Alda S., 2007). The requirements of chemical control have evolved in time: efficacy should be doubled by low production costs and by environmental protection. To control weeds in wheat crops, they have synthesised over 100 simple and combined herbicides that make up the richest assortment of herbicides agriculture can rely on (Lăzureanu A. et.al., 2006).

MATERIAL AND METHOD

The trial was set after the randomised block method with 10 variants and 4 replications (Săulescu N.A., Săulescu N.N., 1967), with a total number of 40 trial plots measuring 81 m^2 (4.5 m x 18 m) each.

Trial variants were as follows: V_1 – Aim Plus (5,75% carfentrazon-ethyl + 64.7% acid 2,4D) – 0.35 kg/ha; V_2 – Derby **(**75 g/l florasulam + 100g/l flumetsulam) –0.07 l/ha; V_3 – DMA 6(dimethyl amine salt 600 g/l) – 1 l/ha; V_4 – Icedin super**(**acid 2,4D 300 g/l + dicamba 100 g/l) –1 l/ha; V_5 – Lancet (fluroxipir 80 g/l + acid 2,4 D 450 g/l)–1.25 l/ha; V_6 – Lintur 70 WG(tiasulfuron 4.1% + dicamba 65.9%) –125 g/ha; V_7 – Mustang (florasulam 6.25 g/l + acid 2,4 D 300 g/l) –0.6 l/ha; V_8 – Oltisan extra (acid 2,4D 325 g/l + dicamba 75 g/l) – 1 l/ha; V_9 – Sekator (amidosulfuron 5% + iodosulfuron-methyl 1.25%) –300 g/ha, and V_{10} – Not treated.

The sowing was done in the second decade of October and all the trial variants were fertilized with complex chemical fertilizers corresponding to a dose of $N_{100}P_{45}K_{45}$. Fertilizers were applied in fractions, upon preparation of the germination bed and early in spring.Herbicide doses were established depending on weeding degree and on the recommendations of the producers, being calculated for the area of 82 m^2 of each variant.

RESULTS OBTAINED

Synthesising the results (the average of the years 2005-2007), we can see that the weeding degree in the Alex cultivar not treated variant was 101.94 weeds/m^2. The largest share was that of the annual dicot *Polygonum convolvulus* (21.68%), followed by perennial dicots *Cirsium arvense* (12.58%) and *Convolvulus arvensis* (12.52%). (Table 1).

Table 1

The number of weeds in the control variant(no herbicides), in cultivar Alex, the average 2005–2007

No	Weed species	Clasa botanica	Number of weeds/m^2	Participation(%)
1	*Polygonum convolvulus*	D.a.	22,11	21,68
2	*Cirsium arvense*	D.p.	12,82	12,58
3	*Convolvulus arvensis*	D.p.	12,77	12,52
4	*Stellaria media*	D.a.	8,57	8,41
5	*Veronica hederifolia*	D.a.	7,55	7,41
6	*Lamium purpureum*	D.a.	4,41	4,33
7	*Capsella bursa pastoris*	D.a.	4,34	4,26
8	*Chenopodium album*	D.a.	4,26	4,18
9	*Sinapis arvensis*	D.a.	3,57	3,50
10	*Polygonum aviculare*	D.a.	3,00	2,94
11	*Fumaria officinalis*	D.a.	2,85	2,79
12	*Cardaria draba*	D.p.	2,63	2,58
13	*Matricaria inodora*	D.a.	2,03	1,99
14	*Taraxacum officinale*	D.p.	2,31	2,27
15	*Raphanus raphanistrum*	D.a.	2,30	2,26
16	*Papaver rhoeas*	D.a.	1,37	1,34
17	*Galium aparine*	D.a.	1,17	1,15
18	*Consolida regalis*	D.a.	0,81	0,80
19	*Viola arvensis*	D.a.	0,77	0,76
20	*Stachys annua*	D.a.	0,57	0,56
21	*Lathyrus tuberosus*	D.a.	0,51	0,50
22	*Agropyron repens*	M.p.	0,42	0,41
23	*Lamium amplexicaule*	D.a.	0,38	0,37
24	*Sonchus arvensis*	D.a.	0,38	0,37
25	*Sorghum halepense*	D.a.	0,04	0,04
TOTAL			**101,94**	**100,00**

Analysing the average of the results of experimental years 2005-2007 (Table 2 and Figure 1), we can see that the herbicides Icedin super 1/ha and Oltisan extra 1/ha resulted in weed control values of over 90% (90.47%) and (90.19%), respectively.

Table 2

The herbicides effect on weeding degree in winter wheat (Alex cultivar), the average 2005–2007

Variant	Number of weeds/m^2	Weed control degree(%)	Weeds destroyed/m^2	Significance of the difference
V_4-Icedin super1l/ha	9,71	90,47	92,23	***
V_8-Oltisan extra 1 l/ha	10,00	90,19	91,94	***
V_7-Mustang 0,6 l/ha	12,29	87,94	89,65	***
V_5-Lancet 1,25 l/ha	12,53	87,70	89,41	***
V_2- Derby 175 SC 0,07l/ha	12,70	87,54	89,24	***
V_6-Lintur 70WG 125g/ha	15,06	85,22	86,88	***

V_1-Aim Plus 0,35 kg/ha	15,35	84,94	86,59	***
V_9-Sekator 300g/ha	18,81	81,54	83,13	***
V_3-DMA_6 1l/ha	29,06	71,49	72,88	***
V_{10}-non treated	101,94	0,00	Mt.	-

$DL_{5\%}$ =1,42 weeds/m^2 $DL_{1\%}$ = 1,96 weeds/m^2 $DL_{0,1\%}$= 2,61 weeds/m^2

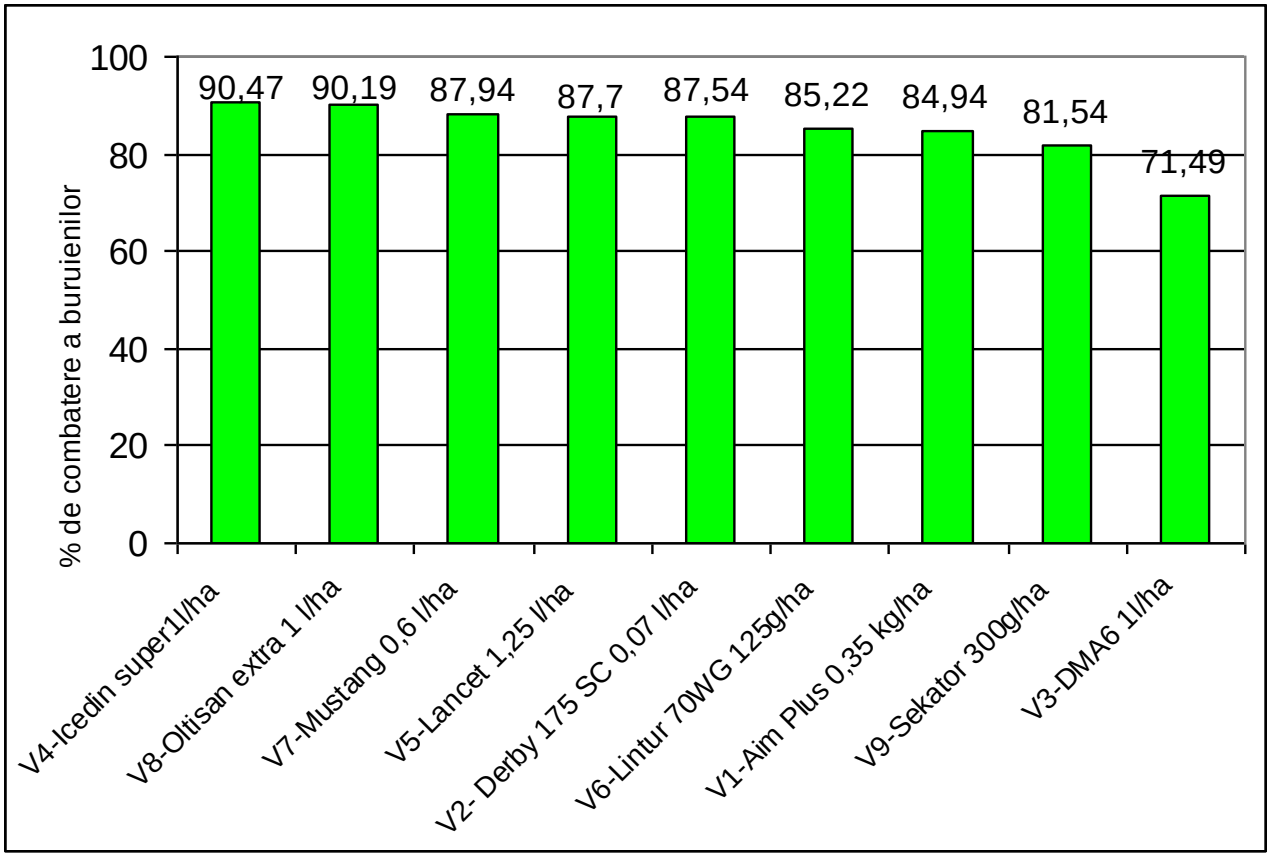

Figure 1. Weed control degree in winter wheat cultivar Alex after herbicide treatment, the average 2005-2007

A weed control degree of over 87% was ensured by the herbicides Mustang 0.6 l/ha (87.94%), Lancet 1.25 l/ha (87.70%), and Derby 175 SC 0.07 l/ha (87.54%). A weed control degree of about 85% was ensured by the herbicides Lintur 70 WG 125 g/ha (85.22%) and Aim Plus 0.35 kg/ha (84.94%). The herbicide Sekator 300 g/ha controls weeds in about 81.54% of the cases, while the herbicide DMA6 1l/ha only reaches 71.49%.

Table 3 and Figure 2 present the results, i.e. the average of the years 2005-2007 in the Alex winter wheat cultivar after the treatment with herbicides. The largest yields were in the variants treated with Icedin super 1l/ha (44.56 q/ha) and Oltisan extra 1 l/ha (44.49 q/ha), the differences compared to the average of the field being significant. In the variant treated with Mustang 0.6 l/ha, the yield reached 43.36 q/ha, with a distinctly significant difference compared to the field average.

The variants treated with Lancet 1.25 l/ha (42.35 q/ha) and Derby 175 SC 0.07 l/ha (41.99 q/ha) were above the average of the field, but with insignificant yield differences from a statistical point of view.

The variants treated with Lintur 125 g/ha (40.99 q/ha) and Aim Plus 0.35 kg/ha (40.79 q/ha) were below the average of the field (41.09 q/ha), but with insignificant yield differences from a statistical point of view. The herbicides Sekator 300 g/ha (39.51 q/ha) and DMA 6 1 l/ha (38.55 q/ha) and the variant not treated (34.97 q/ha) resulted in negative differences – significant, distinctly significant, and very significant ones.

Table 3

The impact of herbicides on yield in winter wheat (Alex cultivar), the average 2005–2007

Variant	Absolute yield (q/ha)	Relative yield %	Difference in yield (q/ha)	Significance
V_4-Icedin super 1l/ha	44,56	108,45	3,47	***
V_8-Oltisan extra 1 l/ha	44,49	108,28	3,40	***
V_7-Mustang 0,6 l/ha	43,36	105,53	2,27	**
V_5-Lancet 1,25 l/ha	42,35	103,07	1,26	-
V_2- Derby 175 SC 0,07l/ha	41,99	102,19	0,9	-
Average	41,09	100,00	Mt.	-
V_6-Lintur 70WG 125g/ha	40,99	99,76	-0,10	-
V_1-Aim Plus 0,35 kg/ha	40,79	99,27	-0,30	-
V_9-Sekator 300g/ha	39,51	96,16	-1,58	0
V_3-DMA_6 1l/ha	38,55	93,82	-2,54	00
V_{10}-non-treated	34,97	85,11	-6,12	000

$DL_{5\%}$ = 1,42 q/ha
$DL_{1\%}$ = 1,92 q/ha
$DL_{0,1\%}$= 2,55 q/ha

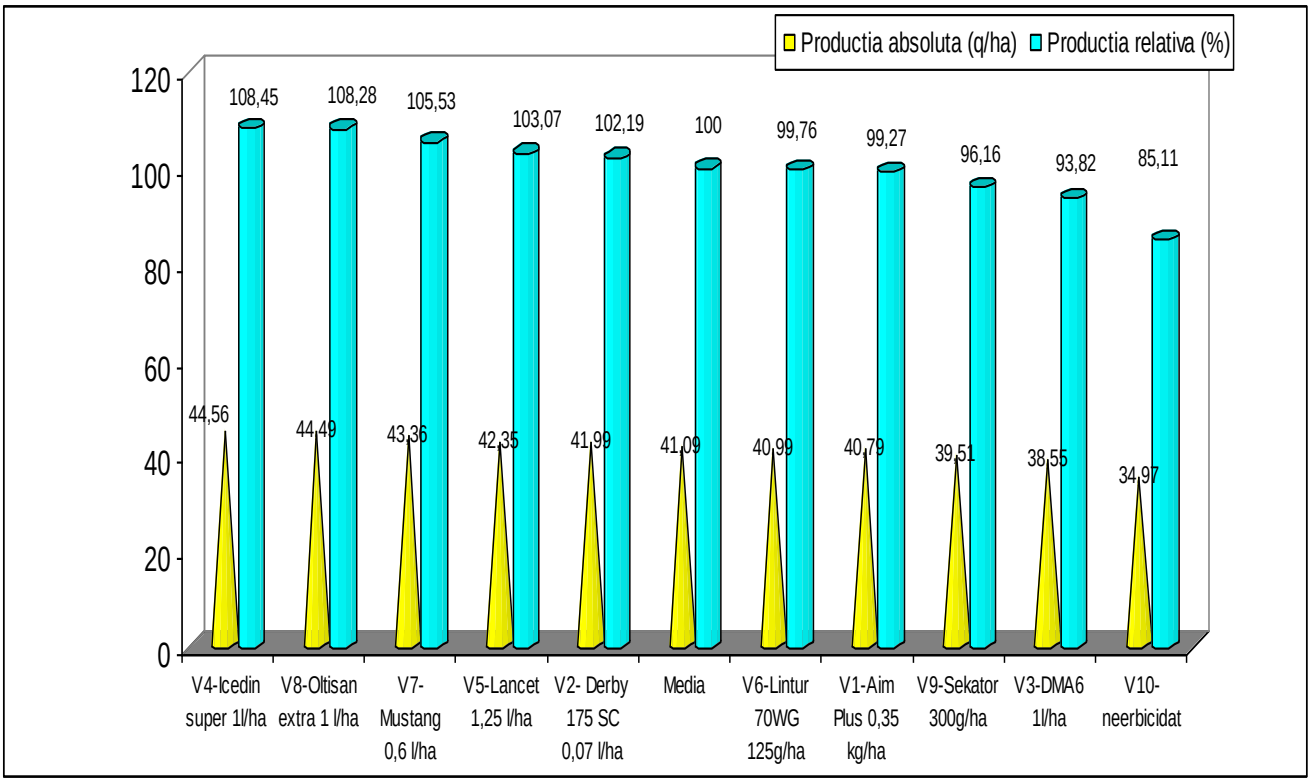

Figure 2 The winter wheat (Alex cultivar) absolute yield (q/ha) and relative yield (q/ha) after treatment with herbicides , the average 2005-2007

CONCLUSIONS

1) Analysing the weeding degree in the not treated variants, we could see that in the Alex cultivar the average of the years 2005-2007 there were 101,94 weeds/m^2 . The largest share was that of the annual dicot *Polygonum convolvulus* (21,68 %) followed by the perennial dicot species *Cirsium arvense* (12,58 %) and *Convolvulus arvensis* (12,52 %).

2) Analysing the data concerning the average of the trial years, we can draw the conclusion that the highest weeding degree control was when treated with Icedin super 1 l/ha 90,47% , the number of weeds diminishing with 92,23 weeds/m^2.

3) The lowest degree of weed control in both cultivars was that of the herbicide DMA 6 1 l/ha. In the Alex cultivar, after applying this herbicide, the number of weeds diminished with 72,88 weeds/m^2 which corresponds to a weed control degree of 71,49%.

4) As for the impact of h as an average for the years 2005-2007 was in the variant treated with Icedin super 1l/ha (44,56 q/ha) followed by the variant treated with Oltisan extra 1 l/ha (44,49 q/ha) with very significant yield increases compared to the average of the field. The following herbicides resulted in values below the average: Lintur 70 WG 125 g/ha (40,99 q/ha), Aim Plus 0.35 kg/ha (40,79 q/ha), Sekator 300 g/ha (39.51 q/ha), and DMA 6 1l/ha (38.55 q/ha).

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INFLUENȚA ERBICIDELOR ŞI FERTILIZĂRII DIFERENȚIATE ASUPRA PRODUCȚIEI LA DOUĂ SOIURI DE GRÂU DE TOAMNĂ ZONATE ÎN VESTUL ROMÂNIEI

ON THE IMPACT OF HERBICIDES AND DIFFERENTIATED FERTILISERS ON YIELD IN TWO WINTER WHEAT CULTIVARS ADAPTED TO WESTERN ROMANIA

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Keywords : winter wheat, yield, herbicides, fertilisers

ABSTRACT

Cercetările desfăşurate pe durata a doi ani agricoli 2006/2007 şi 2007/2008 au vizat evidențierea efectului erbicidelor şi fertilizării diferențiate cu îngrăşăminte minerale asupra producției de grâu de toamnă la soiurile Alex şi Romulus.În anul 2007, producția de grâu de toamnă la soiul Alex a fost cuprinsă între 26,49 q/ha şi 49,92 q/ha, iar la soiul Romulus între 26,10 q/ha şi 43,92 q/ha. Producțiile cele mai mari s-au obținut în variantele la soiul Alex fertilizate cu $N_{120}P_{45}K_{45}$ şi erbicidate cu Oltisan M 1l/ha şi Mustang 0,5 l/ha acestea fiind de 49,92 q/ha şi respectiv 46,83 q/ha. Şi la soiul Romulus, variantele erbicidate cu Oltisan M 1l/ha, Mustang 0,5 l/ha şi fertilizate cu $N_{120}P_{45}K_{45}$ realizează producții de 43,92 q/ha şi 43,90 q/ha. Ținând cont de faptul că în primăvara anului 2007, s-a înregistrat o secetă prelungită (luna aprilie s-au înregistrat 4 mm precipitații) se constată o slabă valorificare a îngrăşămintelor administrate, producția de grâu fiind inferioară mediei anilor favorabili culturii grâului din această zonă a țării. În anul 2008, în urma aplicării erbicidelor şi fertilizării, producția de grâu de toamnă la soiul Alex a fost cuprinsă între 32,92 q/ha şi 54,28 q/ha. Producțiile cele mai mari s-au obținut în variantele erbicidate cu Oltisan M 1l/ha, Mustang 0,5 l/ha şi fertilizate cu $N_{120}P_{45}K_{45}$ acestea fiind de 54,28 q/ha,si respectiv 52,17q/ha. Soiul Romulus, comparativ cu soiul Alex în anul 2008 realizează producții inferioare. Variantele erbicidate cu Oltisan M 1l/ha, Mustang 0,5 l/ha g/ha şi fertilizate cu $N_{120}P_{45}K_{45}$ realizează cele mai mari producții, de 50,14 q/ha şi respectiv 49,58 q/ha.

Research carried out over two agricultural years (2006-2007 and 2007-2008) aimed at pointing out the effect of herbicides and differentiated fertilisers with mineral fertilisers on yield in winter wheat (Alex and Romulus cultivars). In the year 2007, yield in the Alex winter wheat cultivar was between 26,49 q/ha and 49,92 q/ha, and in yield in the Romulus winter wheat cultivar it was between 26,10 q/ha and 43,92 q/ha. The highest yields in the Alex cultivar were in the $N_{120}P_{45}K_{45}$ variants treated with Oltisan M 1l/ha and Mustang 0,5 l/ha, i.e. 49,92 q/ha and 46,83 q/ha, respectively. In the Romulus winter wheat cultivar also, the variants treated with Oltisan M 1l/ha, Mustang 0,5 l/ha, and fertilised with $N_{120}P_{45}K_{45}$ yielded 43,92 q/ha and 43,90 q/ha. Taking into account the fact that the spring of 2007 was marked by prolonged drought (in April there were 4 mm of rainfall), there was a poor valorising of the fertilisers administered, winter wheat yield being lower than the average of the years considered favourable to this crop in this area of the country. In the year 2008, after applying herbicides and fertilisers, winter wheat yield in the Alex cultivar was between 32,92 q/ha and 54,28 q/ha. The highest yields were in the variants treated with Oltisan M 1l/ha and Mustang 0,5 l/ha and fertilised with $N_{120}P_{45}K_{45}$, i.e. 54,28 q/ha and 52,17q/ha, respectively. The Romulus winter wheat cultivar yielded less than the Alex winter wheat cultivar in 2008. The variants treated with Oltisan M 1l/ha and Mustang 0,5 l/ha g/ha and fertilised with $N_{120}P_{45}K_{45}$ yielded the highest yields, i.e. 50,14 q/ha and 49,58 q/ha, respectively.

INTRODUCTION

Chemical fertilisers as a major factor in increasing yield can also improve yield quality. Results obtained by Hera et al. (1986), Oproiu et al. (1980) show the positive effect of chemical fertilisers on winter wheat, as well as their impact on raw protein content. Nitrogen increases yield and raw protein content. Phosphorus allows a better valorising of nitrogen fertilizers in yield increases per ha. Potassium has a lesser impact than nitrogen, but it determines particularly better yield quality. Radulov (2004) reports increase in winter wheat yield with the increase of phosphorus and potassium fertiliser rate, no matter the nitrogen fertilisation of the soil.

MATERIAL AND METHODES

During the experimental years 2006-2007 and 2007-2008, we developed at the Didactic Station of the University of Agricultural Science and Veterinary Medicine of the Banat in Timişoara, a polyfactorial experiment with four replications after the sub-divided plot method, each harvestable plot measuring 35 m^2 (7 m x 5 m) (Săulescu and Săulescu, 1967).

The three experimental factors were as follows:

Factor A – cultivated cultivar, with the following graduations: a_1 – Alex; a_2 – Romulus;

Factor B – post-emergent herbicides, with the following graduations: b_1 – not treated; b_2 – Oltisan M (10 g/l dicamba + 325 g/l acid 2.4 D), 1l/ha; b_3 – Mustang (florasulam 6.25 g/l + 300 g/l 2.4-D) 0.5 l/ha; b_4 – Lintur 70 WG (triasulfuron 4.1% + dicamba 65.9%) 150 g/ha;

Factor C – fertilisation, with the following graduations: c_1 – not fertilised; c_2 – fertilised with $N_{45}P_{45}K_{45}$, c_3 – $N_{90}P_{45}K_{45}$, and c_4 – $N_{120}P_{45}K_{45}$.

The cultivation technology we applied is specific to the chernozem area of the Western Romanian Plain, with the following mentions:

- soy was the pre-emergent crop;
- sowing was done during the second decade of October;
- experimental variants were treated with complex chemical fertilisers, i.e. with ammonia nitrate in two steps: fall – upon preparation of the germination bed, and spring (March);
- herbicides were applied during the vegetation stage, when there were 3 leaves on each plant, until the development of the first inter-not, when weeds had 2 to 4 leaves.

Herbicide application was done with the help of a portable sprayer at a rate of 300 l per ha. Herbicide rates were established depending on the weeding degree and on the recommendations made by the producers.

RESULTATS

In the spring of the year 2007, there was prolonged drought (there were only 4 mm rainfall in April), which resulted in poor valorising of the yielding potential; as a result, winter wheat yield was much inferior to the average of the years favourable to winter wheat in this pat of the country. Comparing the two winter wheat cultivars, Alex and Romulus (Factor A), we can see that, from the point of view of the yields, the Alex winter wheat cultivar, with an average production of 39.14 q/ha, was superior to the Romulus winter wheat cultivar, with an average production of 35.95 q/ha (Table 1).

Table 1

The unilateral analysis of factor A (cultivar) on yield in 2007

Factor A combination	Values of the factors(q/ha)	Difference in yield(q/ha)	Significance of the difference
Romulus–Alex	**35,95–39,14**	**–3,18**	**000**

DL 5%=0,27 q/ha
DL 1%=0,49 q/ha
DL0,1%=1,08 q/ha

Analysing the impact of weed control measures on yield (Factor B), the highest yields were when treated with Oltisan M 1 l/ha, with an average of 40.28 q/ha, followed by Mustang 0.5 l/ha (38.61 q/ha) and Lintur 70 WG 150 g/ha (38.46 q/ha), (Table 2).

Table 2

The unilateral analysis of factor B (herbicides) on yield in 2007

Factor B combination	Values of the factors(q/ha)	Difference in yield (q/ha)	Significance of the difference
Oltisan M–neerbicidat	**40,28–32,83**	**7,45**	***
Mustang– neerbicidat	**38,61–32,83**	**5,78**	***
Lintur 70WG–neerbicidat	**38,46–32,83**	**5,63**	***
Mustang–Oltisan M	**38,61–40,28**	**-1,67**	**000**
Lintur 70WG–Oltisan M	**38,46–40,28**	**-1,82**	**000**
Lintur 70WG–Mustang	**38,46–38,61**	**-0,15**	**-**

DL 5%= 0,48 q/ha
DL 1%=0,64 q/ha
DL0,1%=0,83 q/ha

Differences in yield between the treated and the not treated variants are very significant. The highest difference in yield between fertilisation levels is 12.86 q/ha between the agri-funds $N_{120}P_{45}K_{45}$ and $N_0P_0K_0$, while the least difference is 2.77 q/ha between the levels $N_{90}P_{45}K_{45}$ and $N_{45}P_{45}K_{45}$ (Table 3).

Table 3

The unilateral analysis of factor C (fertiliser) on yield in 2007

Factor C combination	Values of the factors(q/ha)	Difference in yield(q/ha)	Significance of the difference
$N_{45}P_{45}K_{45}$–$N_0P_0K_0$	**36,84–30,44**	**6,40**	***
$N_{90}P_{45}K_{45}$–$N_0P_0K_0$	**39,60–30,44**	**9,16**	***
$N_{120}P_{45}K_{45}$–$N_0P_0K_0$	**43,30–30,44**	**12,86**	***
$N_{90}P_{45}K_{45}$–$N_{45}P_{45}K_{45}$	**39,60–36,84**	**2,77**	***
$N_{120}P_{45}K_{45}$–$N_{45}P_{45}K_{45}$	**43,30–36,84**	**6,47**	***
$N_{120}P_{45}K_{45}$– $N_{90}P_{45}K_{45}$	**43,30–39,60**	**3,70**	***

DL 5%=0,23 q/ha
DL 1%=0,32 q/ha
DL0,1%=0,43 q/ha

Synthesis of production results (Table 4) shows that the field average was 37.54 q/ha. The highest yields – 49.22 q/ha, 46.83 q/ha and 44.68 q/ha – were in the Alex winter wheat cultivar fertilised with $N_{120}P_{45}K_{45}$ and treated with Oltisan M 1 l/ha, Mustang 0.5 l/ha

and Lintur 70 WG 150 g/ha. The variants not fertilised and not treated yielded the least in both winter wheat cultivars: Alex with 26.49 q/ha and Romulus with 26.10 q/ha.

Table 4

Synthesis of trial concerning the influence of interaction between experimental factors on yield in winter wheat in 2007

No.	Variant	Absolute yield (q/ha)	Relative yield (%)	Difference in yield to the control (q/ha)	Signifi-cance
1	**Alex–Oltisan M–$N_{120}P_{45}K_{45}$**	**49,92**	**132,98**	**12,38**	***
2	**Alex–Mustang–$N_{120}P_{45}K_{45}$**	**46,83**	**124,75**	**9,29**	***
3	**Alex–Lintur 70WG–$N_{120}P_{45}K_{45}$**	**44,68**	**119,02**	**7,14**	***
4	**Romulus–Oltisan M–$N_{120}P_{45}K_{45}$**	**43,92**	**117,00**	**6,38**	***
5	**Romulus–Mustang–$N_{120}P_{45}K_{45}$**	**43,90**	**116,94**	**6,36**	***
6	**Alex–Mustang–$N_{90}P_{45}K_{45}$**	**43,76**	**116,57**	**6,22**	***
7	**Alex–Oltisan M–$N_{90}P_{45}K_{45}$**	**43,25**	**115,21**	**5,71**	***
8	**Alex–Oltisan M–$N_{45}P_{45}K_{45}$**	**42,47**	**113,13**	**4,93**	***
9	**Alex–Lintur 70WG–$N_{90}P_{45}K_{45}$**	**42,09**	**112,12**	**4,55**	***
10	**Romulus–Lintur–$N_{120}P_{45}K_{45}$**	**42,06**	**112,04**	**4,52**	***
11	**Romulus–Oltisan M–$N_{90}P_{45}K_{45}$**	**40,37**	**107,54**	**2,83**	***
12	**Alex–neerbicidat–$N_{120}P_{45}K_{45}$**	**39,94**	**106,39**	**2,40**	***
13	**Alex–Mustang–$N_{45}P_{45}K_{45}$**	**39,20**	**104,42**	**1,66**	**
14	**Alex–Lintur 70WG–$N_{45}P_{45}K_{45}$**	**39,15**	**104,29**	**1,61**	*
15	**Romulus–Lintur 70 WG–$N_{90}P_{45}K_{45}$**	**38,97**	**103,81**	**1,43**	*
16	**Romulus–Mustang–$N_{90}P_{45}K_{45}$**	**38,87**	**103,54**	**1,33**	*
17	Average	37,54	100,00	Mt.	-
18	**Romulus–Oltisan M–$N_{45}P_{45}K_{45}$**	**37,05**	**98,69**	**-0,49**	-
19	**Romulus–Lintur 70WG–$N_{45}P_{45}K_{45}$**	**36,35**	**96,83**	**-1,19**	-
20	**Alex–neerbicidat–$N_{90}P_{45}K_{45}$**	**35,81**	**95,39**	**-1,73**	00
21	**Romulus–neerbicicidat–$N_{120}P_{45}K_{45}$**	**35,17**	**93,69**	**-2,37**	000
22	**Romulus–Mustang–$N_{45}P_{45}K_{45}$**	**35,01**	**93,26**	**-2,53**	000
23	**Alex–neerbicidat–$N_{45}P_{45}K_{45}$**	**33,70**	**89,77**	**-3,84**	000
24	**Romulus–neerbicidat–$N_{90}P_{45}K_{45}$**	**33,68**	**89,72**	**-3,86**	000
25	**Alex–Oltisan M–$N_0P_0K_0$**	**33,28**	**88,65**	**-4,26**	000
26	**Alex–Lintur 70WG–$N_0P_0K_0$**	**33,27**	**88,63**	**-4,27**	000
27	**Alex–Mustang–$N_0P_0K_0$**	**32,34**	**86,15**	**-5,20**	000
28	**Romulus–Oltisan M–$N_0P_0K_0$**	**31,98**	**85,19**	**-5,56**	000
29	**Romulus– neerbicidat–$N_{45}P_{45}K_{45}$**	**31,75**	**84,58**	**-5,79**	000
30	**Romulus–Lintur 70WG–$N_0P_0K_0$**	**31,09**	**82,82**	**-6,45**	000
31	**Romulus–Mustang–$N_0P_0K_0$**	**28,96**	**77,14**	**-8,58**	000
32	**Alex–neerbicidat–$N_0P_0K_0$**	**26,49**	**70,56**	**-11,05**	000
33	**Romulus–neerbicidat–$N_0P_0K_0$**	**26,10**	**69,53**	**-11,44**	000

$DL_{5\%}$ = 1,23 q/ha $DL_{1\%}$ = 1,63 q/ha $DL_{0,1\%}$= 2,12 q/ha

Compared to the agricultural year 2006-2007, the agricultural year 2007-2008 was favourable to winter wheat, with yields confirming the mentions above. Analysing Factor A (cultivar) unilaterally, we can see that the Alex winter wheat cultivar, with an average of 43.99 q/ha, proved superior to the Romulus winter wheat cultivar, with an average of 42.17 q/ha, the difference in yield between the averages of the two winter wheat cultivars being very significant from a statistic point of view (Table 5).

Table 5

The unilateral analysis of factor A (cultivar) on yield in 2008

Factor A combination	Values of the factors(q/ha)	Difference in yield (q/ha)	Significance of the difference

Romulus–Alex	**42,17–43,99**	**-1,82**	**000**

DL $_{5\%}$=0,27 q/ha DL $_{1\%}$=0,50 q/ha DL $_{0,1\%}$=1,11 q/ha

As for the analysis of Factor B (treating with herbicides), we can see that the differences between the treated ad the not treated variants – 7.46 q/ha (Oltisan M –not treated), 5.53 q/ha (Lintur 70WG – not treated) and 5.47 q/ha (Mustang –not treated), being very significant from a statistic point of view. Differences in yield among tested herbicides show that Oltisan M 1 l/ha (with an average of 45.92 q/ha), yielded the best results, followed by Lintur 70 WG 150 g/ha (with an average of 43.99 q/ha) and Mustang 0.5 l/ha (with an average of 43.93 q/ha) ,(Table 6).

Table 6

The unilateral analysis of factor B (herbicides) on yield in 2008

Factor B combination	Values of the factors(q/ha)	Difference in yield (q/ha)	Significance of the difference
Oltisan M–neerbicidat	**45,92–38,46**	**7,46**	***
Mustang– neerbicidat	**43,93–38,46**	**5,47**	***
Lintur 70WG– neerbicidat	**43,99–38,46**	**5,53**	***
Mustang–Oltisan M	**43,93–45,92**	**-1,99**	**000**
Lintur 70WG–Oltisan M	**43,99–45,92**	**-1,93**	**000**
Lintur 70WG– Mustang	**43,99–43,93**	**0,07**	**-**

DL $_{5\%}$=0,49 q/ha DL $_{1\%}$=0,65 q/ha DL $_{0,1\%}$=0,84 q/ha

Yield differences among the graduations of Factor C (fertilisation) are very significant statistically, the highest difference in yield being on the agri-funds between $N_{120}P_{45}K_{45}$ and $N_0P_0K_0$, i.e. 13.06 q/ha, with the lowest differences in yield between the agri-funds $N_{90}P_{45}K_{45}$ and $N_{45}P_{45}K_{45}$, i.e. 2.86 q/ha, (Table 7).

Table 7

The unilateral analysis of factor C (fertiliser) on yield in 2008

Factor C combination	Values of the factors(q/ha)	Difference in yield (q/ha)	Significance
$N_{45}P_{45}K_{45}$–$N_0P_0K_0$	**42,48–35,71**	**6,77**	***
$N_{90}P_{45}K_{45}$–$N_0P_0K_0$	**45,34–35,71**	**9,63**	***
$N_{120}P_{45}K_{45}$–$N_0P_0K_0$	**48,77–35,71**	**13,06**	***
$N_{90}P_{45}K_{45}$–$N_{45}P_{45}K_{45}$	**45,34–42,48**	**2,86**	***
$N_{120}P_{45}K_{45}$–$N_{45}P_{45}K_{45}$	**48,77–42,48**	**6,29**	***
$N_{120}P_{45}K_{45}$– $N_{90}P_{45}K_{45}$	**48,77–45,34**	**3,43**	***

DL $_{5\%}$=0,37 q/ha DL $_{1\%}$=0,50 q/ha DL $_{0,1\%}$=0,68 q/ha

The highest yield in the year 2008 was in the Alex winter wheat cultivar treated with Oltisan M on the agri-fund $N_{120}P_{45}K_{45}$ (54.28 q/ha), the increase in yield reaching 26.01% compared to the average of the experiment, followed by the Alex winter wheat cultivar treated with Mustang on the agri-fund $N_{120}P_{45}K_{45}$ (52.17 q/ha) with a yield increase compared to the control of 21.11 q/ha and the Romulus winter wheat cultivar treated with Oltisan M on the agri-fund $N_{120}P_{45}K_{45}$ (50.14 q/ha), with an increase in yield compared to the control of 16.40%. The least yields were in the variant treated and not fertilised variant in the Alex winter wheat cultivar, i.e. 32.92 q/ha, and in the Romulus winter wheat cultivar, i.e. 32.10 q/ha, differences compared to the control being statistically not significant, (Table 8).

Table 8

Synthesis of trial concerning the influence of interaction between experimental factors on yield in winter wheat in 2008

No	Variant	Absolute yield (q/ha)	Relative yield (%)	Difference in yield to the control (q/ha)	Signifi-cance
1	**Alex–Oltisan M–$N_{120}P_{45}K_{45}$**	**54,28**	**126,01**	**11,20**	***
2	**Alex–Mustang–$N_{120}P_{45}K_{45}$**	**52,17**	**121,11**	**9,09**	***
3	**Romulus–Oltisan M–$N_{120}P_{45}K_{45}$**	**50,14**	**116,40**	**7,06**	***
4	**Romulus–Mustang–$N_{120}P_{45}K_{45}$**	**49,58**	**115,10**	**6,50**	***
5	**Alex–Lintur 70WG–$N_{120}P_{45}K_{45}$**	**49,35**	**114,56**	**6,27**	***
6	**Romulus–Lintur 70WG–$N_{120}P_{45}K_{45}$**	**48,75**	**113,17**	**5,67**	***
7	**Alex–Oltisan M–$N_{90}P_{45}K_{45}$**	**48,15**	**111,78**	**5,07**	***
8	**Alex–Mustang–$N_{90}P_{45}K_{45}$**	**48,07**	**111,59**	**4,99**	***
9	**Alex–Oltisan M–$N_{45}P_{45}K_{45}$**	**47,53**	**110,34**	**4,45**	***
10	**Romulus–Oltisan M–$N_{90}P_{45}K_{45}$**	**47,35**	**109,92**	**4,27**	***
11	**Alex–Lintur 70 WG–$N_{90}P_{45}K_{45}$**	**47,26**	**109,71**	**4,18**	***
12	**Romulus–Mustang–$N_{90}P_{45}K_{45}$**	**45,58**	**105,81**	**2,50**	***
13	**Romulus–Lintur 70WG–$N_{90}P_{45}K_{45}$**	**45,40**	**105,39**	**2,32**	**
14	**Alex–neerbicidat–$N_{120}P_{45}K_{45}$**	**44,87**	**104,16**	**1,79**	**
15	**Alex–Mustang–$N_{45}P_{45}K_{45}$**	**44,32**	**102,89**	**1,24**	-
16	**Romulus–Oltisan M–$N_{45}P_{45}K_{45}$**	**44,16**	**102,52**	**1,08**	-
17	**Alex–Lintur–$N_{45}P_{45}K_{45}$**	**44,07**	**102,31**	**0,99**	-
18	Average	43,08	100,00	Mt.	-
19	**Romulus–Lintur 70WG–$N_{45}P_{45}K_{45}$**	**42,95**	**99,71**	**-0,13**	-
20	**Romulus–neerbicidat–$N_{120}P_{45}K_{45}$**	**41,03**	**95,25**	**-2,05**	00
21	**Romulus–Mustang–$N_{45}P_{45}K_{45}$**	**40,97**	**95,11**	**-2,11**	00
22	**Alex–neerbicidat–$N_{90}P_{45}K_{45}$**	**40,78**	**94,67**	**-2,30**	00
23	**Romulus–neerbicidat–$N_{90}P_{45}K_{45}$**	**40,12**	**93,14**	**-2,96**	000
24	**Alex–neerbicidat–$N_{45}P_{45}K_{45}$**	**38,47**	**89,31**	**-4,61**	000
25	**Romulus–Oltisan M–$N_0P_0K_0$**	**37,96**	**88,12**	**-5,12**	000
26	**Alex–Oltisan M–$N_0P_0K_0$**	**37,81**	**87,77**	**-5,27**	000
27	**Romulus–neerbicidat–$N_{45}P_{45}K_{45}$**	**37,40**	**86,82**	**-5,68**	000
28	**Alex–Lintur 70WG–$N_0P_0K_0$**	**37,25**	**86,47**	**-5,83**	000
29	**Romulus– Lintur 70WG–$N_0P_0K_0$**	**36,92**	**85,71**	**-6,16**	000
30	**AlexMustang–$N_0P_0K_0$**	**36,47**	**84,66**	**-6,61**	000
31	**Romulus–Mustang–$N_0P_0K_0$**	**34,27**	**79,56**	**-8,81**	000
32	**Alex–neerbicidat–$N_0P_0K_0$**	**32,92**	**76,42**	**-10,16**	000
33	**Romulus–neerbicidat–$N_0P_0K_0$**	**32,10**	**74,52**	**-10,98**	000

$DL_{5\%}$ = 1,31 q/ha $DL_{1\%}$ = 1,76 q/ha $DL_{0,1\%}$= 2,36 q/ha

CONCLUSIONS

1. Analysing yield results, we can draw the conclusion tat during the two experimental years 2006-2007 and 2007-2008 the Alex winter wheat cultivar was superior to the Romulus winter wheat cultivar. Thus, in the year 2007, the Alex winter wheat cultivar yielded an average production of 39.14 q/ha, and in the year 2008 it yielded 43.99 q/ha, compared to

the Romulus winter wheat cultivar which yielded an average production of 35.95 q/ha in the year 2007 and 42.17 q/ha in the year 2008.

2. In the year 2007, the best yielding results where when treated with Oltisan M 1 l/ha with an average production of 40.28 q/ha, followed by the herbicides Mustang 0.5 l/ha (38.61 q/ha) and Lintur 70 WG 150 g/ha (38.46 q/ha). In the year 2008 too, the herbicide Oltisan M 1l/ha, with an average production of 45.92 q/ha, proved to be superior to the other two herbicides: Lintur 70WG 150 g/ha (43.99 q/ha) and Mustang 0.5 l/ha (43.93 q/ha).

3. In the year 2007, the fertilisation level $N_{120}P_{45}K_{45}$ resulted in a maximum average production of 43.30 q/ha, followed by the agri-funds $N_{90}P_{45}K_{45}$ with an average production of 39.60 q/ha and $N_{45}P_{45}K_{45}$ with an average production of 36.84 q/ha. In the year 2008 too, the fertilisation level $_{120}P_{45}K_{45}$ resulted in a maximum production level of 48.77 q/ha compared to the other agri-funds: $N_{90}P_{45}K_{45}$ with an average production of 45.34 q/ha, $N_{45}P_{45}K_{45}$ with an average production of 42.48 q/ha, while the not fertilised variant (the control) yielded 35.71 q/ha.

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EFECTUL APLICĂRII UNOR ÎNGRĂŞĂMINTE LICHIDE LA ARDEI GRAS ÎN SPAȚIU PROTEJAT

THE EFFECT OF LIQUID FERTILIZERS APPLIED ON BELL-PEPPER IN THE PROTECTED SPACE

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Key words: fertilization, bell-pepper, liquid fertilizers

ABSTRACT

Lucrarea prezintă rezultatele experimentale obținute în casa de vegetație prin aplicarea a patru noi tipuri de îngrăşăminte lichide (NEB 26, Stimusoil, Kelpak şi Bionat). Aceste îngrăşăminte au fost testate la cultura de ardei gras, soiul Cornel. Îngrăşămintele au fost administrate prin aplicarea atât în sol (Neb-26 şi Stimusoil) cât şi pe cale foliară (Kelpak şi Bionat).

Aplicarea acestora, în 2005-2007, pe solul cernoziom cambic a asigurat sporuri semnificative de producție care variază între 37 şi 67%.

De asemenea, fertilizanții lichizi cu însuşiri ecologice aplicați au avut ca rezultat direct creşterea semnificativă a gradelor de utilizare productivă a nutrienților în recoltă, ceea ce corespunde cu diminuarea poluării chimice a mediului ambiant.

Această lucrare a fost finanțată de Ministerul Educației, Cercetării şi Tineretului, Centrul Național de Management Programe, Proiect PENSOL, nr. 52-149/1.10.2008.

The paper presents experiment results obtained into the greenhouse applying four new ranges of liquid fertilizers (NEB 26, Stimusoil, Kelpak and Bionat). This fertilizers was tested with the bell-pepper crop, Cornel cultivar. The tested fertilizers were administrated by applying both in soil (Neb-26 and Stimusoil) and on leaves (Kelpak and Bionat).

The application of these, in 2005-2007, on cambic chernozem soil, ensured a significant yield increases, varying between 37 and 67%.

Also, the applied liquid fertilizers with ecological features had as a direct result the significant increase of degree of productive use of nutrients in crop yield, that corresponds with the environmental chemical pollution diminuation.

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INTRODUCTION

Vegetables have a share in the growing population of food, peppers and the fat part of the main species grown in the EU. For this reason, manufactures of fertilizers are concerned with the manufacture of some sort in particular for vegetable crops.

The importance of these fertilizers containing increased stimulators and low amounts of nutrients consists in the fact that they are applied in small quantities and produce important effects on plant growth and development. Thanks to the fertilization suitable for this type of fertilizers, the ameliorative effects on plant nutrition are achieved by increasing the capacity of plants to assimilate by roots the nutrients in soil reserve.

MATERIAL AND METHODS

The effect of liquid fertilizers applied to bell pepper was observed in the I.C.P.A. greenhouse. The experiments were organized in Mitscherlich pots with 20 kg of soil per pot.

The experiment soil material was Fundulea Phaeoziom topsoil.

The experiment included two kinds of prepared soil material, that is:

A1 - topsoil plus: N-300 mg/kg of soil, P_2O_5-300 mg/kg of soil, K_2O-300 mg/kg of soil, and 30 g peat/kg of soil; and

A2 - topsoil plus: N-300 mg/kg of soil, P_2O_5-300 mg/kg of soil, K_2O-300 mg/kg of soil.

The used test plant was bell pepper, Cornel cultivar.

Applied treatment fertilizers included: NEB-26, STIMUSOIL for application in soil, and KELPAK, BIONAT for application on plant leaves in three splittings.

The three foliar fertilizations were carried out as follows:

- the first fertilization after 10 days from the plantation;
- the second and the third fertilization at every 7-8 days between them.

The chemical composition of tested fertilizers is presented in the table 1.

Table 1

The chemical composition of fertilizers

Components	KELPAK*	BIONAT*	**STIMUSOIL**	**NEB - 26**
	conc./UM			
N org	0.4%	1.28%	0.125%	-
N tot	0.04%	1.28%	0.125%	-
P_2O_5	0.03%	1.37%	0.175%	0.355%
K_2O	0.61%	0.24%	0.278%	0.108%
Fe	2.2 ppm	0.152%	$7.8 \cdot 10^{-4}$ %	14 ppm
Cu	1.8 ppm	0.215%	0.025%	0.048%
Zn	0.9 ppm	0.195%	$6.9 \cdot 10^{-5}$%	2.1 ppm
Mg	56.4 ppm	0.2%	0.03%	0.025%
Mn	0.8 ppm	0.078%	-	1.7 ppm
B	3.2 ppm	-	$7.3 \cdot 10^{-4}$%	2.5 ppm
Mo	-	-	$8.2 \cdot 10^{-6}$%	0.033 ppm
Na	0.16%	-		0.017%
Ca	0.02%	-	0.042%	0.03%
Growing stimulators (regulators)	auxin 10.7 ppm citokinone 0.03 ppm	-	-	-
protein	0.2%	-	0.78%	0.233%
Amino acids	0.1%	-	-	-
Other organic substances	carbohydrates 1.0%	salicylic acid 1% organic extract from plants 10%	20.87%	11%

**Amounts of organic substances are those declared by the producer*

The used solution concentration was 1% and the applied quantity was 30 ml solution/pot for each treatment. Treatments included: V_1 - control, V_2 - Neb-26, V_3 - Stimusoil, V_4 - Kelpak and V_5 - Bionat.

OBTAINED RESULTS

Table 2 presents productive efficiency of the use of fertilizers described above, with complex solutions containing macro-and micro-nutrients, such as pacemakers and other substances over a period of 4 years (2004 - 2007), as a way of increasing agricultural production by providing a optimal level of nutrition.

Thus, the lowest production (851.01 g / pot) is done in the control variant.

The higher production (2139 g / pot) is carried out in the version fertilized with liquid fertilizer Stimusoil in 2006, pointing to an abundance of highly significant (54%) compared with controls. As regards the average/total year notes significant yield increases to the control in all variants fertilized with liquid fertilizer.

Effectiveness of these fertilization is determined not only the composition rich in macro-and micronutrients but, on the one hand and the presence of substances with the role of stimulating chlorophyl assimilation, which increases efficiency, and on the other hand, increase energy efficiency and metabolic, as a foliar nutrient, and those assimilated from the reserve land.

CONLUSIONS

All the tested liquid fertilizers showed a positive influence on yield increases of bell pepper as compared with controls.

Due to their composition and features they are suitable for foliar fertilization and fertigation.

The liquid fertilizers represents a high efficiency class of fertilizers, which are used as supplementary fertilization during the growing season of crops characterized by a high consumption of nutrients.

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Table 2

The yield increases obtained with tested fertilizers (Neb 26, Stimusoil, Kelpak, Bionat) applied to bell pepper,
Cornel cultivar grown in ICPA greenhouse

Variant	2005					
	A1*			A2*		
	Fruits yield (g/pot)	Yield increases		Fruits yield (g/pot)	Yield increases	
		g/pot	%		g/pot	%
Control	311,46 d	-	-	260,35 c	-	-
NEB-26	406,46 c	95,00	30	392,36 b	132,00	51
STIMUSOIL	407,66 c	96,20	31	384,21 b	123,06	48
KELPAK	625,76 b	314,30	101	547,65 a	287,30	110
BIONAT	780,28 a	488,50	151	571,90 a	311,55	120
Variant	2006					
	A1			A2		
	Fruits yield (g/pot)	Yield increases		Fruits yield (g/pot)	Yield increases	
		g/pot	%		g/pot	%
Control	744,90 c	-	-	684,21 b	-	-
NEB-26	848,82 b	103,92	14	891,98 a	207,77	30
STIMUSOIL	917,90 ab	173,00	23	768,51 ab	84,30	12
KELPAK	963,58 a	218,68	29	867,42 a	183,21	27
BIONAT	878,02 b	133,12	18	870,51 a	186,30	27
Variant	2007					
	A1			A2		
	Fruits yield (g/pot)	Yield increases		Fruits yield (g/pot)	Yield increases	
		g/pot	%		g/pot	%
Control	760,25 d	-	-	747,00 d	-	-
NEB-26	1064,37 c	304, 12	40	1187,80 c	440,80	59
STIMUSOIL	1263,00 b	502,75	66	1532,50 a	785,50	105
KELPAK	1486,12 a	725,87	95	1286,50 b	531,50	72
BIONAT	1603,25 a	843,00	111	1143,00 c	396,00	53

* a topsoil plus marked with the same letter do not differ in terms of statistical significance for the level of 0.05, according Student test statistically-Newman-Keuls

IMPORTANTA MASURILOR DE COMBATERE INTEGRATA IN CADRUL MANAGEMENTULUI DURABIL AL SOLULUI

THE IMPORTANCE OF THE INTEGRATED CROPS CONTROL METHODS IN THE SUSTAINABLE SOIL MANAGEMENT

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Cuvinte cheie: combaterea integrata a culturilor, densitate numerica *(ND)*, nivel de infestare cu fitopatogeni, managementul durabil al solului
Key words: integrated pest control, numerical density (ND), phyto-pathogens infestation level (IL), sustainable soil management.

ABSTRACT

In cadrul acestei lucrari sunt prezentate cateva rezultate preliminarii privind rolul protectiei integrate a plantelor tinand astfel cont de protejarea solului si a mediului si principalele masuri ce trebuie luate in cadrul celor 20 de ferme mici si milocii luate in studiu, din judetul Ilfov.

Acest sutdiu a fost efectuat in cadrul proiectului CEEX nr. 56/2006 cu tema:"Modelarea raspunsului exploatatiilor agricole la integrarea principiilor economice cu cele de mediu prin managementul durabil al resurselor de sol."

Datele statistice referitoare la tehnologia de productie au fost investigate pentru a putea stabili cel mai bun sistem de management si pentru a implementa cele mai eficiente metode de combatere integrate a plantelor.

In our paper we present a few preliminary results of the study regarding the role of integrated crop control principles in the soil and the environmental protection and the main actions which should be applied in the case of twenty small and medium-sized farms from the county Ilfov.

These studies were performed under the project CEEX no. 56/2006 on the theme: "Modelling the response of agricultural holdings to the integration of economic and environmental principles through the sustainable management of soil resources", regarding the integration of economic and environmental principles and actions for the development of sustainable soil management.

The statistical data referring to production technology were investigated in order to achieve the best management system and to establish the measurements adopted for the integrated crop protection implementation.

INTRODUCTION

The *integrated control* concept was introduced in 1956 by B. Bartlett and in 1959 by Stern, considering it a new crop protection concept, which should take into consideration environment protection. The rational organization of the integrated crop control strategy needs to reveal the infestation level (IL) and the numerical density (ND) of the populations of harmful and useful organisms, in order to establish the treatments to be applied.

The methods applied in the integrated control are the following: physical-mechanical, genetic, phyto-sanitary hygiene, crop management, biological and chemical therapy.

The mechanical means are used for the removal of certain phyto-pathogenic agents from the crops, by simple mechanical means. Thus, the dry, diseased branches are cut off; the tree trunks are cleared of mosses and lichens; the diseased kernels are removed from seeds; the Cuscuta (dodders) is separated from the seeds (mainly in the case of alfalfa, clover, linseed).

The mostly frequently used *physical methods* are the following: heat treatment, preservation at cold temperatures, active airing, radiotherapy, electromagnetic techniques or electronic devices.

Heat has been used in the control of phyto-pathogenic agents for a long time. The low temperatures are used in order to preserve certain agricultural products for a long period of time (fruit, vegetables, potatoes, tubers) at 1-4 °C, which represents the lower limit for microorganism development. The active airing of storage rooms hinder the development of phyto-pathogenic micro-organisms, also contributing to their quality preservation.

The sunlight (heliotherapy) can be used in order to fight against certain pathogenic agents, for curative and preventive purposes. It is mostly used for the diseases that are transmitted through seeds or vegetative organs. The X-ray radiation (radiotherapy) proved to be efficient for disinfecting the seeds and the vegetative organs that are to be planted (*Agrobacterium tumefaciens* in the fruit-trees).

The electromagnetic means can be used, for example, for the removal of Cuscuta seeds from the alfalfa or clover seeds. The electric power is used for soil disinfection in certain countries, such as the United States. There is also electronic equipment in place for the chemical treatments. Their jet is electronically directed so as to avoid the great losses of active substance and to reduce soil pollution at minimum.

The genetic engineering methods are used in order to induce pest and disease resistance in certain crops. These genetically modified crops do no longer need specific phyto-sanitary treatments and contribute to the diminution of environment pollution.

The phyto-sanitary hygiene has the role to remove the contagion points, to prevent the spreading and multiplication of phyto-pathogens and to ensure optimum conditions for plant growth and development. Among these measures, the following should be mentioned: disinfection of working tools, of protection equipment; collection and removal of diseased crops, of the fallen leaves and fruit; destruction of weeds that can serve as host-plants for phyto-pathogens; destruction of the vegetal waste that remained after harvesting; removal of dried branches, etc.

The crop management measures, by their correct application, can maintain the infestation with phyto-pathogenic agents below the economic injury threshold (EIT), also contributing to chemical pollution prevention. The main crop management measures are the following: selection and preparation of soil for crops; soil structure improvement works; destruction of second growth plants; crop rotation; rational fertilization; selection of planting stock; plantation period and depth; plant density; maintenance works; irrigation scheme and harvesting period.

The effect of this set of measures is the modification of the ecologic conditions that favours the plants and is less favourable for phyto-pathogens development.

Biotherapy is the biological control that takes place by using the action of “living organisms upon the living organisms”, by means of live organisms and/or with products of

their metabolic activity. The biological control can take place by the action of bacteriophages; on the basis of the antagonism between micro-organisms, by hyper-parasitism, by means of antibiotics and phytoncides, be means of insects, by plant pre-immunization.

The chemotherapy consists in stopping the evolution of pathogen infestation by chemical treatments. The method has a fast and maximum effect, yet it also has a series of disadvantages, such as: pollution of agricultural products, soil and water pollution, harmful effects upon the useful flora and fauna, development of varieties that are resistant to the specific active substance that is used.

The decision on the application of a certain chemical treatment should be well considered, under all its aspects, while always having in view Hippocrate's statement: "primum non nocere" ("first of all, don't do any harm").

MATERIAL AND METHOD

In the present paper we present a few preliminary results of the study on the integration of integrated pest control principles and actions with the environmental principles and actions in the case of small and medium-sized farms from the county Ilfov.

The analysis of the implementation possibilities of the integrated pest control methods in the soil management was based upon the information resulted from the processing of the validated questionnaires applied to 20 agricultural units from the county Ilfov.

The necessary data for the characterization of the "agricultural holding" system, of the production technologies and soil management quality were centralized and investigated on the basis of several criteria: cultivated land area, production structure, land area under organic re-conversion, organically certified land area, cropping system (extensive, intensive), conventional agricultural practices, crop rotation, crop protection systems and methods, minimum soil conservation methods, use of chemical and organic fertilizers, waste storage facilities and treatment application techniques.

On the basis of these data, the management system will be characterized and a series of scenarios will be developed with regard to the farm response to the integration of economic and environmental principles in the sustainable soil management.

RESULTS AND DISCUSSIONS

According to the production structure, the investigated agricultural holdings were divided into three great categories: 11 crop farms, one animal farm and 8 mixed farms (Figure1). Out of total investigated farms, 12 farms belong to physical entities and 8 farms are legal entities.

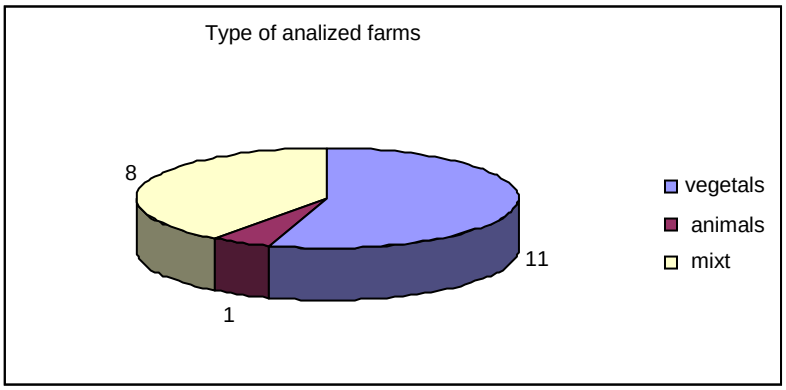

Figure1. Activity profile of the investigated farms

The arable area of these farms sums up 5739.23 ha. Out of this area, about 96.73%, i.e. 5552 ha, belong to the 8 legal entity farms, being represented by mixed (crop and animal) farms (Figure 2).

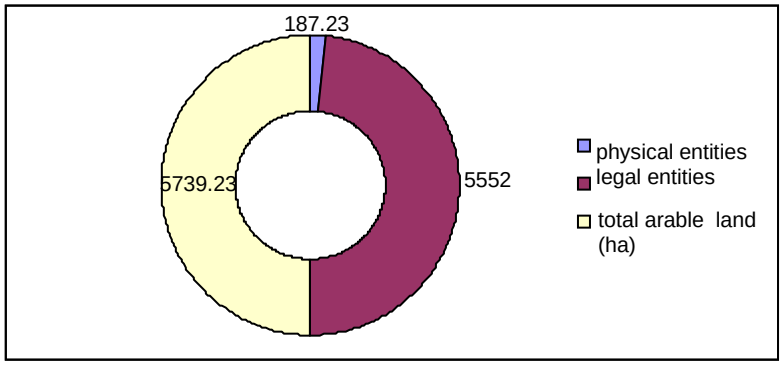

Figure 2. Distribution of arable area by the legal status of farms

With regard to the agricultural production methods that are used, out of the total number of investigated farms, only 4 farms were under organic reconversion (1 physical entity +3 legal entities), the remaining 16 farms using conventional practices.

The analysis of data referring to the agricultural practices used on these farms reveals that 94.62% of the total area was tilled with plough or disk, while disk harrowing was applied on 81.73% of total land. For weed and pest control, mainly chemical and mechanical methods were used (Figure 3).

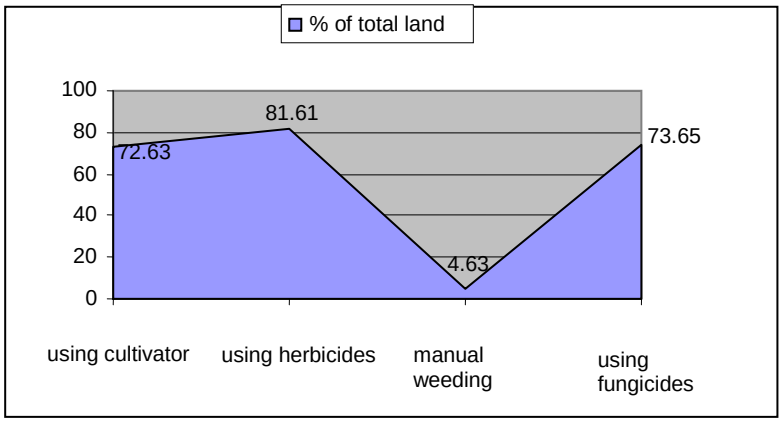

Figure 3. Different shares of weed and pest control methods

The high percentage of chemical control methods can be explained by the economic efficiency induced by the fast and maximum effect of the chemical substances applied.

With regard to the fertilization methods applied, on about 73% of total arable area chemical fertilizers were applied, 13% were fertilized with chemical and organic fertilizers, while only organic fertilizers were applied on only 1.8 ha, which represent 0.035 of total arable land under study (Figure 4). Half of the investigated farmers apply nitrogen fertilizers twice a year, the remaining farms only once a year. Only two agricultural holdings buy manure, about 50 tons each year. This is spread directly in the field under solid form.

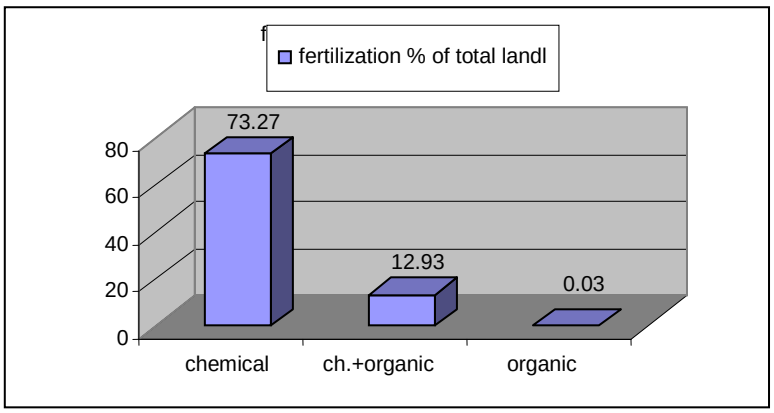

Figure 4. Situation on land where chemical and organic fertilizers are applied

It is worth noticing that when questioned on the decision on which the application of chemical or organic fertilizers was based, only 2 farms decide on the basis of soil analyses, 7 farms respect the farm fertilization plans, in 2 cases the information from the consultancy services is taken into consideration, one farm takes into consideration the information from the chemical plants, while in 17 cases the decision is made according to farmers' own experience.

In relation to the integrated pest control methods, the centralization of the data collected in the field reveal that out of the total arable land area, i.e. 5739.23 ha, the chemical control methods were applied on 2383.98 ha, which accounts for 41.54%. The pest resistant varieties were cultivated on 2331.8 ha, i.e. on about 40.63% of total arable land. The biotech methods were applied on 13.33% of the total arable area of farms. No data were reported for the biological and cultural control methods (Figure 5).

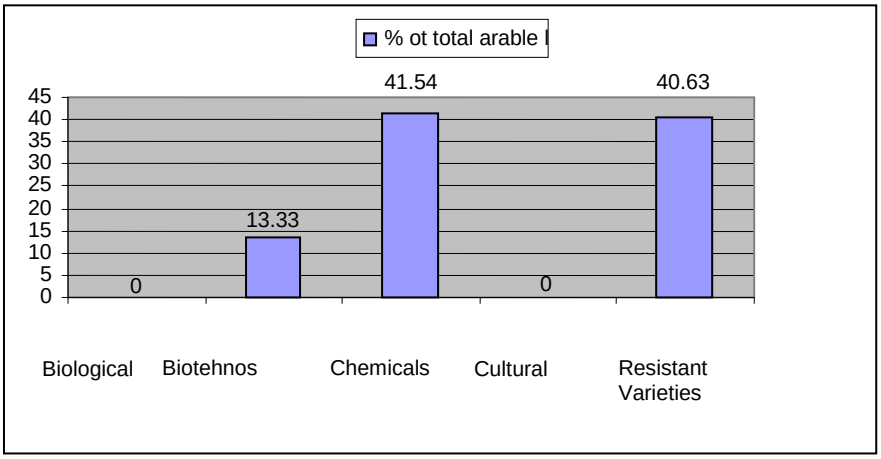

Figure 5. Share of integrated pest control methods

With regard to crop rotation, it can be noticed that on 19 farms from total investigated farms, this beneficial practice is used.

The land areas under crop rotation totalled 5097.53 ha, which represents about 88.82% of total arable land. The average number of crops under crop rotation was 5-6 crops on the largesized farms and 2-3 crops in the case of small-sized farms, with an average period of crop rotation ranging from 2 to 5 years.

With regard to the crop protection measures, out of the total arable land of 5739.23 ha / total farms, on 82.98 ha weed control was performed manually (weeding), while the mechanical method was applied on 1923.73 ha.

In order to reduce the number of predators or parasites, no biological methods were used, only chemical methods.

The preventive chemical methods against insects and weed development were used on 2849.5 ha, while the curative chemical methods were used on 2394 ha out of total arable land (Figure 6).

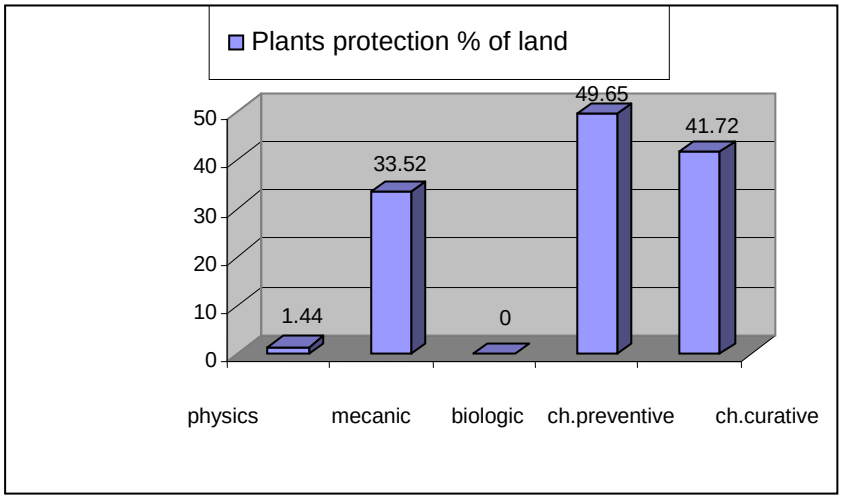

Figure 6. Situation of crop protection methods applied

The pesticides were applied by a sprayer on an area of 4046.88 ha and the treatments by air were applied on 1410 ha of the total arable land.

To the questions referring to the decision basis for the application of treatments, the answers were the following: 3 for the treatment schemes; 3 for consultancy services; 2 for mass-media forecasts; 7 for consultancy from the part of pesticide suppliers; 2 for decision-making only when the economic injury threshold was reached; 17 for farmers' own experience.

CONCLUSIONS

The overall analysis of the agricultural practices used on the investigated farms in the county Ilfov proves that in most cases, the management of soil resources on organic principles basis is rather deficient.

The organic fertilization and the mechanical weed control are applied on quite small areas compared to the chemical treatments, even in the case of the 4 farms that are under organic conversion.

The excessive application of the chemical fertilizers (2-3 times per year), in the absence of an evidence on soil treatments and analysis, may result in a series of future problems related to soil pollution, water pollution and even the pollution of agricultural products.

The use of large amounts of pesticides each year are harmful for the fauna and flora on the respective areas, generating great health risks both for people and for animals.

They may even induce cancer risk when their toxic, remanent and non-biodegradable effect is not taken into consideration.

In order to reduce the hazardous effects of the chemical treatments the following recommendations should be followed: use of low toxicity fungicides; application in the right doses; diminution of the number of treatments; application of treatments only on warning; use of selected products and of those with low remanence; use of complex products; handling of chemicals and application of treatments only by authorized staff.

Consequently, the integrated control strategy should take into consideration its intrinsic objectives, the main elements of the integrated control and the right choice of the most efficient and non-polluting methods.

The implementation measures of the integrated pest control methods in the sustainable soil management are the following:

1. permanent knowledge of the phyto-sanitary condition of crops and the establishment of the key-diseases specific for each crop;
2. establishment of the economic injury threshold (EIT – critical limit of infestation), i.e. of the level from which the value of losses exceeds the control treatment costs. EIT has different values according to: biology of pathogen agent (virulence, spread speed); biological value of crop; commercial value of crop;
3. protection and stimulation of useful flora and fauna;
4. use of non-chemical means for disease control (crop management techniques, biological means);
5. use of chemical control only when the case, i.e. only at warning – in this case it is recommended to use selected products that destroy specific pathogens and are not harmful to the useful flora and fauna;
6. avoiding the chemical substances with high remanence and use of minimum recommended doses;
7. implementation of modern techniques of chemicals application (eg. electrostatic application);
8. development and use of new pest and disease resistant hybrids.

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ASPECTE PRIVIND CARACTERIZAREA MORFOLOGICĂ, FIZICĂ ŞI CHIMICĂ A CERNOZIOMURILOR GLEICE SALINICE DIN CÂMPIA VIZIRU

ASPECTS CONCERNING MORPHOLOGICAL, CHEMICAL AND PHYSICAL CHARACTERIZATION OF THE GLEYIC HYPOSALIC CHERNOZEMS FROM VIZIRU PLANE

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Keywords: plain, soils, gleyic hyposalic chernozems

ABSTRACT

Situated in the southern extremity of the Romanian Plane, Viziru Plane presents a relative large soils scale, unified in Cernisoils and Salsodisoils classes. From Cernisoils class are found gleyic hyposalic chernozems that occupy relative small areas (1300 ha) and appear locally in central part of the plane, close to the salty lakes which correspond to some microdeppresions area imperfect drained.

INTRODUCTION

In the present paper the author collective presents some aspects concerning morphological characteristics, chemical and physical attributes concerning agroproductive characterstics of gleyic hyposalic chernozems from Viziru Plane.

MATERIAL AND METHOD

To establish the principal properties of the gleyic hyposalic chernozems from Viziru Plane a series of the chemical and physical analyses were effected. Physical analyses effected on soil drawing samples were ascertained in apparent density, total porosity, aeration porosity, withering coefficient, field capacity, utile water capacity, total capacity for water and saturate hydraulic conductivity determination.

Chemical analyses were ascertained in determination of the: pH, organic matter, total nitrogen, accessible phosphorus and potassium.

Physical and chemical analysis for drawing soil samples were made in conformity with “Methodology of pedologycal studies elaboration” made by I.C.P.A. Bucharest and soils type were established in conformity with “Romanian System of Soils Taxonomy, 2003”.

RESULTS OF DISCUSSIONS

From geographical point of view, Viziru Plane is situated in eastern extremity of Romanian Plane, at a subunit of this, North Baragan exactly.

Geologic, like integrated part of Romanian Plane, Viziru Plane is formed and it has evolved concomitant with this. Surface deposits are represented through loess, loess deposits and sandy aeolian deposits.

Relief is presented through form of one plate plane with altitudes by 20 - 21 m at south from Viziru locality and 13 - 16 m in north art (Braila). Although plane surface is apparent plate, these are perturbation in north by sand dunes and in central part by some low portion with callow aspects named gullyes.

Studies concerning agro climatic Romanian areas (INMH, 1982) placed Viziru plane in warm draughty climate limits, sub area 2, characterized through high values of termic resources, low hydric resources, low accessible water in soil resources and stress high termic and hydric indexes. Average annual temperatures

are ranged between 10,5 °C and 11,0 °C. Average annual precipitation is situated under 500 mm (401 - 500 mm) and it has unevenness allotting in one year.

North Baragan is surrounded by some hydrographic arteries by maximum importance for all region (Danube, Siret, Buzau and Calmatui), all have autochthonous hydrographic affluent. Regard as Viziru Plane, are without native hydrographic network. However a weak represented network, formed by lakes (Salty Lake I and II) and some weak small valleys.

Field vegetation has made part from steppe and forest-steppe vegetation, whereon adding azonal formations like (dunes, salty, etc). In present spontaneous vegetation was placed with agricultural vegetation in proportion by 95 %.

As result of effected researches in Viziru Plane it was evidentiated a relative large scale of soils unified in class Cernisoils and Salsodisoils. From these the bigger spreading have soils from Cernisoils class that occupy over 95 % through territory. Among soils from this class are counting gleyic hyposalic chernozems (1300 ha), over who we stop in this paper.

In frame of the Viziru Plane, gleyic hyposalic chernozems appear locally, on small area, in central part that corresponds with micro callows.

Gleyic hyposalic chernozems present follow morphological characters:

Ap horizon (0 - 25 cm), texture (LL) average clay, brown grey with dark nuances color (10YR 2/2) at wet state, and brown grey dark at dry state (10YR 4/2), structure polyhedral glomerulus's sub angular weak developed, porous, aerate, easy friable, herbs roots relative gauge, frequents, clear passing.

Amsc horizon (25 - 49 cm), texture (LN) sandy-claying lute, brown dark color (10YR 3/3) in wet state and brown (10YR 4/3) in dry state, glomerulus's average well developed structure, aerate, porous, frequent slender herbs roots, week effervescence, gradual passing.

A/Csc horizon (49 - 70 cm), sandy-claying (LN) texture, brown, brown-dark color in wet state (10YR 3/3), and dark yellow-brown in dry state (10YR 5/3), polyhedral sub angular weak-average developed structure, porous, aerate, mass strong effervescence, frequent efflorescence's and veins, gradual passing.

C/Asc horizon (70 - 90 cm), lute claying-sandy texture (LN), dark yellow-brown color with yellowish nuance (10YR 6/3) in wet state and dark yellowish in dry state (10YR 6/3 – 7/3), polyhedral sub angular structure, less friable, porous, week settling, humid, strong effervescence, pseudo mycelium's and veins, gradual passing.

C/Gosc horizon (92 - 152 cm), texture claying-sandy (LN), dark yellowish-brown color (10YR 5/4) in wet states and yellowish-dark yellowish with small rusty spots (10 YR 7/3) in dry state, humid at base, weak settle, unstructured, porous, strong effervescence, veins and $CaCO_3$.

Physical and *hydro-physical characteristics*. gleyic hyposalic chernozems aren't differenced on profile, been usually clayey in first 90 cm from the surface, after that become clay-sandy. Are aerate soils in superior horizons, (DA = 1,22 – 1,25 g/cm^3), but easy settle in next horizons, on base soil profile (DA = 1,47 g/cm^3). Total porosity is high on all profile, with values ranged between 45 - 54 %. Aeration porosity is small to average in first 70 cm (11 - 25 %) after that decrease dramatically, become low (7 %). Penetration resistance varied high on profile from low values to average (5 - 31 kgf/cm^2). Permeability for water and air of the gleyic hyposalic chernozems are good, saturate hydraulic conductivity values on deep 0 - 50 cm, been 18,0 - 58,1 mm/h. At these soils, physical limitative characteristics for plants growing and development and for agricultural soil works are compensated partially by well developed glomerulus's structure and high values of the structural hydro-stability. Withering coefficient values, filed capacity and utile eater capacity on deep 0 - 70 cm it has ranged in interval 9,3 - 10,8 %; 23,1 - 24,4 % and 13,2 - 13,8 % (table 1, figure 1, 2).

Table 1

Physical properties of gleyic hyposalic chernozems

Horizons	Depth (cm)	DA g/cm^3	PT %	PA %	CO %	CC %	CU %	CT %	GT %	RP Kgf/cm^2	CCD max	K mm/h
Ap	0 – 25	1,25	46	11	10,8	24,4	13,6	32,7	3	12	18,3	58,1
Amsc	25 – 49	1,22	54	25	10,2	23,4	13,2	44,2	-13	5	20,8	18,0
A/Csc	55 – 70	1,24	54	25	9,3	23,1	13,8	43,3	-12	12	20,2	8,0
C/Asc	74 – 84	1,47	45	7	9,6	25,8	12,3	30,7	6	31	8,9	-
CGosc	90 – 105	1,47	45	7	9,5	25,8	12,3	30,7	6	31	8,9	-

Figura 1. Physical propierties of gleyic hyposalic chernozems

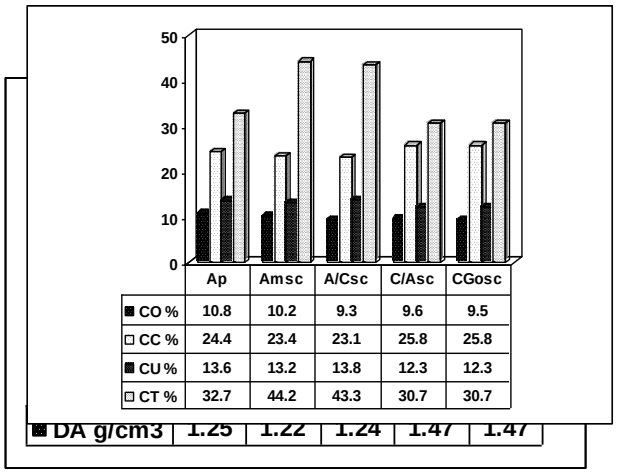
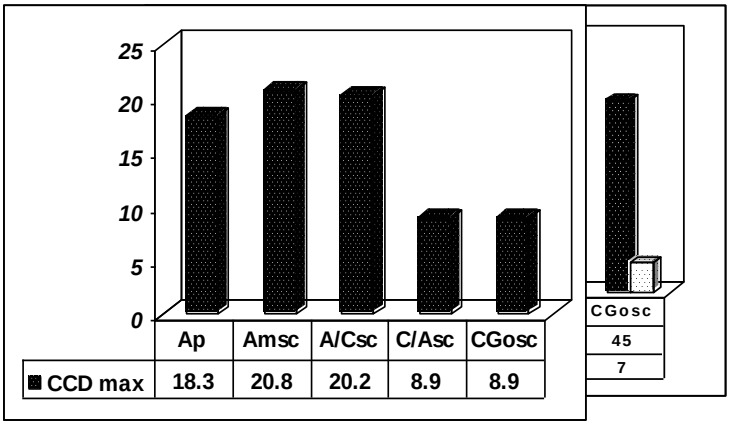


Figura 2. Physical propierties of gleyic hyposalic chernozems



Chemical characteristics. Reaction of the gleyic hyposalic chernozems is week alkaline on all profile (pH = 7,3 – 8,4). Organic matter content are average with values ranged between 2,65 - 3,37 %. Nitrogen assigment are average (0,148 – 0,174 %) in first 25 cm, after that become small (0,134 %). Mobil phosphorus content is small (10,0 – 17,4 ppm), and mobile potassium content present average values (141,5 – 199,3 ppm) (table 2, figure 3).

Table 2

Chemical properties of gleyic hyposalic chernozems

Horizons	Depth cm	pH	Humus %	N total %	C/N	P ppm	K ppm	$CaCO_3$
Ap	0 - 15	7,3	3,37	0,174	13,1	10,0	199,3	-
Amsc	25 – 49	8,2	2,65	0,148	-	17,4	141,5	3,9
A/Csc	55 – 70	8,3	-	0,134	-	-		7,8
C/Asc	74 – 84	8,3	-	-	-	-		9,9

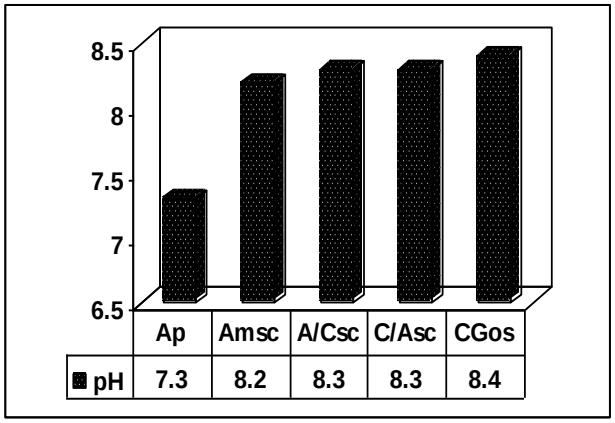
CGosc	90 - 152	8,4	-	-	-	-		19,4

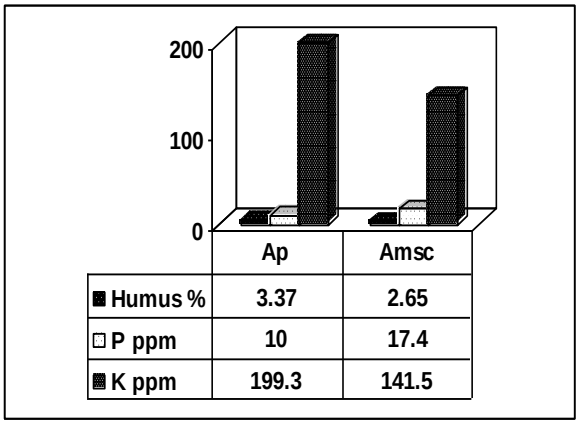
Figura 3. Chemical properties of gleyic hyposalic chernozems

Agro-productive characteristics. gleyic hyposalic chernozems it has characterized through good-moderate natural fertility. This act it has caused both good mould supplying and humidity deficit compensation through supplying of the crop with water from phreatic cloth, like gleyic chernozems. On these soils it has developed close all kinds of crops, will low smaller production then gleyic chernozems.

CONCLUSIONS

Gleyic hyposalic chernozems are soils with local spreading, occupying a surface of approximate 1300 ha.





Regarding the nutritive elements supplying, gleyic hyposalic chernozems present average nitrogen content, and less supplying with mobile phosphorus and average supplying with mobile potassium.

Are soils with weaker fertility comparative to other chernozems because of the relative high content of changeable Na and easy soluble mineral salts.

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EVOLUȚIA UNOR INDICI AGROCHIMICI DIN CADRUL UNOR EXPERIENȚE CU PORUMB, PAJIŞTE NATURALĂ ŞI PAJIŞTE SEMANATĂ DE LA CENTRUL EXPERIMENTAL PREAJBA GORJ,IN AL DOILEA SI AL TREILEA AN DE EXPERIMENTARE

THE EVOLUTION OF CERTAIN AGRO-CHEMICAL VALUES WITHIN CERTAIN EXPERIMENTS WITH CORN, NATURAL LAWN AND SEEDED LAWN FROM THE EXPERIMENTAL CENTER PREAJBA GORJ, IN THE SECOND AND THIRD YEAR OF EXPERIMENTING

BALAN MIHAELA

Keywords: the hydrolytic acidity (Ah), pH value, index of nitrogen (IN), phosphorus content, potassium content, humus content, the degree of saturation in bases (V%)

ABSTRACT

In this work is presented the evolution of agro-chemical indexes as: pH, mobile phosphorus content and humus content, the BA (the changing bases amount from the soil), the Ah (the hydrolytic acidity), the content of mobile aluminum, the degree of saturation in bases (V%) and the index of nitrogen (IN), as a result of the application of different doses of NPK, from experiments with corn, natural lawn and seeded lawn, from Experiments Center from Preajba Gorj, in the second and the third year of experimenting.

INTRODUCTION

The fertility is the ability to provide simultaneously and permanently to the plants the nutritional ingredients and water of enough quantities comparing to their needs and to ensure the physical and biochemical conditions necessary for the growth and development of plants.

The quality of the soil can change due to natural causes as well as anthropic causes, affecting its agrochemical characteristics.

Depending on the evolution of the agro-chemical characteristics of the soils, these can have positive or negative effects, either short term - small proportions ones or others that, cumulated and over a longer period of time, can lead – in certain conditions – to important changes, often irreversible, of the fertility state, directly influencing the productive capacity of the soil. The permanent surveillance of the fertility potential of the soils, the directing of the agro-chemical evolution towards optional levels and fields, are requests that do not necessarily belong only to an intensive agriculture, but to a system in which each factor must have a substantial contribution.

MATERIAL AND METHOD

The land on which Preajba-Gorj Experimental Center lies is located on the plateau situated on the upper terrace of Jiu River. The type of soil that is in this area is a typical luvisoil and stagnated (pseudo-glazed) luvisoil. The land on which the experiment has been placed has a slope of approximately 11%.

In order to study the evolution of agrochemical indices, in 2006 there were located 3 experiments in 3 crops in 3 rehearsals. These experiments are incorporated in some experimental devices comprising 3 crops in 3 rehearsals, respectively corn, natural lawn and seeded lawn, within Preajba-Gorj Experimental Center.

Experimental plots were marked out under a rectangular form with the long side of 25 m and oriented on the line of highest pitch and the short side of 2.5 m, having a surface of 62.5 m^2. After the marking out, the long sides and the short side of the upstream end of

each part of the plot were isolated with mill board, which has been inserted into a trench of 15 cm, of which 10 cm remained at the surface. The isolation of the parcels with mill board was made in order for the water not to enter or exit in or from each piece separately.

Experimental plots with natural lawn and seeded lawn were cleaned of the old vegetation and then there were applied different doses of fertilizers as it follows:

On the natural lawn:

- B_1 – M_t non fertilized;
- B_2 – $N_{60}P_{60}K_{60}$ ($N_{15}P_{15}K_{15}$ – 2.5kg);
- B_3 – $N_{100}P_{90}K_{60}$ ($N_{15}P_{15}K_{15}$ – 3.75kg +NH_4NO_3 – 0.206kg).

On the seeded lawn:

- B_4 - M_t non fertilized;
- B_5 - $N_{60}P_{60}K_{60}$ ($N_{15}P_{15}K_{15}$ - 2.5kg);
- B_6 - $N_{100}P_{90}K_{60}$ ($N_{15}P_{15}K_{15}$ - 3.75 kg + NH_4NO_3 - 0.206 kg).

The preparation of the 3 plots in order to seed the maize consisted of cleaning and removing the existing vegetation, the knobs, the stones, and so on. Leveling the land was executed manually, in order to seed the maize the land was prepared using the scraping iron, then the early hybrid Monalisa was sowed, at a depth of 6-7 cm and at a distance of 70 cm, with a density of 40000-45000 plants / ha. The sowing was executed manually and on the direction of the level curves.

After the sowing there were applied different doses of fertilizers as it follows:

- B_7 - $N_{100}P_{90}K_{60}$ ($N_{15}P_{15}K_{15}$ - 3.75 kg + NH_4NO_3 - 0.206 kg);
- B_8 - $N_{60}P_{60}K_{60}$ ($N_{15}P_{15}K_{15}$ - 2.5kg);
- B_9 - M_t non fertilized.

In order to see the dynamics of the nutrient elements and their correlation with the loss of nutrient elements, there have been collected samples of soil in 2007 and 2008 from each parcels as it follows:

On the natural lawn and seeded lawn - 2 samples of soil were taken with the agro-chemical probe from each of the parcels, from a depth of 0.10 m, (one from the first half of the parcel, the second from the other half of the parcel), each sample being taken from 10 random locations;

On the corn - 2 samples of soil were taken with the agro-chemical probe from each of the parcels, from a depth of 0.20 m, (one from the first half of the parcel, the second from the other half of the parcel), each sample being taken from 10 random locations.

The samples of soil collected from the experimental plots were placed in plastic bags and labeled, after which they were subjected at OSPA Gorj to some analyses such as: pH, the content of digestible phosphorus, the content of digestible potassium, the content of humus, the BS (the changing bases amount from the soil), the Ah (the hydrolytic acidity), the content of mobile aluminum, the degree of saturation in bases (V%) and the index of nitrogen (IN).

RESULTS AND DISCUSSION

After the performed tests the following aspects were revealed:

-From the point of view of soils acidity found when performing experiments, it is noticed an increase of acidity in the year 2008 compared to 2007 in all variants, increase concretized by the decrease of the pH having values between 0.2 and 0.8 units, as well as by an increase of the hydrolytic acidity. This slight acidification can be attributed to the administration of nitrogen fertilizers, emphasized both by increasing the nitrogen content index (IN) and the nitrogen in all the fertilized variants.

-Regarding the degree of saturation in bases, it is ascertained an obvious growth in 2008 compared to 2007 made both by increasing the BS and by increasing the degree of saturation in bases. This increase in 2008 compared to 2007 can be attributed to the administration of fertilizers. After the fertilization, in 2008 compared to 2007, it is made a slight debase due in particular to the increasing acidity.

-Concerning the state of supply in the major nutrients:

-*N* in all the fertilized variants it is ascertained a progressive increase of the content of the N from one year to another, on each fertilized variant, as well as an increase of the content of the N compared to the unfertilized witness. This is also an increase of the NI from one year to another, as well as by increasing the N;

-*P* in 2007 and 2008, the overall line is of a slight increase of the content of mobile P at the beginning of the period of vegetation to the period after fertilization, after which it is made a decrease highlighted at the end of the vegetation period, both for the natural and seeded lawn as well as for the maize crop, decrease due also to the consumption of the plants. It should be mentioned that for the phosphorus it is highlighted an inconstancy of the growth due to the high acidity caused primarily by the content of Al. In fact, a large part of the phosphorus introduced in soil passes in immobile forms through the entry forms built in complex with the Al. and therefore it can not be emphasized clearly by analytical data. Also due to this fact (of the Al.) the mobile phosphorus is maintained at very low values (very low and poorly supplied);

-*K*. Both in 2007 and 2008 it is made an increase of the K content from year to year in the fertilized variants versus the witness. The K determined values increase after the fertilization, which obviously decrease until the end of the vegetation period due to plant consumption.

Table no. 1

Basic agrochemical characteristics of the soils from the experimental plots in 2007

No.	The number of the laboratory test	pH	BS	Ah	Al	V %	H %	IN	P-AL	K-AL	N %
			me/100g sol						ppm		
1.	1 B_3	5,7	6,4	2,5	0,36	71,9	2,88	2,07	4	42	0,136
2.	2 B_3	5,6	5,8	2,6	0,66	69,0	2,92	2,01	2	45	0,136
3.	1 B_2	5,7	4,8	2,8	0,44	63,1	3,04	1,91	5	38	0,135
4.	2 B_2	5,7	5,8	2,6	0,74	69,0	2,84	1,95	4	28	0,141
5.	1 B_1	5,9	5,0	2,4	0,90	67,5	2,52	1,30	4	30	0,136
6.	2 B_1	5,8	5,2	2,5	0,90	67,5	2,44	1,25	2	24	0,119
7.	1 B_6	5,7	5,8	2,5	0,56	69,8	2,48	1,73	6	34	0,112
8.	2 B_6	5,6	7,7	2,2	0,76	77,7	2,84	2,20	4	30	0,113
9.	1 B_5	5,9	6,2	2,3	0,40	72,9	2,24	1,63	5	42	0,116
10.	2 B_5	5,5	5,0	2,9	0,36	63,2	2,64	1,66	4	50	0,119
11.	1 B_4	5,5	4,6	2,6	0,76	63,8	2,40	1,53	2	25	0,078
12.	2 B_4	5,4	5,6	3,0	1,48	65,1	2,32	1,51	3	27	0,061
13.	1 B_9	5,6	5,6	2,3	0,80	70,8	1,84	1,30	2	27	0,053
14.	2 B_9	5,7	6,0	4,4	0,72	57,6	2,24	1,29	3	28	0,082
15.	1 B_8	5,9	6,6	3,3	0,73	66,6	1,96	1,69	6	38	0,117
16.	2 B_8	5,6	6,0	4,6	0,74	56,6	2,32	1,71	4	42	0,120
17.	1 B_7	5,6	5,2	4,0	0,44	56,5	2,04	1,95	5	46	0,132
18.	2 B_7	5,4	5,6	4,7	1,30	54,3	2,00	1,90	6	50	0,146

Table no. 2

Basic agrochemical characteristics of the soils from the experimental plots in 2008

No.	The number of the laboratory test	PH	BS	Ah	Al	V %	H %	IN	P-AL	K-AL	N %
			me/100g sol						ppm		
1.	1 B_3	5,04	5,7	5,0	1,20	53,7	4,60	2,47	6	52	0,169
2.	2 B_3	5,17	5,1	5,0	1,18	50,4	4,04	2,35	4	50	0,161
3.	1 B_2	5,39	4,9	4,6	1,00	51,5	4,32	2,22	5	52	0,156
4.	2 B_2	5,33	5,9	4,6	1,02	56,1	3,76	2,10	8	30	0,151
5.	1 B_1	5,42	5,3	4,2	0,90	55,7	4,28	1,55	4	34	0,116
6.	2 B_1	5,53	6,1	4,3	0,90	58,6	4,08	1.50	3	30	0,120
7.	1 B_6	5,53	6,1	4,8	0,98	55,9	3,76	2,40	16	56	0,160

No.	The number of the laboratory test	PH	BS	Ah	Al	V	H	IN	P-AL	K-AL	N
			me/100g sol			%	%		ppm		%
8.	2 B_6	5,17	5,3	5,0	1,02	51,4	4,20	2,45	4	52	0,162
9.	1 B_5	5,10	5,3	4,1	0,94	56,3	3,64	2,34	7	50	0,147
10.	2 B_5	5,18	4,5	4,0	0,98	47,3	3,32	2,37	5	51	0,149
11.	1 B_4	5,05	5,3	4,7	1,14	53,0	3,04	1,61	4	30	0,110
12.	2 B_4	5,05	4,5	4,8	1,18	48,3	3,00	1,60	4	30	0,103
13.	1 B_9	5,18	5,5	4,1	1,08	57,2	2,48	1,41	4	32	0,113
14.	2 B_9	5,21	5,9	4,0	1,06	59,5	2,56	1,52	4	30	0,121
15.	1 B_8	5,36	5,7	3,8	1,04	60,0	2,44	2,19	9	42	0,135
16.	2 B_8	5,37	5,9	3,8	1,04	60,8	3,04	2,16	8	47	0,137
17.	1 B_7	5,12	4,3	4,1	1,04	51,1	2,76	2,25	9	50	0,170
18.	2 B_7	5,07	4,9	4,0	1,20	55,0	2,80	2,20	9	54	0,172

CONCLUSIONS

The soil on which the experiment was performed falls in the class of the luvisoils at the subtype -typical

-stagnated (pseudo-glazed).

They have a pronounced acid characteristic, acidity to which, in the first place, the content of Al. brings its contribution. The pronounced acid characteristic of the soils is inherited on one hand from the solidification rock and on the other hand it is due to the genesis processes (clay - illuviation).

They are strongly debased.The humus content is moderate, but has a very low value due to the fact that in the humus prevail the fulvic acids. The P content is low and very low. The K content is moderate and low. The BS has low values and the total acidity, the sum of the hydrogens has high values in accordance with the pH. The soil is characterized by a high content of break stones and hoes of fluviatile nature (Jiu terraces).

It is appraised that the usual and multi-annual application of some nitrogen fertilizers (especially with $N\text{-}NH_4$) even on the P background determines the concomitant processes of the debase and acidification of soils. These effects depend on the dose of the incorporated N and on the plugging capacity of soils.

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OPTIMIZAREA DOZELOR DE NUTRIENȚI PENTRU UNELE CULTURI ÎN FUNCȚIE DE REZERVELE SOLULUI

THE OPTIMISATION OF THE NUTRIENT DOSES WITH SEVERAL CROPS IN FUNCTION OF THE SOIL SUPPLY

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***Key words*: agrochemical analyses, fertilizers, yields**

ABSTRACT

De pe o suprafață de 100 ha, situată în zona Slatina-Coteana, județul Olt, s-au recoltat probe de sol, pe adâncimea de 0-20 cm şi s-au efectuat analize agrochimice. În funcție de rezultatele analizelor, s-au calculate dozele de îngrăşăminte N,P,K, substanțe active, pentru fertilizarea culturilor de grâu, porumb, floarea.-soarelui, sfeclă de zahăr, soia şi rapiță.

From a surface of about 100 ha, located in Slatina – Coteana zone, District Olt, there have been taken soil samples on 0-20 cm depth and there were made agrochemical analyses. In function of the results of the abnalyses there were calculated the fertilizer doses N, P, K, active ingredients, for the fertilization of the wheat, corn, sunflower, sugar beet, soybean and oil seed rape.

INTRODUCTION

The active ingredient doses from the usual fertilizers that are needed for the field crops are calculated in function of the supplying status of the soil with a certain element as well as well as in function of the bases saturation degree and the value of the crops.

MATERIAL AND METHOD

A surface from the Slatina – Coteana zone was split in 13 agrochemical plots with similar properties and sizes. From each plot there was taken a soil average sample. There were determined: the pH in hydrous suspension, the sum of the exchangeable bases, SB, the total nitrogen, Nt, and the nitric nitrogen, NO_3, the humus content, H, phosphorus, P_{Al} , potassium, K_{Al} (extracted from solution of acetate lactate of ammonia at pH = 3.7, marked as Al). The analyses were carried out after official methods, approved in Romania (the National Institute for Pedology and Agrochemistry, 1980, 1981).

From the experimental data there were calculated the agrochemical indicators: the total capacity for cationic exchange T, the bases saturation degree V_{Ah} and the nitrogen indicator, after the downward formulas:

$$T = SB + Ah;\ V_{Ah} = \frac{SB \cdot 100}{SB + Ah};\quad IN = \frac{H\% \cdot V_{Ah}\%}{100}$$

The calculus of the fertilizer doses was made using the formulas developed by the ICPA Bucharest on the basis of the experimental data, of the Mitscherlich type formulas

and the statistical math metods of computing the experimental data (1980). These formulas are:

$$NOET = \frac{\lg(2{,}303 \cdot C \cdot Rs \cdot \frac{V.U.R.}{C.U.I.}}{C}$$

$E = a(IA)-b(IA)^2 + d.Rs$

$DOE_{N,P2O5,K2O} = NOET_{N,P2O5,K2O} – E_{N,P2O5,K2O}$, where:
NOET – the total N, P_2O_5, K_2O (kg/ha) optimal economical
E – the soil supply of nutrients N, P_2O_5, K_2O (kg/ha)
DOE – the optimal economical doses of N, P_2O_5, K_2O (kg/ha)
Rs – the expected yield (kg/ha)
VUR – the value of the vegetal yield (lei/kg)
CUI – the cost of the fertilizers (lei/kg, N, P_2O_5, K_2O)
IA – the agrochemical indicators: IN, P_{AL} şi K_{AL}
C,a,b,d, - constants

RESULTS AND DISCUTIONS

Within the table nr.1 there are the values of the agrochemical indicators for all 13 plots. The table 2 contains the way of interpreting the analytical data. In the table 3 there are the doses of active ingredients that are needed for several crops. In this table there are two different values. For the plots 1, 2, 4, 9, 11 and 13 it was used the IN = IA = 1.5 and for the 3,5,6,7,8,10 and 12 plots it was used the IA = IN = 2.5 for the calculus of the nitrogen doses. For the calculus of the P_2O_5 and K_2O doses there were used the values of IA = P_{AL} = 40 ppm and IA = K_{AL} = 180 ppm.

Table 1

The average values of the agrochemical indicators

Plot nr.	pH	Ah me/ 100g sol	SB me/ 100g sol	T me/ 100g sol	V_{Ah} %	Nt %	N_{NO3} ppm	H %	IN	P_{AL} ppm	K_{AL} ppm
1	5,93	5,13	14,81	19,94	74,28	0,097	5,793	1,836	1,363	30,59	279
2	6,20	3,53	14,53	18,06	80,43	0,120	5,123	2,228	1,791	20,56	259
3	5,84	5,45	14,95	20,40	73,27	0,173	8,470	3,205	2,348	95,80	317
4	5,99	4,09	14,62	18,71	78,15	0,121	10,712	2,287	1,787	32,11	177
5	6,34	2,34	13,73	16,07	85,44	0,165	7,950	3,083	2,634	31,35	209
6	6,10	3,00	13,91	16,91	82,27	0,153	10,785	2,837	2,333	60,70	225
7	7,18	0,05	13,48	13,53	100	0,110	4,980	2,032	2,032	21,32	228
8	5,84	4,62	14,88	19,50	76,32	0,183	10,025	3,397	2,592	49,17	188
9	6,60	2,51	13,51	16,02	84,32	0,124	9,583	2,329	1,963	30,85	179
10	5,97	4,41	14,92	19,33	77,18	0,182	9,874	3,386	2,613	28,84	165
11	6,05	3,45	14,20	17,65	80,43	0,122	12,220	2,264	1,820	59,44	198
12	5,76	6,07	15,03	21,10	71,23	0,183	9,837	3,394	2,417	44,14	205
13	5,71	6,37	15,22	21,59	70,48	0,112	5,345	2,097	1,477	24,08	250

Table 2

The interpretation of the experimental data

Supply	Nt %	IN	H %	P_{AL} ppm	K_{AL} ppm	N_{NO3} ppm
Very weak	-	-	under 1	under 8	-	under 6
weak	under 0,10	under 2	1-2	8-18	under 66	6
average	0,10-0,15	2-4	2-3	18-36	66-132	9
Good	0,15-0,20	4-6	3-5	36-72	132-200	14
high	0,20-0,30	over 6	5-8	72-144	200-400	23
Very high	over 0,30	-	over 8	over 144	over 400	over 23

Table 3

The optimal doses of fertilizer, active ingredient required for the expected yields

The expected yield Kg/ha	*The dose of a.i., kg/ha*			
	N		*P_2O_5*	*K_2O*
	Plots 1,2,4,9,11,13	Plots 3, 5-8,10,12		
WINTER WHEAT				
3000	101	86	-	14
4000	124	109	24	41
5000	142	127	45	62
6000	156	142	62	81
7000	169	154	76	96
8000	180	165	89	110
BARLEY FOR BEVERAGE				
3000	95	85	23	21
4000	106	96	51	48
5000	114	104	76	69
CORN				
3000	76	56	-	-
4000	106	86	11	2
5000	134	113	27	26
6000	157	146	40	47
7000	180	169	50	65
8000	201	181	59	81
9000	220	200	67	95
SUNFLOWER				
2000	79	65	25	18
3000	107	93	76	60
4000	126	112	117	92

5000	140	126	155	106
OILSEED RAPE				
3000	119	104	61	52
4000	136	121	91	79
SOIA				
3000	68	44	44	36
4000	84	60	73	60
5000	93	69	96	79
SUGARBEET				
20 000	95	73	16	-
30 000	144	122	43	37
40 000	184	162	66	63
50 000	218	196	87	83
60 000	247	225	105	98
70 000	272	250	122	111
80 000	297	275	137	121

CONCLUSIONS

It can be said that the studied soils are moderate acid, moderate – good supplied with nitrogen and humus. They have low values of nitrogen indicators due to the acid reaction of the soil. They are also moderate supplied with phosphorus and well supplied with potash.

There are recommended fertilizers with basic physiological reaction (nitrolime) and enriched in phosphorus (16-48-0, 12-52-0).

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EFECTELE CLORSULFURONULUI, AMIDOSULFURONULUI ŞI TIFENSULFURONULUI ASUPRA ACTIVITĂȚII ZAHARAZEI DIN SOL

THE EFFECTS OF SULFONYLUREA, AMIDOSULFURON AND TIFENSULFURON ON SACCHAROSE ACTIVITY FROM SOIL

Borozan Aurica, Radu Florina, Filimon Nicoleta, Gherman V, Ştefanic Gh.

Cuvinte cheie: zaharază, clorsulfuron, amidosulfuron, tifensulfuron

ABSTRACT:

Efectele erbicidelor sulfonilureice: clorsulfuron, amidosulfuron şi tifensulfuron asupra activității zaharazei dintr-un cernoziom cambic (Cămpia de Vest), au fost evaluate timp de 7 zile.

În condiții naturale (câmp), cât şi în condiții de laborator au fost testate doze crescânde de erbicid.

În condiții de câmp sau naturale, ca urmare a aplicării erbicidelor, în special al clorsulfuronului (20 g/ha), potențialul zaharazic suferă modificări de natură inhibitoare, care aşezate pe o scară a valorilor nu pot fi considerate alarmante, deoarece sunt destul de mici.

În condiții de laborator, prezența erbicidului tifensulfuron, în proba de sol determină descreşterea activității zaharazice la dozele de 60, respectiv 300 g/ha față de martor.

The effects of sulfonylurea herbicides: chlorsulfuron, amidosulfuron and tifensulfuron on saccharose activity from cambic chernozem (West Plain) have been evaluated for seven days.

In natural climate conditions (field conditions) as well as laboratory conditions different increasing herbicide doses have been tested.

Considering field or natural conditions, as a result of herbicide treatments, and particularly chlorsulfuron (20 g/ha), it has been observed that saccharose potential undergoes several changes of inhibitory nature, but without important significance due to very small registered values.

In laboratory conditions, the presence of tifensulfuron herbicide in the soil sample induces the decrease of saccharose activity to 60 and 300 g/ha, respectively, comparing with the control variant.

INTRODUCTION

The biodegradation process of the sulphonylurea herbicide depends on temperature, humidity and the pH of the soil. In 1985, Walker and Pauline Brown (cited by Ghinea and co., 1987) found a t50 of 40 days and a t95 of 140 days.

Free enzymes from the soil may damage herbicides (Cervelli and colab., 1978).

There are very few biographical data about the enzymatic activity under the influence of herbicides (Torstensson, 1980).

In Romania, enzymatic studies of the sulphonylurea herbicides were made on a red brown soil. As a result of these studies, it was evidenced that after 30 days of amidosulfuron herbicide (in a natural habitat), at a dosis of 15, 22,5 and 45 g/ha, a

stimulation of the zaharasic activity took place with 3, 03% compared to the untreated variety (Gheorgiță Niculina, 2002).

MATERIALS AND METHODS

A study of the soil has been made. Black earth was collected from the Western Plain and was later treated with three sulphonylurea herbicides. All treatment was made on the field or in the lab. The zaharasic activity has been established seven days after the treatment.

The experience gained on the field and in the lab includes 20 varieties (V1 – witness, V2 – V10 – varieties or samples treated on the fields; V11 – witness, V12 – V20 – varieties or samples treated in lab conditions). Two important factors are taken into consideration. These factors are:

Factor A – herbicides which contain the following:

a_1 – witness or untreated variety;

a_2 – chlorsulfuron;

a_3 – amidosulfuron;

a_4 – tifensulfuron.

Factor B – measures:

b_1 – 0 or untreated variety;

b_2 – usual doses of herbicide (20g/ha chlorsulfuron; 60g/ha amidosulfuron and 60g/ha tiphensulfuron);

b_3 – two times the usual doses of herbicide (40g/ha chlorsulfuron; 120g/ha amidosulfuron and 120g/ha tiphensulfuron);

b_4 – five times the usual doses of herbicide (100g/ha chlorsulfuron; 300g/ha amidosulfuron and 300g/ha tiphensulfuron).

How is made: the mix for the enzymatic reaction is made with the help of the method used by Hofmann E., Seegerer A.(1950). The coloring of the glucose and fructose mix is made with the dinitrosalicylic reactive used by Sumner J.B., Howel S.F.(1935). Changes were made by Ştefanic and Irimescu-Orzan (2000).

RESULTS AND DISCUSSIONS

Table 1

Evolution of the zaharasic potential (mg enzymatic hydrolyzed sucrose /100g soil treated in natural habitat)

Herbicide/ doses (g/ha)	**Variety**				$\overline{Xa}$
A/B	b_1	b_2	b_3	b_4	
a_1	1939	a 1939	a 1939	a 1939	a 1939
a_2	1939 a	b 1658 b	a 2047 a	a 1868 b	b 1878
a_3	1939 a	a 1944 a	a 1941 a	b 1791 b	a 1904
a_4	1939 a	a 1891 a	b 1900 a	a 1940 a	a 1917
$\overline{Xb}$	1939 a	1858 b	1957 a	1884 a	

D.L.P.	A	B	$\tilde{A}\,\overline{B}$	$\widetilde{B}\,\bar{A}$
5%	57.02 *	78.94 *	123.12 *	136.73 *
1%	131.68	119.54	199.11	207.04
0.1%	419.04	192.03	377.85	332.61

Note: Letters infront of numbers compare variety vertically. Letters after the numbers compare variety horizontally, separating them in different statistical groups. The biggest numbers are labbeled with an „a". The following sign „* " means the DL which has been used for statistically grouping the numbers.

Table 1 represents study made in the field. It reports the treated variety with three plant protection substances. As concerning the untreated variety, a kind of sensitivity appears, compared to certain tested herbicide doses. The highest level of inhibition (compared to other treated varieties) can be achieved adding 20g/ha of chlorsulfuron. In this first case, the inhibition`s magnitude is 14,71%.

The tiphensulfuron herbicides may also cause inhibitive effects when the doses are 120 g/ha (2,01 %). The amidosulfuron is 300 g/ha (7,63 %), but at a lower rate when compared to the chlorsulfuron.

Table 2

Evolution of the zaharasic potential (mg enzymatic hydrolyzed sucrose/100g soil treated in lab)

Herbicide/ doses (g/ha)	*Variety*				$\overline{Xa}$
A/B	b_1	b_2	b_3	b_4	
a_1	1959	a 1959	a 1959	a 1959	a 1959
a_2	1959 a	a 2001 a	a 2106 a	a 1936 a	a 2000
a_3	1959 a	a 1927 a	b 1934 a	b 1909 a	a 1932
a_4	1959 a	a 1864 a	b 1857 a	a 1863 a	b 1886
$\overline{Xb}$	1959 a	1938 b	1964 a	1917 b	

D.L.P.	A	B	$\tilde{A}\,\overline{B}$	$\widetilde{B}\,\bar{A}$
5%	97.86 *	102.41 *	170.33 *	177.40 *
1%	225.99	155.09	285.88	268.63
0.1%	719.15	249.15	587.19	431.54

In the field the chlorsulfuron has more powerfully reduced the enzymatic hydrolysis, compared to the substances included in this study. In the lab (table 2), the enzymatic activity is established for every substance and measurement. We notice here that the

enzymatic activity doesn't go under a significant change and it does not vary in the presence of the witness.

In this situation it is clear that, unlike the zaharasic activity made in the lab, in controlled conditions, where most of the results are statistically the same, in the field each herbicide has an inhibited doss.

In the case of this enzymatic process, there are more inhibited effects (though, as a value, they are reduced) compared to the enzymatic potentials taken into consideration during this study.

When using double doses, we have a decrease of the enzymatic intensity. The following two herbicides are evidenced here: amidosulfuron (1,28%) and tiphensulfuron (5,21 %).

CONCLUSIONS

In a natural habitat, because of the herbicides, the zaharasic potential goes under some inhibited changes, which are not considered to be alarming, because there are very few changes.

In this situation it is very clear that, unlike the zaharasic activity made in the lab, in controlled conditions, where most of the results are statistically the same, in the field each herbicide has an inhibited doss.

In the case of this enzymatic process, there are more inhibited effects (though, as a value, they are reduced) compared to other enzymatic potentials taken into consideration by the writers.

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THE RESEARCH REGARDING THE MAIN PROPERTIES OF THE PSAMOSOILS FROM THE REGION OF POIANA MARE

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Keywords: molic, eutric, calcite, salinized psamosoils; fertility; humyfication; aeolian deflation.

ABSTRACT

În zona Localității Poiana Mare psamosolurile ocupă o suprafață de 5 000 ha. Principalele psamosoluri întâlnite în zonă sunt: psamosoluri molice, psamosoluri eutrice, psamosoluri calcarice, psamosoluri gleice şi psamosoluri salinice.

Fertilitatea acestor psamosoluri este diferită în funcție de zonele de microrelief şi de gradul de humificare. Astfel, cele mai fertile sunt psamosolurile molice, întâlnite în interdunele largi şi mai puțin adânci. Fertilitatea cea mai mică o au psamosolurile eutrice întâlnite pe vârfurile dunelor, uneori în zonele cu nisipuri mişcătoare şi psamosolurile salinice întâlnite în interdunele cu procese intense de depunere a sărurilor solubile.

Pentru creşterea capacității productive a psamosolurilor din zonă, trebuiesc luate măsuri de combatere a deflației eoliene, de fertilizare organo- minerală şi de irigare.

In Poiana Mare area psamosils occupy a surface of 5000 ha. The main psamosoils meet in area are: molic psamosoils, eutric psamosoils, calcite psamosoils, gleic psamosoils and salinized psamosoils.

Those psamosoils fertility is different function of micro-relief areas and humification degree. Thus, the most fertile are molic psamosoils, meet on large and less depth inter-dunes. The smallest fertility is for eutric psamosoils meet on dunes top, sometimes in places with sand drifts and salinized psamosoils meet in inter dunes with intense processes of soluble salt depositing.

For increase the productive capacity of psamosoils from the studied area, must be taken measures of aeolian deflation combating, of organic and mineral fertilization and irrigation.

INTRODUCTION

Poiana Mare is situated in the South-East of Dolj County, at a distance of 80 km from Craiova, the administrative center. The total surface of the locality is around 11500km, from which 9900 represents arable soil. This puts the locality between the biggest rural settlements in Romania.

From the geomorphologic point of view, Poiana Mare is situated in the South-East of the Oltenia Plain and, also, occupies surfaces on the terraces and the Danubian waterside. The Danube had the most important part in the formation of the relief in this are, because it created the major relief forms.

The general view of the relief made the hydrographical system of this area to be not so visible, while the drainage is more representative. It can be observed a specific dune hydrological system with small water courses and many mud-holes and swamp lakes. The drainage of the dunes is alimented especially with the rain and the underground water areas and at 5-6 m in the regions with terraces. The phreatic level has a strong influence over the forming process of the soil.

From the climatic point of view, the region enframes in the C.f.a.x. climatic area (after Kopper), which is specific for the South-East of the country, where due to the strong mediterranean influence the summers are more arid and the winters are softer.

The meteorological information registered at the station from Calafat show multiannual medium temperatures around 11,5 ° C and rainfalls of approximately 500mm (Table 1).

Table no. 1

Monthly and annual medium values of the temperatures and rainfalls at the meteorological station of Calafat

Specification	Months												Average
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
T^{o} C	-2,2	0,1	5,4	12,0	17,2	21,0	23,2	22,6	18,0	12,1	6,2	0,7	11,5
P mm	40,1	32,7	34,8	48,7	51,1	60,3	43,3	31,5	38,7	33,8	43,5	41,3	499,8

The dominant winds in the area are the Austru, which blows from the West and the North-West, bringing arid summers, and the Crivăț, which blows from the South-East and the East, bringing cold winters with little snow. (Table 2)

Table no.2

The frequency and the speed of winds at the meteorological station of Calafat

Direction	N	NE	E	SE	S	SV	V	NV
Frequency %	1,8	4,8	9,8	20,1	8,9	12,3	14,1	12,5
Speed m/s	1,4	1,4	1,6	1,4	1,2	2,2	4,0	3,8

The natural vegetation of this area is specific for the forest steppe and less to the steppe, with leafy forests (cvercinee) and herbaceous vegetation of hayfield (Festuca, Alopecurus).

In the sandy regions can be found specific vegetation for the psamosoil, less pretentious to humidity, and in the watersides grows a well developed herbaceous vegetation of hayfield represented by hydrophilic species (in the area of the lakes and mudholes).

Most of these plots of land are cultivated at the moment, mostly with cereal plants (wheat, maize, sun flower, soy bean, sugar beet etc.).

RESULTS AND DISCUSSIONS

The origin of the psamosoils from Poiana Mare is close related with the microrelief forms and the depth of the ground-water layer. The most important psamosoils from the region of Poiana Mare are: eutrics (specific), molics, gleics and salinized psamosoils.

1. ***The eutrics psamosoils*** (specific) are mostly found on the plateau of the larger dunes with the ground-water layer to a bigger depth, occupied with under-developed xerofil vegetation. It is characterized by a profile of type Ao-AC-C.
   - The Ao horizon: between 0-32 cm, brown-grey colour (10 YR 5/2) in humid state; sandy texture, without structure, porous, compact by drying and stepped passing.
   - The Ac horizon: between 32-50 cm; grey-yellow colour (10 YR 6/1) in humid state; sandy-loam texture, without structure, stepped passing.
   - The C horizon: under 50 cm, dark yellow colour (10 YR 6/4) in humid state; sandy texture, without structure, friable.

Table no. 3

The main physicochemical properties of the eutric psamosoils from the Poioana Mare region

Horizon (cm)	Sand 2-0,02 mm	Dust 0,02-0.002mm	Clay below 0,002 mm	pH (H2O)	Humus %	P	K	SB	T	V %	Carbonates %
						ppm		me/100g soil			
Ao 0- 32 cm	80,8	3,5	5,8	6,6	0,96	43,3	102	12,5	14,5	86	_____
AC 32-50 cm	90,3	2,9	6,8	7,0	0,94	7,6	60	12,8	14,3	89	_____
C Sub 50 cm	89,5	5,2	5,3	7,3	0,56	3,2	42	14,4	14,9	96	0,3

From the granulometrical point of view, the soil has a very high content of sand, around 90%, and a low content of dust and clay, around 10%, which gives the soil a sandy texture. (Table no.3). The soil's reaction is low acid on the surface and neutral going to low alkaline in depth, the PH value growing from 6,6 to 7,3. The soil is lean provisioned with humus 0, 96% and it has a good content of nutritive elements on the surface, being fertilized with P and K. The colloidal complex is reduced, and the saturation rank with bases (V %) is almost of 100%.

2. ***The molic psamosoils*** are mostly found in the larger interdunes area, where, due to the higher humidity, the vegetation is well developed, reason because in the first horizon was gathered a bigger cantity of humus. They have a profile of type: Am-AC-C.
    - The Am horizon: 0-35 cm; dark brown-grey (10 YR 4/3) in humid state; sandy-loam texture; granuled structure low formed, porous, compact environment, stepped passing.
    - The AC horizon: 35-70 cm; grey-yellow colour (10 YR 5/4), sandy-loam texture, without structure, porous environment, compact environment, lean effervescence.
    - The C horizon: under 70 cm; brown-yellow color (10 YR 6/4), sandy-loam texture, without structure, porous, medium effervescence.

Table no. 4

The main physicochemical properties of the molic psamosoils from the Poioana Mare region

Horizon (cm)	Sand 2-0,02 mm	Dust 0,02-0.002mm	Clay below 0,002 mm	pH (H2O)	Humus %	P	K	SB	T	V %	Carbonates %
						ppm		me/100g soil			

Am 0- 35 cm	80,8	9,3	9,9	7,2	1,56	44	140	16,8	17,2	97	0,5
AC 35-70 cm	80,8	8,6	10,6	8,1	1,40	18	74	17,6	17,7	99	3,6
C below 70 cm	85,1	8,6	6,3	8,3	0,84	12	48	18,4	18,5	99	5,4

From the granulometrical point of view, the soil has a lower percent of sand, around 80-85% and a higher content of dust (9,3% and clay(10,6%). (Table no.4) This granulometric composition gives the soil a sandy-loam texture. The soil has a lean alkaline reaction, the PH value growing until 8,3, is better provisioned with humus 1,56%, contains more P and mobile K, and the saturation rank of bases (V %) is of almost 100%. The soil contains carbonates over the entire soil profile.

3. ***The gleic psamosoils*** are mostly found in the thin and deep interdunes where the ground-water layer comes to the surface of the soil and sometimes is swamping, especially in spring. The excess of humidity created intense conditions of anaerobiosis, this is why to lower depths appear gleization processes. The soil has a profile of type Am-Gr.
    - The Am horizon: 0-40 cm; black olive color (7,5 YR 3/2) in humid state, reduction stains in proportion of 50-60%, sandy-loam texture, under-developed structure, dry to moist porous, lean effervescence.
    - The Gr horizon: 40-110 cm; has a dark grey olive color (5 Gy 4/1) in humid state, sandy to sandy-loam texture, without structure, lean effervescence, alkalization, humid friable.

Table no. 5

The main physicochemical properties of the gleic psamosoils from the Poiana Mare region

Horizon (cm)	Sand 2-0,02 mm	Dust 0,02-0.002mm	Clay below 0,002 mm	pH (H2O)	Humus %	P	K	SB	T	V %	Carbonates %
						ppm		me/100g soil			
Am 0- 40 cm	87,2	4,0	8,8	7,9	1,34	3,3	64	14,6	14,9	97	0,5
Gr 40-110 cm	93,2	1,4	5,4	8,4	0,75	3,3	64	15,1	15,2	99	1,7

The gleic psamosoils have a high content of sand, until 93% and a lean content of dust, lower than 4% , and clay under 8,8%. (Table no. 5) the texture of the soil is sandy, the reaction of these psamosoils is lean alkaline, with the value of Ph between 7,9 and 8,4, the content in humus is of 1,34 %, are lean alimented with p and K, and the saturation rank in bases (V %) of almost 100 %.

4. ***The salinized psamosoils*** occupy few surfaces in the Poiana Mare region, because they are situated in the lower grounds, with the found-water relay at little depth, from where in the summer water is lifting up until the surface of the soil through the capillary ascension for the secondary saturation. They have a profile of type: Aosc-Agsc-CGsc.

    - The Aosc horizon: 0-30 cm; brown-yellow colour (2,5 Y 5/2) in humid state, sandy-loam texture, without structure, low compact, porous, lean effervescence.
    - The Agsc horizon: 30-70 cm; dark yellow-grey colour (2,5 Y 5/2) in humid state, sandy-loam texture, without structure, porous, reduction spots in percentage of 5-10 %, strong effervescence.
    - The CGsc horizon: under 70 cm, grey-yellow colour (2,5 Y 6/1) in humid state, with 10-15% reduction spots, sandy-loam texture, without structure, friable.

Table no. 6

The main physicochemical properties of the salinized psamosoils from the Poiana Mare region

Horizon (cm)	Sand 2-0,02 mm	Dust 0,02-0.002mm	Clay below 0,002 mm	pH (H2O)	Humus %	P ppm	K ppm	SB me/100g soil	T me/100g soil	V %	Carbonates %
Aosc 0- 30 cm	83,6	6,0	10,4	8,6	0,41	2,8	48	12,3	12,5	98	1,2
AGsc 30-70 cm	87,1	4,9	8,0	8,8	0,32	1,6	39	12,9	13,1	98	2,4
CG below 70 cm	87,2	4,0	6,8	9,4	0,20	1,4	30	14,4	14,4	100	16,5

The salinized psamosoils also have a high content of sand which grows on the profile from the 83 to 87%, a low content of dust, between 4-6 %, and the clay reduces on the profile from 10,4 to 6,8 %. (Table no. 6) The soils have an alkaline reaction, the PH is growing from 8,6 to 9,4, are low provisioned with humus 0,41% and with nutritive elements. The saturation rank in bases (V %) is also of almost 100%, and the carbonates are present on the entire profile.

CONCLUSIONS

With the research was established that the psamosoils from the Poiana Mare region have a sandy or sandy-loam texture, are low provisioned with humus and nutritive elements and they have a low alkaline or alkaline reaction.

This information underlines the natural low fertility of these psamosoils, which demand a serie of measures of improvement in order to be cultivated.

Through these measures can be named the fight against the sun deflation , the irrigation and the massive organic and mineral fertilization.

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CERCETĂRI CU PRIVIRE LA NIVELUL DE CONTAMINARE CU NITRAȚI ŞI NITRIȚI LA CULTURILE DE SFECLĂ ROŞIE, CASTRAVEȚI, ȚELINĂ, RIDICHI ŞI CEAPĂ VERDE

RESEARCH CONCERNING THE NITRATE AND NITRITE CONTAMINATION LEVEL IN BEETROOTS, CUCUMBERS, CELERY, RADISH, AND GREEN ONION

Cârciu G., Lăzureanu A., Alda S., Alda Liana Maria

ABSTRACT

Cercetările efectuate la ora actuală cu privire la conținutul de nitrați şi nitriți la culturile de sfeclă roşie, castraveți, țelină, ridichi şi ceapă verde încearcă să atenționeze consumatorii de legume despre efectele negative la care sunt supuşi aceştia dacă conținutul substanțelor respective depăşeşte cu mult limita maximă admisă. În acest scop s-au prelevat probe de legume din două piețe agroalimentare şi dintr-un supermaket. Analizele efectuate la legumele din Piața Badea Cârțan indică un conținut de nitrați ce oscilează între 187,5 ppm (ridichi) şi 1427 ppm (sfecla roşie), iar cel de nitriți între 0,4 ppm (ceapă verde) şi 8,6 ppm (ridichi). Valorile înregistrate la legume din Piața Iosefin sunt apropiate de cele înregistrate la Piața Badea Cârțan, conținutul de nitrați oscilează între 273 ppm şi 1724 ppm, în timp ce conținutul de nitriți are valorile cuprinse între 0,2 ppm şi 4,9 ppm. Analizele efectuate la legumele din supermarketul Real cu privire la conținutul de nitrați şi nitriți prezintă valori apropiate de cele obținute în cele două piețe din oraş, excepție făcând conținutul de nitrați din sfecla roşie care se cifrează la 1852 ppm.

Research being carried out at present on the nitrate and nitrite content in beetroot, cucumber, celery, radish, and green onion aim at getting vegetable consumers aware of the negative effects of eating such vegetables if they contain more nitrates and nitrites than admitted. To do that, we sampled vegetables from two markets and a supermarket in Timisoara. Analyses carried out on the vegetables purchased from the Badea Cârțan Market pointed out a nitrate content between 187,5 ppm (radish) and 1427 ppm (beetroot), while nitrite content was between 0,4 ppm (green onion) and 8,6 ppm (radish). The values measured in the vegetables purchased from the Iosefin Market are close to the values measured in the Badea Cârțan Market, and they range between 273 ppm and 1724 ppm, while nitrite values range between 0,2 ppm and 4,9 ppm. Analyses carried out on the vegetables purchased from the Real Supermarket show values close to the values measured in the vegetables purchased from the two markets, except for the nitrate content in beetroots – 1852 ppm.

INTRODUCTION

Present trends at international levels are oriented towards the monitoring and control of plant products with a view to obtain ecological agricultural produce. This is why in this paper we approach a field of maximum importance which is the main focus of scientific research at international level. Nitrates and nitrites under ionic form get into the soil through the mineralization of organic nitrogen substances. From the soil, nitrates and nitrites are taken over by the plants (Riviş, 2004).

Plant parts closer to the soil contain the largest amounts of nitrates. Leaves contain less nitrates than the stem, while seeds and flowers usually contain little nitrates or are even nitrate free. Nitrate amounts diminish with plant growth (Alexa, 2003).

Fertilising with organic or mineral fertilisers should be eliminated to avoid nitrogen

excess in the soil and plants (Rădulescu, 1999).

The multitude of the factors intervening in the growth and development of the plants explain the wide variations of nitrate content in the vegetables consumed by man.

In Romania, the maximum nitrate and nitrite levels in the plants are regulated by the Ministry Order 611/03.04.1995.

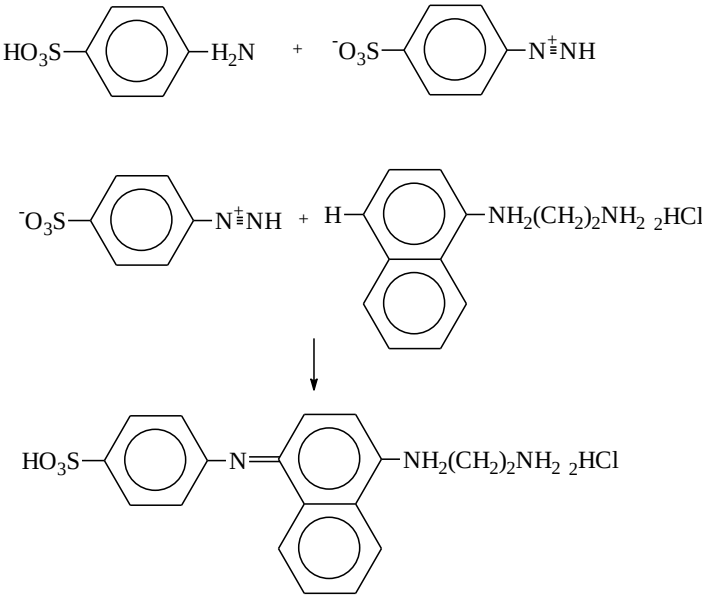
MATERIAL AND METHOD

Content of nitrate, nitrite, and ammonia in beetroot, cucumbers, celery, radish, and green onion was determined colorimetrically with the help of the rapid tests AQUA MERCK, on a spectrophotometer SQ 118 with the wave lengths 515, 525, and 690 nm for nitrates, nitrites, and ammonia, respectively.

The tests sued were SPECTROQUANT NITRAT 14773, SPECTROQUANT NITRIT 14776, and SPECTROQUANT AMONIUM 14752.

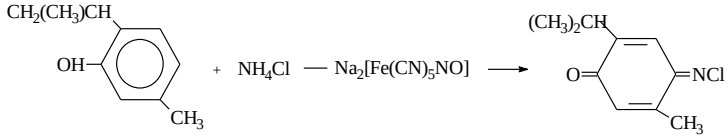
The test SPECTROQUANT NITRAT 14773 is used to determine nitrates in vegetal produce. Determination is done on the basis of the colour reaction obtained by the reaction of the nitrate in the presence of the concentrated sulphuric acid with Nitrospectral with the formation of a nitro derivate strongly coloured in red.

The test SPECTROQUANT NITRIT 14776 consists of the spectrophotometrical determination of nitrites at 525 nm and is based on the Griess reaction (Alexa, 2003). It consists of the conversion of nitrites in the presence of sulphanyl acid into 4-diasobensenesulphonic acid. It condenses with N-(1 naphtyl) ethylendiammonia dichloride (NNEDDC) resulting in a diaso- compound coloured in red-purple.



The test SPECTROQUANT AMONIUM 14752 is used in the spectrophotometrical determination of the ammonia ion. After alkalinisation at pH 13, ammonia reacts with the hypochlorite forming mono-chloride-amine. The latter, in a second stage, forms, together with timol (2-isopropyl-5-methyl phenol) and (Dinatrium-pentacyan-nitrosyl-ferat [III]) natrium nitroprusiate, N-chloride – 2-isopropil-5-methyl-chinon-monoimine.

NH3 + NaClO NH2Cl + NaOH



Chinon-monoimine reacts, in a second stage, with a new molecule of timol, forming indo-phenol, coloured in blue in a basic medium.

Minimal detection limits according to the working method are: 1 mg/l for nitrates, 0.02 mg/l for nitrites, and 0.1 mg/l for ammonia.

DETERMINING NITRATE, NITRITE, AND AMMONIA CONTENT IN VEGETAL PRODUCE (BEETROOT) THROUGH HPLC

Determining nitrate and nitrite contamination of the vegetal produce need performing analytic methods for the detection, identification, and measurement.

High pressure (performance) liquid chromatography is an analytic procedure advantageous compared to gaseous phase chromatography used in the analysis of some very stable compounds with very high melting and boiling points for compounds unstable at high temperatures as well as for some compounds with large molecular volume. This procedure is characterised by speed, resolution, and high sensitivity.

Trial conditions: HPLC – Birchoff, Column C18, Mobile phase Potassium Hydrogen Phtalate 0.01 M, Detection UV -290 nm.

RESULTS

In the year 2008 we sampled vegetables from the Real Hypermarket and from two private markets, i.e. the Badea Cârțan and the Iosefin markets. In order to get a clearest image of the nitrate and nitrite content, we sampled and analysed vegetables on July 15, 2008, and on September 20, 2008, respectively.

Measurements made on July 15, 2008

Nitrate content in the Real Hypermarket oscillated between 257,5 ppm in onion and 912 ppm in beetroots. In red radishes, it reached 480.5 ppm, in cucumbers – 456.5 ppm (above the admitted value), and in celery – 341 ppm. Nitrite content was 1,35 ppm in green onion and 4.55 ppm in red radishes (Table 1).

In the vegetables sampled in the Badea Cârțan market, nitrate content was much lower, with values between 187.5 ppm in red radishes and 791.5 ppm in beetroots. Nitrate contents in cucumbers was 371.5 ppm, i.e. above the admitted limit. In green onion and celery, nitrate content was below admissible limit. Nitrites had values between 0.85 ppm (green onion) and 4.90 ppm (red radishes) (Table 2).

In the vegetables sampled in the Iosefin market, nitrate content in cucumbers, celery, and green onion was lower compared to the same values in the vegetables sampled from the Badea Cârțan market. In red radishes and in beetroots, nitrate content was higher than in the vegetables sampled from the Badea Cârțan market, i.e. 273 ppm and 952 ppm, respectively. Nitrite values oscillated between 0.87 ppm (cucumbers) and 4.9 ppm (celery) (Table 3).

Table 1

Nitrate and nitrite content in the vegetables from the REAL Hypermarket

Nr. crt	PROBA	Mass (g)	Nitrate (mg/l)	Nitrate (ppm)	Nitrite (mg/l)	Nitrite (ppm)	Ammonia (mg/l)	Ammonia (ppm)
1	Cucumbers	10	91,3	45	0,29	1,45	-	-

		0		6,5				
2	Green onion	100	51,5	257,5	0,27	1,35	-	-
3	Radish	100	96,1	480,5	0,91	4,55	-	-
4	Beetroots	100	182,4	912	0,42	2,1	0,092	0,46
5	Celery	100	68,2	341	0,74	3,7	-	-

Table 2

Nitrate and nitrite content in the vegetables from the BADEA CÂRȚAN MARKET (Private vegetable growers)

Nr. crt	PROBA	Mass (g)	Nitrate (mg/l)	Nitrate (ppm)	Nitrite (mg/l)	Nitrite (ppm)	Ammonia
1	Cucumbers	100	74,3	371,5	0,38	1,9	-
2	Green onion	100	48,6	243	0,17	0,85	-
3	Celery	100	69,4	347	0,57	2,85	-
4	Radish	100	37,5	187,5	0,98	4,90	-
5	Beetroots	100	158,3	791,5	0,32	1,60	-

Table 3

Nitrate and nitrite content in the vegetables from the IOSEFIN MARKET (Private vegetable growers)

Nr. crt	PROBA	Mass (g)	Nitrate (mg/l)	Nitrate (ppm)	Nitrite (mg/l)	Nitrite (ppm)	Ammonia
1	Cucumbers	91,38	80,0	438	0,16	0,87	-
2	Celery	100	78,2	391	0,98	4,9	-
3	Green onion	100	54,6	273	0,35	1,75	-
4	Radish	100	74,8	374	0,76	3,80	-
5	Beetroots	100	190,4	952	0,95	4,75	-

Measurements made on September 20, 2008

After we analysed the nitrate and nitrite content in vegetables sampled in September 2008 from the Real Hypermarket, we could see it was much higher compared to the values measured in July. In cucumbers, there were 294 ppm, i.e. 162.5 ppm less than in July. In the other crops, nitrate content was much higher, reaching, in beetroot, double nitrate content, i.e. from 912 ppm in July to 1,852 ppm in September. Nitrite content had higher values in cucumbers, i.e. 4.5 ppm, and 8.2 ppm in beetroots (Table 4).

In the vegetable samples from the Badea Cârțan market also, measurements showed much higher values than in July. Nitrate content oscillated between 285 ppm in red radishes and 1,427 ppm in beetroots. Nitrite content was 0.4 ppm in green onion and 8.6 ppm in red radishes (Table 5). The same decreasing trend was also noted in the nitrate and nitrite content sampled from the Iosefin market. In green onion, the nitrate content reached 342 ppm, while in beetroots it reached 1,724 ppm. Nitrite content was lower, i.e. between 0.2 ppm in green onion and 4.7 ppm in beetroots (Table 6).

Table 4

Nitrate and nitrite content in the vegetables from the REAL Hypermarket

Nr. crt	PROBA	Mass (g)	Nitrate (mg/l)	Nitrate (ppm)	Nitrite (mg/l)	Nitrite (ppm)	Ammonia
1	Green onion	50	32,6	326	0,05	0,5	-
2	Cucumbers	50	29,4	294	0,45	4,5	-
3	Celery	50	48,5	485	0,49	4,9	-
4	Radisch	50	61,5	615	0,21	2,1	-
5	Beetroots	50	185,2	1852	0,82	8,2	-

Table 5

Nitrate and nitrite content in the vegetables from the BADEA CÂRȚAN MARKET (Private vegetable growers)

Nr. crt	PROBA	Mass (g)	Nitrate (mg/l)	Nitrate (ppm)	Nitrite (mg/l)	Nitrite (ppm)	Ammonia
1	Green onion	50	34,5	345	0,04	0,4	-
2	Cucumbers	50	65,0	650	0,28	2,8	-
3	Celery	50	34,0	340	0,32	3,2	-
4	Radisch	50	28,5	285	0,86	8,6	-
5	Beetroots	50	142,7	1427	0,24	2,4	-

Table 6

Nitrate and nitrite content in the vegetables from the IOSEFIN MARKET (Private vegetable growers)

Nr. crt	PROBA	Mass (g)	Nitrate (mg/l)	Nitrate (ppm)	Nitrite (mg/l)	Nitrite (ppm)	Ammonia
1	Green onion	50	34,2	342	0,02	0,2	-

2	Cucumbers	50	65,2	652	0,16	1,6	-
3	Celery	50	41,2	412	0,25	2,5	-
4	Radisch	50	65,3	653	0,22	2,2	-
5	Beetroots	50	172,4	1724	0,47	4,7	-

CONCLUSIONS

1. As a result of sample analyses in green onion, red radishes, cucumbers, celery, and beetroots, we could note that nitrate content values in July oscillated between 187.5 ppm in red radishes and 952 ppm in beetroots. Nitrite content had values between 0.85 ppm in green onion and 4.9 ppm in red radish.

2. In the vegetables from the Real Hypermarket, nitrate content oscillated between 257.5 ppm in green onion and 1,852 ppm in beetroots. Nitrite content oscillated between 0.5 ppm in green onion and 8.2 ppm in beetroots.

3. Nitrate content in the vegetables sampled from the Badea Cârțan market was between 187.5 ppm in red radish and 1,427 ppm in beetroot. Nitrite content oscillated between 0.4 ppm and 8.6 ppm.

4. In the vegetables sampled from the Iosefin market, nitrate and nitrite contents were the highest. Nitrate content was 273 ppm in green onion and 1,724 ppm in beetroot. Nitrite content was between 0.2 ppm and 4.9 ppm.

5. There was ammonia only in beetroots, in the vegetables sampled in July from the Real Hypermarket – 0.46 ppm.

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ADVANCED OXIDATION PROCESSES (AOP)

Cojocaru Ileana, Dincă Daniela

Key words: oxidation processes, full mineralization organic compounds, inorganic salts;
Cuvinte cheie: procese de oxidare, mineralizare totală a componentelor organice, săruri anorganice.

ABSTRACT

Advanced oxidation processes (AOP) is a class of new and effective methods used to accelerate the process of oxidation and degradation for refractory compounds.

Advanced oxidation processes (AOP) is a class of new and efficient methods used to accelerate the process of oxidation and also for degradation of the refractory compounds.

At the AOP sites are physical and chemical processes through which are generated "in situ" powerful oxidizing species, especially hydroxyl radicals (HO.), which makes conditions favorable for full mineralization organic compounds to form CO2 -, the H2O and inorganic salts.

Procesele de oxidare avansată (AOP) reprezintă o clasă de metode noi şi eficiente utilizate atât pentru accelerarea procesului de oxidare, cât şi pentru degradarea compuşilor refractari.

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La baza AOP-urilor se află procese fizico-chimice prin intermediul cărora sunt generate „in situ" specii puternic oxidante, în special radicali hidroxil (HO.), care în condiții prielnice facilitează mineralizarea completă a compuşilor organici cu formarea CO2 – ului, H2O şi a sărurilor anorganice.

INTRODUCTION

Purifying water is a domain in which the studies have aimed to elaborate and develop processes capable of degrading organic and inorganic contaminants resistant to conventional techniques.

Advanced oxidation processes (AOP) represent a class of new and effective methods used to accelerate the process of oxidation and degradation of refractory compounds.

At the basis of AOPs there are physical and chemical processes through which powerful oxidizing species are generated, especially hydroxyl radicals (HO.), which, under favourable conditions, facilitate full mineralization of organic compounds to form CO2 , H2O, and inorganic salts.

Heterogeneous photocatalysis falls in the class of AOP processes and is successfully used in eliminating pollutants in liquid or gaseous phase.

The basic principles of photocatalysis are very well organised and can be summarized as follows:

a) the photoexcitation of semiconductor particles initiates the jump of an electron from the valence band to the conduction band so that a vacancy is generated in the valence band and simultaneously empty pairs (vacancy)/e- appear;

b) redox processes can take place on / near the surface of the semiconductor excited particle :

In aerated aqueous media, dissolved oxygen is used as electron acceptor:

$O_2 + e^- \rightarrow O_2^{\cdot}$

The superoxide anion radical which is generated undergoes a process of protonation resulting in hydroperoxide radical:

$O_2^{\cdot -} + e^- \rightarrow HO_2$

In this way, e-/vacancies recombination can be effectively prevented and the life of vacancies extended.

By breaking up the hydroperoxide radical H2O2 (hydrogen peroxide) is formed:

$HO_2^{\cdot} + e^- \rightarrow HO_2^-$

$HO_2^- + H^+ \rightarrow H_2O_2$

The gaps formed have a high oxidation potential, which facilitates their reaction with water molecules adsorbed, with formation of hydroxyl radical:

$H_2O_2 + h^+ \rightarrow HO^{\cdot}_{ads} + H^+$

In chemistry literature there is controversy on the oxidizing species; even if the photogenerated gaps have the capacity to oxidize various substrates through e-transfer in aqueous solutions, the oxidation of the water molecule to form radicals HO. seems to be the main mechanism of the photocatalysis process.

A photocatalysis system used for purifying water is made of:

- a reactor inside which the waste water solution is fueled,
- a photocatalyser in the form of finely dispersed particles,
- a radiation source that emits mono or polychromatic radiation, with energy equal to or greater than the corresponding band transition.

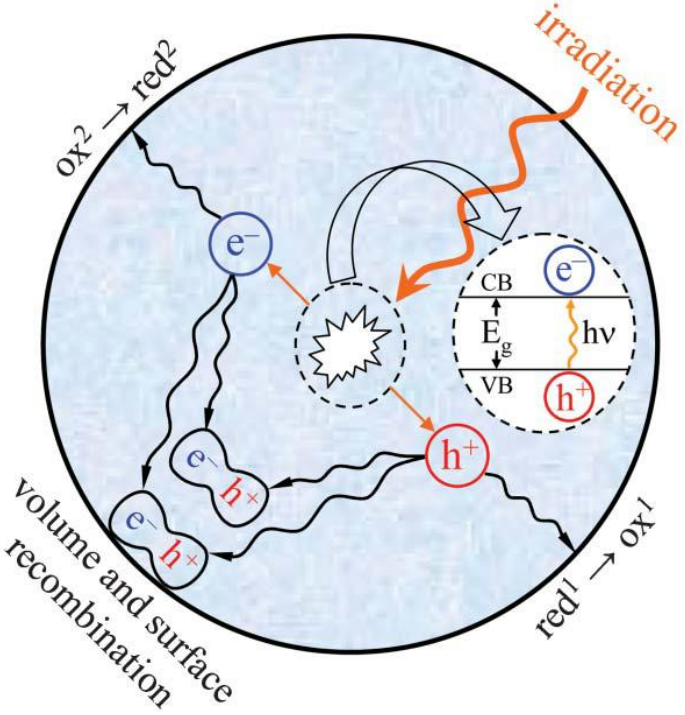


Figure 1. Schematic representation of photocatalysis reaction in the presence of finely dispersed semiconductor

By simplifying the process that takes place after the irradiation of the area of the photocatalyser, four main steps remain:

1) adsorption of luminous radiation, followed by the formation of empty pair/ vacancy;

2) adsorption of reagents;

3) redox reaction;

4) desorption of products.

It is unanimously agreed that the stages taking place on the surface of the semiconductor that is irradiated with photons possessing energy equal to or greater than the band of transition are:

SC (semiconductor) + hv ($\geq E_g$) $\rightarrow$ $h^+ + e^-$

$h^+ + e^- \rightarrow h_{vb}^+ + e_{cb}^-$

vb – valence band

cb – conduction band

$h^+ + OH^- \rightarrow OH^{\cdot}$

$e^- + O_2 \rightarrow O_2^{\cdot -}$

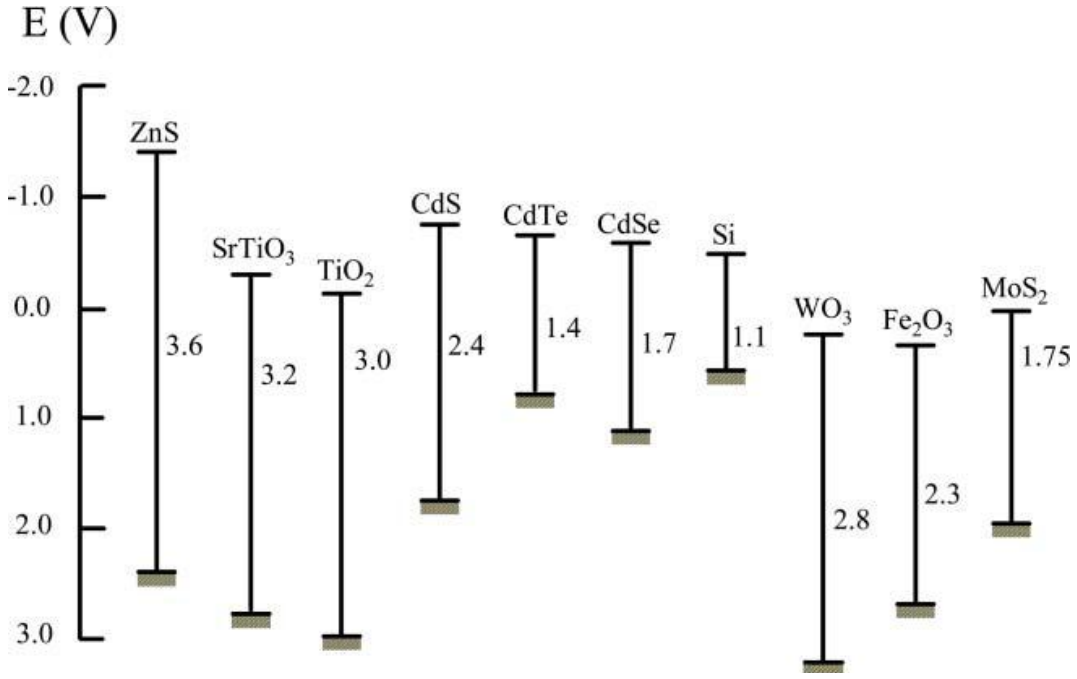


Figure 2. Transition band energies and redox potentials corresponding to the most used semiconductors employed as photocatalysers

Among the materials which are most used for manufacturing photocatalysers we can include: SiO_2, TiO_2, ZnO, WO_3, CdS, NiO

These catalysers are often produced by doping metals from the group of transition metals in order to make possible the extension of the activity to the visible area and their supporting on different materials (eg silica and zeolite) to obtain an increase in active surface area and, implicitly, the speed of response.

In studies carried out recently, new materials have been tested so as to produce photocatalysers, among them : uranyl (VI), polyoxometalates, porphirine phtalocyanines. These materials form a new class of chemical species with high potential for use as selective photocatalysers.

Out of the multitude of semiconductor materials tested as potential photocatalysers, it is unanimously agreed that TiO2 is the most suitable material, which is due to the advantages it possesses:

- Reduced cost;
- Stability in photocorrosion;
- High chemical activity.

Titanium crystalises in three forms: Brucite, rutile and anatase. TiO_2 particles in the form anatase (Eg = transition band width = 3.2 eV, corresponding to the absorption of

radiation by 382 nm) are more photoreactive than other forms in which the photocatalyser is found and this is the reason why they are most often used.

UO_2^{2+} (λexc = wavelength at which the excitement of the photocatalyser takes place = 385 nm) is an example of inorganic uniform photocatalyser which, through absorption of light in the visible spectrum, leads to the formation of UO_2^{2+} strong oxidizing species that are capable of catalyzing aerated oxidation reactions of cyclopentane to cyclopentanone:

$UO_2^{2+} + hv \rightarrow {}^*UO_2^{2+}$

${}^*UO_2^{2+} + C_5H_{10} \rightarrow UO_2^{2+} + C_5H_9^{\cdot} + H^+$

$C_5H_9^{\cdot} + O_2 \rightarrow C_5H_9O_2^{\cdot}$

$C_5H_9O_2^{\cdot} \rightarrow C_5H_8O + 1/2H_2O_2$

$2UO_2^{2+} + O_2 + 2H^+ \rightarrow 2UO_2^{2+} + H_2O_2$

Polioximetalates (POMs) also induce reversible redox reactions under the influence of radiation. The mechanism of reaction proposed to convert organic substrate (especially alcohol) is:

$POM + hv \rightarrow POM^*$

$POM^* + Me_2CHOH \rightarrow POM(e^-) + Me_2COH^{\cdot} + H^+$

$POM + Me_2COH^{\cdot} \rightarrow POM(e^-) + Me_2CO + H^+$

Phtalocyamines and porphyrins have been intensively studied for possible use as photocatalysers especially in aerobic oxidation reactions of hydrocarbons.

OXIDATION REACTIONS

Photooxidation is by far the most studied class of chemical reactions. Most studies conducted so far have been focused on aliphatic alkenes and aromatics, derivatives of alkenes, special attention being given to selective oxidation of alcohols with the formation of carbonyl.

AROMATIC HYDROXYLATION

Hydroxylation of aromatic compounds is a reaction of great importance for the chemical industry. In the category of photocatalytic oxidation reactions of aromatic compounds, benzene to phenol conversion is probably the most interesting. The mechanism of the process that takes place after the irradiation of the photocatalyser's area is made up of 2 competitive stages:

- The hydroxylation of the aromatic ring;
- Multi-stage oxidation reactions to achieve complete mineralization.

Diagram 1 shows that for the class of compounds that contain in the structure of the molecule an electron-donating group, the attack of OH radicals observes the rules of selectivity known for the reactions of homogeneous electrophile aromatic substitution, resulting only in ortho and para isomers.

In the absence of an e-donating group, OH radicals' attack is unselective, a mixture composed of 3 isomers being obtained in this case.

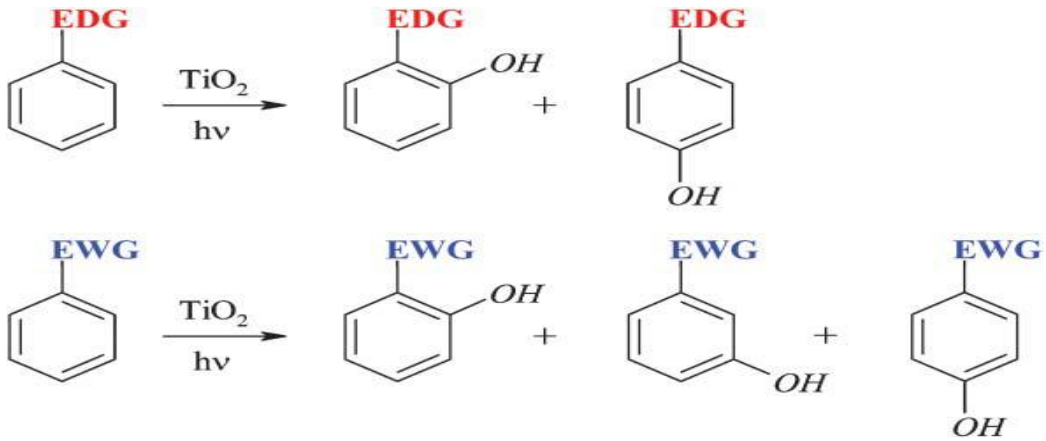


Diagram 1
OXIDATION OF HYDROCARBONS

The direct transformation of alkalies into oxygenated compounds: alcohols, ketones, aldehydes, carboxylic acids represents an important stage with big future for the chemical industry, photocalysis standing out as a promising technology.

The reaction mechanism proposed for the formation of cyclohexanol is initiated by the formation of the Alkyl radical through the reaction of a hydrocarbon with a gap or a hydroxyl radical:

$RH^{\cdot} + OH^{\cdot} \rightarrow RHOH$

$RH^{\cdot} + O_2 \rightarrow RHOO^{\cdot}$

$RHOO^{\cdot} + RH_2 \rightarrow RHOOH + HR^{\cdot}$

$RHOOH + e^{-} \rightarrow HRO^{\cdot} + OH^{-}$

$HRO^{\cdot} + RH_2 \rightarrow RHOH + HR^{\cdot}$

As regards the formation of cyclohexanone, the suggested reactions are:

$RHOH + 2OH^{\cdot} \rightarrow RO + 2H_2O$

$RHOO^{\cdot} + e^{-} \rightarrow RO + OH^{-}$

$RH^{\cdot} + O_2^{-\cdot} \rightarrow RO + OH^{-}$

$RH^{\cdot} + HO_2^{\cdot} \rightarrow RO + H_2O$

For the partial oxidation of cyclohexane photocatalytic reactors have been successfully used, in which the TiO_2 photocatalyser was deposited in the form of thin films activated by irradiation with UV light. The best selectivity (99%) was obtained for the case in which the photocatalyser films were created through the sol-gel method.

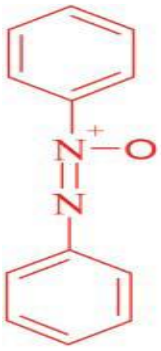
REACTIONS OF REDUCTION

The reduction in a photocatalytic way is intrinsically more secure as compared to the reaction of reduction in a chemical way, in which the chemicals that are used are unsafe or potentially of high risk for environmental protection. So far photocatalytic reduction is less used than oxidation, most likely due to the lower reducing ability of the electron of the conduction band as compared to the oxidative capacity of the gap generated in the valence band.

Reducing Nitro-Aromatic Compounds

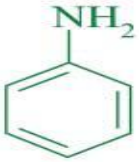
Photoinduced reduction of nitro-aromatic compounds has lately aroused the attention of researchers. For example, reducing the nitrobenzene and its derivatives using TiO2 films activated by irradiation with UV reaction has been studied intensively in the last decade.

In nitrobenzene conversion, 3 and 4 nitrotoluen, nitrobenzonitril in the presence of aqueous suspensions of TiO2, methanol or 2-propanol play the role of electron donors, achieving very good speeds of reaction and selectivities.

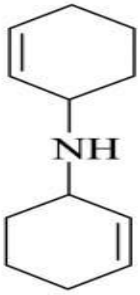


I

II



III



IV

Figure 3 Products resulted from the photoreduction of nitrobenzene.

To improve overall performance of the heterogeneous photocatalysis process, the latter has recently begun to be combined with different physical or chemical processes that positively influence the kinetics of the proceedings and / or overall effectiveness.

The results of such combinations can be:

1) increasing the overall efficiency of the process and reducing the reaction time as compared to using only photocatalysis;

2) lowering costs (especially energy-related costs) which are involved by the use of photocatalysis only.

Heterogeneous photocatalysis combinations are divided/classified into two large categories:

1) Heterogeneous photocatalysis is coupled with an operation which influences the photocatalytic mechanism, leading to an improvement in the efficiency of photocatalytic process. In this case coupling is made with:

- Ultrasonic irradiation;
- photo – Fenton reaction;
- Ozonization;
- Electrochemical treatment.

2) Heterogeneous photocatalysis is coupled with an operation that does not alter the mechanism that promotes the overall efficiency of the process. In this case, coupling is made with:

- Organic phase;
- Membrane reactor;
- Physical adsorption.

CONCLUSIONS

Heterogeneous photocatalysis is a process which is part of the category of AOPs that provides satisfactory results for both treating and purifying water.

Maximum efficiency in the field of purifying water is obtained only if one wants to transform the refractory compounds to readily biodegradable compounds that subsequently are going to be eliminated by conventional means.

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CÂTEVA ASPECTE REFERITOARE LA RECOMANDĂRILE DE FERTILIZARE MINERALĂ PENTRU CULTURA DE GRÂU DE TOAMNĂ ÎN LOTUL EXPERIMENTAL DE LA SC AGROTEHNIC SRL PĂULEŞTI

SOME ASPECTS CONCERNING THE RECOMMENDATIONS FOR MINERAL FERTILIZATON TO WINTER WHEAT CROP IN THE SC AGROTEHNIC SRL PĂULEŞTI EXPERIMENTAL PLOT

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Key words: winter wheat, mineral nutrition, fertilization recommendations

ABSTRACT

Această lucrare prezintă câteva aspecte referitoare la fertilizarea minerală în doze optime economice (DOE), la cultura de grâu. De asemenea, lucrarea prezintă datele necesare pentru stabilirea recomandărilor de fertilizare cu N, P şi K. Recomandările de fertilizare au fost stabilite in funcție de starea de nutriție a plantelor de grâu şi condițiile de sol de la SC Agrotehnic Plăuleşti. Soiurile de grâu pentru care s-au făcut recomandările de fertilizare au fost Serina şi Renan, iar solul din lotul experimental a fost preluvosol roşcat.

Acest studiu a fost finanțat de Ministerul Educației, Cercetării şi Tineretului, Centrul Național de Management Programe, Proiect GRIFOX, nr. 51-040 /14.09.2007.

This paper is dealing with some aspects regarding the mineral fertilization in optimal economical rates (OER) for winter wheat crop. Therefore, the paper presents data necessary to establish the recommendations for N, P and K fertilization.

The optimat economical N, P, K rates are differentiated as related to the available soil macroronutrient contents and the expected yields.

Also, the fertilization recommendations were estabilish in relation with the mineral nutrition status of winter wheat and the soil conditions from SC Agrotehnic Plăuleşti experimental plot. The tested plant was Serina and Renan cultivars, grown on Chromic luvisols.

This study was financed by the Ministry of Education, Research and Youth, National Management Programme Center, project 51-040 /14.09.2007 GRIFOX.

INTRODUCTION

In all crop production systems it can be established the causative relation between the physical, chemical and biological properties of the soil and the crop productivity level. In the equal conditions from all the wiev points the crop productivity depend on the fertility state of the soil. This relation become quite obvious then when the

mobile nutrients contents in the soil decline bellow the critical values for crop production (Borlan Z., et al. 1982, 1984, 1994, Dana D., et al., 2000).

The actually problem for Romanian crop production systems is represented by the decline of soil crop production capability and by the decline of the phosphorus contents in plants and soils.

At present, when Romania desires the sustainable development of crop production, as well as the increase the agricultural productivity and outputs (comparable to those obtained in the countries with advanced agriculture), is necessary to establish and promote a good management of fertilization, which includes the use of N,P,K at optimal rates for crop yield.

MATERIAL AND METHODS

In order to calculate the optimal economic rates (OER) of fertilizers for winter wheat the following formula was used (Borlan et al. 1982, 1984, 1994):

$$OER, kg\ N, P_2O_5, K_2O/ha = \{\log[2.3 \cdot c_a \cdot Y_e \cdot (Cy/Cf)] - c_a SC_y\}/c_a$$

where: c_a = action coefficient of nutrients, determined in long term field experiments with fertilizers; Y_e = expected yield, t/ha; Cy= unitary yield price, lei/kg; Cf = unitary fertilizers price, lei/kg a.i.; SC_y = soil contribution to yield, kg N, P_2O_5 and K_2O/ha, which is evaluated using the following equation:

$$SC_y = SC_{y\,max}(1 - 10^{-ca \cdot IA}) + c \cdot Y_e$$

where: $SC_{y\,max}$ = maximum soil contribution to yield under the conditions of very good nutrients supply; c = coefficient of ecological crop conditions, experimentally established for each species and each nutrient; IA = soil agrochemical index (in the soil layer 0-20 cm) which is represented by: the soil nitrogen index (IN) for N, and the available P, K for P and K.

OBTAINED RESULTS

Table 1 presents the data regarding the applied fertilizer rates to experimental plot in SC Agrotehnic Păulesti, Prahova County, in autumn, 2007.

The effective equations used for winter wheat in order to calculate SC_y are presented in Table 2. From this, it can be seen that nutrient soil contribution increase as the soil agrochemical indexes (IN, P_{AL}, K_{AL}) increase.

Optimal economic rates (OER which correspond to maximum revenue from fertilizers) are presented in the Table 3. The OER of chemical fertilizers decrease as the soil agrochemical indexes (IN, P_{AL}, K_{AL}) increase, and depend by level of expected yield (Y_e).

able 1

Data regarding the applied fertilizer rates to experimental plot in SC Agrotehnic Păulesti, Prahova County, 2007

Parcel/Cultivar	Surface (ha)	Expected yield (kg/ha)	Applied fertilizer rate (kg a.i.* /ha)	
			N	P_2O_5
P1 OVEZIŞTE/SERINA	20	5500	28	60

P2 BĂICOI/SERINA	50	5500	16	80
P3 TUFE/RENAN	30	5500	16	80

* active ingredients

Table 2

Data regarding the nutrient soil contribution calculated in relation with soil agrochemical index

No. parcel	Soil agrochemical index			Soil contribution to yield, kg N, P_2O_5 and K_2O/ha		
	IN	P_{AL}	K_{AL}	N	P_2O_5	K_2O
P1	0,81	15,02	103	26,53	88,23	120,21
P2	1,51	9,95	239	41,64	71,04	171,94
P3	1,70	14,09	105	42,97	85,34	121,48
$SC_N=24,5\ (HV)-2,41(HV)^2+0,0015xY_e$						
$SC_P=137(1-10^{-0,018xPAL}) +0,0045xY_e$						
$SC_K=180(1-10^{-0,00362xKAL}) +0,003xY_e$ H-humus content,% V-base saturation degrees,% IN - soil nitrogen index; P_{AL} and K_{AL} - soil mobile P and K extractable with AL solution (0.1M ammonium lactate and 0.4 N acetic acid at a pH of 3.7), expressed as ppm P and K.						

Table 3

The optimal economic rates (OER) of fertilizers for winter wheat (expected yield-5.5 t/ha)

No. parcel	EOR (kg/ha)			Applied fertilizer rate (kg a.i.* /ha) in autumn		N fertilizer rates for application in spring (kg a.i.* /ha)
	N	P_2O_5	K_2O	N	P_2O_5	N
P1	163	83	91	28	60	135
P2	148	100	40	16	80	132
P3	147	86	90	16	80	131

* active ingredients

CONLUSIONS

A stable (durable) crop production implay with necesity a certain agrochemical stability of the soil, especially for macronutrient content.

Stabilisation of the macronutrient supplying power of the soil at the required level for sustained crop productions can be reached only by the application of chemical fertilizers in EOR rates, which ensure a certain amelioration of the macronutrient regime on poor soils.

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FERTILIZAREA FOLIARĂ O METODĂ EFICIENTĂ PENTRU REDUCEREA PIERDERILOR DE NUTRIENȚI ÎN MEDIU

FOLIAR FERTILIZATION AN EFFICIENT METHOD FOR REDUCTION OF NUTRIENTS LOSSES IN THE ENVIRONMENT

Dana Daniela, Răducu Daniel, Mihalache Daniela, Anton Iulia, Anghelescu Letiția, Grigore Adrian, Eftene Marius, Dodocioiu Ana Maria, Mocanu Romulus, Filiche Eugen, Purnavel Gheorghe

Keywords: nutrients losses, maize, sunflower, foliar fertilizers

ABSTRACT

Astăzi, utilizarea excesivă a fertilizanților chimici reprezintă una dintre cele mai frecvente cauze ale poluării mediului. Reducerea pierderilor de nutrienți şi sol poate fii realizată prin utilizarea unui sistem alternativ de fertilizare, sistem care să includă şi fertilizarea foliară. In acest context, fertilizarea foliară cu nutrienți minerali şi substanțe organice, aplicată pe plante în scopul prevenirii şi corectării deficiențelor de nutriție, poate fi o posibilitate de reducere a riscului de poluare chimică a mediului ambiant, în special, datorită creşterii gradelor de utilizare productivă în recolte, a nutrienților din rezervele solului şi din fertilizanții aplicați.

Aceasta lucrare prezintă rezultatele experimentale obținute în casa de vegetație, prin aplicarea a două noi tipuri de fertilizanții foliari la cultura de porumb şi floarea soarelui. Aplicarea acestora, pe solul cernoziom vermic,în anul 2007, a asigurat importante creşteri ale producției de substanță uscată şi a avut un efect pozitiv asupra acumulărilor de N, P si K în substanța uscată a plantelor. Această lucrare a fost finanțată de Ministerul Educației, Cercetării şi Tineretului, Centrul Național de Management Programe, Proiect PENSOL, nr. 52-149/1.10.2008.

Today the excessive use of chemical fertilizers is one of the most frequent causes of environmental pollution. The reduction of nutrient losses in soil and water may be achieved by using an alternative fertilization system, that including the foliar fertilizers application.

In this context, the foliar fertilizers with mineral nutrients and organic substances, applied on plant leaves in order to prevent or to correct the nutrient disorders in plant, may by a possibility for reduction of chemical pollution risk in the environment, especially, due to increasing the degees of productive nutrient use from soil reserves and applied fertilisers.

This paper presents experiment results obtained into the greenhouse applying two new ranges of foliar fertilizers with maize and sunflower crops. Their application, on vermic chernozems, ensured important yield increases of dry matter and had a positive effect on N, P and K uptakes in plant dry matter.

This paper was financed by the Ministry of Education, Research and Youth, National Management Programme Center, project PENSOL, no. 52-149 /1.10.2008

INTRODUCTION

The foliar fertilization represents an important mean for fertilizing the agricultural crops and increasing the crop production, especially, due to the many advantages, which can be offered throught its application within crop tehnologies (Borlan et al., 1992, Marschner, 1995, Goos and Johnson, 2000, Godsey et al., 2003), such as:

-rapid correction of the primary and secundary nutrient disorders in plant;

-high yields obtained with a small consumption of nutrients on unit of surface;

-low chemical pollution risk in the environment assured by high degees of productive nutrient use from soil reserves and foliar applied fertilisers;

The possibility of action with this mean are related to Liebscher,s optimum rule (Borlan Z., et al. 1989, 1994, 1998). These imply, the partial compensation of nutrient deficiennces by optimizing the physical conditions for plant growth.

MATERIAL AND METHODS

The experiment was organized in Mitscherlich pots with 20 kg of soil/pot and and was treated as monofactorial experiment with 4 replicates.

The soil was Vermic Chernozems from Feteşti with the following properties: humus – 3.76 %; pH (H_2O) – 7.78; mobile P – 235 ppm and mobile K – 84 ppm. All variants, excepting control – unfertilized in soil, received 100 mg N, P_2O_5, K_2O/kg soil in the case of maize crop and 50 mg N, P_2O_5, K_2O/kg soil in the case of sunflower crop, as a 16-16-16 complex fertilizer. The foliar fertilizers have been applied 3 times as diluted solutions with 1 % concentrations. The plants have been harvested after 7 days from the last application of the foliar fertilizers. The chemical compositions of tested fertilizers are presented in the table 1.

The experimental data have been processed by the variance analysis method (Student-Newman-Keuls test) and have been compared with the two controls: unfertilized in soil and fertilized in soil.

OBTAINED RESULTS

From the data presented in Table 2, it can be observed that all the foliar fertilizers have determined a positive increase of the maize dry matter yield as compared with both controls.

Thus, foliar fertilizers have assured yield increases between 22.45–26.63 g/plant as compared with the control unfertilized in soil and between 3.34-5.52 g/plant as compared with the control fertilized in soil.

With sunflower crop (Table 3), the foliar fertilizers assured yield increases between 2.54–3.41 g/plant as compared with the control unfertilized in soil and between 0.74-1.61 g/plant as compared with the control fertilized in soil.

Regarding the effect of tested foliar fertilizers on macro-micronutrient contents in maize plants (Tables 2), it can be seen a general tendency of increase versus controls.

In the case of sunflower crops, may be observed a tendency of decrease of macro-micronutrient contents, in foliar variants (Table 3), especially, due to dilution effect.

As concerns the influence of foliar fertilizers on N, P and K uptake of maize plants (Table 2), they have, generally, positive effect as compared with both controls. Thus, regarding N uptake, the foliar fertilizers assured increases between 0.10-0.15 g/plant, for P uptake between 0.02-0.03 g/plant, and for K uptake between 0.10-0.15 g/plant as compared with the control fertilized in soil.

With sunflower crop, the foliar fertilizers assured for N uptake-increases between 0.03-0.08 g/plant, for P uptake-increases between 0.006–0.017 g/plant, and for K uptake-increases between 0.01–0.09 g/plant, as compared with the control fertilized in soil (Table 3).

The positive increase on N, P and K uptakes in maize and sunflower plants demonstrate that the foliar fertilizers assured a real ecological protection effect of the environment due to the increase of the degrees of productive use of nutrients from the foliar fertilizers and from soil resources trough the stimulation of the consumptions of nutrients in yield increases.

Table 1

The chemical composition of applied fertilizers

Crop	Maize		Sunflower	
Components	V 1.1	V 1.2	V 2.1	V 2.2
N, g/l	238.0	117.8	190.7	184.8
P2O5, g/l	129.8	185.6	181.7	165.6
K2O, g/l	110.1	133.4	146.1	61.6
S, g/l	35.80	32.42	31.37	33.36
Mn, ppm	0.3	0.4	0.6	0.6
Fe, ppm	0.8	0.6	0.4	0.5
Zn, ppm	0.5	2.0	0.4	0.4
Cu, ppm	0.2	0.2	0.3	0.3
B, ppm	0.3	0.9	0.8	1.4

CONLUSIONS

All the tested foliar fertilizers showed a positive influence on dry matter yield of maize and sunflower plants, as compared with controls;

The foliar fertilizers have, generally, a positive effect on N, P, K content of maize plants as compared with control fertilized in soil;

The N, P and K uptakes in maize and sunflower plants recorded increases in the all foliar variants.

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Table 2

Data regarding the effect of foliar fertilizers on dry matter yield, macro-micromutrient contents and macronutrient uptakes in the aerial parts of maize, Oriente cultivar, 2007

Variants	Dry matter yield (g/plant)	N	P	K	Ca	Mg	Cu	Zn	Fe	Mn	N	P	K
		Macromutrient content, % DM					Micronutrient content, ppm DM				Macronutrient uptake, g/plant		
Control unfertilized in soil	22.24 b	2.13 b	0.545 b	1.63 b	0.35 a	0.28 a	11.62 a	23.68 b	63.43 a	43.79 b	0.47	0.12	0.36
Control fertilized in soil	43.35 a	2.60 a	0.578 a	2.03 a	0.27 a	0.24 b	13.49 a	22.06 b	75.79 b	65.95 a	1.12	0.25	0.88
V 1.1	46.69 a	2.62 a	0.593 a	2.10 a	0.28 a	0.20 c	12.66 a	23.64 b	75.53 b	57.67 a	1.22	0.27	0.98
V 1.2	48.87 a	2.60 a	0.573 a	2.11 a	0.28 a	0.20 c	11.44 a	28.13 a	91.16 c	63.08 a	1.27	0.28	1.03

Table 3

Data regarding the effect of foliar fertilizers on dry matter yield, macro-micromutrient contents and macronutrient uptakes in the aerial parts of sunflower, Justin cultivar, 2007

Variants	Dry matter yield (g/plant)	N	P	K	Ca	Mg	Cu	Zn	Fe	Mn	N	P	K
		Macronutrient content, % DM					Micronutrient content, ppm DM				Macronutrient uptake, g/plant		
Control unfertilized in soil	2.77 c	5.26 a	1.025 b	3.241 a	2.74 a	0.77 a	26.88 a	29.69 a	158.76 a	32.97 a	0.14	0.028	0.08
Control fertilized in soil	4.57 b	5.12 a	1.100 a	4.133 a	1.91 b	0.65 a	20.16 bc	35.35 a	159.60 a	51.97 a	0.23	0.050	0.18
V 2.1	6.18 a	5.07 a	1.088 a	4.416 a	1.78 b	0.60 a	22.41 b	53.90 a	161.84 a	55.58 a	0.31	0.067	0.27
V 2.2	5.31 a	4.96 a	1.071 a	3.756 a	1.68 b	0.59 a	19.15 c	35.81 a	140.43 a	40.85 a	0.26	0.056	0.19

THE ECOLOGICAL BUILDUP OF THE STERILE DUMPS FROM DISTRICT MEHEDINTI

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Keywords: gangue dumps, compost, fertilizers, corn, sunflower, chick pea, alpha alpha

ABSTRACT

After coal extraction and deposition of the gangue there are formed dumps that replace the initial soils within the Husnicioara quarry perimeter. The initial soils were: reddish preluvosoil, typical preluvosoil, vertic luvosoil, albic luvosoil; they were replaced by the psamic entiantrosoil that has not favoraable features for plant growth. Its texture is sandy-loamy or sandy in comparison with the initial one that was clayey, the reaction is weak or moderate alkaline, in comparison with formerly weak acid, the humus content has decreased to 0.5% from 1.5-2.2% and the phosphorus and potash contents have severelly decreased.

This soil belongs to the Vth class of fertility, in comparison with the former ones which belonged to the IInd or IIIrd class.

Their ecological recovery can be made using suitable crops as annual and perenial pulses and by using large quantities of organic and chemical fertilizers. The goal ist o enrich the new soil in organic matter.

The lignite extraction from surface quarries determines the most aggressive form of soil degradation. They produce total or partial transformations of the soil on a period of 10-15 years. There take place the inversion and the blending of the geological strata, the natural migration of the nutritive elements from the soil, the intensification of the erosion process, the landscape degradation the place of the former soil being taken by gangue deposits. The former soil has disappeared or was excavated along with the gangue material and deposited separately the result being a heterogeneous mixture of geological strata.

MATERIAL AND METHOD

In order to research the fertility degree and the main agrochemical features of this degraded soil and to establish the needed measures for their recovery there was set up an experiment in Husnicioara Mehedinti quarry. There have been made several soil profiles. For the ecological buildup there have been made several trials in 2001-2004 period with different crops and fertilizer doses in order to determine how these plants behave in these conditions.

RESULTS AND DISCUSSIONS

In the case of surface quarries the impact on the soil was harsh. By exploitation and deposition the former soils have disappeared either by inseparable blending or by separately deposition. The place of the former soils like: typical preluvosoil, reddish preluvosoil, albic luvosoil, entiantrosoil have been taken by diverse lithological materials that are heterogeneously mixed and form the psamic entiantrosoil.

The main physico-chemical features of the psamic entiantrosoil are given in the table 1.

The texture is silty – sandy, silty or sandy with high content of thick sand (21.5-45.5%) and fine sand (47.3-75.3), lower of loam (0.3-4.0%) and physical and colloidal clay (2.9-7.6%). The reaction is low to moderate alkaline (pH 8.0-9.0) and low to moderate content of $CaCO_3$ (3.2-4.8).

Table 1

The main physico-chemical features of the psamic entiantrosoil from Husnicioara

Layer	Depth	Size composition						Chemical features					
		Sand I	Sand II	Silt	Clay I	Clay II	Texture	pH	$CaCO_3$	H %	TN %	P ppm	K Ppm
S_1	0-23	21.5	75.3	0.3	3.0	2.9	S	8.7	4.8	0.4	0.16	6.96	44.86
S_2	24-37	39.3	51.9	3.2	7.6	5.6	SL	8.9	4.8	0.5	0.16	4.52	39.95
S_3	38-72	45.5	47.3	4.0	7.1	3.2	S	9.0	3.2	0.4	0.2	5.09	33.24
S_4	63-128	30.9	62.1	3.7	5.4	3.3	S	8.0	2.4	0.4	0.08	11.09	33.21

The humus total nitrogen content is extremely reduced (0.4-0.5%) and 0.08-0.20% being low supplied by nitrogen.

The available phosphorus is low (5.09-11.09 ppm) that indicates a low supplying degree with this element.

The potash content of 33.21 – 44.86 ppm also indicates a low supplying degree.

Calculating the evaluation mark of these soils there results a 10.20 mark, these terrains being included in the Vth category of soils, the lowest. Initially, the former soil had the evaluation mark of 70 and was included in the second category of fertility.

All these aspects show that the gangue deposits have a low fertility degree and they need special measures of increasing their fertility.

Ecological buildup measures

On the basis of several experiments carried out within the 2001-2004 period on the gangue deposits by different fertilizer doses there have resulted the means that must be taken in order to recover these gangue deposits.

The main objective of the biological recultivation is the increasing of the organic matter and nutrients content. In this respect the using of chemical and organic fertilizer has a special importance. Without them the wheat and corn crops do not succeed on this kind of soils.

Because the wheat crop gives low yield even with fertilization of $N_{64}N_{120}$ between 448-1208 kg/ha in comparison with 2500 kg/ha on the nearby soils, it is not recommendable.

The corn crop is advisable on the gangue deposits only when fertilized. The recommended dose is $N_{136}P_{80}K_{80}$ when yields of over 2200 kg/ha can obtained and when using 20-30 t/ha manure along with $N_{136}P_{80}$ there can be obtained 3500 kg/ha.

The sunflower is the crop that succeed on these soil more than wheat and corn even without chemical fertilizers yet its yields are still low.

The pulse crops are of perspective on the gangue deposits. In fact with these crops the ecological buildup of these terrains must begin. The alpha-alpha is the crop that gives the best results on the fresh gangue deposits. Without any fertilizer it gives 861 kg/ha hay. The fertilization only by chemical fertilizers of N_{96} or $N_{96}P_{64}$ increases the yield to 2883 kg/ha hay and when an organic mineral fertilization is applied (25 t/ha manure + $N_{96}P_{64}$) there are obtained 4717 kg hay per hectare.

Along with the alpha-alpha crop, the peanuts can be introduced on the gangue deposits from Husnicioara. They give yields of 510-800 kg pods/ha. When chemically fertilized by N_{96} or $N_{96}P_{64}$ or orcanic mineral fertilization, the peanut yield can reach 900 – 1200 kg/ha.

CONCLUSIONS

Taking account of the obtained results by using to the chick pea, sunflower and corn of an organic fertilizer of compost type that has 3.1 times more nitrogen and 2.5 times more phosphorus than the usual manure we advise its applying due to the following advantages:

- the increasing of the yield from 708 to 791 and 926 kg/ha with chick pea after applying 10, 20 and respectively 30 t/ha in comparison with 596 kg/ha when it is not applied;
- A higher yield when applied to the sunflower crop, from 619 kg/ha when no applied to 708, 1058 and 1167 kg/ha when 10, 20 and 30 t/ha are applied;
- When applied to the corn crop there are obtained 2600, 3225 and 3793 kg/ha in comparison with 914 kg/ha when no compost is applied.

Our recommendation is to apply 20-30 t/ha compost to all crops that are cropped on the gangue deposits, alone or along with N64, P64 or N96P64K80.

The compost has a positively effect on the increasing the organic matter content of the gangue deposits.

The gangue deposits can be cropped by woody species like acacia and poplar. The acacia can be planted in order to fasten the versants in crossed form (X).

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DESEMNAREA CORPURILOR DE APA PUTERNIC MODIFICATE PENTRU RAUL JIU

THE HEAVILY MODIFIED WATER BODIES DESIGNATION FOR JIU RIVER

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Key words: heavily modified water bodies, water ecosystem.

ABSTRACT

Alterarile hidromorfologice si degradarea calitativa a apelor de suprafata datorate industrializarii si cresterii populatiei din ultimul secol, au facut ca starea ecologica a raurilor sa aiba de suferit, intr-un mod fara precedent.

Tinta Directivei Cadru 60/2000/CE este atingerea starii bune si a potentialului ecologic bun pentru toate categoriile de corpuri de apa: corpuri de apa naturale, artificiale si corpuri de apa puternic modificate.

Hydro morphological alterations and surface water quality decrease, has been done by industry and population grow from last century. In this context ecological status for surface water have suffered, in an awareness way.

The target of Framework Water Directive 2000/60/EEC is to achieve the good ecological status and good ecological potential for every water body categories: natural water bodies, artificial and heavily modified water bodies.

INTRODUCTION

Water is part of the global patrimony; it represents a natural but limited resource, an integrant part of natural ecosystems.

Water is a vulnerable resource, the human activity exercising a direct influence, submitting it to a powerful and permanent process of degradation, with fatal consequences on the life and heath of people and environment.

Most of the hydro morphological impacts are caused by river regulation works over the past 300 years and in particular the last 150 years. Related activities include:

High-water regulation: Flood protection, floodplain cut-off, first channel regulations.

Mean water regulation: Straightening of the main channel and cut off of side arms and meanders, enforcing waterway transport and the flood capacity during flood events.

Low water regulation: Mainly used to enhance the navigability during low water by groynes and guiding structures in the channel.

The flood management (upcoming EU Flood Directive) gives another important aspect for hydro morphological inventories. Especially along the lowland reaches of rivers the discharge capacity is very important.

For the overall planning process of the WFD, hydro morphological data and assessments are getting more and more important, in particular for the programmes of measures (PoM) and for the application of other EU Directives such as for Habitats and the upcoming Floods Directives.

MATERIAL AND METHOD

For the following main tasks within the WFD planning process hydro morphological data are needed in relation to the biological quality elements (BQE), in particular related to fish, macro invertebrates,

Status quo and target (regarding hydro morphological conditions and alterations):

• Reference conditions and typology (river type specific)
• Current status and relation to the good ecological status
• Base line scenario for 2015

The following points consider socio-economic parameters (regarding hydro morphological alterations):

• Pressures and impact analysis
• HMWB, AWB (artificial water bodies) designation
• Status or good ecological potential (less stringent measures)
• Monitoring (six years interval)

Restoration measures to reach the target (regarding hydro morphological alterations):

• Gap analysis and programme of measures (PoM)
• Implementation of the PoM
• Evaluation of the PoM

Waters with a very strongly modified regime

The concept of waters (or water bodies) with the powerful regime antropically modified was introduced in the Water Framework Directive taking into account the facto status of the rivers in Europe, many of them being fitted up - “physically tainted” in order to use their economic functions, in order to satisfy the requirements of various usages and to fight with the negative effects of waters.

Also, one hopes that this new concept will reconcile the divergent positions of the specialists in water engineering and ecologic fields.

In essence, this concept has as environment objective for the water bodies strongly modified to achieve a “good ecologic potential”, and not a “good state” of waters, which usually means the conservation of the fitting up of the river as it currently is or with small changes and the improvement of the water quality and regime.

In other words in case of this water category, one tries to satisfy the maximum efficiency regarding both economic and social aspects of water as limited resource as well as the aspects regarding the conservation of natural ecosystems seen as life environment.

Strongly modified bodies of water are those surface bodies of water that because of the “physical alterations” substantially changed their natural character (FWD Art. 2.8).

The substantial changes of the water characteristics in comparison to the natural regimen mean:

- Significant morphological and hydrological changes;
- Important, profound and spatially extended modifications being very difficult and sometimes impossible to restore. In such cases as it was mentioned above, the environment objective is to reach the good ecological potential.
- Permanent and not temporary or imminent changes;
- Changes are due to certain specific usages – v. FWD Art. 4(3)(a).

Steps required for the designation of heavily modified water bodies

Designation of artificial and heavily modified water bodies requires two important steps:

• Preliminary designation
• Final designation

Step 1: Distinct bodies of water must be identified and described in accordance with the Guidelines on bodies of water. Identification of bodies of water is an iterative procedure

with possible adjustments in future stages of the designation process, mainly after stage 6 - preliminary identification of bodies heavily modified. Identification of bodies of water must be achieved for all (natural, heavily modified, artificial) surface waters and is essential because bodies of water are units for which the state is estimated, environmental objectives are established and the achievement of the objectives is verified in accordance with Water Framework Directive.

Step 2: In this stage it is established whether the body of water was “created by human activity”. If so, Member States will have the option to identify them as artificial bodies of water or, in some cases to identify them as natural bodies of water. In case the body of water is designated as artificial, the first designation test (stage 7) is not relevant and it is continued with the second (stage 8).

Stage 3: The goal of this stage is to exclude from the designation process of the heavily modified bodies of water those that do not have hydro morphological changes or have hydro morphological minor modifications. If changes in character are due mainly to other impacts (eg. pollution), the respective body of water should not be considered for the designation process of heavily modified bodies.

Step 4: For those bodies of water that are not the subject of phase 3, the hydro morphological changes and impacts resulted will be further investigated and described. This stage includes a description of hydro morphological changes and assessment of the impacts resulted (part of the characterization - DCA, Appendix II)

Stage 5: Based on the results of the previous stage and on the assessment of the ecological state of the body of water, stage 5 assesses the likelihood of not touching the good ecological state. This stage establishes if the reasons for which the good ecological status can’t be achieved are related to hydro morphological changes or other pressures such as toxic substances or other issues of water quality.

Stage 6: The goal of this stage is to separate / select those bodies of water for which hydro morphological modifications substantially change the characteristics of the body of water. Such bodies of water can be preliminary identified as heavily modified water bodies. The rest water bodies that risk not to achieve a good ecological status, which have not changed substantially their characteristics will be identified as natural water bodies. Environmental objectives for these bodies of water will be good ecological status or other less severe environmental objectives.

Stages 7-8-9: If Member States wish to designate a water body as being heavily modified, they must take it into account for the designation tests specified by Art.4 (3) (a) & Art. 4 (3) (b). Artificial bodies of water are considered only for the designation test specified by Article 4 (3) (b). In the first “designation test" (**stage 7**) one must identify the hydro morphological changes needed ("restoration measures") to achieve "good ecological condition." In the first test it must be assessed whether these "measures" have significant adverse effects on any "specific uses" or "environment in general." If so, the second designation test will be done (**stage 8**).

The second designation test consists of several sub-tests. First, "other means" will be considered to achieve the beneficial objectives (for example, replacement of the drinking water from surface sources with underground sources). Then, it must be assessed whether these "other means" are:

a) technically feasible, b) represent a better environment option, c) don’t have very high costs. If any of the sub-tests a), b) or c) are negative, the water bodies can be designated as heavily modified water bodies (**stage 9**). If any of the restoration measures don’t have significant adverse effects (see Step 7) or if "other means" can be found to meet the criteria a), b) or c), (see step 8) the body of water must NOT be designated as heavily modified body of water and the environment objective will be good ecological status or less severe objective.

Stages 10-11: These steps are not part of the designation process. However, they are important only for artificial and heavily modified bodies of water and therefore presented in this documentation methodology. They regard the defining of the reference conditions and the establishment of environmental objectives for artificial and heavily modified bodies of water. In **stage 10** the reference condition for artificial and heavily modified bodies of water, respectively the Maxim Ecological Potential (PEM) is defined. Based on PEM, is the Good Ecological Potential is defined (**stage 11**).

RESULTS AND DISCUSSIONS

Going through these steps for Jiu river led to the designation of the following sections of river with heavily modified water bodies:

Paroseni – Jiu de Est confluence

Hydro morphological alterations:

The sector is 10.7 Km long, and the river embankment of 3.6 km long (33.6 %);

In this sector it was created the bank intake - CET Paroseni, another significant hydro morphological pressure.

The physical alteration refers to the works of defense against flooding and with the purpose of producing hydropower.

Tg. Jiu – Vadeni reservoir

It is the result of some transversal interception works; there are storages with complex uses consisting of two basins bordered by heavy dams done from ripraps with masks of reinforced concrete situated about 2 km distance between them.

The physical alteration refers to the works of defense against flooding (it is protected more than 110 000 people) work as a whole having as secondary destination hydro-energy

Targu Jiu – Rovinari Sector is characterized by the following hydro-morphological alterations:

- continuous dam on the left bank Tg. JIU-Rovinari 21.7 km
- discontinuous dam on the left bank Tg. JIU-Rovinari 13.0 km;

Length of dams / Length of sector = 21.7/21.7 (100%)

River regulation length / Length of sector = 12.9/21.7 (79.2%)

The body of water does not keep within the good ecological status because it is met ICPDR condition with a safety degree of 100% (High confidence of correct assessment) River regulation / consolidation of the banks > 50% of the body of water.

Physical alteration: JIU river and Hodinau tributary are captured and used in hydro-energetic purpose; defend all localities downstream from Tg. Jiu town including Rovinari, meaning approximately 23 000 people with agricultural lands.

Rovinari - Ac. Turceni

Hydro-morphological alterations:

-continuous dam on the left bank Rovinari -Ac. Turceni 41,0 km;
-discontinuous dam on the left bank Rovinari - Ac. Turceni 39,0 Km;
Length of sector = 41,0/41,0 (100%)

The body of water does not keep within the good ecological status because the 100% safety degree condition is met (High confidence of correct assessment) in addition there is the intensive river regulation /consolidation work of the banks of more than 50% of the body of water.

Turceni reservoir – Isalnita reservoir

Hydro-morphological alterations:

Intensive river regulation / consolidation of the banks > 50% of the body of water

The existence of cross obstacles in river potamal rivers

Isalnita reservoir– Bratovoesti sector

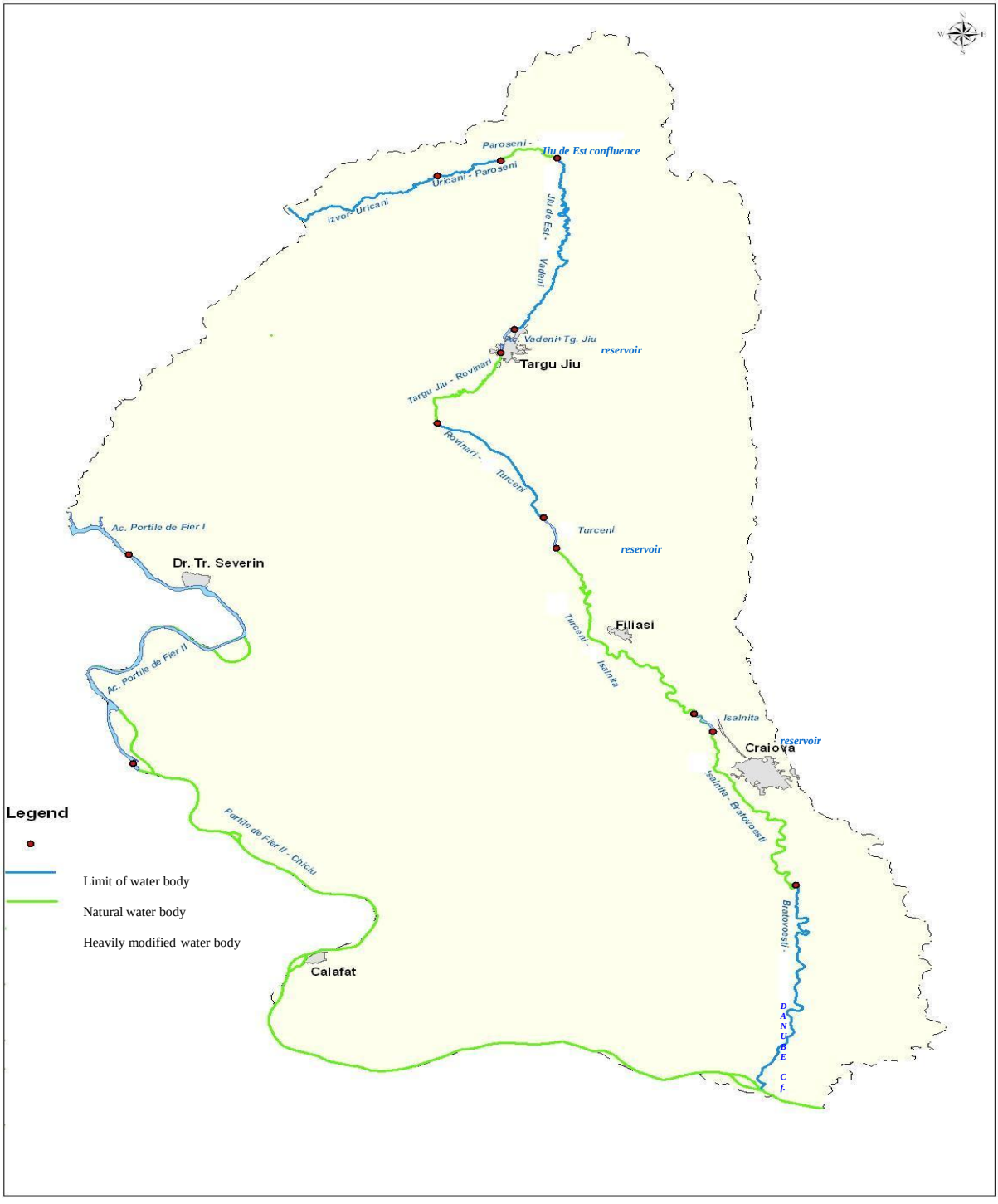
Hydro-morphological alterations:

- discontinuous dam on the left bank Isalnita reservoir- Bratovoiesti 33,3 km;
- discontinuous dam on the right bank Ac. Isalnita- Bratovoiesti 19.7 Km;
- ration: length of dams / lengths of sector =33.3/46.5 (71.6 %)

The body of water does not keep within the good ecological status.

Physical alteration is related to defense work against flood for 21 villages located downstream of Isalnita basin including the city of Craiova, about 345,000 people including 6900 hectares of agricultural land.

All this alteration categories are represented in next map (Fig.1):



Havelly modified water body designated for Jiu river ***(Fig. 1)***

CONCLUSIONS

Hydro-morphological alterations have a great impact on aquatic biocenosis, the quality of which is depreciated for all categories of indicators required by DC2000/60/EC: macro invertebrates, micro and macro aquatic flora, migratory fish fauna.

This category of alterations is reflected in the chemical quality of water, the drinking destination being limited due to an increased risk to eutrophisation process in any river basins.

The phytoplankton bloom is the most important effect, especially in big reservoirs situation, where the biomass increase in the summer season is an imminent process.

In this case, the quality of water is putting in danger for drinking reservoir.

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SOIL DATA USED AS INPUT IN THE NUTRIENT MANAGEMENT PLAN AT A FARM LEVEL

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Keywords: nitrogen cycle, soil properties, pedotransfer functions

ABSTRACT

În ultimii ani, publicul larg şi factorii politici sunt tot mai interesați de problemele de mediu, atât la nivel european, cât şi la nivel mondial. Activitățile agricole sunt principala sursă de azot, prin aplicarea dozelor de fertilizanți minerali şi organici. În ultimii ani, peste tot în lume există o creştere în utilizarea fertilizanților pe bază de azot, deoarece aceştia reprezintă un nutrient esențial pentru conservarea/ameliorarea stării de fertilitate a solului şi pentru producția agricolă, care trebuie să satisfacă necesitățile unei populații în creştere. Prezența azotului în concentrație ridicată, depăşind limitele maxim admise poate avea un impact negativ asupra mediului prin posibilele pierderi spre apele de suprafață şi de adâncime şi/sau spre atmosferă.

Pentru a optimiza producția agricolă cu scopul de a evita contaminarea mediului cu nitrați, a fost dezvoltat un plan de management al nutrienților la nivel de fermă sau aşezare rurală. Acest program este un instrument util pentru fermieri şi/sau stakeholder-i, ca şi pentru factorii de decizie locali. În lucrare sunt prezentate datele de intrare de sol.

At European level, people and policy makers start to feel very strongly about environment issues. The agricultural activities are the main nitrogen supply in soil, through application of the mineral and organic fertilizers doses. In the last decades, worldwide there was an increasing tendency of for using nitrogen based fertilizers, being well known that it represents an essential nutrient for conservation and/or amelioration the soil fertility state and for agricultural production, which has to satisfy the needs of increasing population. The presence of the high nitrogen concentrations, exceeding the admissible maxim limits may have a negative impact of the environment through the possible losses in the ground and surface waters and/or atmosphere.

In order to optimize the crop production in order to avoid the environmental contamination with nitrates, a nutrient management plan at the farm/village level was developed. The software is a useful tool for the farmer and/or local stakeholders, as well as for local authorities. In this paper the input data for soil are presented.

INTRODUCTION

The nutrients management problem at NUTS5 or farm level is an up-to-date issue in the last period, in the frame of adapting the European Union environmental regulation.

One reason to develop a nutrient management plan as a tool useful for the farm level is given by groundwater pollution, mostly in the nitrates vulnerable comunes (NUTS5 level). Many rural localities in Romania use for potable water the public or individual wells, most of them being placed not far from households. On the other hand, many of these villages have no sewer systems or water epuration systems. Even if these systems will be developed in the future, many villages will use wells water as potable water for a long period of time. Due to relative high concentrations of animals in some villages and to inappropriate practices for housing and manure storage, relative great and unprotected manure quantities will reach the groundwater, determining a potential danger for ground and surfacewater quality, being a nitrates and other nutrients, as well as bacteria, source. Another pollution sources are the sewage sludge effluents, the waste residues (organic and anorganic) accumulated in the surface water bodies or infiltred directly in soil, contamining water in the well water, as well as the solid compost piles (Sonneveld, 2008).

Another reason for developing the Nutrient Management Plan is given by the use of manure piles and sewage sludge to fertilize gardens and small agricultural areas, the mineral fertilizers being too expensive for the small households. Therefore, the nutrients management plans have to focus both to the conservation of existing nutrients and to the maximum efficiency of applied nutrients.

The aim of the present Nutrient Management Plan are therefore: a safe disposal of sewage sludge and another organic residues; the insurance of minimum environmental losses of nutrients, as well as minimum transport costs, and an efficient nutrients use for the crop.

A SHORT DESCRIPTION OF THE NUTRIENTS MANAGEMENT PLAN (NMP)

The Nutrient Management Plan (NMP) has been developed at a NUTS5 level in the frame of a large action plan at the Vulnerable Area to Nitrate Pollution (NUTS5) level, designed to prevent, reduce or retrieve surface and groundwater bodies pollution with nitrates from agricultural sources in Vulnerable or Potential Vulnerable Areas to Nitrate Pollution. This plan helds measures that should be taken by farmers as well as by local authorities, which have also an important role in public awarness, information dissemination and in measures applications tracking. The action plan include also a monitoring program for these water bodies, as well as a plan with suitable measures enforced in the large zootechnical complexes, under Environmental Protection Agency and/or other Water Organisms control.

The plan takes into consideration the further increase of nutrients pressures (in the terms of kg N manure per hectar available for disposal), as well as the increasing livestock (leading to increasing areas for manure recycling). The individual farms could sometimes share the manure ammounts with the neighbours.

The Nutrients Management Plan is developed using soil maps 1:200 000, or, when they will be available, with ortophotograms from Land Parcel Information System – LPIS.

The management plan for (organic and mineral) nitrogen fertilizers is based on the description of N cycle in soil-plant-hidrosphere system, taking into account the following soil N forms: inorganic nitrogen (nitrates), organic nitrates from vegetal residues incorporated in soil, organic nitrates in active and stable form associated with soil humus stock, organic nitrates from organic manure. The nitrogen alteration processes between different N forms (humus mineralization, vegetal residues decomposition and the associated mineralization, denitrification and imobilization) are described through equations for chemical cinetic associated, the reaction speed being influenced by temperature, soil moisture, and the different nitrogen ammount from each form types. Mineral nitrates flux percolating under the roots depth (leaching) is calculated as function of water drained flux and average nitrates concentration on soil profile.

The time step for calculation is monthly average. The used equations are similar to those of SWAT methodology (Neitsch et al., 2001). The water balance in soil-plant-hydrosphere system (potential and actual evapotranspiration, drainage) is based on Thornthwaite-Mathers method (Thornthwaite et al., 1957), using average monthly air temperature and accumulated monthly precipitations.

The nutrients management plan is developed using an interactive application – a workbook in Microsoft EXCELTM.

Running the application, the management plan (mineral fertilizers ammount for a balanced fertilization) for a certain crop (type and expected yield), a certain previous crop (type, yield, the vegetal residues management) and farm manure use is calculated.

The “Plan Management” folder helds: the pmn.xls file; the pmn.doc (describing the procedure); two climatic databases using a 10 x 10 km grid, for two series of years 1960-

1990 and 1990-2000; a shMeteo.exe file to extract meteo data for a specific comune, two .txt files holding the meteo data for the specific comuna, and some library files.

THE SOFTWARE INPUTS

The following inputs are used: soil type; soil parameters; farm localization and area; number of animal; the manure application way; the expected yield; the previous yield, as well as the percent incorporated in soil.

SOIL DATA

The soil is both a source of nitrogen and a medium for the nitrogen cycle. Therefore, its properties are important for the soil and plant N supply, as well as for N transport to the groundwater or to the plant. To describe all the processes involved in N cycle, some properties related to soil physical state, soil reaction, carbonates content as well as the maximum roots depth are needed. These properties are used by the software to model the N cycle through the soil to plant or groundwater. The soil morphological and physico-chemical characteristics are evaluated using at least a soil profile. Facilities for indirect assessmment of different parameters (when analytical data are missing) are included in the application, using soil type, textural classes and landuse classes, through the pedotransfer functions and rules database (Bouma, 1989) developed by our institute.

Therefore, there are several ways to include soil data in NMP.

1. Using a pedological study.

The most exact way is to use a pedological study (soil survey study), for one or more profiles from the farm. If there is such a study, one can introduce the main properties in the “Input” worksheet (fig. 1):

- The maximum roots depth
- The humus content (%) in the 0-50 cm layer
- The bulk density (g cm^{-3}) in the 0-50 cm layer
- The clay (<0.002 mm), silt (0.002- 0.02mm) and sand (0.02-0.2) content
- The $CaCO_3$ content (%)
- The topsoil depth

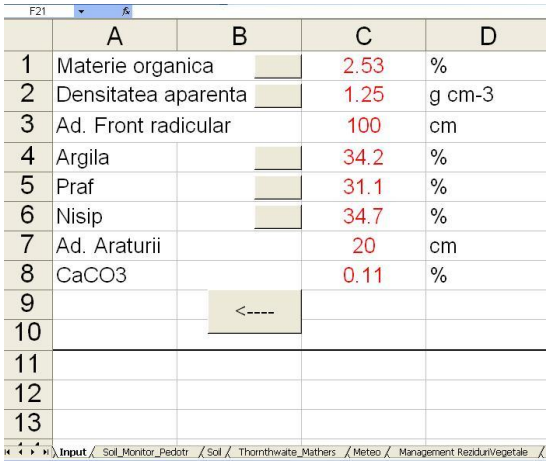


Fig. 1. The “Input” Worksheet.

The values for each property will be used by the software to develop the soil contribution to N cycle.

2. Using pedotransfer rules.

If there is no available soil survey study, one could use the pedotransfer rules developed by ICPA. Therefore, to evaluate the organic matter content, as assessmment is

developed in “Pedo_MO” worksheet (fig. 2) using soil type, soil textural class, landuse, climat, and erosion degree (Canarache, 2005).

Pedotransfer rules needed in management plan assessmment are calculated as functions of soil parameters running a specific subroutine using the “Executa calculul functiilor de pedotransfer” button from “Menu” worksheet.

The bulk density is calculated in “Pedo_DA” worksheet, using soil type in top layer, and some correction coefficients depending on topsoil texture, erosion, landuse and climate type. First, the reference value for humus content is selected as a function of soil type from the pedotransfer rule table. Then, the correction coefficients are also selected from their tables, and added in the main table, calculating the final value for humus content, that will be further used by the software.

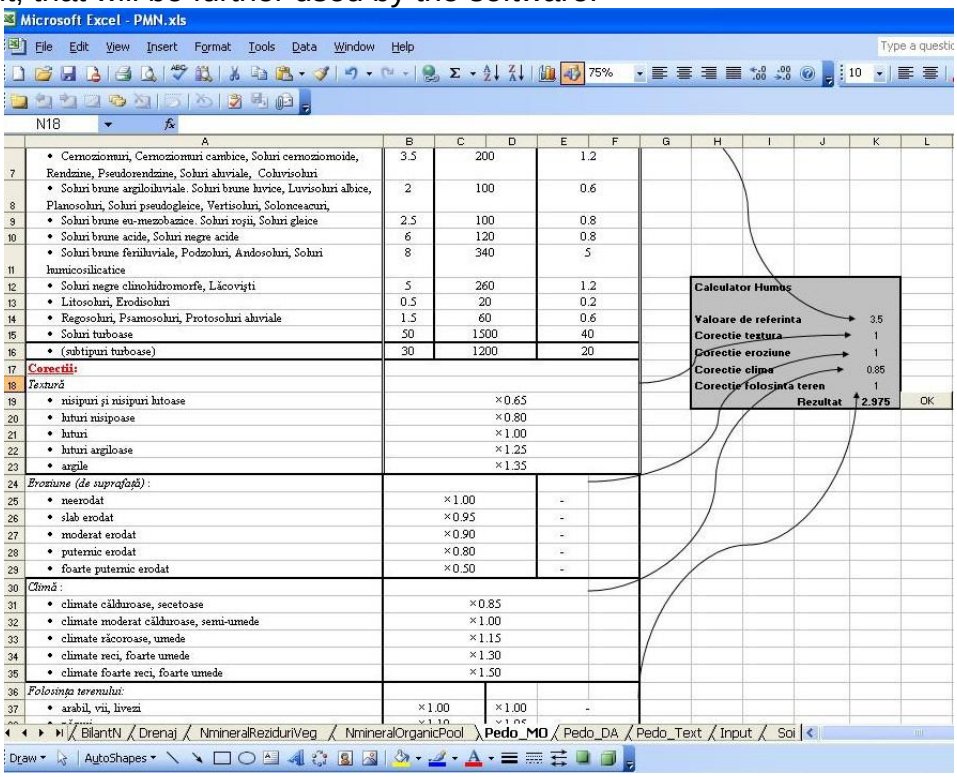


Fig. 2. Worksheet describing the use of pedotransfer rules for organic matter content.

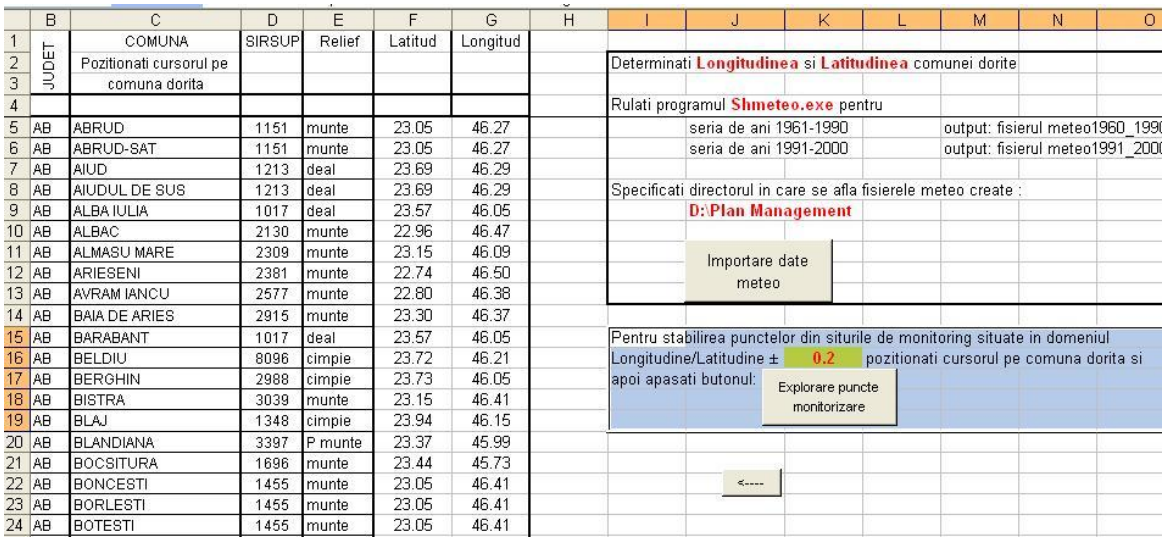
The bulk density is calculated in “Pedo_DA” worksheet, using soil type and texture in top layer. The clay, silt and sand contents are evaluated in “Pedo_text” worksheet.

Therefore, the software will use these values to calculate the soil contribution to N cycle.

3. Using monitoring profiles.

If there is no such information needed for the pedotransfer rules, one can use a Profiles database held by ICPA – the profiles from the “Monitoring Romanian Network”. The monitoring network is designed to a 16 x 16 km grid. The database has several physical and chemical properties stored in a separate worksheet “Soil_Monitor”.

To use the soil data held by this soil database, some steps are needed. First, the software needs the coordinates of the center of the comuna. In order to do this, the name of the comuna has to be selected in the “Long_Lat” sheet (fig. 3). The next step is to press the “Explorare puncte monitorizare” button, to select the Monitoring profiles around that point in a range of $\pm 0{,}2^0$. The software look in the database, bringing the soil profiles that match this range in the “Soil_Monitor_Pedotr” sheet (fig. 4).



	B	C	D	E	F	G	H
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2		Pozitionati cursorul pe					
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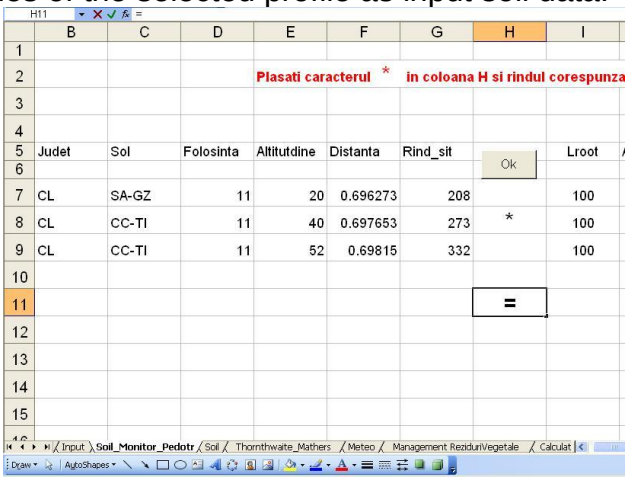
5	AB	ABRUD	1151	munte	23.05	46.27	
6	AB	ABRUD-SAT	1151	munte	23.05	46.27	
7	AB	AIUD	1213	deal	23.69	46.29	
8	AB	AIUDUL DE SUS	1213	deal	23.69	46.29	
9	AB	ALBA IULIA	1017	deal	23.57	46.05	
10	AB	ALBAC	2130	munte	22.96	46.47	
11	AB	ALMASU MARE	2309	munte	23.15	46.09	
12	AB	ARIESENI	2381	munte	22.74	46.50	
13	AB	AVRAM IANCU	2577	munte	22.80	46.38	
14	AB	BAIA DE ARIES	2915	munte	23.30	46.37	
15	AB	BARABANT	1017	deal	23.57	46.05	
16	AB	BELDIU	8096	cimpie	23.72	46.21	
17	AB	BERGHIN	2988	cimpie	23.73	46.05	
18	AB	BISTRA	3039	munte	23.15	46.41	
19	AB	BLAJ	1348	cimpie	23.94	46.15	
20	AB	BLANDIANA	3397	P munte	23.37	45.99	
21	AB	BOCSITURA	1696	munte	23.44	45.73	
22	AB	BONCESTI	1455	munte	23.05	46.41	
23	AB	BORLESTI	1455	munte	23.05	46.41	
24	AB	BOTESTI	1455	munte	23.05	46.41	

Fig. 3. The "Long_lat" Worksheet.

The third step is to select one of these profiles in order to be used for the software as a reference profile, by placing the "*" sign in the row describing it. The software will further use the soil properties of the selected profile as input soil data.



	B	C	D	E	F	G	H	I
1								
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7	CL	SA-GZ	11	20	0.696273	208		100
8	CL	CC-TI	11	40	0.697653	273	*	100
9	CL	CC-TI	11	52	0.69815	332		100
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11							=	
12								
13								
14								
15								

Fig. 4. The "Soil_Monitor_Pedotr" Worksheet.

THE SOFTWARE OUTPUTS

The final result of this plan is the assessmment of mineral fertilizers necessary to balance the nitrates export to the present crop as well as the nitrates flux leached under the root depth. This leached flux is evaluated according to the application date and to the applied quantities (with an interface interactive for the user).

Therefore, the outputs are as follows: the animal concentration (UVM / ha), the nitrates ammount for the expected yield, the mineralizated nitrogen from vegetal residues, and from manure, the imobilized nitrogen, as well as the nitrogen leached. The final output is the needed mineral fertilizers, used for an uniforme fertilization.

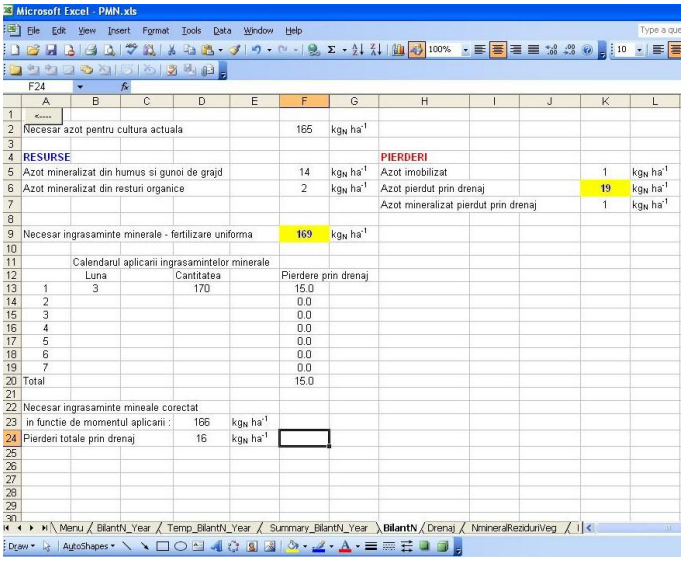

Fig. 3. The soil nitrates balance assessmment

CONCLUSIONS

The governamental politics implementation concerning the decrease of nitrates pollution in soil, surface and ground water in Vulnerable or Potential Vulnerable areas to Nitrate Pollution needs a powerfull tool to evaluate and monitoring the impact of measures on environment quality. For this purpose, a nutrients management plan at farm level has been developed, in order to transfer to the local communities the information related to:

- The importance of a balanced nutrients inputs and outputs in farms having livestock.
- The identification of potential indexes characterising the unbalanced nutrients management at the farm activities level.
- Awaking the main strategies to solve the unbalanced nutrients management at the farm activities level.

The MNP has a flexible database input, adapting to local conditions and to data accesibility, by using a pedological study, pedotransfer rules, or monitoring profiles.

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STUDIU PRIVIND TEHNICILE DE IRIGAȚIE FOLOSITE LA CULTURA CĂPŞUNULUI ÎN CONDIȚIILE DIN ZONA LOVRIN – GOTTLOB – TIMIŞ

STUDY ABOOT THE IRRIGATION TECHNICS USED AT STRAWBERRY CULTURE IN CONDITIONS OF LOVRIN – GOTTLOB – TIMIŞ

FAZAKAS PAL, SZABO LASZLO, IENCIU ANIŞOARA
- USAMVB Timişoara -

Cuvinte keie: regim de irigare, irigație prin picurare
Key words: irrigations regime, drip – irrigations

REZUMAT

Cultura căpşunului cunoaşte o extindere în prezent datorită calităților fructelor şi solicitării pieței. În zona Gottlob – Lovrin, județul Timiş condițiile de vegetație sunt prielnice, dar perioadele de secetă impun compensarea umidității solului prin irigație.

Paralel cu extinderea culturii căpşunului şi tehnicile de irigație cunosc o diversificare. Producătorii de căpşuni aleg varianta convenabilă după capacitatea investițională.

SUMMARY

The strawberry culture knows an extension these days thanks to the quality of fruits and the market's request. In the areas of Gottlob – Lovrin – Timiş county, the vegetation conditions are favorable but the droughty periods requires soil humidity through irrigation. Simultaneously with strawberry culture extension, also the irrigation technics knows some changes. Strawberry producers choose a reasonable variant, concerning investments capacities.

INTRODUCERE

În prezent pomicultura modernă impune folosirea în condiții optime a tuturor factorilor de vegetație în vederea obținerii unor randamente economice sporite.

Apa este unul dintre factorii importanți, care împreună cu ceilalți factori de vegetație asigură obținerea de recolte mari şi de bună calitate.

Prin irigare se corectează clima, fluctuațiile de producție de la un an la altul şi de la o zonă la alta. Pe lângă metodele clasice de irigare cum sunt scurgerea la suprafață şi aspersiunea, în ultimul timp se extinde rapid tehnica irigației prin picurare.

În prezent această tehnică de irigație se experimentează în mai multe zone pentru a i se stabili parametrii specifici de funcționare a instalațiilor şi totodată influența pe care o are asupra plantelor, solului şi mediului înconjurător în general.

Experiența este amplasată la 50 km distanță de Timişoara între localitățile Lovrin şi Gotllob, județul Timiş, încadrându-se în perimetrul Câmpiei Banatului.

Studiile pedologice ne arată că solul pe care se află amplasată cultura de căpşun îndeplineşte criteriile de aplicare a irigației prin picurare.

MATERIAL ŞI METODE

Cercetările efectuate au ca scop studierea regimului de irigare prin picurare şi influența acestuia asupra unor specii pomicole şi asupra mediului reprezentat prin sol şi pânza freatică.

În cadrul regimului de irigare s-au stabilit următoarele elemente: mărimea normei de irigare, norma de udare, momentul de aplicare al udărilor, durata udărilor şi numărul de udări.

Regimul de irigare a fost determinat în funcție de evoluția factorilor naturali, ai factorilor tehnici şi agrobiologici. Dintre factorii naturali o influență hotărâtoare o are clima prin precipitațiile căzute şi repartizarea lor în timp, prin evoluția temperaturilor aerului şi a umidității relative şi prin succesiunea secetelor.

Căpşunul preferă solurile cu textură mijlocie, fertile şi reavăne. Tocmai problema umidității solului pe termen lung este problema, mai cu seamă în Câmpia Banatului, unde suma precipitațiilor anuale este destul de favorabilă, numai distribuția în timp este necorespunzătoare culturii căpşunului fără irigații.

Experiența constă din cultura în câmp deschis a două soiuri: Senga Senqaua şi Lovrin 18, soiuri cultivate în România.

Factorii experimentali sunt următorii:

A – regimul de irigare cu graduările:

a_1 – neirigat;

a_2 – irigat la plafonul de 25% IUA;

a_3 – irigat la plafonul de 50% IUA;

a_4 – irigat la plafonul de 75% IUA;

B – soiul de căpşun cu graduările;

b_1 – soiul Senga Sengana;

b_2 – soiul Lovrin 18.

Dispunerea variantelor s-a realizat după metoda parcelelor subdivizate, cu aranjare sistematică a factorului A. Numărul repetițiilor este 4.

REZULTATELE CERCETĂRILOR

Udările se aplică sub formă de norme de udare calculate în funcție de sol şi plantă. Norma de udare calculată cu relația uzuală trebuie redusă cu termenul φ care reprezintă fracțiunea de sol efectiv umezită prin picurare.

Pentru plantațiile de căpşun φ are valori cuprinse între 0,60 – 0,70.

În tabel sunt redate elementele care trebuie luate în considerare la aplicarea udărilor în cadrul plantației de căpşun.

Varianta	PM	M (m^3/ha)	qP (l/h)	D (m)	WL/pic	φ	mp	Tv (ore)	T (zile)
V_1	25% IUA	300	1,5	0,30	13	0,70	200	8	3
V_2	50% IUA	400	1,5	0,30	27	0,70	300	16	5
V_3	75% IUA	600	1,5	0,30	40	0,70	400	24	8

Semnificația termenilor:

IUA – intervalul umidității active;
m – norma de udare calculată uzual;
qp – debitul picurătorului;
d – diametrul zonei umezite;
W – volumul de apă distribuit de picurător;
φ – fracțiunea de sol umezit;
mp – norma de udare prin picurare;
tv – durata unei udări;
t – intervalul dintre udări.

CONCLUZII

1. Rezultatele parțiale scot în evidență economia de apă realizată de aplicarea irigației prin picurare;
2. Solul, ca şi caracteristici fizice şi chimice nu a suferit modificări;
3. Normele de udare se pot determina conform cerințelor reale de apă, astfel se evită total percolările spre pânza freatic.

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CERCETARI PRIVIND PIERDERILE DE ELEMENTE FERTILIZANTE PETERENURILE AGRICOLE IN PANTA CA REZULTAT AL EROZIUNII SOLULUI

RESEARCHES CONCERNING THE NUTRIENTS LOST ON SLOPE AGRICULTURAL LAND AS A RESULT OF SOIL EROSION

FILICHE E., PURNAVEL GH. , PETROVICI G., DANA D., RADUCU D., EFTENE M. L., DODOCIOIU A. M., MOCANU R.

Key words: soil, lost nutrients, runoff, erosion

ABSTRACT

Lucrarea prezinta cercetarile efectuate in cadrul C.C.D.C.E.S. Perieni privind pierderile de elemente fertilizante prin eroziune la graul de toamna, porumb, soia, fasole, bromus.Solul, considerat ca resursă naturală strategică unică, poate fi distrus rapid, fertilitatea lui putând fi refăcută prin măsuri adecvate, într-o perioadă de ani sau decenii, iar reconstrucția ecologică a solului distrus poate dura secole sau chiar milenii.

Principalele elemente cu rol important în nutriția plantelor sunt: humusul, azotul, fosforul şi potasiul.

Modalitățile prin care se pierd aceste elemente sunt:

- prin intermediul solului erodat, care contribuie la deplasarea acestor elemente pe versanți si depunerea la baza versantului, în lunci sau în acumulări, în funcție de puterea de transport a agenților erozivi, odată cu materialul solid transportat;

- pierderi de elemente odată cu apa scursă la suprafața solului, aceste pierderi fiind direct proporționale cu solubilitatea şi cantitatea elementului din sol;

- deplasarea acestor elemente pe profilul solului prin intermediul apei infiltrate în sol.;

De remarcat faptul că la parcela cultivată cu bromus, pirderile cele mai mari s-au înregistrat când cultura era în anul întâi, nefiind suficient de bine dezvoltată.

Raportând pierderile de elemente fertilizante înregistrate la pierderile calculate pentru eroziunea admisibilă de 8 to/ha/an, constatăm că:

- la păioase, pirderile de nutrienți reprezintă 0,2-15 % din pierderile calculate,

- la prăşitoare, pirderile de nutrienți reprezintă 99-138 % din pierderile calculate

- la legumunoase anuale, pirderile de nutrienți reprezintă 71-126 % din pierderile calculate.

This paper deals with the researches made in the frame of C.C.D.C.E.S. PERIENI concerning of the nutrients lost through erosion at winter wheat, corn, soybean, been and bromus sp.

The soil, considered like a natural unique resource, can be quickly destroyed, its fertility being able to remake by suitable measures, in a long period of time, but the soil's ecological restoration can last centuries or even millenniums. The main elements that have an important contribution in crop nutrition are: humus, nitrogen, phosphorus and potassium.

These elements are lost by:

Through soil eroded, who contribute at removing of these elements on slope and laying down of them to the base slope, in flood plain or in reservoirs, depended by force of flow, in the same time with solid material carry out;

Through water flowing on the soil surface and, these losses being in direct dependence with soil solubility and element quantity from soil;

Through moving of these elements together with the water piercing downwards the soil profile

It is necessary to remark that to crop plot with brome grass, the great nutrients lost it was recorded when the crop was in first year, when it was insufficiently developed

Make a ratio of nutrients losses recorded at crop plots to nutrients losses computed for acceptable erosion with are 8 to/ha/year, we see that:

- at cereals, the lost of nutrients represent 0.2 – 15% from calculated losses;

- at row crops the lost of nutrients represent 99 – 138% from calculated losses;

- at annual leguminous plants the lost of nutrients represent 71 – 126 % from calculated losses

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INTRODUCTION

The ever growing and diverse requirements of society, in conjunction with the demographic dynamics of agriculture calls on multiple plans, with productive parameters increasingly high. The increasing use of mineral fertilizers contribute to increasing agricultural crops, but must be used only those fertilizers that improve soil, are harmless to humans and animals and allow production of agricultural products of high quality.

Soil, considered as a unique strategic natural resource, it can be destroyed quickly, his fertility can be restored through appropriate measures, within a period of years or decades, and the ecological reconstruction of the destroyed soil can take centuries or even millennia.

The most serious losses, which affect soil fertility, are related to the loss of organic matter, namely the loss of humus.

When they waste the layer of humus, farmers must pay a price of reduced soil fertility, but unfortunately the cost of erosion is not only to delimit agriculture. Hummus removed from the arable land because of runoff can reach streams, river channels or lakes accumulation, and deposits of sediment, increasing concentrations of chemicals that wash through leakage from the area. The area where these sediments are deposited and the concentrations of chemicals exceed certain thresholds of toxicity becomes impractical to cultivate crops a certain period of time. Annually the loss of humus is around 1.5 million tons. Because of practicing a kind of "mining" agriculture, meaning extraction until the exhaustion of nutrients, without adequate compensation, there is a tendency in impoverished soil humus and other nutrients.

Property chemical modifications of soil as a result of the erosion process are more powerful than those produced on physical properties. The most important changes occur regarding the content of nutrients for plants: humus, nitrogen, phosphorus and potassium.

Knowing exactly how the loss of nutrients (humus, nitrogen, phosphorus, potassium) through liquid and solid leaks represents an important activity in the antierosion research because it helps to appreciate the decreasing nutrient capacity of soil, which has great implications on soil productivity. Also, the movement of these elements on the surface and the soil profile is a source of pollution of the environment.

The manner in which these elements are lost:

- through the eroded soil, contributing to the movement of these elements on the slops and laying it down at the base of the slop, in meadows or accumulation, depending on the transport strength of the erosion agents, with the solid material transported;
- Loss of elements with water flow on soil surface,
- Moving the elements through the soil profile with water infiltration into the soil.

The loss of nutrients through fluid runoffs is closely related to the solubility in water of each element and the capacity of retention in the soil adsorption complex. From this point of view, the behavior of each ion with role in plant nutrition is the following:
- Nitrogen in the form of nitrate anion in fertilizers, is the most easily moved, both by penetration to depth, and by leaching;
- Nitrogen in the form of ammonium cation, is being moved more difficult being retained by the argilo-humic complex;
- Phosphorus from chemical fertilizers easier leachate (superfosfații) is removed more quickly through liquid leakages;
- Potassium is a cation with a high solubility in water is easily removed by the surface leakage, while the penetration to depth in the profile is more difficult because of the detention in the soil adsorption complex.

PLACE AND METHOD OF RESEARCH

This paper presents researches carried out for 10 years concerning the loss of nutrients on the soil surface through leakages solid and liquid and the obvious role in making crop rotation, for the area C.C.DC.E.S.Perieni.

Experiences have been conducted in the upper watershed in the Tarinei valley, where land is characterized by long and evenly hill slopes, with moderate slopes of 10-14% and conservation works. The soil is predominantly cambic chernozem, moderately eroded. To estimate the humus content was used the wet oxidation method and titrimetrical dosage (after Walkley-Black in the amendment Gogoasa)

Determination of total nitrogen in the soil was made by the Kjeldahl method. To determine concentrations of phosphorus and potassium in soil samples collected was used the method of extraction in acetate-ammonium lactate with 3.75 pH as Egner-Riehm-Domingo. The colorimetric method used to determine the phosphorus was the dosage reduction by ascorbic acid, according to Murphy - Riley, and potassium was dosed by flame photometry in both the soil samples, and for water samples.

The determination of amoniacal nitrogen from water samples has been colorimetric made with Nessler reagent (tetraiodo - Mercury potassium), and nitrates, colorimetric, with phenol disulfonic 2-4 acid.

The method for determining the phosphate anion consists in determining colorimetric blue color complex, resulting from the reaction of ammonium molibdatul and phosphate anion, in the presence of a reducer ($SnCl_2.2H_2O$) at a wavelength of 830 nm.

RESULTS OBTAINED

The first table presents the total loss of nutrients for a period of 10 years, the average period and average over 10 years taking into account the events which caused rain leaking liquid and solid.
- The best crop protection (bromus, wheat), the average loss over 10 years are up 20.72 kg / ha of humus, 1.152 kg / ha of nitrogen, up to 0.309 kg / ha of phosphorus while the potassium is reached the loss of 0.153 kg / ha;
- Weak crop protection from the erozional point of view is registered with the loss of nutrients between: 154.48-209.44 kg / ha of humus, 8.416-11.07 kg / ha of nitrogen, 0.721-1.141 kg / ha of phosphorus and 1.557-1.914 kg / ha of potassium;
- At the witness parcel are moved through soil and water leakege in average: 898.21 kg / ha of humus, 45,037 kg / ha of nitrogen, 3323 kg / ha of phosphorus and 5.54 kg / ha of potassium;

In table 2 are showed the average losses in multi monocultures of wheat and maize. The data presented shows that developed agriculture with monocultures are registered with loss of nutrients ten times higher in monocultures of maize (weak protective culture) compared to winter wheat culture, good for the soil.

In table no 3 is the average nutrient loss in the crop rotation:
- Loss of humus the lowest recorded is in 5 years crop rotation, while black fallow permanently recorded losses of more than 6 times compared to the 3-year crops rotation (that worst of the crop rotation for this case)
- About the loss of nitrogen, we see a similar evolution to that of humus, which is explicable if we keep in mind that approximately 90% of the total nitrogen in the soil is related to organic matter,
- Loss of phosphorus are very close in the second and third year crops rotation, being a little higher than the five years crop rotation and up to five times lower than the permanent black fallow.
- Potassium is with the greatest losses in three years crop rotation, and sensitive in the other two equal crop rotations.

By reporting the nutrient losses, the estimated losses for permissible erosion is maximum 8 tons / ha (established for the testing) the following has been established:
- Winter wheat monocultures registered losses between 8.29 and 22.89% of estimated
- The maize monocultures causes the biggest losses of nutrients, 84.52-94.74% of estimated.

- The three years crop rotation is the most unfavorable, the losses being between 53.33 and 68.92%;

- The five years crop rotation is the best, losses osciland between 59.48 and 48.81%, specifying that the loss of potassium are somewhat higher compared to the two years crop rotation.

- The losses in the black fallow are very high, with a percentage ranging between 247.99 and 379.47% of the allowable calculated.

CONCLUSIONS

Good crop protection from erosion, as wheat and Bromus reduce raindrop impact on soil, thus diminishing the possibility of detachment and transport of soil particles. Meanwhile, a large quantity of water enters the deep so that nutrient losses by erosion are much lower compared to row crops or black fallow.

Using the antierosional system in crop areas (Alternating crops with improved protection with weak protection) considerably reduces losses of nutrients through the water and soil;

Monocultures with a weak protective plant, in this case maize, recorded losses of nutrients ten times higher compared to monocultures with a good protective plant (Wheat)

In terms of loss of nutrients through erosion, the better crop rotation was the five years one.

- Permanent black fallow lead to irretrievable loss of nutrients.

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Table 1

Total losses of nutrients, average 10 years and average years of rain events which occurred leaking liquid and solid, the main crops

Crops	Total 10 ani				Media 10ani				Media/ 10 ani / eveniment			
	Humus	Azot	P2o5	K2o	Humus	Azot	P2o5	K2o	Humus	Azot	P2o5	K2o
	Kg/ha	Kg/ha	Kg/ha	Kg/ha	Kg/ha	Kg/ha	Kg/ha	Kg/ha	Kg/ha	Kg/ha	Kg/ha	Kg/ha
Wheat	207.18	11.252	3.087	1.528	20.72	1.152	0.309	0.153	41.436	2.251	0.617	0.306
Corn	2194.42	110.704	11.406	19.482	209.44	11.070	1.141	1.748	261.803	13.838	1.426	2.435
Soybeans	1898.43	85.426	7.924	19.138	189.84	8.543	0.792	1.914	23.730	1.068	0.099	0.239
Brome grass	11.92	1.69	0.559	1.146	1.19	0.169	0.056	0.115	2.981	0.423	0.140	0.287
Beans	1544.75	84.162	7.254	15.565	154.48	8.416	0.725	1.557	220.679	12.023	1.036	2.224
Black fallow 100	8982.14	450.366	33.233	55.399	898.21	45.037	3.323	5.540	898.21	45.037	3.323	5.540

Table 2

Loss of nutrients, average 10 years in monocultures of wheat or corn

Crops	Media 10 ani			
	Humus	Azot	P2o5	K2o
	Kg/ha	Kg/ha	Kg/ha	Kg/ha
Wheat	20.72	1.152	0.309	0.153
Corn	219.44	11.070	1.141	1.748

Table 3

Loss of nutrients, average 10 years in some rotation

Rrotation	Humus	Azot	P_2O_5	K_2O
	Kg/ha	Kg/ha	Kg/ha	Kg/ha
Wheat-Corn	120.08	6.089	0.725	0.951
Wheat-Corn -Soybeans	143.333	6.913	0.747	1.271
Wheat-Corn - Soybeans -Beans-Brome grass	117.134	5.878	0.605	1.097
Ogor 100 mp.	898.21	45.037	3.323	5.540

Table 4

Reporting loss of nutrients in different rotation, compared to losses calculated for the erosion of permissible 8 to / ha

Rrotation	*Humus*		*Azot*		*P_2O_5*		*K_2O*	
	Kg/ha	*% din calculat*	*Kg/ha*	*% din calculat*	*Kg/ha*	*% din calculat*	*Kg/ha*	*% din calculat*
Admisibil calculat	*237.6*	*100.00*	*12.00*	*100.00*	*1.35*	*100.00*	*1.845*	*100.00*
Monocultura grau	*20.72*	*8.72*	*1.152*	*9.6*	*0.309*	*22.89*	*0.153*	*8.29*
Monocultura porumb	*219.44*	*92.36*	*11.070*	*92.25*	*1.141*	*84.52*	*1.748*	*94.74*
Grau-porumb	*120.08*	*50.74*	*6.089*	*50.75*	*0.725*	*50.7*	*0.951*	*51.52*
Grau-porumb-soia	*143.333*	*60.55*	*6.913*	*57.61*	*0.747*	*53.33*	*1.271*	*68.92*
Grau-porumb-soia-fasole-bromus	*117.143*	*49.30*	*5.878*	*48.98*	*0.605*	*48.81*	*1.097*	*59.48*
Black fallow 100 mp.	*898.21*	*379.47*	*45.037*	*375.31*	*3.323*	*247.99*	*5.540*	*300.27*

RESEARCHES ON THE ESTABLISHING THE YIELDING CAPACITY OF THE PRELUVOSOILS FROM THE HILLY ZONE OF OLTENIA BY SOIL EVALUATION WORK

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ABSTRACT

Din cauza condițiilor diverse de relief, climă şi vegetație, în zona de deal a Oltenie s-au format multe tipuri de preluvosoluri.

După cercetările efectuate în câmp şi după analizele de laborator efectuate, în cadrul zonei studiate s-au identificat următoarele tipuri de soluri: preluvosolul tipic, preluvosolul molic, preluvosolul vertic, preluvosolul stagnic şi preluvosolul roşcat.

Prin lucrarea de bonitare, în condiții naturale a rezultat că toate preluvosolurile au o capacitate medie de producție. Preluvosolul molic are o capacitate mai mare iar cel stagnic, mai mică. Prin lucrări de amendare şi de îmbunătățire a fertilității poate creşte capacitatea de producție.

Abstract

Due to the diverse relief, clime and vegetation conditions, within the hilly zone of Oltenia there were formed different preluvosoils.

After the researches that have been carried out on the field and the results of the laboratory analyses, within the studied zone there were identified typical preluvosoils; molic preluvosoils; vertic preluvosoils; redish and stagnic preluvosoils.

By soil evaluation work, in natural conditions there resulted that all preluvosoils have an average yielding capacity. The molic preluvosoil has a higher fertility and the stagnic preluvosoil has a lower fertility. By reclamation works the yielding capacity of the preluvosoil can increase evidently.

INTRODUCTION

The hilly zone of Oltenia is characterized by diverse soil, clime and relief conditions this being the cause why the solification process has determined a mosaic of soils. The most encountered preluvosoils from the hilly zone are: typical preluvosoils, molic preluvosoils, vertic preluvosoils, reddish preluvosoils and stagnic preluvosoils.

After studying these kind of soils there was set up their yielding capacity by the evaluating work.

MATERIAL AND METHOD

The evaluation of preluvosoils in natural conditions

The plant developing depends on the whole vegetation factors that will ensure the optimal yielding conditions. The quantitative expression of these conditions is achieved by the evaluation coefficients that can have values between 0 and 1. With value 1 the conditions are optimal and with value 0 the conditions are minimal which means that the respective crop can not be cropped. The value of the bonitation conditions can be taken from the aside tables within the ‘’Methodology of elaborating the pedological studies’’ – part two, elaborated by ICPA Bucharest (1987). In function of the evaluation coefficients there is established the evaluation mark using the following formula:

E.M. = (a1xa2xa3x …xan)x100

E.M. – the natural evaluation mark.

a1,a2,…an – the values of the potentiation coefficients.

The evaluation marks can have values between 0 and 100 points. As much as the evaluation marks are higher the plants find better developing conditions. In function of the evaluation m arks there can be established the favorability classes as follows:

Table 1

Enframing in the favorability classes

Evaluation marks	Favorability classes
91-100	I
81-90	II
71-80	III
61-70	IV
51-60	V
41-50	VI
31-40	VII
21-30	VIII
11-20	IX
0-10	X

The evaluation of soils in reclaimed conditions

The potentiation consists on the increasing of the evaluation marks of the natural factors on which the technological measures are applied or land improvement using the potentiation marks that are multiplied by the ‘’potentiation coefficients’’ ehance the final mark according with the new situation.

The potentiation of the evaluation marks is made only for that works that have a long term effect that modify the level of productivity of the lands.

The values of the potentiation marks are taken from the annexes in the ‘’Methodology of elaborating the pedological studies’’, part III – ICPA, 1987, Bucharest.

RESULTS AND DISCUSSIONS

Analyzing the evaluation marks and the favorability classes of the main soils from Oltenia there can be noticed that, in general, they have an average fertility having marks of 50 points and belonging to the fifth favorability class (table 2).

The typical preluvosoil (brown, argiloilluvial), the molic preluvosoil (brown – reddish) and the reddish preluvosoil (typical brown-reddish preluvosoil) have alike fertility being differentiated by the crop that is cultivated.

The vertic preluvosoil that is characterized by higher fine fractions and a higher compactity has a lower fertility, the bonitation mark being around 30.

The lowest fertility is recorded with the stagnic preluvosoil that, due to the long term waterlogging during spring seasons and rainy periods, the air-water regime is wrong.

Due to this cause, with the majority of crops the evaluation marks are low and the favorability classes are 8, 9 and 10.

Taking account the all crops, the lawns and pastures have good marks on all kinds of soils.

Table 2

The evaluation marks and the favorability classes from the hilly zone of Oltenia in natural conditions

Crop	Soils									
	Preluvosol typical		Preluvosol molic		Preluvosol reddish		Preluvosol vertic		Preluvosol stagnic	
	N.B.	C.F.	N.B.	C.F.	N.B.	C.F.	N.B.	C.F.	N.B.	C.F.

PS	81	II	64	IV	64	IV	58	V	65	IV
FN	72	III	56	V	56	V	51	V	58	V
MR	81	II	57	V	51	V	41	VI	22	VIII
PR	81	II	64	IV	58	V	41	VI	18	IX
PN	81	II	72	III	72	III	58	V	18	IX
CV	72	III	64	IV	58	V	37	VII	13	IX
CS	51	V	64	IV	58	V	41	VI	1	X
PC	43	VI	72	III	58	V	32	VII	3	X
VV	64	IV	80	III	72	III	46	VI	1	X
VM	17	IX	80	III	64	IV	23	VIII	0	X
GR	72	III	72	III	64	IV	46	VI	23	VIII
OR	72	III	72	III	64	IV	41	VI	23	VIII
PB	59	V	64	IV	47	VI	26	VIII	10	X
FS	47	VI	72	III	52	V	26	VIII	4	X
CT	53	V	51	V	37	VII	26	VIII	14	IX
SF	59	V	64	IV	47	VI	40	VII	17	IX
SO	59	V	72	III	58	V	52	V	9	X
MF	59	V	72	III	58	V	45	VI	13	IX
IU	72	III	72	III	64	IV	58	V	5	X
IF	81	II	58	V	52	V	58	V	33	VII
CN	81	II	64	IV	58	V	46	VI	9	X
LU	72	III	64	IV	58	V	46	VI	7	X
TR	81	II	51	V	46	VI	59	V	33	VII
LG	52	V	72	III	52	V	32	VII	20	IX

The typical preluvosoil is the best due to the fact that it is located in a wetter zone and the vegetation can grow better. Among the fruit trees, the apple tree, pear tree and plum tree can grow properly on the typical preluvosoil. Lower results are recorded with peach tree and apricot tree.

On the molic preluvosoil and reddish preluvosoil, the orchards can give good results.

The vertic preluvosoil is not so good for orchards nevertheless; the plum tree can give good yields with 58 points the evaluation mark.

The stagnic preluvosoil does not suits for orchards, all fruit trees recording under 20 points, the peach and apricot tree recording low results, between 1 and three points.

Alike results were recorded with vine crop which recorded good evaluation marks only for three soils. The vine crop varieties for table record low results, excepting the molic preluvosoil.

On the stagnic preluvosoil the vine crop neither is nor recommended. Due to cool and humid climate conditions the roots of the vine crop can not grow deep ward and the pest attack is high. The table vine varieties have had 0 points.

The cereals with shallow rooting (whaet and barley) are suitable for the preluvosoils from the hilly zone of Oltenia, the evauation marks being of 70 points. Also, these crops give bad results on the stagnic preluvosoil, around 20.

The row crops with deeper rooting (corn and sunflower) give lower results in comparison with wheat and barley excepting the vertic preluvosoil and stagnic preluvosoil where the yields are not economical.

The tuber and root crops (potato, sugarbeet) are less recommended for these soils. The main pulses (soybean, bean, peas) give good results on the typical preluvosoil, molic preluvosoil and reddish preluvosoil and are not recommended on stagnic preluvosoil.

Among the fodder pulses, the alpha-alpha crop gives better results on the southern soils and the trefoil on the northern part that have an acid reaction. Neither them are recommended for the stagnic preluvosoil.

The vegetables give better results on the molic preluvosoil, with 72 points, followed by the typical preluvosoil and the reddish one with 52 points, each. They are not recommended on the stagnic preluvosoil.

In conclusion, by the evaluation work in natural conditions of the preluvosoils from the hilly zone of Oltenia there has resulted that we have average fertility soils, low and very low fertility soils.

The evaluation of soils in reclaimed conditions

The preluvosoils from the hilly zone of Oltenia need an entire reclamation work as: deep rumagement, radical fertilization, surface erosion control and avoiding waterlogging.

For each reclamation work there were established the potentiation coefficients for the natural factor. After the evaluation work the mark has increased.

With the typical preluvosoil, as reclaiming works there are need: radical fertilization, erosion control and pollution reduction. After applying such kind of works, the evaluation marks with the majority of crops have increased to 70-90 points. Only the vine crop for table has remained with low point due to low annual average temperatures (table 3). The peach tree, also, has gained low points.

With the mollic preluvosoil, as reclamation works there were taken into consideration: deep tillage, radical fertilization and the reduction of pollution. After applying these works, the evaluation marks increases with all crops over 50 points, so the fertility is above average.

With the reddish preluvosoil there were considered as reclamation works the following: radical fertilization, deep tillage, erosion control and reduction of pollution. Also, in this case the potentiation of the evaluation marks there were obtained marks of over 70 points.

The vertic preluvosoil needs radical reclamation works as: deep tillage, improving of water and air relations. After applying these works, the yielding capacity of these soils have increased over 70 points, lower points being recorded with corn, potato, under 50 points.

The stagnic preluvosoil is considered as having the lowest fertility from the hilly zone of Oltenia and it needs as reclaiming works: amendments, radical fertilization, air – water improved relations, rainfall intake, reducing the polluting degree.

After these works, the evaluation marks have increased very much on pastures and lawns which can be verified on the field.

Also, after reclaiming, there can be cropped cereals with shallow rooting (wheat and barley) that have obtained 62 points, each.

After reclaiming the evaluation mark increases with trefoil at 70 points, with lignum at 61 points which are crops that prefer humid and cool climate.

All other crops have obtained low evaluation that demonstrates that the stagnic preluvosoil is not enough cropped yet better suited for woods, pastures and lawns.

Table 3 .

The evaluation marks and the favorability classes from the hilly zone of Oltenia in reclaimed conditions

Crop	Soils									
	Preluvosol typic		Preluvosol mollic		Preluvosol reddish		Preluvosol vertic		Preluvosolul stagnic	
	N.B.	C.F.	N.B.	C.F.	N.B.	C.F.	N.B.	C.F.	N.B.	C.F.
PS	81	II	70	IV	70	IV	70	IV	96	I
FN	80	III	61	IV	61	IV	62	IV	93	I
MR	81	II	57	V	57	V	60	V	44	VI
PR	81	II	64	IV	64	IV	55	V	39	VII
PN	81	II	79	III	79	III	77	III	44	VI
CV	72	III	64	IV	64	IV	54	V	32	VII
CS	51	V	64	IV	64	IV	55	V	6	X
PC	43	VI	71	III	71	III	55	V	13	IX
VV	64	IV	79	III	79	III	67	IV	7	X
VM	18	IX	79	III	78	III	49	VI	6	X
GR	80	III	78	III	78	III	67	IV	62	IV
OR	88	II	86	II	86	II	60	V	62	IV
PB	78	III	69	IV	69	IV	44	VI	36	VII
FS	62	IV	77	III	76	III	44	VI	22	VIII
CT	70	IV	55	V	55	V	48	VI	53	V
SF	78	III	69	IV	69	IV	69	IV	52	V
SO	78	III	86	II	85	II	76	III	28	VIII
MF	71	III	77	III	77	III	76	III	46	VI
IU	72	III	71	III	71	III	84	II	17	IX
IF	81	II	57	V	57	V	77	III	61	IV
CN	89	II	70	IV	70	IV	67	IV	28	VIII
LU			64	IV	64	IV	67	IV	23	VIII
TR	89	II	55	V	55	V	78	III	70	IV
LG	76	III	84	II	83	II	55	V	68	IV

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COMPARASION OF SIMULATION MODELS THAT ESTIMATE EROSION AND SOIL PHYSICAL PROPERTIES RELATED TO SOIL WATER DYNAMICS

STUDIU COMPARATIV CU PRIVIRE LA MODELE DE SIMULARE CARE ESTIMEAZA EROZIUNEA SI PROPRIETATILE FIZICE ALE SOLULUI RAPORTATE LA DINAMICA APEI IN SOL

E. L. Grigore

Keywords: Simulation models, Physical properties, Erosion

ABSTRACT

Modelarea datelor este un factor important in estimarea indicatorilor. Precizia rezultatelor depinde in mare masura de acuratetea datelor, in general acestea sunt reprezentate prin harti de soluri, acestea sunt disponibile la diferite scari si in diferite sisteme de clasificare, in toate statele Uniunii Europene.

Modelul matematic utilizat trebuie sa fie capabil sa realizeze scenarii ale eroziunii solului in conditiile schimbarilor climatice, a conductivitatii hidraulice saturate si nesaturate, capacitatii de camp si a densitatii aparente.

Aceasta lucrare isi propune sa faca o sinteza si sa compare diferite modele de simulare utilizate in evaluarea indicatorilor in Europa. Un model de simulare cu distributia spatiala ce estimeaza dinamica agro-fizica a solului (SIDASS) in comparatie cu alte modele de simulare, cum ar fi PESERA si USLE. Un alt exemplu de model este abordarea GLASOD, acesta identificand zonele cu risc ridicat de eroziune sin respectiv a conditiilor care duc la aparitia lui.

Data modeling is an important issue in indicators estimation. The accuracy of the result will mainly depend on the accuracy of the input data. In general the data input is represent by soil maps. Soil maps are available at different scales and using different classification systems and legends in all EU Member States and Accession Countries.

The model should be able to simulate scenario's of soil erosion under changing climatic conditions, estimate soil physical properties related to soil water dynamics (soil water characteristic curve, saturated and unsaturated hydraulic conductivity, field capacity, minimum soil water content for watering etc.) on the base of soil texture and bulk density.

The purpose of this paper is to synthesize and compare different simulation models used in indicator assessing in Europe: a simulation model spatially distributed predicting the dynamics of agro-physical soil state (SIDASS) in comparation with another simulation models like PESERA and USLE.

Another example of an expert-based approach is GLASOD – Global Assessment of Soil Degradation. The GLASOD map identifies areas with a subjectively similar severity of erosion risk, irrespective of the conditions that would produce this erosion.

INTRODUCTION

Research and monitoring the soil specified characteristic, the system soil water and natural environment is very important to know and to realize the prediction of characteristics evolution under the natural influence (precipitation, temperature, subsidence, structure, the reserve and the evolution of the chemical composition, the reaction and the capacity to cation exchang etc.) and atrophic (cultivation and sustenance system, etc).

MATERIALS AND METHOD

Evaluation of the erosion risk could be done or by using expert tip methods, or by those model tip.

The CORINE program, an example for an expert tip method, has estimated the erosion risk (applied in Mediterranean Europe), overlaying information regarding the soil, clime and relief, using the SIG technology. The CORINE methodology is based on Universal Soil Losing Equation (USLE). Is an expert tip approach that is using an factorial method applied on a 1km x 1km grid.

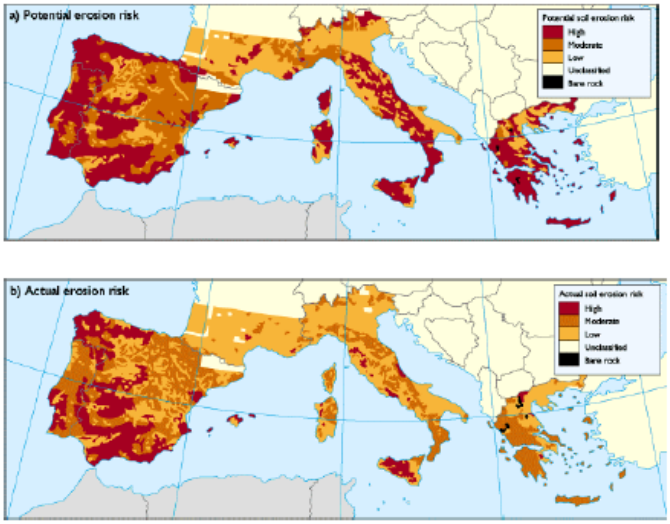

Fig.1 CORINE: Estimation of water erosion risk in Europe

Another example of an expert tip approach is GLASOD – Global Soil Demotion evaluation. The Global Assessment of Human Induced Soil Degradation (GLASOD) was conducted by the International Soil Reference and Information Centre (ISRIC) at Wageningen, The Netherlands, as commissioned by the United Nations Environment Programme (UNEP). In essence, the GLASOD data base contains information on soil degradation within map units as reported by numerous soil experts around the world through a questionnaire. It includes the type, degree, extent, cause and rate of soil degradation.

The GLASOD data set as processed by GRID consists of four files. The four files are : GLSDOCO.E00 , CALCAREA.E00 , GLSGEO.E00 , GLSMOLL.E00. The first two files are text files. The next two files are the actual GLASOD ARC/INFO coverages :

- GLSGEO is referenced in geographic coordinates (decimal degrees latitude and longitude) centered over the Greenwich Meridian. This is a very common general reference system which is handled by most GIS and image processing systems.
- GLSMOLL is referenced in the Mollweide equal-area projection (the parameters are listed in the above-mentioned text file).

The GLASOD map identifies areas with an erosion similar risk, without taking in consideration the condition that will produce this erosion. Is based on answers to an questioner fill out by well known experts from all the countries. Its weak spot is that it has low control or objectivity in comparison with the standard applied by different expert from different regions

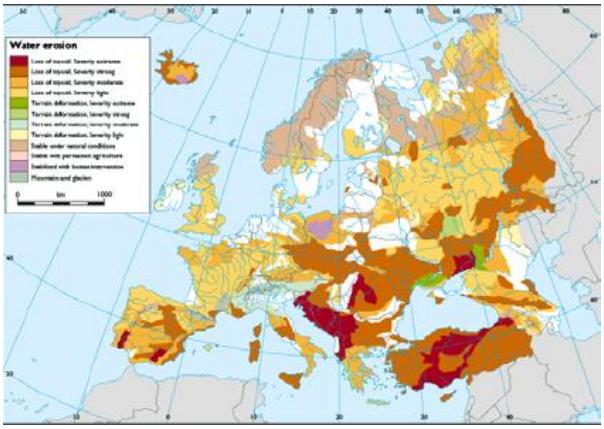

Fig.2 GLASOD: Estimation of water erosion risk in Europe

Disponibilitatea datelor în format digital în ultimii ani a facilitat aplicarea metodelor de tip model.

USLE is an empiric simple model, based on rate regression analyze by obliteration of the soil through erosion, on parcels from USA. It was created with the purpose of estimating annual rate of erosion on long terms on agricultural terrain. In comparison with expert tip methods described above USLE is offering, perhaps, the most objective situation of the national and European level of erosion risk distribution. Its value is consist in the fact that erosion risk estimation is based on harmonized data sets, standard for all Europe, the model producing outputs quantitative such as sediment effective loss (t/ha/year), very important in taking decision. Although, a quantitative evaluation could be considerate unsuitable under the quality aspect and the available data resolution. This way, maps shouldn't be used to predict the process advent as landfall. The agricultural practice management effect is almost impossible to estimate to a small scale. In comparison with other models, USLE is one of the least pretentious regarding the needed data. Although, the are some incertitude regarding the different tips of data and should be appreciated that, in many cases, the agricultural management could be one of the most important fact that determines the soil erosion.

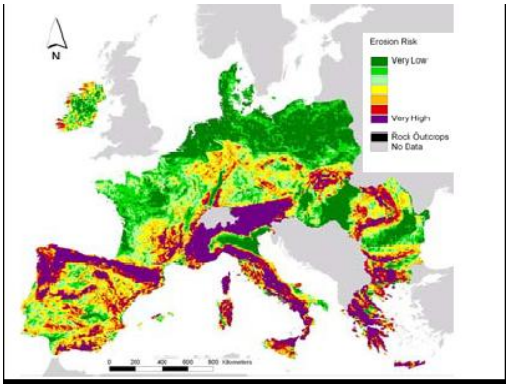

Fig. 3 USLE: Potential risk of water erosion in Europe (simulation model without vegetal coverage).

The PESERA (Pan–European Soil Erosion Risk Assessment) model is a physically based and spatial distributed model developed for quantifying soil erosion in environmentally sensitive areas relevant to a regional or European scale and defining soil

conservation strategies. The current version of the model was developed during the execution of the PESERA project and was also based on previous funded and un-funded research (Kirkby and Neale, 1987; de Ploey *et al*., 1991; Kirkby and Cox, 1995; Kirkby *et al.*, 2000).

The PESERA model combines the effect of topography, climate and soil into a single integrated forecast of runoff and soil erosion (Figure 6). Data for each of these three factors have been extracted from existing sources and combined in a physically based model to make rational forecasts of soil erosion. The model is built in three conceptual stages, explained more fully below.

1. A storage threshold model to convert daily rainfall to daily total overland flow runoff;
2. A power law to estimate sediment transport from runoff discharge and gradient, and interpret sediment transport at the base of the hillside as average erosion loss;
3. Integration of daily rates over the frequency distribution of daily rainfalls to estimate long-term average erosion rates.

The SIDASS model was developed to predict losses due to mechanical and hydraulic processes and it also enables users to simulate prevention strategies if the required basic datasets are available. SIDASS model is linking under the same umbrella of a spatially distributed information framework, the experimental and theoretical researches from various fields of soil physics directly to farming practices (soil mechanics, soil compaction, soil erosion, and soil hydrology) in order to have a tool for recommendations of site-specific land use and management practices, and to evaluate agriculture policies at local and regional scales. SIDASS is validated on some precise datasets from specific areas, and was proved to forecast the effects of soil mechanical processes like soil deformation on soil erosion. It may be also used to couple the effects of hydraulic and mechanical properties on soil erosion processes.

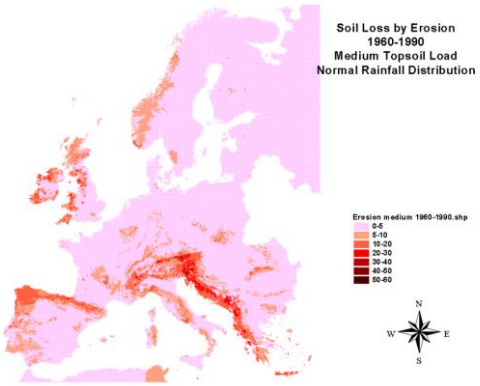

Fig.4 SIDASS: Soil loss by water erosion. Medium Topsoil Load. Normal Rainfall Distribution

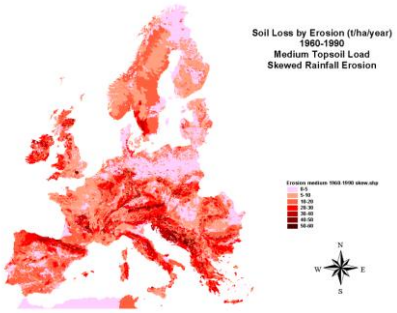

Fig.5 SIDASS: Soil loss by erosion (t/ha/year)

Models based on process analyze, like PESERA and SIDASS offers hopes for obtaining some better prognosis as the one estimated in the past.

RESULTS AND DISCUSSION

From the models described above PESERA and SIDASS are the better formed from the conceptual point of view because are taking in consideration

- Leakage and eroded sediments, separately
- Daily precipitation monthly accumulated
- Scabbing and vegetal overlay process, monthly
- Other clime information, like the freeze number of days

Data availability in a digital format, in the last years, had facilitated applying model tip methods.

CONCLUSIONS

For a short an precise environmental balance, the estimate models should be validated in site where the effective sediment losses are measured, and, to quantify the tendency, the measurements on the erosion should be added to the list of all that is needed for the entire country.

To provide this kind of data a national network of soil monitoring in needed. The improvement of the erosion simulation models, the improve of resolution and the spatial information accuracy should increase “hand by hand” with the real measurements.

In the close future, the identified surface with a very high risk of erosion should be used as a general indicative of state. Monitoring the tips of soil usage could provide information regarding a potential erosion increase.

Are taken in consideration, also, the stat and the process of distribution in soil compacting.

The overall degradation of the soil cause by compacting could:

- increase the slope soil erosion risk, by concentrated the water excess over the compact horizon;
- accelerate the effective leak in and from the hydrographic basin.

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THE INFLUENCE OF THE SOIL WORKS AND MINERAL FERTILIZATION ON THE WEEDS LEVEL OF THE AGRICULTURE CROPS FROM S.D. CRAIOVA, TAMBURESTI CENTER

Iancu S., Popescu C., Prioteasa Marilena-Alina, Iancu D.

Key words : weed, sandy soil, scarification, fertilization, irrigation

ABSTRACT

Gradul de îmburuienare a culturilor de pe psamosoluri este influenţat de lucrările solului, erbicidare, fertilizare minerală, irigare etc. Speciile dominante sunt şopârliţa, iarba bărboasă, meişorul roşu, rocoina, volbura, ştirul, mohorul verde etc.

Ştirul a rezistat la toate schimbările cu excepţia lipsei de azot.

The weeding level of the crops on the sandy soils depends of soil works, herbicides, mineral fertilization, irrigation etc. The dominant species are Veronica hederifolia, Echinochloa crus-galli, Digitaria sanguinalis, Stellaria media, Convolvulus arvensis, Amaranthus retroflexus, Setaria viridis etc. Amaranthus retroflexus weed has resisted to all changings except the absence of nitrogen.

INTRODUCTION

Knowing the weeds species from agriculture crops is necessary for establish the best fighting methods of them, in special with the help of crop specific herbicides.

The flow eristic composition sandy soils from Tâmbureşti – Dolj, is on the changing in time depending on the agrotehnical factors (applied herbicides, the crop rotation, the soil work), agrochemical (fertilizers and amend aments used), pedological (reaction, level compactly), climatically etc.

MATERIAL AND METHOD

The investigations were made between 2004-2007, in the experiences plain of the Agrotehnica discipline at the Craiova Didactical Station, Tâmbureşti center.

In every year has been made determinations regarding the weeds level thought tee numerical and gravimetrical methods, with the help from the metrical frame, in latch variant, in 4 repetitions, letch ca leveled and unleveled ground. Has been made the variants mean and the lass calculated the total medium number, the participation and the steadfastness for all the identified weeds species.

RESULTS AND DISCUSSIONS

I. The modification of the weeds level under the influence of soil works

The deep aeration works from two by two years and from four by four years have changed the weeds density but they have influenced very little the structure of the weeds species (tables 1 and 2).

The result is that some species prefer the deep mobilized soils: Fumaria schcleicheri, Thlaspi arvense, Stellaria media, Solanum nigrum, Trifolium arvense, Capsella bursa-pastoris etc.

Others prefer a smaller volume of mobilized soil, weeds like: Gallium aparine, Vicia villosa, Cirsium arvense, Echinochloa crus-galli, Portulaca oleracea, Digitaria sanquinalis etc. In accordance with the dates from the number one table has results that in the autumn rice crop, the biggest percentage was at the next weeds species: Veronica hederifolia (21.9%), Stellaria media (19.1%), Convolvulus arvensis (9.9%) and Gallium aparine (6.5%), while the smaller values were at next species: Polygonum convolvulus (0,7%), Sorghum halepense (1.5%), Matricaria inodora (1.6%) and Lithospermum arvense (1.7%).

Table 1

The influence of the sandy soil works from the Tâmbureşti – Dolj on the flow eristic composition from the autumn barley culture (2005 - 2007)

Nr. crt	The weeds species	The class	Yearly ploughing		Deep mobilization at 4 years		Very deep plough at 4 years		The mean Nr. / m^2
			Nr. / m^2	P %	Nr. / m^2	P %	Nr. / m^2	P %	
1	Veronica hederifolia	Da	24.2	23.7	21.6	22.7	19.8	21.5	21.9
2	Stellaria media	Da	15.7	15.4	18.7	19.6	22.9	24.8	19.1
3	Convolvulus arvensis	Dp	12.8	12.5	9.3	9.8	7.5	8.1	9.9
4	Gallium aparine	Da	8.9	8.7	7.0	7.3	3.7	4.0	6.5
5	Centaurea cyanus	Da	6.0	5.9	4.7	4.9	4.3	4.7	5.0
6	Vicia villosa	Da	6.8	6.7	4.2	4.4	3.6	3.9	4.9
7	Polygonum hidrpiper	Da	5.2	5.1	4.1	4.3	3.0	3.3	4.1
8	Capsella bursa-pastoris	Da	3.9	3.8	4.3	4.5	4.1	4.4	4.1
9	Fumaria schcleicheri	Da	1.3	1.3	3.7	3.9	6.9	7.5	4.0
10	Anthemis austriaca	Da	3.0	2.9	3.2	3.4	3.6	3.9	3.3
11	Thlaspi arvense	Da	1.3	1.3	3.5	3.7	4.8	5.2	3.2
12	Cirsium arvense	Dp	4.2	4.1	2.5	2.6	1.8	1.9	2.8
13	Trifolium arvense	Da	1.5	1.5	2.7	2.8	3.0	3.3	2.4
14	Lithospermum arvense	Da	2.3	2.2	1.7	1.8	1.1	1.2	1.7
15	Matricaria inodora	Da	1.9	1.9	1.7	1.8	1.3	1.4	1.6
16	Sorghum halepense	Mp	2.2	2.1	1.7	1.8	0.6	0.6	1.5
17	Polygonum convolvulus	Da	1.0	1.0	0.7	0.7	0.3	0.3	0.7
TOTAL			**102.2**	**100**	**95.3**	**100**	**92.3**	**100**	**96.6**

The date analyzed from the number two table demonstrate that in maize crop the biggest densities and the biggest participations it had obtained at the next species: Echinochloa crus-galli (18,5%), Digitaria sanquinalis (9.9%), Amaranthus retroflexus (9.5%), Veronica hederifolia (9.4%) şi Convolvulus arvensis (8.9%).

The smallest value ad been obtained at the next species: Abutilon theophrasti (0.4%), Erigeron canadensis (0.4%), Solanum nigrum (1.0%) and Cynodon dactylon (1.6%).

Table 2

The influence of the sandy soil works from the Tâmbureşti – Dolj on the flow eristic composition from the maize culture (2005 - 2007)

Nr crt	The weeds species	The class	Yearly ploughing		Deep mobilization at 4 years		Very deepplough at 4 years		The mean Nr./m^2
			Nr./m^2	P%	Nr./m^2	Nr./m^2	P%	Nr./ m^2	
1	Echinochloa crus-galli	Ma	22.3	19.7	18.3	18.2	15.0	15.5	18.5
2	Digitaria sanquinalis	Ma	15.2	13.4	14.0	14.0	13.1	13.5	9.9
3	Amarahthus retroflexus	Dp	10.9	9.6	8.5	8.5	9.1	9.4	9.5
4	Veronica hederifolia	Da	9.2	8.1	8.2	8.2	10.7	11.1	9.4
5	Convolvulus arvensis	Dp	8.2	7.2	9.1	9.1	9.4	9.7	8.9
6	Polygonum hidropiper	Da	8.8	7.8	8.3	8.3	8.1	8.4	8.4
7	Portulaca oleraceea	Da	10.3	9.1	8.1	8.1	6.4	6.6	8.3
8	Setaria viridis	Ma	8.1	7.1	7.9	7.9	7.7	8.0	7.9
9	Hibiscus trionum	Da	4.2	3.7	3.9	3.9	5.3	5.5	4.5
10	Chenopodium album	Da	4.2	3.7	3.5	3.5	2.6	2.7	3.4
11	Xanthium italicum	Da	2.9	2.6	3.0	3.0	2.6	2.7	2.8
12	Cirsium arvense	Dp	3.0	2.6	2.5	2.5	2.3	2.4	2.6
13	Sorghum halepense	Mp	2.1	1.9	1.8	1.8	1.3	1.3	1.7
14	Cynodon dactylon	Mp	2.5	2.2	1.4	1.4	1.0	1.0	1.6
15	Solanum nigrum	Da	0.4	0.4	0.8	0.8	1.7	1.8	1.0
16	Erigeron canadensis	Da	0.5	0.4	0.4	0.4	0.4	0.4	0.4
17	Abutilon therophrasti	Da	0.6	0.5	0.4	0.4	0.1	0.1	0.4
TOTAL			**113.4**	**100**	**100.1**	**100**	**96.8**	**100**	**103.4**

II. The modification of the weeds level under the fertilization influence

At the autumn barley crop the biggest values of the participation had been obtained at the next species (table 3): Veronica hederifolia (21.5%), Stellaria media (21.3%), Polzgonum hidropiper (18.5%) and Gallium aparine (8.2%).

The smaller values was at the next species: Lithospermum arvense (0.2%), Trifolium arvense (0.6%), Delphinium consolida (0.6%) and Cirsium arvense (1.4%).

In the same time with the growing of the fertilizer dose, the density of some species has increase (Centaurea cyanus, Delphinium consolida, Anthemis arvensis), hand while the majority has decrease (Veronica hederifolia, Polygonum hidropiper, Convolvulus arvensis, Polygonum aviculare, Thlaspi arvense).

At the maize crop the biggest density was identified at next species (table 4): Digitaria sanquinalis (21.2%), Echinochloa crus-galli (16.1%), Convolvulus arvensis (11.5%) and Setaria viridis (11.0%), while the smaller values was recorded at the next species : Solanum nigrum (0.3%), Sorghum halepense (1.0%), Erigeron canadensis (1.4%) and Cynodon dactylon (1.7%).

Table 3

The influence of the mineral fertilization on the floweristic composition from the autumn barley culture from the Tâmbureşti – Dolj (2005 -2007)

Nr crt	The weeds species	The class	$N_0P_0K_0$		$N_{100}P_{32}$		$N_{200}P_{64}K_{40}$		The mean Nr. /m^2
			Nr. /m^2	P %	Nr. /m^2	P %	Nr. /m^2	P %	
1	Veronica hederifolia	Da	26.1	23.8	20.6	22.3	17.9	22.1	21.5
2	Stellaria media	Da	22.0	20.0	20.8	22.5	21.0	26.0	21.3
3	Polygonum hidropiper	Da	21.1	19.2	18.2	19.7	16.3	20.1	18.5
4	Gallium aparine	Da	8.2	7.5	8.0	8.6	8.4	10.4	8.2
5	Convolvulus arvensis	Dp	11.6	10.6	7.2	7.8	1.1	1.4	6.6
6	Vicia villosa	Da	5.1	4.6	4.6	5.0	4.9	6.1	4.9
7	Centaurea cyanus	Da	2.6	2.4	3.3	3.6	3.5	4.3	3.1
8	Polygonum aviculare	Da	5.5	5.0	1.6	1.7	0.0	0.0	2.4
9	Anthemis arvensis	Da	2.0	1.8	2.7	2.9	2.4	3.0	2.4
10	Thlaspi arvense	Da	2.4	2.2	1.7	1.8	0.8	1.0	1.6
11	Matricaria inodora	Da	1.2	1.1	1.6	1.7	1.5	1.9	1.4
12	Cirsium arvense	Dp	1.3	1.2	1.0	1.1	0.9	1.1	1.4
13	Delphinium consolida	Da	0.2	0.2	0.5	0.5	1.1	1.4	0.6
14	Trifolium arvense	Da	0.3	0.3	0.5	0.5	1.0	1.2	0.6
15	Lithospermum arvense	Da	0.2	0.2	0.2	0.2	0.1	0.1	0,2
TOTAL			**109.8**	**100**	**92.5**	**100**	**80.9**	**100**	**94.4**

Table 4

The influence of the mineral fertilization on the floweristic composition from the maize culture from the Tâmbureşti – Dolj (2005 - 2007)

Nr crt	The weeds species	The class	$N_0P_0K_0$		$N_{100}P_{32}$		$N_{200}P_{64}K_{40}$		The mean Nr./m^2
			Nr. /m^2	P %	Nr. /m^2	P %	Nr. /m^2	P %	
1	Digitaria sanquinalis	Ma	29.7	24.1	20.8	19.2	13.0	13.4	21.2
2	Echinochloa crus-galli	Ma	3.2	2.6	16.4	15.2	28.7	29.6	16.1
3	Convolvulus arvensis	Dp	17.9	14.6	11.3	10.5	5.2	5.4	11.5
4	Setaria viridis	Ma	18.3	14.9	12.1	11.2	2.6	2.7	11.0
5	Portulaca oleraceea	Da	9.7	7.9	7.2	6.7	5.2	5.4	7.4
6	Amarahthus retroflexus	Dp	0.1	0.1	8.4	7.8	13.6	14.0	7.4
7	Veronica hederifolia	Da	7.2	5.9	5.5	5.1	8.4	8.7	7.0
8	Polygonum hidropiper	Da	10.0	8.1	5.3	4.9	2.1	2.2	5.8
9	Hibiscus trionum	Da	6.3	5.1	5.1	4.7	1.5	1.5	4.3
10	Chenopodium album	Da	2.6	2.1	3.8	3.5	6.1	6.3	4.2
11	Xanthium italicum	Da	4,4	3,6	3,0	2,8	3,3	3,4	3,6
12	Polygonum aviculare	Da	5.4	4.4	2.9	2.7	0.7	0.7	3.0
13	Cirsium arvense	Dp	3.2	2.6	2.6	2.4	2.3	2.4	2.7
14	Cynodon dactylon	Mp	2.1	1.7	1.4	1.3	1.6	1.6	1.7
15	Erigeron canadensis	Da	1.6	1.3	1.2	1.1	1.3	1.3	1.4
16	Sorghum halepense	Mp	1.2	1.0	0.8	0.7	0.9	0.9	1.0
17	Solanum nigrum	Da	0.1	0.1	0.3	0.3	0.5	0.5	0.3
TOTAL			**123.0**	**100**	**108.1**	**100**	**97.0**	**100**	**109.4**

CONCLUSIONS

The weedes nivel was influenced by works soil, by fertilized and by herbicides.

In the barley crop were dominant the next species: Veronica hederifolia and Stelaria media, while in the maize crop were dominant the next species: Echinochloa crus/galli, Digitaria sanquinalis and Convolvulus arvensis.

The types of herbicides will be established depending by the crop and the dominant species of weed.

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INVESTIGATIONS CONCERNING THE CHEMICAL CONTROL OF THE WEEDING LEVEL FROM THE TOBACCO CROP ON THE SANDY SOILS FROM THE LEFT SIDE OF JIU RIVER

Iancu S., Prioteasa I.A., Ciobanu A., Iancu D.

Key words: sandy soil, tobacco, weeds, herbicides, productions

ABSTRACT

Pentru controlul chimic al buruienilor din cultura de tutun au fost create peste 25 de erbicide. In acest sens a fost amplasată în camp o experiență bifactorială cu tipuri de erbicide şi număr de praşile (manuale şi mecanice), în total 20 de parcele experimentale în 4 repetiții.

A fost determinată producția de frunze uscate de tutun (tipul Virginia), randamentul la uscare, gradul de îmburuienare, înălțimea plantelor etc.

Cele mai bune rezultate de producție (2068 kg/ha) au fost obținute în varianta erbicidată cu Stomp (4 l/ha) plus 2 praşile manuale şi una mecanică.

În varianta neerbicidată şi neprăşită s-au recoltat doar 278 kg/ha.

For the chemical control of the weeds from the tobacco crop there were been created over 25 herbicides (Diizocab, Dual 500, Mecloran, Balan, Benefex, Treflan, Triflurom, Gallant, Targa, Stomp, Fusilade, Harnex, Afalon etc.).

In this sense an bifactorial experiment was put in the field with herbicides types and number of hoeing (manual and mecanical), in total of 20 experimental plot of land in 4 repetitions. It has determined the tobacco dry leafs production (Virginia type), the efficiency at drying, the weeding level, the plants height etc.

The best results of production (2068 kg/ha) has been obtain in the herbicidated variant with Stomp (4 l/ha) plus 2 manual hoeing and a mecanical one.

In the unherbicidated and unhoeing variant has been recordet only 278 kg/ha.

INTRODUCTION

The weeds are competing the tobacco plants regarding de vegetation factor, in special the water and the nutritive elements, they are fast plants for different pathogen agent (Peronospora tabacina, Pseudomonas tabaci) and pest (Thrips tabaci), they burden the harvest.

For the chemical fight against weeds frown the tobacco crop have used over 25 herbicides (Dual 500, Balan, Diizocab, Treflan, Triflurom, Gallant, Targa, Fusilade, Stomp, Harness, Afalon, Mecloran, Benefex etc.

MATERIAL AND METHOD

On the irrigated sandy soil from Mârşani - Dolj has been made a bifactorial experience, after the divided plat of land method, with 4 repetitions, in the scientific investigation contract with the S.C. DIMON International Tabak S.R.L. Rumanian – American company, from Bucharest.

The used factors and their graduated were: the A factor (types of herbicides): a_1 - unherbicid; a_2 - Stomp 4l/ha, a_3 - Harness, 5l/ha and a_4 - Stomp, 2l/ha + Harness, 2.5 l/ha.

The B factor (the number of hoeing): b_1 - on hoeing; b_2 - one mechanical hoeing; b_3 - one manual and one mechanical hoeing; b_4 - one manual hoeing and b_5 two manual and one mechanical hoeing.

In every experimental plot of land of 27 m^2, have been planted 5 rows of plants, at the 90 cm distances between rows and 50 cm between plants on a row. The herbicides lave been manual applied, p.p.i.

REZULTATS AND DISCUSIONS

Have been obtained the next dry tobacco leafs productions after the Dimon Technology 1222.2 kg/ha in the unherbicidated variant, 1787.6 kg/ha in the herbicidated variant with Stomp, 1613.2 in the case of Harness herbicidasion and 1699 kg/ha in the case of herbicidated variant with the two herbicides, in half doses (table 1).

The herbicidation has bringer a very important production growth between 391.0 kg/ha and 565.4 kg/ha. The perceptual growth between 31.9% (a_3) and 46.3% (a_2). At the b_1 variant (no hoeing) the production was of obtained 1126 kg/ha, at the b_2 variant (one mechanical hoeing) the production was of obtained 1498 kg/ha, while at b_3 (one mechanical and one manual hoeing) the obtained production was of 1744 kg/ha.

Through the effect of one manual hoeing (b_4) the production was of 1633 kg/ha, while through 3 hoeing (two manual and one mechanical) has been obtained the biggest production of 1900 kg/ha (b_5).

Table 1

The influence of the A factor interaction (types of herbicides) and B (number of hoeing) on the dry tobacco production (Virginia type), on the irrigated sandy soil from Mârşani - Dolj, (2005 – 2007)

The factors			Production			Signifi - cation
A	B		Kg/ha	%	d / Mt.	
a1 – No herbi-cides	b1	No hoeing	278	100	-	
	b2	1 mecanical hoeing	1269	456	991	x x x
	b3	1 manual hoeing+ 1 mecanical hoeing	1527	549	1249	x x x
	b4	1 manual hoeing	1372	494	1094	x x x
	b5	2 manual hoeing+ 1 mecanical hoeing	1665	599	1387	x x x
a2 – Stomp 4 l/ha	b1	No hoeing	1483	100	-	
	b2	1 mecanical hoeing	1624	110	141	-
	b3	1 manual hoeing+ 1 mecanical hoeing	1935	130	452	x
	b4	1 manual hoeing	1828	123	345	-
	b5	2 manual hoeing+ 1 mecanical hoeing	2068	139	585	x x
a3 – Harness 5 l/ha	b1	No hoeing	1338	100	-	
	b2	1 mecanical hoeing	1501	112	163	-
	b3	1 manual hoeing+ 1 mecanical hoeing	1680	126	342	-
	b4	1 manual hoeing	1622	121	284	-
	b5	2 manual hoeing+ 1 mecanical hoeing	1925	144	587	x x
a4 – Stomp 2 l/ha + Harness 2,5 l/ha	b1	No hoeing	1407	100	-	
	b2	1 mecanical hoeing	1600	114	193	-
	b3	1 manual hoeing+ 1 mecanical hoeing	1836	130	429	x
	b4	1 manual hoeing	1709	121	302	-
	b5	2 manual hoeing+ 1 mecanical hoeing	1943	138	536	x x

DL 5 % = 363 kg/ha
DL 1 % = 479 kg/ha
DL 0.1 % = 632 kg/ha

The interaction between the 2 test factors (types of herbicides x hoeing number) is in the test dates in the number one table.

The smallest production, of only 278 kg/ha has been recorded in the unherbicidated and unhoeinged variant, where the crop was compromised.

The biggest production, of 2068 kg/ha, has been obtained in the variant witch was herbicidated with Stomp (4 l/ha) and hoeing 3 times (2 manual and one mechanical).

In all four herbiciding variants the production growth in this order: b_2, b_4, b_3, and b_5.

The average drying efficiency was of 17.85%.

Between the herbicidation variants the difference was of 0.65% while between en the hoeing variants, was of 0.22%.

On the 2 July, 2 August and 2 September, have been made measurements regarding the weeding level thought the numerical and gravimetrical methods using the metrical frame in all 4x5x4 = 80 experimental plots of land.

In average in July were 68.4 weeds/m^2, in august 30.2 weeds/m^2, and in September 6.7 weeds/m^2.

The improvement was thanks to the herbicides and to the hoeing.

At the herbicidated variant, the weeds level was reduce by 2-8 times in comparative with the unherbicidated variant.

At the b_1 (without any hoeing) have determined 43.2 weeds/m^2, at b_2 (one mechanical hoeing) were 24.3 weeds /m^2, at b_3 (one mechanical and one manual hoeing) have been canted 5.8 weeds/m^2 at b_4 (one manual hoeing) of 14.1 weeds/m^2.

At the last variant (b_5 -2 manual hoeing and one mechanical) has been recorded the lowest weeding level, of only 4.7 weeds/m^2 (with over 90% less then the standard).

Until the sawing bed preparation has identified 15 weeds species, the dominant one was Anthemis austriaca, Erigeron canadensis, Chenopodium album and Senecio vernalis.

In vegetation time the tobacco has determined only 5 species: Digitaria sanquinalis, Portulaca oleracea, Chenopodium album, Polygonum aviculare and Echinochloa crus-galli, so 3 dicotiledonated and 2 monocotiledonated, all annual.

Digitaria sanquinalis and Portola oleracea had, together, a percentage of 80% in the weeds structure.

In the case of gravimetrical method, the biggest weeds quantity has been determined at the combination a_1b_1 (no work), of 472 g s.u./m^2 (table 2).

The herbicides application has reduced, gravimetrical, the weeding level with 50.2% - 59.4%, while the application of manual and mechanical hoeing has reduced the level of hoeing with 57.7% - 98.2%.

Table 2

The establish of the weeding level (the gravimetrical method), in g/m^2s.u., in the tobacco culture

The A factor		The B factor					The mean	
		b_1	b_2	b_3	b_4	b_5	g/m^2	%
a_1		472	117	29	63	18	139.8	100
a_2		143	94	-	47	-	56.8	40.6
a_3		189	103	-	56	-	69.6	49.8
a_4		165	96	-	51	-	62.4	44.6
The mean	g/m^2	242.2	102.5	7.2	54.2	4.5	*	*
	%	100	42.3	3.0	22.4	1.8	*	*

CONCLUSIONS

The most efficient production, of 2 t/ha dry leaves of tobacco from Virginia type was recorded in the herbicidated choice with Stomp, 4 l/ha, p.p.i., plus 3 means (two manual and a mechanic one).

The herbicides application has reduced, gravimetrical, the weeding level with 50.2% - 59.4%, while the application of manual and mechanical hoeing has reduced the level of hoeing with 57.7% - 98.2%.

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RESEARCH ON THE STATE OF MATURITY OF VIRGINIA TOBACCO LEAVES WHEN HARVESTING ON DIFFERENT LEVELS OF FERTILIZATION, THE PRODUCTION, ON THE CONDITIONS SOIL AND CLIME MÎRŞANI – DOLJ

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Keywords: sandy soil, tobacco, fertilization, productions, irrigation

ABSTRACT

Calitatea tutunului constituie obiectivul principal atât al cultivatorului cât şi al beneficiarului, ambii parteneri având interesul valorificării recoltei la un preț cât mai bun.

Prin determinările efectuate şi cu mijloacele avute la dispoziție, s-a căutat să se pună în evidență importanța momentului optim de recoltare a frunzelor ca şi rolul fertilizării asupra calității frunzelor şi influența acestora asupra producției şi, dacă este posibil, cât de mare este această influență.

Din rezultatele obținute reiese că nu tutunul nu trebuie să se recolteze înainte sau după perioada de maturitate tehnică, deoarece în aceste situații producția la hectar scade corespunzător şi aceasta fără a mai lua în calcul pierderile calitative atât la recoltarea înainte cât şi după maturitate.

The quality of tobacco is the main objective of both grower as well as the beneficial interest of both partners having recovery harvest at a price as best.

By determinations made and given the means available to seek to put in evidence the importance of the moment of optimum harvest leaves and fertilization on the quality of leaf and influence their and, if possible how big is this influence.

From obtained results show that tobacco does not have to harvest before or after the technical maturity, because in these situations production per hectare and the corresponding decrease without further take into account loss of quality so as to the collection before and after maturity.

INTRODUCTION

In terms of sandy land left Jiu on sandy typical, watered by sprinkle irrigation, from Mîrşani – Dolj, was located two factorial experience with the Virginia tobacco in order to determine the influence of the state of maturation of tobacco leaves in harvest time on different levels of fertilization on the production, according to the local soil and clime conditions.

MATERIAL AND METHOD

On sandy soil typical of Mîrşani – Dolj was located after an experience two factorial method subdivided parcels, with four repetitions.

A factor (fertilization) with 2 sub factors:

a_1= $N_{40}P_{40}K_{80}$,

a_2= $N_{80}P_{40}K_{80}$,

a_3 = $N_{80}P_{80}K_{80}$ (Mt).

Factor B (harvest time) with three sub factors:

b_1 = before maturity technique,

b_2 = technical maturity (Mt),

b_3 past technical maturity.

Using the vegetation or the 2 rear and 2 rear mechanical manuals and a 3 breeding was carried out manually only spots that have appeared in eastern late weeds or perennial weeds. To supplement the shortage of water of 3 watering times of 300 m^3/ha the first 2 watering were 600 m^3/ha.

Area experimental parcel was 6m x 4, 5m = 27m^2 and included 5 rows plant distance of 90 cm between them.

RESULTS AND DISCUSSION

Depending on the factor A (fertilization) production of leaf tobacco in 2005 was between 1645 kg/ha (a_1) and 2258 kg/ha (a_3), registering a minus the harvest of 613 kg/ha very significant and that 281 kg/ha distinct significantly (table 1).

Table 1

The influence of factor A (fertilization) on the production of dried leaves (Virginia type) sandy soil irrigation from Mîrşani – Dolj in 2005

The factor A (fertilization)	Production			The significance
	kg/ha	%	d.	
a_1 - $N_{40}P_{40}K_{80}$	1645	72.9	-613	0 0 0
a_2 - $N_{80}P_{40}K_{80}$	1977	87.6	-281	0 0
a_3 - $N_{80}P_{80}K_{80}$ (Mt.)	2258	100.0	Mt.	

DL 5 % = 142.3 kg/ha
DL 1 % = 215.5 kg/ha
DL 0.1 % = 346.3 kg/ha

Decrease rather drastic a production (table 2) of 532 kg/ha registered with the harvested Variation before arriving at maturity (b_1), it is because the leaves were harvested before fully ripe to be.

Of course, in practice such a variation cannot meet, meaning no one will crop production in the crudeness. It is still partially met when the mistake can be harvested and leaves crude with the ripe, or in cases fortuities may announce dust and do not want to miss the last full harvest. In these cases, of course, losses are proportional to the amount harvested.

A somewhat reverse the situation are recorded when harvesting is done after the leaves have passed the stage of maturity in technique and passing phase over baking, although the difference between the harvested Variation in time (b_2) and harvested late (b_3) is insignificant, being productive virtually equal (2034 kg/ha b_2 and b_3 to 2010 kg/ha).

Table 2

The influence of factor (fertilization) on the production of dried leaves (virginia type) sandy soil irrigation from mîrşani – dolj in 2005

The factor B (harvesting time)	Production			The significance
	kg/ha	%	d.	
b_1- before maturity technique	1502	73.8	-532	0 0 0
b_2- technical maturity	2034	100.0	Mt.	
b_3- past technical maturity	2010	98.8	-24	

DL 5 % = 274.2 kg/ha
DL 1 % = 415.2 kg/ha
DL 0, 1 % = 667.0 kg/ha

Regarding as the influence of interaction of factors A (fertilization) x B (harvest time) found that production of leaf tobacco was between 1197 kg / ha (a_1b_1) and 2657 (a_3b_2). Compared with variant witness a_3b_2, diminishing production can be observed, recorded. Minuses of harvest is very significant in combinations a_1b_1 (1460 kg/ha), a_1b_3 (962 kg/ha), and a_2b_1 (1168 kg/ha), distinct significant combinations a_3b_1 (837 kg/ha) and significant a_2b_2 (614 kg/ha) and 618 kg / ha to a_2b_3 (table 3).

Table 3

The interplay of factors influence A (fertilization) x B (harvest time) on the production of dried leaves (Virginia type) *sandy soil irrigation* Mîrşani – Dolj in 2005

Factors investigation		Production			The significance
A factor (fertilization)	Factor B (harvest time)	Kg/ha	%	d.	
a_1 – N_{40} P_{40} K_{80}	b_1 - before maturity technique	1197	45.1	-1460	0 0 0
	b_2 - Technical maturity	2043	76.9	-614	0
	b_3 - past technical maturity	1695	63.7	-962	0 0 0
a_2 – N_{80} P_{40} K_{80}	b_1 - before maturity technique	1489	56.0	-1168	0 0 0
	b_2 - Technical maturity	2402	90.4	-255	
	b_3 - past technical maturity	2039	76.7	-618	0
a_3 – N_{80} P_{80} K_{80}	b_1 - before maturity technique	1820	68.5	-837	0 0
	b_2 - Technical maturity	2657	100.0	(Mt.)	
	b_3 - past technical maturity	2296	86.4	-361	

	$a_1b_2 – a_1b_1$	a_1b_2-a_2b_2 or a_1b_2-a_2b_1
DL 5%	962.1 kg/ha	480.1 kg/ha
DL 1%	770.8 kg/ha	663.7 kg/ha
DL 0,1%	1049.2 kg/ha	916.9 kg/ha

CONCLUSIONS

1. Production per hectare correspondingly decrease when harvesting is done before the building and passed technical maturity (harvested leaves are not fully formed, and after the leaves have passed this stage in passing phase over baking).

2. Both the collection before and after the technical maturity are recorded loss of quality, but in practice such situations to meet less often, meaning producers will not harvest the entire production before and after the maturity of leaves, just by mistake.

3. In terms of fertilization and irrigation type Virginia tobacco harvested at maturity and technical fertilized with N_{80} P_{80} K_{80} (a_3) give very good results (achieved production of 2657 kg/ha).

4. With irrigation, the quality of Virginia tobacco grows. There was an increase of the content of carbohydrates and a reduction of the content of albumin and nicotine. Color sheets becomes more open, it improves the taste and aroma.

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EVOLUȚIA PRINCIPALILOR INDICI CALITATIVI LA DOUĂ SOIURI DE GRÂU DE TOAMNĂ ZONATE ÎN PARTEA DE VEST A ȚĂRII

ON THE EVOLUTION OF THE MAIN QUALITY INDICATORS IN TWO WINTER WHEAT CULTIVARS ADAPTED TO WESTERN ROMANIA

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Key words: winter wheat, herbicides, fertilisers, quality indicators

ABSTRACT

Cercetările efectuate pe parcursul anilor 2007 şi 2008 la două soiuri de grâu de toamnă (Alex şi Romulus) au demonstrat faptul că factorii genetici, climatici şi cei tehnologici contribuie la modificarea în limite destul de largi a compoziției chimice a boabelor de grâu de toamnă. Experimentând diferite erbicide (Oltisan M, Mustang, Lintur) şi doze diferite de îngrăşăminte minerale ($N_{45}K_{45}P_{45}$, $N_{90}K_{45}P_{45}$, $N_{120}K_{45}P_{45}$), în anul agricol 2006/2007 la soiul Alex conținutul de proteină variază între 11,0% în varianta Oltisan M-nefertilizat şi 13,8% în varianta Oltisan M-$N_{120}K_{45}P_{45}$. În acelaşi an (2007), conținutul de gluten umed la soiul Alex variază între 24,0% şi 31,2%, iar la soiul Romulus între 24,5% şi 31,4%. Din punct de vedere al continutului de proteină (media anului 2007),la soiului Alex, acesta a fost de 12,29%,iar la soiul Romulus de 12,57%, iar media conținutului de glutenul umed s-a situat la 28,20% la soiul Alex şi 27,74% la soiul Romulus. În anul agricol 2007-2008, valorile proteinei brute la soiul Alex variază între 10,9% (neerbicidat -nefertilizat) şi 13,1% (Oltisan M- $N_{120}K_{45}P_{45}$), iar la soiul Romulus între 10,9% (neerbicidat -nefertilizat) şi 13,6% (Mustang- $N_{120}K_{45}P_{45}$). Din punct de vedere al conținutului de proteină brută, analizând media anului 2008 se constată că la soiul Alex, aceasta are o valoare de 12,02%, iar la soiul Romulus de 12,04%. Şi conținutul de gluten umed prezintă variații mici, la soiul Alex cifrîndu-se la 27,76%, iar la Romulus la 27,17%.

Research carried out over the years 2007 and 2008 in two winter wheat cultivars (Alex and Romulus) show that genetic, climate, and technological factors contribute significantly to the changes of winter wheat grain chemical composition. By testing different herbicides (Oltisan M, Mustang, Lintur) and different doses of mineral fertilisers ($N_{45}K_{45}P_{45}$, $N_{90}K_{45}P_{45}$, $N_{120}K_{45}P_{45}$), we could see that protein content in the Alex winter wheat cultivar varied in the agricultural year 2006-2007 between 11,0% in the variant treated with Oltisan M but not fertilised and 13,8% in the variant treated with Oltisan M and fertilised with $N_{120}K_{45}P_{45}$. In the same year, moist gluten content in the Alex winter wheat cultivar varied between 24.0% and 31,2%, and in the Romulus winter wheat cultivar it varied between 24,5% and 31.4%. As far as the protein content is concerned (average of the year 2007), it reached 12,29% in the Alex winter wheat cultivar and 12,57% in the Romulus winter wheat cultivar; moist gluten content represented 28,20% in the Alex winter wheat cultivar and 27,74% in the Romulus winter wheat cultivar. In the agricultural year 2007-2008, raw protein values in the Alex winter wheat cultivar varied between 10,9% (not treated, not fertilised) and 13,1 % (treated with Oltisan M and fertilised with $N_{120}K_{45}P_{45}$), while in the Romulus winter wheat cultivar it ranged between 10,9% (not treated, not fertilised) and 13,6 % (treated with Mustang and fertilised with $N_{120}K_{45}P_{45}$). From the point of view of raw protein content, we could see that the average of the year 2008 reached 12,02% in the Alex winter wheat cultivar and 12,04% in the Romulus winter wheat cultivar. Moist gluten content also had low variations: 27,76% in the Alex winter wheat cultivar and 27,17% in the Romulus winter wheat cultivar.

INTRODUCTION

Research carried out in different soil and climate conditions show that, together with genetic, climate and particularly technological factors, contribute to the wide alteration of chemical composition and yield quality (Bâlteanu et al., 1991; Borlan et al., 1994). High protein content is associated with good bread-making quality (Borlan et al., 1994). Research reported by Hera (1986), show that in droughty years, protein accumulation is higher than in rainy years.

MATERIAL AND METHOD

During the experimental years 2006-2007 and 2007-2008, we developed at the Didactic Station of the University of Agricultural Science and Veterinary Medicine of the Banat in Timişoara, a polyfactorial experiment with four replications after the sub-divided plot method, each harvestable plot measuring 35 m^2 (7 m x 5 m) (Săulescu and Săulescu, 1967). The three experimental factors were as follows: *Factor A – cultivated cultivar,* with the following graduations: a_1 – Alex; a_2 – Romulus; *Factor B – post-emergent herbicides,* with the following graduations: b_1 – not treated; b_2 – Oltisan M (10 g/l dicamba + 325 g/l acid 2.4 D), 1l/ha; b_3 – Mustang (florasulam 6.25 g/l + 300 g/l 2.4-D) 0.5 l/ha; b_4 – Lintur 70 WG (triasulfuron 4.1% + dicamba 65.9%) 150 g/ha; *Factor C – fertilisation*, with the following graduations: c_1 – not fertilised; c_2 – fertilised with $N_{45}P_{45}K_{45}$, c_3 – $N_{90}P_{45}K_{45}$, and c_4 – $N_{120}P_{45}K_{45}$.

RESULTATS

Analysing the raw protein content (%) depending on the winter wheat cultivar in the year 2007, we can see that in the Alex winter wheat cultivar it varied between 11.0% in the variant treated with Oltisan M 1 l/ha and not fertilised and 13.8% in the variant treated with Oltisan M 1 l/ha on an agri-fund of $N_{120}K_{45}P_{45}$ (Table 1). In the Romulus winter wheat cultivar too, raw protein content varied between 10.8% in the variant treated with Oltisan M 1l/ha and not fertilised and 13.8% in the variant treated with Oltisan M 1 l/ha on an agri-fund of $N_{120}K_{45}P_{45}$ (Table 2).

Table 1

The influence of interaction between experimental factors on raw protein content in winter wheat (Alex cultivar), in 2007

Fact A	Fact B	Fact C	Raw protein (%)	%	Difference (%)	Signifi-cance
Alex	Not treated	$N_0P_0K_0$	11,2	100,00	–	-
		$N_{45}P_{45}K_{45}$	11,7	104,47	0,5	-
		$N_{90}P_{45}K_{45}$	12,4	110,72	1,20	***
		$N_{120}P_{45}K_{45}$	13,4	119,65	2,20	***
	Oltisan M	$N_0P_0K_0$	11,0	98,22	–0,2	-
		$N_{45}P_{45}K_{45}$	12,0	107,15	0,8	**
		$N_{90}P_{45}K_{45}$	12,9	115,18	1,7	***
		$N_{120}P_{45}K_{45}$	13,8	123,22	2,6	***
	Mustang	$N_0P_0K_0$	11,4	101,79	0,2	-
		$N_{45}P_{45}K_{45}$	11,6	103,58	0,4	-
		$N_{90}P_{45}K_{45}$	12,3	109,83	1,1	**
		$N_{120}P_{45}K_{45}$	13,7	122,33	2,5	***
	Lintur 70WG	$N_0P_0K_0$	11,3	100,90	0,1	-
		$N_{45}P_{45}K_{45}$	11,7	104,47	0,5	-

		$N_{90}P_{45}K_{45}$	**12,8**	**114,29**	**1,6**	*******
		$N_{120}P_{45}K_{45}$	**13,4**	**119,65**	**2,2**	*******

$DL_{5\%}$= 0,66 % $DL_{1\%}$= 0,76 $DL_{0,1\%}$=1,16%

Table 2

The influence of interaction between experimental factors on raw protein content in winter wheat (Romulus cultivar), in 2007

Fact A	Fact B	Fact C	Raw protein (%)	%	Difference (%)	Signifi-cance
Romulus	**Not treated**	**$N_0P_0K_0$**	**11,2**	**100,00**	**–**	**-**
		$N_{45}P_{45}K_{45}$	**11,7**	**104,47**	**0,5**	**-**
		$N_{90}P_{45}K_{45}$	**12,9**	**115,18**	**1,7**	*******
		$N_{120}P_{45}K_{45}$	**13,7**	**122,33**	**2,5**	*******
	Oltisan M	**$N_0P_0K_0$**	**10,8**	**96,43**	**–0,4**	**-**
		$N_{45}P_{45}K_{45}$	**12,7**	**113,40**	**1,5**	*******
		$N_{90}P_{45}K_{45}$	**12,9**	**115,18**	**1,7**	*******
		$N_{120}P_{45}K_{45}$	**13,8**	**123,22**	**2,6**	*******
	Mustang	**$N_0P_0K_0$**	**11,9**	**106,25**	**0,7**	*****
		$N_{45}P_{45}K_{45}$	**12,9**	**115,18**	**1,7**	*******
		$N_{90}P_{45}K_{45}$	**13,7**	**122,33**	**2,5**	*******
		$N_{120}P_{45}K_{45}$	**13,6**	**121,43**	**2,4**	*******
	Lintur 70WG	**$N_0P_0K_0$**	**11,3**	**100,90**	**0,1**	**-**
		$N_{45}P_{45}K_{45}$	**11,9**	**106,25**	**0,7**	*****
		$N_{90}P_{45}K_{45}$	**12,7**	**113,40**	**1,5**	*******
		$N_{120}P_{45}K_{45}$	**13,4**	**119,65**	**2,2**	*******

$DL_{5\%}$=0,68% $DL_{1\%}$=0,86 % $DL_{0,1\%}$=1,25%

Analysing the results concerning the evolution of aw protein content in winter wheat depending on the three experimental factors under study (Table 3), we can see that in the year 2007 the average of the Alex winter wheat cultivar (12.29%) is inferior to the average of the Romulus winter wheat cultivar (12.57%). Synthesis results concerning the impact of herbicides on raw protein content shows that the best average results were in the variants treated with Mustang 0.5 l/ha (12.64%) and Oltisan M 1l/ha (12.49%). Results obtained on different agri-funds point out the positive effect of fertilisers, i.e. increases of raw protein content from 11.27% in the variants not fertilised to 12.03% in the variants fertilised with $N_{45}P_{45}K_{45}$, to 12.83% in the variants treated with $N_{90}P_{45}K_{45}$, to 13.61% in the variants treated with $N_{120}P_{45}K_{45}$.

Table 3

Synthesis of trial results regarding the ground of raw protein(%), in winter wheat in 2007

Average of experimental factors (%)									
Factor A- cultivar		Factor B- herbicides				Factor C- fertilisation			
a_1	a_2	b_1	b_2	b_3	b_4	c_1	c_2	c_3	c_4
12,2	12,5	12,2	12,4	12,6	12,3	11,2	12,0	12,8	13,6

9	7	8	9	4	2	7	3	3	1

a_1-Alex; b_1- not treated c_1- $N_0P_0K_0$
a_2-Romulus b_2- Oltisan M c_2- $N_{45}P_{45}K_{45}$
b_3- Mustang c_3- $N_{90}P_{45}K_{45}$
b_4-Lintur 70 WG c_4- $N_{120}P_{45}K_{45}$

In the Alex winter wheat cultivar, moist gluten content (%) had values between 24.0% in the variant treated with Oltisan M 1l/ha and not fertilised and 31.2% in the variant treated with Lintur 70WG 150 g/ha and fertilised with $N_{120}P_{45}K_{45}$ (Table 4). In the Romulus winter wheat cultivar, moist gluten content had values between 24.5% in the variant treated with Lintur 70WG 150 g/ha and not fertilised, and 31.4% in the variant treated with Oltisan M 1 l/ha and fertilised with $N_{120}P_{45}K_{45}$ (Table 5).

Table 4

The influence of interaction between experimental factors on moist gluten content in winter wheat (Alex cultivar), in 2007

Fact A	Fact B	Fact C	Moist gluten		Difference (%)	Significance
			%	%		
Alex	Not treated	$N_0P_0K_0$	26,3	100,00	-	-
		$N_{45}P_{45}K_{45}$	28,5	108,37	2,2	***
		$N_{90}P_{45}K_{45}$	29,8	113,31	3,5	***
		$N_{120}P_{45}K_{45}$	31,2	118,64	4,9	***
	Oltisan M	$N_0P_0K_0$	24,0	91,26	-2,3	000
		$N_{45}P_{45}K_{45}$	27,9	106,09	1,6	***
		$N_{90}P_{45}K_{45}$	29,7	112,93	3,4	***
		$N_{120}P_{45}K_{45}$	30,4	115,59	4,1	***
	Mustang	$N_0P_0K_0$	25,4	96,58	-0,9	0
		$N_{45}P_{45}K_{45}$	26,8	101,91	0,5	-
		$N_{90}P_{45}K_{45}$	29,9	113,69	3,6	***
		$N_{120}P_{45}K_{45}$	30,0	114,07	3,7	***
	Lintur 70 WG	$N_0P_0K_0$	25,2	95,82	-1,1	00
		$N_{45}P_{45}K_{45}$	24,8	94,30	-1,5	000
		$N_{90}P_{45}K_{45}$	30,0	114,07	3,7	***
		$N_{120}P_{45}K_{45}$	31,2	118,64	4,9	***

$DL_{5\%}$= 0,86 % $DL_{1\%}$= 1,11 $DL_{0,1\%}$=1,32%

Table 5

The influence of interaction between experimental factors on moist gluten content in winter wheat (Romulus cultivar), in 2007

Fact A	Fact B	Fact C	Moist gluten		Difference (%)	Signifi -cance
			%	%		
	Not treated	$N_0P_0K_0$	24,9	100,0	–	–
		$N_{45}P_{45}K_{45}$	25,7	103,22	0,8	*
		$N_{90}P_{45}K_{45}$	27,0	108,44	2,10	***
		$N_{120}P_{45}K_{45}$	30,7	123,30	5,8	***

Romulus	**Oltisan M**	**$N_0P_0K_0$**	**26,4**	**106,03**	**1,5**	*******
		$N_{45}P_{45}K_{45}$	**26,5**	**106,43**	**1,6**	*******
		$N_{90}P_{45}K_{45}$	**30,2**	**121,29**	**5,3**	*******
		$N_{120}P_{45}K_{45}$	**31,4**	**126,11**	**6,5**	*******
	Mustang	**$N_0P_0K_0$**	**25,7**	**103,22**	**0,8**	*****
		$N_{45}P_{45}K_{45}$	**26,8**	**107,63**	**1,9**	*******
		$N_{90}P_{45}K_{45}$	**27,4**	**110,04**	**2,5**	*******
		$N_{120}P_{45}K_{45}$	**30,2**	**121,29**	**5,3**	*******
	Lintur 70 WG	**$N_0P_0K_0$**	**24,5**	**98,40**	**–0,4**	**-**
		$N_{45}P_{45}K_{45}$	**25,7**	**103,22**	**0,8**	*****
		$N_{90}P_{45}K_{45}$	**29,9**	**120,08**	**5,0**	*******
		$N_{120}P_{45}K_{45}$	**30,7**	**123,30**	**5,8**	*******

$DL_{5\%}$=0,77% $DL_{1\%}$=1,02% $DL_{0,1\%}$=1,14%

In the year 2007, the Alex winter wheat cultivar had an average moist gluten content of 28.20%, which made it superior to the Romulus winter wheat cultivar that reached only 27.74% moist gluten content (Table 6). As for the impact of the herbicides we applied, we can see that in the variants treated with Oltisan M 1 l/ha there were maximum values of moist gluten content (28.32%). Moist gluten content (%) increased proportionally with the rate of fertilisers applied, i.e. from 25.31% in the variant not fertilised to 26.59% in the variant $N_{45}P_{45}K_{45,}$ to 29.24% in the variant fertilised with $N_{90}P_{45}K_{45}$, and to 30.73% in the variant fertilised with $N_{120}P_{45}K_{45}$ (Table 6).

Table 6

Synthesis of trial results regarding the ground of moist gluten (%), in winter wheat in 2007

Average of experimental factors (%)									
Factor A-cultivar		Factor B- herbicides				Factor C-fertilisation			
a_1	a_2	b_1	b_2	b_3	b_4	c_1	c_2	c_3	c_4
28,20	27,74	28,02	28,32	27,78	27,75	25,31	26,59	29,24	30,73

a_1-Alex; b_1- Not treated c_1- $N_0P_0K_0$

a_2-Romulus b_2- Oltisan M c_2- $N_{45}P_{45}K_{45}$

b_3- Mustang c_3- $N_{90}P_{45}K_{45}$

b_4-Lintur 70 WG c_4- $N_{120}P_{45}K_{45}$

As for raw protein content in the winter wheat cultivars in the year 2008, it varied in the Alex winter wheat cultivar between 10.9% in the variant not treated and not fertilised to 13.1% in the variant treated with Oltisan M-$N_{120}K_{45}P_{45}$ (Table 7).

Tabelul 7

The influence of interaction between experimental factors on raw protein content in winter wheat (Alex cultivar), in 2008

Fact A	**Fact B**	**Fact C**	**Raw protein (%)**	**%**	**Difference (%)**	**Signifi-cance**
	Not treated	**$N_0P_0K_0$**	**10,9**	**100,00**	**–**	**-**
		$N_{45}P_{45}K_{45}$	**11,8**	**108,26**	**0,9**	**-**

Alex		$N_{90}P_{45}K_{45}$	12,0	110,10	1,1	-
		$N_{120}P_{45}K_{45}$	12,8	117,44	1,9	**
	Oltisan M	$N_0P_0K_0$	11,5	105,51	0,6	-
		$N_{45}P_{45}K_{45}$	11,6	106,43	0,7	-
		$N_{90}P_{45}K_{45}$	12,4	113,77	1,5	*
		$N_{120}P_{45}K_{45}$	13,1	120,19	2,2	***
	Mustang	$N_0P_0K_0$	11,2	102,76	0,3	-
		$N_{45}P_{45}K_{45}$	11,5	105,51	0,6	-
		$N_{90}P_{45}K_{45}$	12,3	112,85	1,4	*
		$N_{120}P_{45}K_{45}$	12,9	118,35	2,0	**
	Lintur 70WG	$N_0P_0K_0$	11,2	102,76	0,3	-
		$N_{45}P_{45}K_{45}$	11,7	107,34	0,8	-
		$N_{90}P_{45}K_{45}$	12,5	114,68	1,6	**
		$N_{120}P_{45}K_{45}$	12,9	118,35	2,0	**

$DL_{5\%}$= 1,13% $DL_{1\%}$=1,53% $DL_{0,1\%}$=2,01

Raw protein content values in the Romulus winter wheat cultivar varied between 10.9% in the not treated and not fertilised variant to 13.6% in the variant treated with Mustang-$N_{120}K_{45}P_{45}$ (Table 8). Synthesising the results concerning the raw protein content in winter wheat cultivars in the year 2008, we can see that the average of the Alex winter wheat cultivar was 12.02% while the average value of raw protein content in the Romulus winter wheat cultivar was 12.04%, i.e. very little differences (Table 9). If we analyse factor B (treating with herbicides), we can see that it played an important role in the accumulation of protein n the grains, with very little differences between the average values: first ranked the herbicide Mustang 0.5 l/ha (with an average of 12.24%), Lintur 70 WG 150 g/ha (with an average of 12.08%) and Oltisan M 1 l/ha (with an average of 12.04%). Analysing factor C (fertilisation) unilaterally in the agricultural year 2007-2008, we can see that the variant $N_{120}P_{45}K_{45}$, with an average of 13.04%, was the variant with the best results from this point of view (Table 9).

Table 8

The influence of interaction between experimental factors on raw protein content in winter wheat (Romulus cultivar), in 2008

Fact A	Fact B	Fact C	Raw protein(%)	%	Difference (%)	Signifi -cance
Romulus	Not treated	$N_0P_0K_0$	10,9	100,00	–	-
		$N_{45}P_{45}K_{45}$	11,2	102,76	0,3	-
		$N_{90}P_{45}K_{45}$	11,8	108,26	0,9	-
		$N_{120}P_{45}K_{45}$	12,6	115,60	1,7	**
	Oltisan M	$N_0P_0K_0$	11,0	100,92	0,1	-
		$N_{45}P_{45}K_{45}$	11,5	105,51	0,6	-
		$N_{90}P_{45}K_{45}$	12,2	111,93	1,3	*
		$N_{120}P_{45}K_{45}$	13,0	119,27	2,1	**
	Mustang	$N_0P_0K_0$	11,2	102,76	0,3	-
		$N_{45}P_{45}K_{45}$	12,1	111,01	1,2	*
		$N_{90}P_{45}K_{45}$	13,1	120,19	2,2	***

		$N_{120}P_{45}K_{45}$	**13,6**	**124,77**	**2,7**	*******
	Lintur 70WG	**$N_0P_0K_0$**	**11,1**	**101,84**	**0,2**	**-**
		$N_{45}P_{45}K_{45}$	**11,5**	**105,51**	**0,6**	**-**
		$N_{90}P_{45}K_{45}$	**12,3**	**112,85**	**1,4**	******
		$N_{120}P_{45}K_{45}$	**13,4**	**122,94**	**2,5**	*******

$DL_{5\%}$= 1,16% $DL_{1\%}$=1,56% $DL_{0,1\%}$= 2,05%

Table 9

Synthesis of trial results regarding the ground of raw protein (%) in winter wheat in 2008

Average of experimental factors (%)									
Factor A-cultivar		Factor B- herbicides				Factor C-fertilisation			
a_1	a_2	b_1	b_2	b_3	b_4	c_1	c_2	c_3	c_4
12,02	12,04	11,76	12,04	12,24	12,08	11,13	11,62	12,33	13,04

a_1-Alex; b_1-not treated c_1- $N_0P_0K_0$

a_2-Romulus. b_2- Oltisan M c_2- $N_{45}P_{45}K_{45}$

b_3- Mustang c_3- $N_{90}P_{45}K_{45}$

b_4-Lintur 70 WG c_4- $N_{120}P_{45}K_{45}$

In the year 2008, the Alex winter wheat cultivar ad moist gluten content values between 24.0% in the variant not treated and not fertilised, and 30.7% in the variant treated with Lintur 70 WG and fertilised with $N_{120}P_{45}K_{45}$ (Table 10). In the Romulus winter wheat cultivar, there were practically the same trends of moist gluten content variation, with values between 24.0% in the variant not treated and not fertilised and 30.5% in the variant treated with Lintur 70 WG and fertilised with $N_{120}P_{45}K_{45}$ (Table 11). In the year 2008, moist gluten content in the Alex winter wheat cultivar reached, on the average, 27.76%, while in the Romulus winter wheat cultivar it reached 27.17% (Table 12). Analysing factor B unilaterally (treating with herbicides) shows that herbicides had a positive impact on moist gluten accumulation, with the highest impact when treated with the herbicide Lintur 70WG 150 g/ha (27.73%), closely followed by the herbicides Oltisan M 1l/ha (27.71%) and Mustang 0.5 l/ha (27.47%). As for the unilateral analysis of the factor C (fertilisation), the variant with the highest amount of nitrogen ($N_{120}P_{45}K_{45}$) yielded the highest values of moist gluten content (30.17%). (Table 12).

Table 10

The influence of interaction between experimental factors on moist gluten content in winter wheat (Alex cultivar), in 2008

Fact A	**Fact B**	**Fact C**	**Moist gluten**		**Difference (%)**	**Signifi-cance**
			%	**%**		
	Not treated	**$N_0P_0K_0$**	24,0	**100,00**	**–**	**–**
		$N_{45}P_{45}K_{45}$	**27,1**	**112,92**	**3,1**	*******
		$N_{90}P_{45}K_{45}$	**28,5**	**118,75**	**4,5**	*******
		$N_{120}P_{45}K_{45}$	**30,5**	**127,09**	**6,5**	*******

Alex	Oltisan M	$N_0P_0K_0$	24,2	100,84	0,2	-
		$N_{45}P_{45}K_{45}$	27,7	115,42	3,7	***
		$N_{90}P_{45}K_{45}$	29,0	120,84	5,0	***
		$N_{120}P_{45}K_{45}$	30,2	125,84	6,2	***
	Mustang	$N_0P_0K_0$	24,5	102,09	0,5	-
		$N_{45}P_{45}K_{45}$	27,3	113,75	3,3	***
		$N_{90}P_{45}K_{45}$	28,8	120,00	4,8	***
		$N_{120}P_{45}K_{45}$	30,1	125,42	6,1	***
	Lintur 70 WG	$N_0P_0K_0$	24,6	102,50	0,6	-
		$N_{45}P_{45}K_{45}$	27,4	114,17	3,4	***
		$N_{90}P_{45}K_{45}$	29,5	122,92	5,5	***
		$N_{120}P_{45}K_{45}$	30,7	127,92	6,7	***

$DL_{5\%}$= 1,09% $DL_{1\%}$= 1,48% $DL_{0,1\%}$= 1,93 %

Tabelul 11

The influence of interaction between experimental factors on moist gluten content in winter wheat (Romulus cultivar), in 2008

Fact A	Fact B	Fact C	Moist gluten		Difference (%)	Signifi -cance
			%	%		
Romulus	Not treated	$N_0P_0K_0$	24,0	100,00	–	-
		$N_{45}P_{45}K_{45}$	25,3	105,42	1,3	-
		$N_{90}P_{45}K_{45}$	26,7	111,25	2,7	***
		$N_{120}P_{45}K_{45}$	29,6	123,34	5,6	***
	Oltisan M	$N_0P_0K_0$	25,3	105,42	1,3	**
		$N_{45}P_{45}K_{45}$	26,2	109,17	2,2	***
		$N_{90}P_{45}K_{45}$	29,0	120,84	5,0	***
		$N_{120}P_{45}K_{45}$	30,0	125,0	6,0	***
	Mustang	$N_0P_0K_0$	25,1	104,59	1,1	-
		$N_{45}P_{45}K_{45}$	26,2	109,17	2,2	***
		$N_{90}P_{45}K_{45}$	28,0	116,67	4,0	***
		$N_{120}P_{45}K_{45}$	29,7	123,75	5,7	***
	Lintur 70WG	$N_0P_0K_0$	24,2	100,84	0,2	-
		$N_{45}P_{45}K_{45}$	26,3	109,59	2,3	***
		$N_{90}P_{45}K_{45}$	28,6	119,17	4,6	***
		$N_{120}P_{45}K_{45}$	30,5	127,09	6,5	***

$DL_{5\%}$= 1,17 % $DL_{1\%}$= 1,58 % $DL_{0,1\%}$=2,08%

Table 12

Synthesis of trial results regarding the ground of wet gluten (%) in winter wheat in 2008

Average of the experimental factors (%)									
Factor A- cultivar		Factor B- herbicides				Factor C-fertilisation			
a_1	a_2	b_1	b_2	b_3	b_4	c_1	c_2	c_3	c_4
27,76	27,17	26,97	27,71	27,47	27,73	24,49	26,69	28,52	30,17

a_1-Alex; b_1- not treated c_1- $N_0P_0K_0$
a_2-Romulus b_2- Oltisan M c_2- $N_{45}P_{45}K_{45}$
b_3- Mustang c_3- $N_{90}P_{45}K_{45}$
b_4-Lintur 70 WG c_4- $N_{120}P_{45}K_{45}$

CONCLUSIONS

1. From the point of view of raw protein content, we can say that in the year 2007, the Alex winter wheat cultivar with an average of 12.29% was inferior to the Romulus winter wheat cultivar with an average of 12.57%. In the year 2008, there was the same superiority of the Romulus winter wheat cultivar, but the differences between the Alex winter wheat cultivar Romulus (12.02%) and the Romulus winter wheat cultivar (12.04%) were less. Treating with herbicides had a positive impact on raw protein content (%) in winter wheat cultivars. In the year 2007, in the variants treated with Mustang 0.5 l/ha and Oltisan M 1 l/ha, there were the highest values of raw protein content, i.e. 12.64% and 12.49%, respectively. In the year 2008, we noted the herbicides Mustang 0.5 l/ha (12.24%) and Lintur 70 WG 150 g/ha (12.08%). As for fertilisation, in the year 2007, in the variant treated with $N_{120}P_{45}K_{45}$ we got the highest raw protein content (13.61%), and in the year 2008, the same variant resulted in a raw protein content of 13.04%.

2. If we analyse the content of moist gluten, we can see that in the year 2007 the average of the Alex winter wheat cultivar (28.20%) was superior to the average of the Romulus winter wheat cultivar (27.74%), while in the year 2008, the average of the Alex winter wheat cultivar (27.76%) was also superior to the average of the Romulus winter wheat cultivar (27.17%). Herbicides had a positive impact on moist gluten content, with the best results in the variant treated with Oltisan M 1 l/ha (28.32%) in the year 2007, while in the year 2008, the best results were in the variant treated with Lintur 70 WG 150 g/ha (27.73%) and Oltisan M 1l/ha (27.71%). From the point of view of the moist gluten content, it increased with the nitrogen rates we applied. Thus, in the year 2007, the variant fertilised with $N_{120}P_{45}K_{45}$ resulted in an average moist gluten content of 30.73%, compared to the variant not treated which yielded an average moist gluten content of 25.31%; in the year 2008, the variant fertilised with $N_{120}P_{45}K_{45}$ resulted in an average of the moist gluten content of 30.17%, compared to the variant not fertilised which reached an average moist gluten content of 24.49%.

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ANALIZA STĂRII DE EROZIUNE A SOLULUI ÎNTR-UN SUBBAZIN HIDROGRAFIC

ANALYSIS OF THE SITUATION OF SOIL EROSION IN A HYDROGRAPHIC SUB-BASIN

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Key words: erosion, cartogram, indicators, degradation, risk.

ABSTRACT

În lucrare se prezintă o analiză a procesului de eroziune a solului intr-un subbazin hidrografic. S-a determinat atât eroziunea potențială cât şi cea efectivă.

Metoda de cercetare s-a bazat pe cartarea eroziunii solului, delimitandu-se pe planuri de situație, la scară, unitățile omogene din punct de vedere al tuturor factorilor ce contribuie la declanşarea fenomenului de eroziune.

*Pentru încadrarea în clase de pericol de eroziune s-a folosit metodologia ICPA /1987, în funcție de pierderile de sol estimate (t/ha*an), iar aprecierea şi notarea eroziunii s-a făcut, în funcție de grosimea orizontului înlăturat prin eroziune.*

Interpretarea datelor obținute s-a făcut prin calculul indicatorilor de stare şi de risc, (M. Moțoc şi A. Vătau /1992), indicatori grupați în următoarele categorii: de stare sau de stadiu actual al degradării, de impact asupra productivității şi de risc.

Lucrarea prezintă centralizat, pe folosințe, suprafețele afectate de eroziunea de suprafață, pe clase şi grade de intensitate.

The paper is an analysis of the erosion process of the soil, a hydrographic sub-bassin and the final purpose of this is making the plans presenting a prognosos of the soil losses by erosion.It has been determined the erosion of two cases: potential erosion and effective erosion.

The plannes that have been executed, offer the possibility of analyising the multiple factors interfiering in starting and developing the erosion processes.

The research method was based on mapping the erosion of the soil.

*The distribution in degrees of danger was made according to the methodology established by ICPA, depending on the estimated soil losses (t/hectare*year). The estimation and the recording of erosion were made based on the regulations established by ICPA, according to thickness of the layer lost by erosion. The potential erosion of the whole sub-basin was calculated using the universal equation of surface erosion, based on the data gathered on the field and on the maps containing the delimitation of erosion units.*

State indicators for surface erosion and risk indicators were used in order to read the obtained data, indicators grouped into the following categories: state or present status of degradation, impact on productivity and risk. The map of the surface erosion degree and the map of the degrees of surface erosion danger were made according to these results.

INTRODUCTION

The rapid rhythm of extension of affected surfaces by soil erosion and the catastrophic consequences of this natural phenomenon have been flagged at the beginning by the science men and then by the farmers from all continents.

Soil degradation has started when men started agriculture, but now its extension and impact to environment have become alarming. The effects are seen in the reduction of production capacity of echo systems, in the changes of global climate and environment, in deterioration of food resources of humanity, in disruption of economic growth (UNEP 1982).

Studies performed during time have concluded that it is now necessary a sustained human and financial effort to reduce the dynamic processes of soil destruction.

MATERIAL AND METHOD

The research method is based on mapping the soil erosion. For each erosion unit researches and notes have been made in the terrain book as follows: the erosion form produced by water and action intensity, form, descent and exposure of relief, lithological bed and soil. For setting the units limits many factors have been taken into account : the change of erosion grades, the flank forms and their inclination, soil colour which is a valuable indicator regarding the surfaces and terrain usage. When one of the above elements has changed a new erosion unit has been set.

Setting the danger grades for surface erosion has been done following the methodology established by ICPA in 1987, according to estimated soil losses (t/ha*year). Estimation and notes on erosion have been done following the ICPA rules , according to the horizon depth cleared by erosion.

Based on data gathered from field and on erosion unit maps (or situation plans), in order to estimate how erosion will evolve in the future, the potential erosion on the entire bed has been calculated based on universal Ecuation of surface erosion. To do this the erosion units which had the same soil type, usage and aproximately same flanks inclination and length have been marked, then the potential erosion has been calculated for the respective group of units.

For correct interpretation of the data collected, the status and risk indicators for surface erosion have been used ; these status indicators proposed by M.Motoc and A. Vatau – 1992, are grouped in the following categories : of current status of degradation, of impact on productivity and of risk.

RESULTS AND DISCUSSIONS

In Arges county, most of agrarian lands are situated on flanks exposed to erosion, temporary or permanent excess of humidity, landslides. In this category there is also the Argeş hydrographic basin.

The first major river feeder is on the left side: Vîlsan (S=358Km^2 ; L=84,6Km). Also, Vîlsan has many feeders (Dobroneagu, Robaia, Sobana, Părului, Topliţa, Buneşti) which generally have small basins.

Vîlsăneşti village, which is crossed by Vîlsan river, presents a great variety of geographical conditions due to heomorphological transition from pre-mountain area of sub-Carpathian hills (known as „the area of the seven hillocks”) to Argeş platform. The oblong shaped form teritory on the median direction ocupies the Vîlsan river bed to where the watersheds of this valley and the neighbour ones meet.

In the north part of the teritory the Vîlsan valley is narrowed much like a corridor between the northern extensions of Plaiul Chicova in the west and the Plaiul Toaca in the est. To south, the valley is growing larger from the confluence with Robaia valley, now entering the depression of the 7 hillocks. As main geomorphological units you can

distinguish the table and bed of Vîlsan river which are interceded by the flanks of different inclinations and varied microrelief forms.

The great diversity of rocks on which soils have formed explains the multitude of soil units. On plateau the mother rock is formed by fine clays and on the flanks from sands and break stones which emerged during torrential erosion or sliding break stones. Going down to Mălureni village we have found out that this teritory is part of the mountain base area called ‚Arges hill top'. This is where the transition from sub-Carpathians (in the north part) to mountain base area of Piteşti (in the south part) is done. Base of mountain has been continously shaped by the hydrographic network of Vîlsan and Doamnei river. The relief energy is stressed so that the meadow and river beds are on a difference of altitude up to 160 m than the plateaus waterways. You can notice the following mesorelief units: inter-river peaks, flanks, Vîlsan terraces and other valleys, meadows and valley soles. On the inter-river peaks, the well developed hydrographic system determined plateaus to have a rather small occurance.

Flanks dominating the Vîlsan valley or any other smaller valleys are characterized by irregularity and have been affected by landslides on Topliţa Valley. Ditches can be seen all over the place. Flanks have varied inclinations, from 5-10% or below to up to 25-35% or more. Length of flanks is very big: 250-300m and in the confluence areas is greater than 400-450m.

Terraces, excepting the lowest one, are isolate mostly because of land big fragmentation. Meadow terrace is present on all Vîlsan valley, on both sides of the river. The subsidence compared to meadow is lower with 3-4m in south, on left side of Vîlsan. In some places, where secondary valleys meet the terrace has been filled with dirt cones. The terrace bridge width is 150-300m but it can reach up to 500m. It is leveled or a little bit inclined. Another terrace, higher and with heavily inclined flanks (20-30%) appears with gaps and it's a feature more for the left side of the Vîlsan. The maximum altitude is of bridge terrace is 475-490m. On Topliţa Valley, at the confluence with Vîlsan fragments of separate terraces (even with 4 levels) can be found. Bridges have a smaller width , a 10-15% inclination and have been affected by landslides.

The meadow is present all over the courses of Vîlsan and Topliţa. Vîlsan meadow is well developed and quite proportionate. Its width is growing larger from 125-150m in the premises of Mălureni village up to more than 250m to south, where it then unifies with the Arges meadow. At the influx of Topliţa valley, the common meadow reaches 450m and has a level conformation. Topliţa has smaller meadow of 30-50m. The other valleys, even if they have their own meadows, present relatively leveled surfaces with widths between 10-30m, former colluvial deposits and dirt cones. In some places the valley bed is at the same altitude as the low terrace of Vîlsan.

Close to the confluence with Arges, Vîlsan river transits the Zărneşti teritory. Vîlsan valley in this terminal sector is growing larger between hills creating a larger meadow to confluence, after leaving behind, on the left side, that 4 level terrace. In this area, the relief appears as carved by the Vîlsan waters, by its few feeders and by Doamnei river (Păuleasa Valley and Budeasa Valley). Vîlsan meadow is now growing larger from 500-600m to 1200-1500m at south of Zărneşti, from where the common meadow of Arges and Vîlsan starts. The meadow altitude is here at 350m from 320m as it was so far.

The hydrographic basin of Arges river is set up by hydrotechnical works. Many feeders of this river having their flow heavily influenced by the rain falls were sometimes carrying a very large fluid or solid flow, causing floods in the lower sector of the meadow. Taking into account the hydroenergetic importance of the hydrographic basin of Arges, as well as the development of a relatively quick plugging process of the existing barrier lakes, many researches have been started on finding the causes which led to excessive plugging of barrier lakes; one of the main causes is the soil erosion effect so the research has been developed to counter act such a thing. Plugging of barrier lakes is enevitable but

specialists have the possibility of reducing this process through works in the hydrographic basin.

Regarding lithology and pedology, there has been observed that relief forms being so varied, lithology is also different, on Vîlsan river finding a large variety of soils. Clay soils are characterized by being found at 30-40cm in depth of a B_t horizon clay enriched:

The luvic brown-red soils are characteristic of leveled plateaus. Podsoling under A horizon and clay accrual processes in the inferior levels of soil have taken place.

Soils are met on narrow top of the hills. They are characterized through an increasing quantity of clay from B_t.

Hydromorphic soil class has it representative:

Gleic soil which characterizes the meadow surfaces and the undergournd water terraces at a small depth of 1-2.5m. The soil is present on flank areas which are almost horizontal, with down-grades springs and small lakes found on behind of landslides.

Un-evolved soil class has a new representative:

Colluvisoil which was formed by accrual of matters from flanks in level areas and on terraces.

Also on the Vîlsan valley, on inclined terrains, the soil crust is very complex and varied due to flanks inclination and varied forms which condition variations in erosion intensity and flanks processes. Of major importance on flanks there are also the suspended underground waters which condition land slides. In these areas there are complex soils: brown young soils with short profile and a small pseudo-gleization, regosol soils and rock on flanks which are very inclined and have powerful erosion, brown soils with a small pseudo-gleization with and small lakes found on behind of landslides and regosols developed on flanks afected by landslides, brown colluvio-deluvialsoils with regosols and protoregosols developed in the inferior third area of the flanks.

The most complex soils are met in the meadow due to varied provenience of matter, texture which is different, water influence (underground or rain origin) and evolution status of soil processes:

Brown colluvio-deluvial pseudo-gleized soils combined to regosols and protoregosols appear on areas with easier inclination on inferior flanks (old stabilized landslides). On more inclined flanks or knobs resulted from old landslides there are regosols and even protoregosols. These soils have the A horizon of 0-21cm and a middle content of humus.

The general climate is the one specific to middle altitude hills with a moderate pluviometric and thermic, favourable for hays and orchards. Rainfalls quantity varies very much from one year to another.

Due to irregular character of rainfall regime intervals with excess of humidity are created and may also appear droughty interval with negative effects on agrarian cultures. Soil humidity regime is capable of important variations according to relief and microrelief, exposure, vegetation blankets, underground water and surface water.

The vegetal blanket within areas transited by Vîlsan river (both for cultivated and volunteer vegetation) is different in respect to the ingredient species and as productivity according to relief, microrelief, texture, Ph, hydro regime of soil and of course, to human influence. On a general overview regarding the vegetal blanket on grazes there are observed differences in the coverage percentage and in some areas there are bulks due to irrational grazing. Natural vegetation ensures a good protection against soil erosion if humans do not interfere in an irrational manner.

The terrain map, in which notes on erosion grades have been done, was used to compile an erosion map. The erosion intensity (using colours) and also the nature and type of dominant erosion (using conventional signs) have been drawn on the map. The erosion units have been grouped obtaining the final erosion map. The erosion class is drawn in colours, the more intense the more powerful the erosion.

Following this study the soil losses cartogram (fig.1) and danger classes for surface erosion (fig. 2) has been compiled.

***Fig. n°1*. Soil losses cartogram**

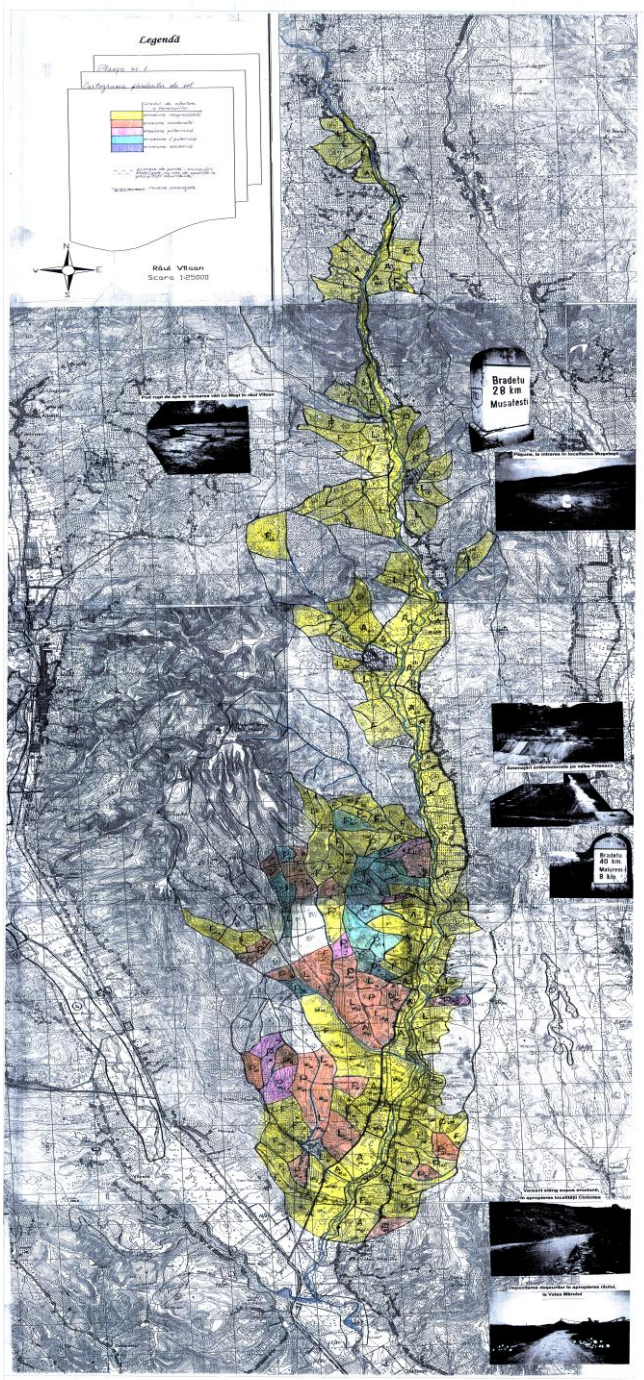
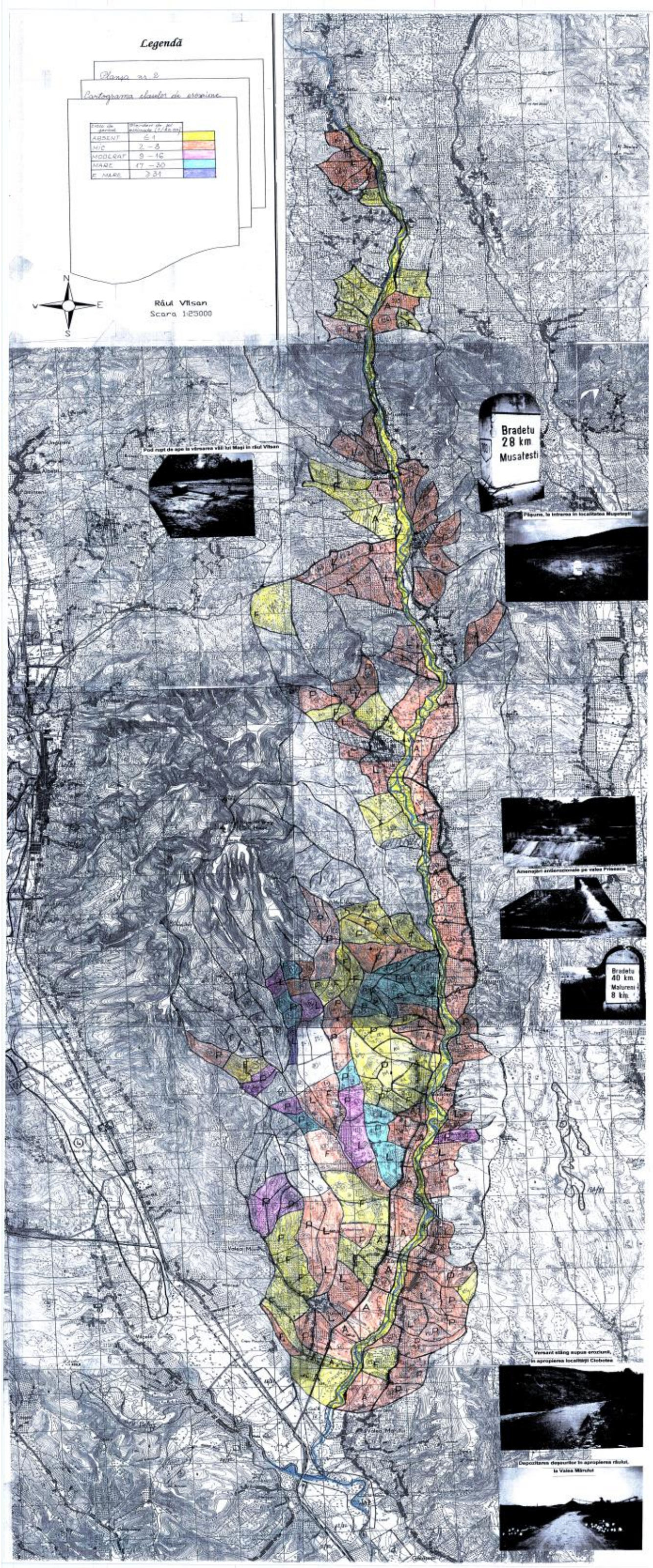


***Fig. n°2*. Erosion classes cartogram**


Legendă
Planşa nr. 8
Cartograma claselor de eroziune
ABSENT ≤1
MIC 2 – 8
MODERAT 9 – 16
MARE 17 – 30
E. MARE ≥31
N
E
S
V
Râul Vîlsan
Scara 1:25000
Bradetu
28 km
Musatesti
Bradetu
40 km.
Malureni
8 km.

Standing of agrarian areas affected by erosion, by usage

Table no. 1

The use ground	Small erosion		Moderate erosion		High erosion		Very high erosion		Excessive erosion		Total (ha)
	Supraf. Ha	%	Supraf. Ha	%	Supraf. Ha	%	Supraf. Ha	%	Supraf. Ha	%	
Subbasin of Vâlsan river											
Arabil	2440,53	29,91	40,00	0,49	-	-	-	-	-	-	2480,53
Păşune	808,06	9,90	479,33	5,88	194,29	2,38	493,70	6,05	-	-	1975,38
Fâneaţă	1288,04	15,79	98,12	1,20	-	-	-	-	-	-	1386,16
Livadă	1720,59	21,09	498,09	6,10	80,62	0,99	18,12	0,22	-	-	2317,42
TOTAL	**6257,22**	**76,69**	**1115,54**	**13,67**	**274,91**	**3,37**	**511,82**	**6,27**	**-**	**-**	**8159,49**

Allocation of areas by classes towards erosion danger in surface by usage, according to potential erosion t/(ha*year), after I.C.P.A. –indicator 187

Table no. 2

The use ground	Absent ≤ 1		Small 2 – 8		Moderate 9 -16		High 17 – 30		Very high ≥ 31		Total (ha)
	Supraf. Ha	%	Supraf. Ha	%	Supraf. Ha	%	Supraf. Ha	%	Supraf. Ha	%	

Subbasin of Vâlsan river											
Arabil	1187,04	14,55	1293,49	15,85	-	-	-	-	-	-	2480,53
Păşune	438,71	5,38	1091,17	13,37	260,52	3,19	184,98	2,27	-	-	1975,38
Fâneaţă	1179,92	14,46	206,24	2,53	-	-	-	-	-	-	1386,16
Livadă	344,46	4,22	1649,23	20,21	136,24	1,67	169,37	2,08	18,12	0,22	2317,42
TOTAL	**3150,13**	**38,61**	**4240,13**	**51,96**	**396,76**	**4,86**	**354,35**	**4,35**	**18,12**	**0,22**	**8159,49**

Potential erosion, average by usage:
Subbasin of Vâlsan river:
E_{mp} / P = 8,34 t/ha*year
E_{mp} / L = 7,21 t/ha*year E_{mp}/ Vîlsan river = 4,94 t/ha*year
E_{mp} / A = 2,67 t/ha*year
E_{mp} / F = 0,38 t/ha*anyear

Flanks erosion status: Vîlsan river: 37,97%

Erosion status by erosion classes:
Small erosion class 2-8 t/ha*year: Sub-basin of Vâlsan river: 84,65%
Moderate erosion class 9-16 t/ha*year: Sub-basin of Vâlsan river: 7,92%
High erosion class 17-30 t/ha*year: Sub-basin of Vâlsan river: 7,07%
Very high erosion class >=31t/ha*year: Sub-basin of Vâlsan river: 0,36%

Erosion status of agrarian field: Vâlsan river: 23,31%

CONCLUSIONS

1. The flank inclination influences erosion, categories of fields usage, sizing of antierosion systems.
2. Due to climate regime there is a limitation of the cultivated plants sortiment.
3. Soils from this hydrographic basin are not very well provided with mobile phosphorus.
4. Heavy rain falls from this sub-basin are characterized by a high intensity, torrential core at the middle and end of rain, by interval of time in which they are journalized (May-June), elements which favour erosion.
5. The undergoing researches have allowed determination of affected erosion areas by agrarian usage, assigning the erosion grades and classes regarding the potential erosion.
6. Erosion triggeris due to both natural factors as well as social and economical ones.
7. Vâlsan is a river, currently with a hydrographic basin characterized by a small surface erosion. But there are landslides processes during heavy rain falls. No unit has signs of excessive erosion and the powerfull erosion is present only in small percentage of 6,27%, on high inclination flanks. Very powerful erosion is assigned by usage: grazes and orchards and on agrarian usahe there is not such an erosion percentage. Genarally. The agrarian fields have in this hydrographic basin a very small erosion.

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THE EFFECT OF NON-CONVENTIONAL TILLAGE UPON THE EDAPHIC COMPONENT OF THE AGRICULTURAL ECOSYSTEMS FROM MOARA DOMNEASCĂ – ILFOV

INFLUENȚA LUCRĂRILOR NECONVEȚIONALE ALE SOLULUI ASUPRA UNOR ÎNSUŞIRI ALE COMPONENTEI EDAFICE DIN ECOSISTEMELE AGRICOLE DIN ZONA MOARA DOMNEASCĂ – ILFOV

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Keywords: non-conventional tillage, soil conservation, agricultural ecosystem
Cuvinte cheie: lucrări neconvenționale, conservarea solului, ecosistem agricol

ABSTRACT

Soil is a basic agrobiotope component whose qualitative features influence the intensity of the processes occuring within the agricultural ecosystem (change, transfer, storage, etc.).
The preservation and multiplication of the favourable features is a fundamental condition for the sustainable use of soil resources, as well as the development of human society.
Together with other basic elements of sustainable agriculture (crop rotation, leguminouse growing, organic matter application, etc.), non-conventional (alternative) soil tillage has positive influence upon the features of the former (Guş, 2001; Marin, 2007; Moraru, 2007; s.a).
Our research was performed in an experimental station located on the reddish preluvosoil of South-southeastern Romania, from Moara Domneasca –Ilfov.
The experiments carried out between 2005 and 2008 show that cisseling is the technological variant with better effects upon the edaphic component of the agroecosystem.
Solul este o componentă de bază a agrobiotopului, iar prin trasăturile sale calitative influențează intensitatea proceselor din ecositemul agricol (transformare, transfer, stocare etc.).
Conservarea înşusirilor favorabile şi multiplicarea acestora este o condiție fundamentală pentru utilizarea durabilă a resurselor de sol şi pentru dezvoltarea societății umane.
Lucrările neconvenționale (alternative) ale solului, alături de alte elemente de bază ale agriculturii durabile (rotația culturilor, diversitatea speciilor cultivate, utilizarea de plante leguminoase, aplicarea de materie organica s.a.) au influențe favorabile asupra însuşirilor acestuia (Guş, 2001;, Marin, 2007; Moraru, 2007; s.a).
Cercetările noastre sunt realizate în cadrul unui poligon experimental staționar, amplasat pe un preluvosol roşcat din zona de S-SE a României, la Ferma didactica şi experimentală din Moara Domnească –Ilfov.
Din cercetările efectuate în perioada 2005-2008 rezultă că lucrarea solului cu cizelul este varianta tehnologica cu efecte superioare asupra însuşirilor componentei edafice a agroecosistemului.

INTRODUCTION

Soil tillage provides the best conditions not only for the development of field crops but also for soil conservation.

In time, conventional tillage (ploughing) has resulted in the degradation of soil characteristics, followed by effects upon global warming by increasing emissions of greenhouse gases from the soil (CO_2, CH_4, etc.).

Non-conventional soil tillage can be regarded necessary nowadays, considering both ecological and economic implications.

MATERIAL AND METHOD

The experimental field is located within the reddish preluvosoil of the Moara Domnească – Ilfov Didactic Farm. Research is organised as three-year rotation: 1. annual leguminous (peas); 2. hay cereals (wheat); 3. weeding plants (maize); four gradations of the ''basic soil tillage" factor (plough 20 cm, cisel 20 cm, cisel 40 cm, disk 10 cm), and two gradations of the fertilisation factor (both mineral and organo-mineral).

The weather conditions have direct influence both on crop plant development and soil characteristics evolution; they have varied between 2005 and 2008, the least favourable conditions being recorded in the agricultural year 2006-2007 which recorded a water deficit of 265.2 mm and temperatures exceeding the multiannual average temperatures. The most favourable weather conditions were recorded in the agricultural year 2007-2008.

The present papaer is aimed at analysing the effect of basic soil tillage – both conventional and non-conventional systems – upon some basic characteristics of the edaphic component of the agroecosystem.

Soil samples were collected from depths between 0-10 cm and 10-20 cm; they were subsequently analysed and interpreted according to the specialist methodology.

The total porosity of soil was measured by the method of constant-volume cylinders whereas the water stability of the structural aggregates was determined by the Tiulin-Erikson method.

RESEARCH RESULTS

The total porosity of soil (Pt%).

The values recorded for total portosity (*Table 1*) fall within the best limits for plant development. Porosity increases from the surface to the depth. Depending on the crop plant, the highest record was in the maize crop grown at a depth of 0-10 cm (resulting from soil loosening by mechanical works). According to the basic soil tillage, the highest values in the depth of 0-10 cm were recorded by ciselling, followed by conventional tillage on the layer between 10 and 20 cm, and the variant cisel 40 on the depths of 20-30 cm and 30-40 cm, respectively.

Hydric stability of the structural aggregates (*Table 2*) shows higher values in the minimum tillage variants. Ciselling results in a significant increase in the percentage of hydrostable structural aggregates in the reddish preluvosoil of the Moara Domneasca area.

For this soil characteristic, the highest values were recorded in the hay cereals (wheat) – between 51.9% - conventional tillage, and 54.6% in the cisel 40 variant. They were followed by the annual leguminous plants (peas) which recorded close values, i.e. 51.6% in ploughing and 54.5% in cisel 40. Weeding plants (maize) resulted in a lower rate

of hydrostable structural aggregates due to the high number of soil tillage works (mechanical works) and the lower degree of soil covering.

Table 1

Total porosity of reddish preluvosoil (Pt %) depending on basic tillage – average values 2005-2008, Moara Domnească

Variant	Annual leguminous - Peas				Hay cereals - Wheat				Weeding plants - Maize			
	Depth (cm)											
	0-10	10-20	20-30	30-40	0-10	10-20	20-30	30-40	0-10	10-20	20-30	30-40
Plough 20	53	52	48	45	52	51	47	45	54	53	49	45
Chisel 20	52	51	48	44	51	50	47	44	53	51	47	43
Chisel 40	51	50	50	49	51	49	48	48	52	51	50	48
Disk 10	52	49	45	44	53	48	45	43	55	49	45	42

Result interpretation, after N. Stangă, 1978.
-extremely high – over 61 %
-very high, between 57 – 61 %
-high, between 52 – 56%
-medium, between 47 – 51%
-low, between 42 – 46%
-very low, under 41%

Table 2

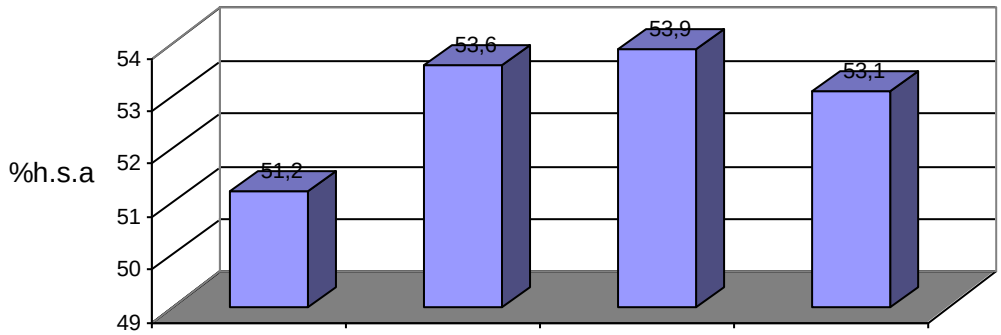
Influence of basic soil tillage upon hydric stability of structural aggregates, recorded for the layer of 0-20 cm - average values 2005-2008, Moara Domneasca

Variant	Annual leguminous - Peas			Hay cereals - Wheat			Weeding plants - Maize		
	% h.s.a	%	Dif.	% h.s.a	%	Dif.	% h.s.a.	%	Dif.
Plough 20	51.6	100	Mt	51.9	100	Mt	50.1	100	Mt
Chisel 20	54.2	105	2.6	54.3	105	2.4	52.2	105	2.1
Chisel 40	54.5	106	2.9	54.6	106	2.7	52.5	105	2.4
Disk	53.9	105	2.3	53.9	104	2.0	51.6	103	1.5
DL 5%	2.5			2.5			2.3		

h.s.a.= hydric stability structural aggregates

Analysing the hydric stability of structural aggregates according to the soil tillage works, expressed as average rotation for 2005-2008 (Fig. 1), it i noteworthy that the ploughing 20 variant (conventional) recorded values of 51.2%, and increased in the low-tillage system variants, as follows: 53.1% in disking, 53.6% in ciselling 20, and the highest (53.9%) in cisseling 40.

Fig. 1 - Hydric stability of structural aggregates, according to the soil tillage, average rotation (peas-wheat-maise) for 2005-2008, Moara Domneasca



CONCLUSIONS

1. Research point out that the application of non-conventional soil tillage, together with its management withing the rotation, have favourable influence upon the physical consition of soil, therefore the agrobiotop conditions.
2. The total porosity of soil recorded values that allow a balanced air-water ratio, as well as the good development of the crop plants.
3. The application of low tillage works stimulates the formation of hydrostable structural aggregates and, thus, soil conservation and agricultural ecosystem protection.

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THE PRODUCTION CAPACITY OF THE AGRICULTURAL FIELDS LOCATED ON THE EAST SIDE OF TIMIS COUNTY

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Keywords: soil fertility, restrictive factors

ABSTRACT

Fertility is a fundamental trait of the agricultural fields that has developed over time simultaneously with the physical conditions, with the soil formation and evolution and also with the growing anthropic intervention. An optimal fertility implies the best physical, chemical and biological soil properties, the abundance or at least the adequate existence of the water and of the nutritive substances necessary for the life of plants. The totality of the conditions necessary for an optimal fertility are seldom met. In the majority of cases one or more factors are being found either faulty or in excess. In order to verify the situation the restrictive and degradation factors are being studied; their type, intensity, association.

INTRODUCTION

The diversity of the natural conditions from the Faget hills, the multiple restrictive factors that interfere, create a large variaty for the capacity of production of the agricultural fields, fot its use, for the cultivated plants, for winegrowing, for pomiculture or for the spontaneous flora.

Knowing the productive traits of the ecological omogen teritories, represented in this paper by the 12 field units, knowing their production capacity and the posibilities to increase those capacities is esential for the maintainance of agricultural fields fertility, for the quality of life.

MATERIAL AND METHODS

Evaluation of production capacity has been achieved through the operation of appreciation based on a national methodology developed by Teaci (1980 and subsequently revised (ICPA - 1987). This is based on the parameterical definition and determination of the environmental conditions and the vegetative factors regarding the growth of vegetation and plant fructification and numerical indication of the favorability degree of all the factors and ecological conditions.

RESEARCH RESULTS

For the whole complex of natural factors (geomorphological, geological, climatic, hydrological or pedogenetical) that contribute to the evaluation of the capacity production was developed a system of characterization indicators that specify the limits of manifestation of measurable physical traits. Each indicator was divided to intervals of manifestation with environmental or physiological meanings (ICPA,1987). For a faster processing of the appreciation indicators they were codified in a way that can be easily entered in an electronic computer.

For processing data has been used a conventional software, dBase language, organized on three levels: at level 1 were introduced lots of possible values of each of the 23 indicators used, and interactions between them, at the second level have been introduced indicators specific to the studied perimeters intervals and the intervals of concrete values, at level three have been introduced the administrative structure of the territory, the categories of use and the areas for each unit of land and / or soil in part.

In the appreciation operation data were processed for 27 separate cases which include use and the dominant culture to the area researched:

Table 1

Utilisations and dominant crops from Faget Hills

AR - arable	GR - wheat
PS - fields	OR - barley
FN - meadows	PB - corn
PO - orchards	FS – sun flower
VI - vineyards	CT -potato
MR – apple tree	SF - beet
PR - pears	SO - soya
PN - plums	MF - peas
CV- cherry	IU - in oil
CS - apricot	IF - in flax
PC - peach	CN - hemp
VV - vineyard	LU - alfalfa
VM - grape	TR - clover
	LG - vegetables

The appreciation note for arable, orchards and vineyards was calculated as an average number of notes for four cultures which are most favorable.

Regarding these considerations, soils identified in the Făgetului Hills obtained scores from 1 to 100 and were placed in class quality and fertility as follows:

Table 2

Favorability and fertility classes of lands from Faget Hills

Destination	Clasa I	Clasa II	Clasa III	Clasa IV	Clasa V	Clasa VI	Clasa VII	Clasa VIII	Clasa IX	Clasa X
Arable %	-	-	-	-	-	19,49	31,13	41,05	8,02	0,31
ha	-	-	-	-	-	7 201,2	11 502,3	15 167,4	2 963,2	114,5
Wheat %	-	-	-	-	8,64	46,67	25,36	13,7	5,32	0,31
ha	-	-	-	-	3 192,6	17 243,9	9 370,1	5 061,9	1 965,6	114,5
Barley%	-	-	-	-	8,21	43,63	-	42,21	5,64	0,31
ha	-	-	-	-	3 033,5	16 120,6	-	15 596,1	2 083,9	114,5
Corn %	-	-	-	-	13,62	3,39	38,05	42,13	2,17	0,64
ha	-	-	-	-	5 032,4	1 252,6	1 4058,9	15 566,5	801,8	236,4
Sun flower%	-	-	-	-	-	15,67	3,82	72,23	5,64	2,64
ha	-	-	-	-	-	5 789,8	1 411,5	26 687,9	2 083,9	975,5
Potato%	-	-	-	-	-	11,69	10,18	52,7	21,25	4,18
ha	-	-	-	-	-	4 319 3	3 761,4	19 471,9	7 851,5	1 544,5
Vegetables %	-	-	-	-	-	7,49	3,82	71,51	14,54	2,64
ha	-	-	-	-	-	2 767,5	1 411,4	26 421,9	5 372,3	975,5
Plum %	-	-	-	-	8,18	7,49	60,75	0,72	22,55	0,31
ha	-	-	-	-	3 022,4	2 767,5	22 446,3	266,0	8 331,9	114,5
Vineyard%	-	-	-	-	-	11,31	63,65	4,51	3,15	17,38
ha	-	-	-	-	-	4 178,9	23 517,7	1 666,5	1 163,8	6 421,7
Field%	8,18	8,49	-	49,58	-	31,11	2,33	-	0,31	-
ha	3 022,4	3 136,9	-	18 319,2	-	11 494,7	860,9	-	114,5	-
Meadows %	-	-	15,67	-	45,76	32,72	3,21	2,33	0,31	-
ha	-	-	5 789,8	-	16 907,6	12 089,5	1 186,3	860,9	114,5	-

To estimate the overall potential of agricultural land in the Făgetului Hills has been calculated the appreciation note, average, as a combination of the product between the value of the appreciation note and the area of each soil unit for the 12 units of soil. This value provides general information on the importance of agricultural land, on their use for different cultures and the use of them in production.

CONCLUSIONS AND RECOMMANDATIONS

The conclusions emerged from research of soil in the field and laboratory show us the directions of the exploitation of agricultural land in the Făgetului Hills and facilitate the

issuance of recommendations for restoring, maintaining or increasing of the productive potential of the restricted areas.

- research in the area of Făgetului Hills in terms of the characteristics of natural factors involved in the formation and evolution of soil, in the processes of qualitative and quantitative development of crops, of conditioning of the morphological characteristics, physical and chemical of the existing soil led to the formulation of conclusions and recommendations for the rational use of land, its redeployment and a shift in the distribution of crops according to the arable land for one or more cultures;

- the establishment of production potential of arable land has been made on the basis of appreciation operations for 5 categories of use and 22 agricultural crops, 21 ecopedological indicators have been used, codified in accordance with the methodology used at national level,

- the agricultural land for arable use, estimated on the basis of appreciation activities approaches the estimation of quality made by operations of the systematization, organization of land and development of agricultural production.

- the numerous restrictions imposed by environmental and soil conditions for most categories of use for the main crops makes the research of the restrictive and limitative factors essential

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CERCETĂRI PRIVIND INFLUENȚA IRIGAȚIEI ASUPRA PROPRIETĂȚILOR SOULURILOR DIN PARTEA DE SUD A ROMÂNIEI

RESEARCH REGARDING THE INFLUENCE OF IRRIGATION ON SOILS PROPERTIES LOCATED IN SOUTH PART OF ROMANIA

M. Mihalache, L. Ilie, D.I. Marin

Key words: irrigation, chemical and physical properties, soil profile

ABSTRACT

Irigația este una dintre cele mai importante componente tehnologice a sistemelor de agricultură cu un puternic impact asupra proprietăților chimice, fizice şi mineralogice ale solurilor. Calitatea apei de irgație este un factor important pentru a evalua efectele irigării aplicării irigației asupra stării fizice şi chimice. Compoziția şi concentrația diferiților constituenți chimici din apa de irigație contribuie la modificarea majoră a proprietăților chimice (reținerea şi mobilitatea nutrienților) acest lucru având efecte indirecte şi asupra stării fizice a solului, în special asupra stabilității structurale (Elisabeta Dumitru, A. Canarache, 1991).

Irrigation is one of the most important components of the agricultural technologic systems with a strong impact on chemical, physical and mineralogical properties soils. The irrigation water quality is a very important factor for evaluating the effects of irrigation on chemical and physical status. The composition and concentration in different chemical compounds of irrigation water contributes to major modification of the chemical soil properties (nutrients retaining and mobilization in soil) that may indirect negative effects on the physical soil state, especially upon soil structural water stability (Elisabeta Dumitru, A. Canarache, 1991).

INTRODUCTION

Research carried out in Romania showed that around 7 millions ha from the total agricultural soil are affected ore or less by drought. Even though there is an irrigation systems which supply around 3.15 millions ha, in last year just approximately 0.32 millions ha were irrigated because of the high costs. The widest irrigated area is located in the south-Eastern part of Romania that is characterized by very high water deficit.

The adequately irrigation schedule, using moderate rates and suitable water irrigation quality on soils with medium texture, may has indirect positive effects on soil chemical and physical properties and optimal condition for root system development.

MATERIAL AND METHODS

The research was carried out on 3 important types of soil (Phaeozem at Fundulea, Chernozem at Marculesti and Fluvisol in Fetesti), being the most representative in the irrigation area. In order to assess the effects of long term irrigation application (20 years) on chemical and physical soil status, different soil properties were took into account.

For characterization soil physical and chemical state there were determined bulk density, penetration resistance, water aggregate stability, dispersion, organic matter content, soil reaction, nitrogen, phosphorus and potassium content. The irrigation water supply in case of the soil located at Fundulea was carried out from Mostistea lake and for soils located at Marculesti and Fetesti from Danube river. Soil profile were collected from soil strata to 40 cm depth. All determination were made under laboratory condition using standard methods.

RESULTS AND DISCUSSION

The data obtained determinig the particle size distribution for the soils from experimental points showed that Phaeozem and Chernozem fit in the clayey-sandy texture class and the Fluvisol soil fit in sandy-loamy texture class. The three soils taken into account are characterized by a very low coarse sand content and a high fine sand content such as 45.7% w/w for Phaeozem, 50.4%w/w for Chernozem and 61.4%w/w for the Fluvisol.

Table 1

Soil particle distribution

Depth (cm)	Coarse sand (2-0.2 mm)	Fine sand (0.2-0.02 mm)	Silt (0.02-0.002 mm)	Clay (<0.002 mm)	Texture class
Phaeozem					
0-20 cm	0.2	45.7	13.5	40.8	TN
20-40 cm	0.3	44.4	15.6	39.7	TN
Chernozem					
0-20 cm	1.1	50.4	13.7	34.8	TN
20-40 cm	1.1	50.4	14.0	34.5	TN
Fluvisol					
0-20 cm	0.7	64.1	16.1	19.1	SF
20-40 cm	0.6	63.4	15.8	20.2	SF

The irrigation should not lead to negative changes in the chemical and physical properties of the chernozem and Phaeozem because of the suitable soil particle distribution. Fluisol has very high fine sand content imposing some restriction regarding to irrigation rate and irrigation interval.

The chemical composition of the irrigation water and evaluating indices of its quality are presented in table 2.

Table 2

Chemical characterization of irrigation water

Characteristis	Fundulea	Marculesti	Fetesti
CO_3^{2-}	0.94	0	0.10
HCO_3^{2-}	6.96	2.91	2.70
SO_4^{2-}	0.66	1.10	0.94
Cl^-	1.03	1.36	1.12
Ca^{2+}	1.63	3.00	2.89
Mg^{2+}	3.79	1.20	1.15
Na^+	3.64	1.13	1.02
pH (H_2O)	8.53	7.65	7.50
SAR	2.20	0.78	0.65
Mineral residue (mg l^{-1})	712	381	376

The total salt concentration is one of the most important index for evaluating irrigation water quality. The total concentration of salt from irrigation water is 712 mg/l^{-1} at Fundulea being suitable for irrigation and classified in the 3rd salinity class. The total concentration of salts from irrigation is 376-381 mg/l^{-1} at Fetesti and Marculesti. These values show a high quality of irrigation water, being fitted in the 1st salinity class.

SAR index has low values 2.2 at Fundulea, 0.78 at Marculesti, 0.65 at Fetesti, situating he water under the tolerance limit.

Both technological components, irrigation and nitrogen fertilization determined some significant direct effects on the Chernozem properties (Marculesti). The humus content increased on 0-20 cm and 20-40 cm depth under irrigation regime application and progressive nitrogen fertilization. The mobile phosphorus content was lower (34 mg/kg)

and the mobile potassium content had higher values (124 mg/kg) in the upper soil layer in irrigated regime compared with non-irrigated one (107 mg/kg) (table 2). The soil reaction placed the chernozem in neutral domain. It was observed in non-irrigated regime a non-significant tendency of reducing pH values correlated with increases of nitrogen doses and depth (7.22 at control to 7.10 at 240 N dose kg/ha).

In non irrigated regime it has been shown an increase in humus content under increasing nitrogen fertilizers application. This may be due to an intense development of vegetation as a result of mineral fertilization that determines the accumulation of higher crop residue quantities.

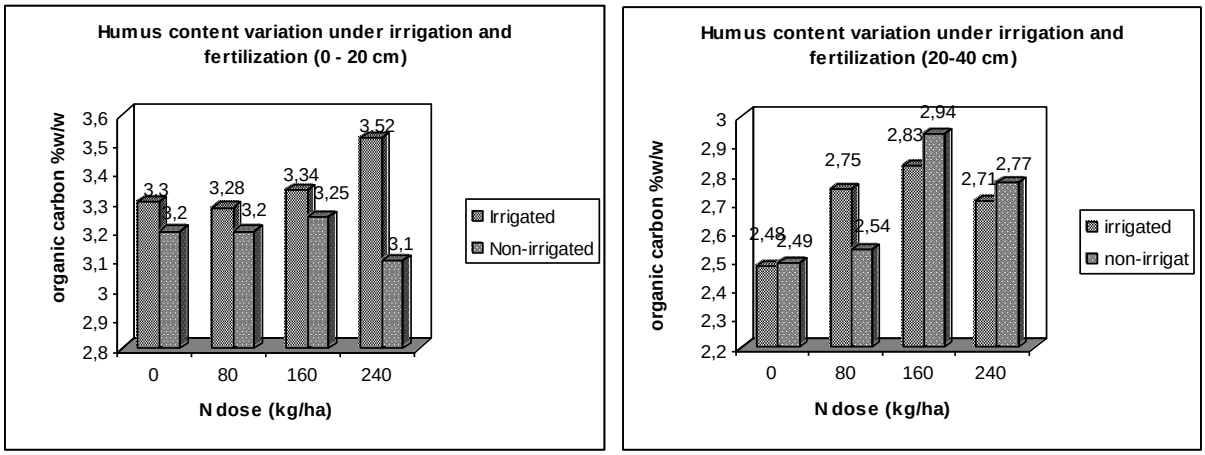

Fig. 1 Humus content variation under irrigation and fertilization of Chernozem located at Marculesti

Irrigation application determined significant statistical changes on soil reaction in the upper part of arable layer. It was noticed an increase of pH from 6.39 in non-irrigated plot to 7.52 in irrigated one and without any mineral fertilization. The values obtained replace this soil from weak acid domain to weak alkaline interval. The progressive increasing of N doses determined an acidification trend with significant changes in some cases.

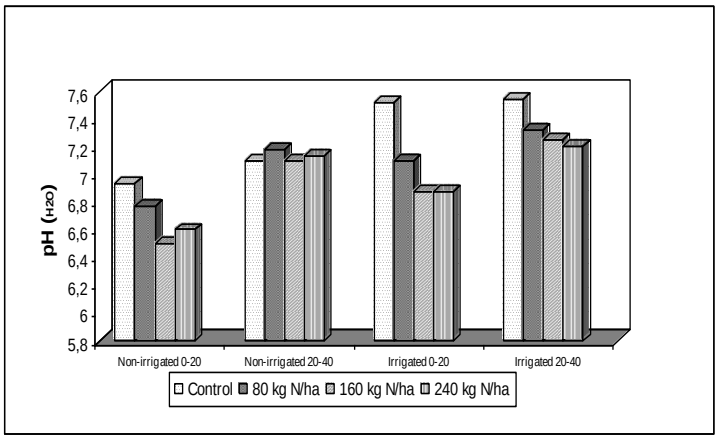

Fig. 2 Effect of irrigation and fertilization of reaction of Phaeozem located at Fundulea

At Fluvisol both technological components studied affected significantly its humus content. The result obtained showes a increase of humus content once with progressive N dose application either in or non-irrigated regime. The highest value 3.10%, was noticed in irrigated plot under 240 kg N /ha application comparing with 2.40% in non-irrigated variant under the same mineral fertilization rate.

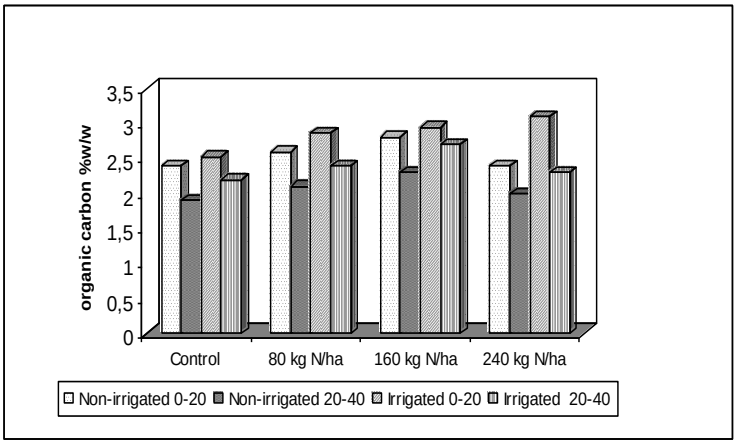

Fig. 3 Effect of irrigation on organic matter content of Fluvisol located at Fetesti

The water stable macro-aggregates content varied from low to medium, the values ranging, generally, in the interval of 8-35% w/w, under irrigation influence. It was observed a slight tendency of its reducing in he irrigated variants in case of Phaeozem, and Chernozem and statistical significant differences for the Fluvisol. The results obtained also show an increase of this parameter in the soil layer not affected by the soil tillage.

Table 3

The effect of irrigation on the structural stability of the three soils studied

Depth (cm)	AH (% ww)		F Test	D (% w/w)		F Test	IS		F Test
	Irrig.	Non-irrig.		Irrig.	Non-irrig.		Irrig.	Non-irrig.	
Phaeozem (Fundulea)									
0-20	8	10	ns	5	8	ns	0.61	0.53	ns
20-40	19	18	ns			ns	0.45	0.46	ns
Chernozem (Marculesti)									
0-20	5	7	ns	4	5	ns	0.81	0.73	ns
20-40	12	10	ns	7	7	ns	0.59	0.62	ns
Fluvisol (Fetesti)									
0-20	15	20	*	9	7	ns	0.62	0.36	*
20-40	27	35	*	12	10	ns	0.46	0.29	*

The water unstable micro-aggregate contents characterized by the dispersion are moderate for the three soil studied, with values ranging between 5-12% w/w without significant differences.

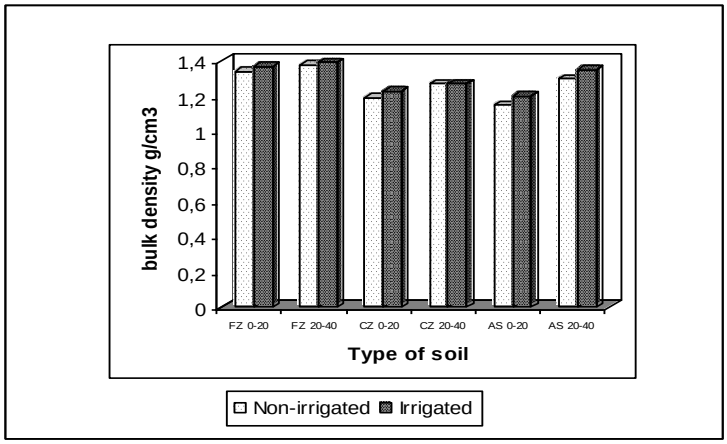

Fig. 4 Effect of irrigation on bulk density

The bulk density of the Chernozem varied from low to moderate values, ranging between 1.20-1.27 g/cm^3, that show a good loosening of the soil. The Phaeozem had higher values of bulk density, 1.34-1.47 g/cm^3, having a moderate loosening.

The Fluvisol had low values of bulk density on 0-20 cm depth and medium values on 20-40 cm depth. It was observed a tendency of bulk density increases in the irrigated variants and on soil profiles for the three types of soils.

CONCLUSIONS

The changes in the soil agrochemical properties as a result of irrigation application in the South-eastern part of our country were low and not significant either for the nutrient state of the consequences on physical properties of the analyzed soils.

It was observed an increase of organic matter contents of Chernozem (Marculesti) and Fluvisol (Fetesti) as a result of mineral fertilization and irrigation with water of a good quality, more pronounced at 20-40 cm depth.

The increase of organic matter content in the arable layer after 20 years of the appropriate technological system application determined a good conservation of these soils that genetically have a high fertility degree.

The irrigation regime determined the leaching of $CaCO_3$ from the surface to the 20-40 cm at Chernozem from Marculesti.

The other physical properties such as penetration resistance, macro-porosity, soil water permeability of the studied soils showed values without significant statistical differences between the experimental factors.

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REGULARITIES FOR DISTRIBUTION OF PLUTONIUM ISOTOPES AROUND NPP "*KOZLODUY"* AND *"RODOPA"* MOUNTAIN

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Keywords: measuring, alpha radionuclide, plutonium isotopes, NPP "Kozloduy", "Rodopa" mountain.

ABSTRACT

The paper deals with the study and practical adoption of precise radiochemical procedures for quantitative determination of $^{239+240}$ Pu and ^{238} Pu which is of highest significance.

The determination of alpha radionuclide in environmental objects with very low activity includes inaccuracies and ambiguities. We applied a scheme of work that simultaneously proves the precision and reliability of the methods for their use in routine practice. We used develop methods in our laboratory.

We noticed the soils around NPP "Kozloduy" and "Rodopa" mountain present raise contents of plutonium isotopes. The paper deals the regularities for distribution of plutonium isotopes and their isotopes relation ^{238} Pu / $^{239+240}$ Pu in the hand of regions.

INTRODUCTION

The *Chernobil* accident led to an absolute necessity to extend the complex study of the contamination of **Bulgarian soils** with alpha-, beta- and gamma-radionuclides /Raykov, 1965/. This required study of the world experience and the development of methods applicable to our conditions, to fill the gap resulting from lack of research in the field of gamma-spectrometry. The existing for years database for gamma-emitting radionuclides and ^{90}Sr content, had to be extended and supplemented with new studies in the field of radiochemistry of alpha emitters and their regularities in the distribution /Raykov, 1969/.

MATERIAL AND STUDY METHODS

Chosen were representative soil samples from the region of the "*Kozloduy"* Nuclear Power Plant /NPP/ */carbonate black earth/* and the *"Rodopa"* Mountains */brown forest soils/*. Collected were virgin soils, subjected to prior preparation as drying to airy dry condition, separation of the organic matter and grinding through a sieve 1 mm. The collected samples were determined the physicochemical characteristics given in Table № 1, and the prepared sail samples were radiochemically analyzed by a methodology of "*Mineral Acids"* adapted to and modified for **Bulgarian soils** in the Laboratory of Radioecology and Radioisotopes Research at the Institute of Cryobiology and Food Technology /Misheva, 2004/.

RESULTS AND DISCUSSION

The soils in Bulgaria have much higher Fe, Mn, Mg, Al, Ca content of geological and geographic nature, which sets them apart from the studied ones. These obstructing elements should be determining for a choice of a suitable work method /Misheva, 2004/.

Due to their specificity, of interest are also *the carbonate black earths* and *brown forest soils.*

The main characteristic of the *carbonate black earths*, representing grounds for their separation, is the content of carbonates on the very top of the soil. These soils are very spread immediately south of the river *Danube*, mainly in the *Middle Danube-Adjacent* soil-geographic country. The copper content is high, relatively high is also the zinc content, but its mobility is much decreased due to the large quantity of calcium carbonate.

The brown forest soils **are spread mainly in the middle belt of our mountains, in altitudes from 700–800 to 1300–1500m – *Rila-Rodopa Mountains.* Due to the specific hydrothermical conditions, the decomposition of the dead forest cover is slow, and allows the accumulation of large quantities of humus. The humus quantity varies from 3 to 8% /Boneva, 1985; Koynov, 1998/.**

Impressive, in the brown forest soils, is the high content of very crystallized iron. In these soils exist favorable conditions, on the one hand, for crystallization of the amorph hydroxides of iron that formed as a result of the weathering, and on the other – for connection of the iron with the humus acids in the form of internal complex compounds. The high relative quantity of internal complex compounds is explained by the specific composition of the humus, in which fulvoacids prevail, that is why the brown forest soils under spruce forests in the *Rila-Rodopa Mountains* formed on deluvium of crystal schist, are characterized by domination of silicate over non-silicate iron /Hajiyanakiev, 1989/.

The average quantity of total iron for the studied group of *carbonate black earths* expressed as Fe_2O_3 in %, varies from 5,8 to 6,2 %.

In Table № 2 are shown the results for ^{238}Pu, $^{239+240}Pu$ content, as well as their isotope relations K= ^{238}Pu / $^{239+240}Pu$

In Figure №№ 1 and 2 are illustrated the data from the analyses of soil samples for $^{239+240}Pu$ and ^{238}Pu content in $Bq.kg^{-1}$, respectively samples from NPP "*Kozloduy"* and samples from the "*Rodopa".*

Pursuant to the authors (Eakins J. D. et al, 1990; Sill, 1975), in case of local contamination caused by various deposits or near regions of possible contaminators, it is logical to observe higher content of the tested transuranium elements, mainly ^{238}Pu.

Observed are much higher results in the samples /samples №№ 1-7, Fig.2*I* from the alpine regions, compared to those from NPP "*Kozloduy"* /samples №№ 1-4, Fig.№1/. this is logical, knowing that the ^{137}Cs and ^{90}Sr content is several times higher in alpine regions soils, a tendency we have proven and have been monitoring for years /Koynov, 1998; Marinov, 1984/.

Again, pursuant to data of the same authors, the main indicator for validity of the method used for radiochemical determining of plutonium isotopes, are the isotope relations $^{238}Pu/^{239+240}Pu$. It has been proven, through an intercallibration between the IAEA laboratories /Tishkova, Ivanova, 1987; De Bortoli, 1967/, that the relations $^{238}Pu/ ^{239+240}Pu$ in different tested samples vary within different limits. For waters, soils and sediments those are, respectively: 0,028 - 0,044 for waters; 0,038 - 0,055 for soils and sediments; 0,30 – 0,50 for silt and deposits. The authors highlight that all those relations are subject to corrections depending on the geographic latitude, location and type of sample.

On Figure № 3 illustrated are the $^{239+240}Pu$, ^{238}Pu content and the K= $^{238}Pu/ ^{239+240}Pu$ relation in the soil samples from Table № 2, as an illustration of the proved relations between the different values for different soil samples.

On Figure № 4 illustrated is the K= $^{238}Pu/^{239+240}Pu$ relation in the soil samples from Table № 2.

The samples from the region of NPP "*Kozloduy"* from № 1 to № 4, with relations between 0,09 and 0,16, prove partial contamination.

Follow the "*Rodopa"* samples from № 5 to № 9, the relations in which completely much the background ones, varying within 0,02 - 0,06. The same is true for samples № 10 and № 11 – with relations 0,05 and 0,09 from the region of the river valley of "*Struma".* The fallout /background/ relations have been monitored since the times of nuclear weapons experiments in the northern hemisphere in 1963 – 1964, which are reviewed in detail by the authors Tishkova et al., De Bortoli et. al. /Tishkova, Ivanova, 1987; Sanchez Martin, 2001; De Bortoli, 1967/.

Studying the data in Figure № 4, it is observed that the results obtained pursuant to the "*Mineral Acids"* methodology correspond to those in the literature, and may serve as proof of the validity of the methodology used for determining the plutonium isotopes in soil samples.

Tabl. №1. Physical-chemistry characteristics of analysis of soil samples

Sample Place	**Depth cm**	**pH H_2O**	**pH KCl**	**$T_{8,2}$ mgequ $100.g^{-1}$**	**обм.Ca mgequ $100.g^{-1}$**	**Ca+Mg mgequ $100.g^{-1}$**	**Ca %**
Soil samples of NPP *"Kozloduy"* region							
1. *Kozloduy*- acacia forest	0 – 5,0	7,9	7,3	21,8	21,3	21,8	0,85
2. *Kozloduy*- catchment	0 – 5,0	8,1	7,3	20,0	18,7	20,0	0,75
3. *Kozloduy*- Runaway bride.	0 – 5,0	7,8	7,3	20,4	19,5	20,4	0,78
4. *Kozloduy* – Botev`s alley	0 – 5,0	7,9	7,3	24,0	23,6	24,5	0,94
Soil samples of "*Rodopa"* mountain region							
(5) 1. Smoljan town - place *"Curve piver"*	0 – 5,0	6,6	5,8	27,6	23,4	24,5	0,94
(6) 2. top *"Snow-white"*	0 – 5,0	4,7	3,8	23,3	6,8	7,6	0,27
(7) 3. top *" Rojen"*	0 – 5,0	5,6	4,7	21,0	10,0	11,5	0,40
(8) 4. village *Solishta*	0 – 5,0	5,6	4,8	40,3	31,2	31,5	1,25
(9) 5. Chepelare town – top *"Persenk"*	0 – 5,0	7,2	6,6	29,9	27,9	28,9	1,12

Tabl. № 2. Radiochemical determination of Pu in soil samples,

using the method of "MINERAL ACIDS"

Soil samples of NPP *"Kozloduy"* region					
Sample Place	**Depth cm**	**Yield %**	**$^{239+240}$Pu Bq.kg^{-1}**	**^{238}Pu Bq.kg^{-1}**	**^{238}Pu / $^{239+240}$Pu**
1. *Kozloduy*- acacia forest	0 – 5,0	62	1,50 ± 0,28	0,200 ± 0,009	0,13
2. *Kozloduy*- catchment	0 – 5,0	52	1,60 ± 0,71	0,200 ± 0,008	0,12
3. *Kozloduy*- Runaway bride.	0 – 5,0	58	1,30 ± 0,13	0,190 ± 0,011	0,15
4. *Kozloduy* – Botev`s alley	0 – 5,0	64	1,11 ± 0,86	0,180 ± 0,004	0,16
Soil samples of "*Rodopa*" mountain region					
Sample Place	**Depth cm**	**Yield %**	**$^{239+240}$Pu Bq.kg^{-1}**	**^{238}Pu Bq.kg^{-1}**	**^{238}Pu / $^{239+240}$Pu**
(5) *1. Smoljan* town - place *"Curve piver"*	0 – 5,0	65	32,40 ± 1,32	0,533 ± 0,044	0,02
(6) *2.* top *"Snow-white"*	0 – 5,0	57	5,07 ± 0,37	0,200 ± 0,008	0,04
(7) *3.* top *" Rojen"*	0 – 5,0	68	4,41 ± 0,38	0,210 ± 0,009	0,05
(8) *4.* village *Solishta*	0 – 5,0	68	3,86 ± 0,55	0,200 ± 0,007	0,05
(9) *5. Chepelare* town – top *"Persenk"*	0 – 5,0	58	3,50 ± 0,17	0,200 ± 0,008	0,06
(10) 6. town *Simitly*	0 – 20	66	6,34 ± 0,47	0,129 ± 0,019	0,05
(11) *7.* village *Igralishte*	0 – 20	57	2,11 ±	0,200 ±	0,09

			0,22	0,006	

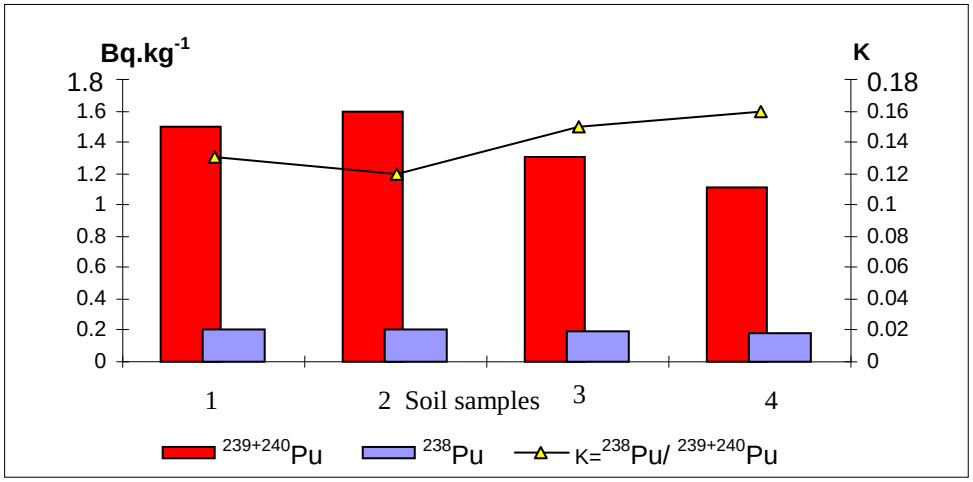

Fig. 1 – Contents of $^{239+240}$ Pu , ^{238} Pu and K in soil samples, from the region of *NPP "Kozloduy"*, definitely of method *"Mineral acids"*

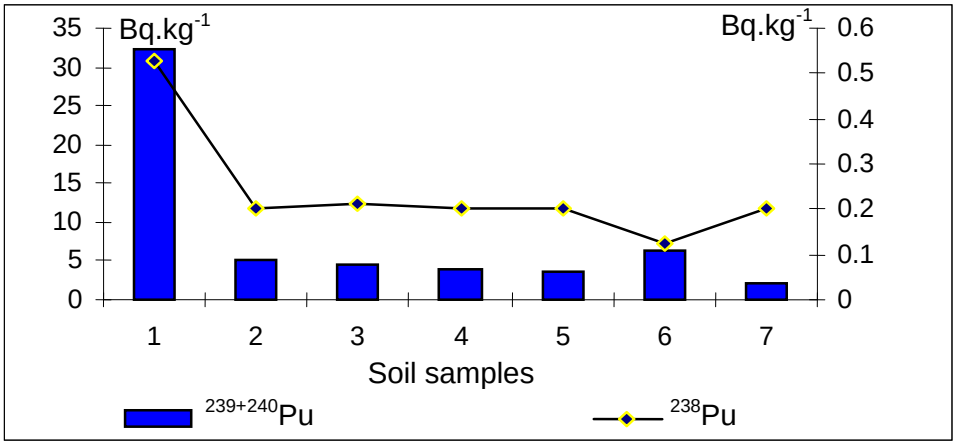

Fig. 2– Contents of $^{239+240}$ Pu and ^{238} Pu in soil samples, from the region of "*Rodopa*" mountain, definitely of method *"Mineral acids"*

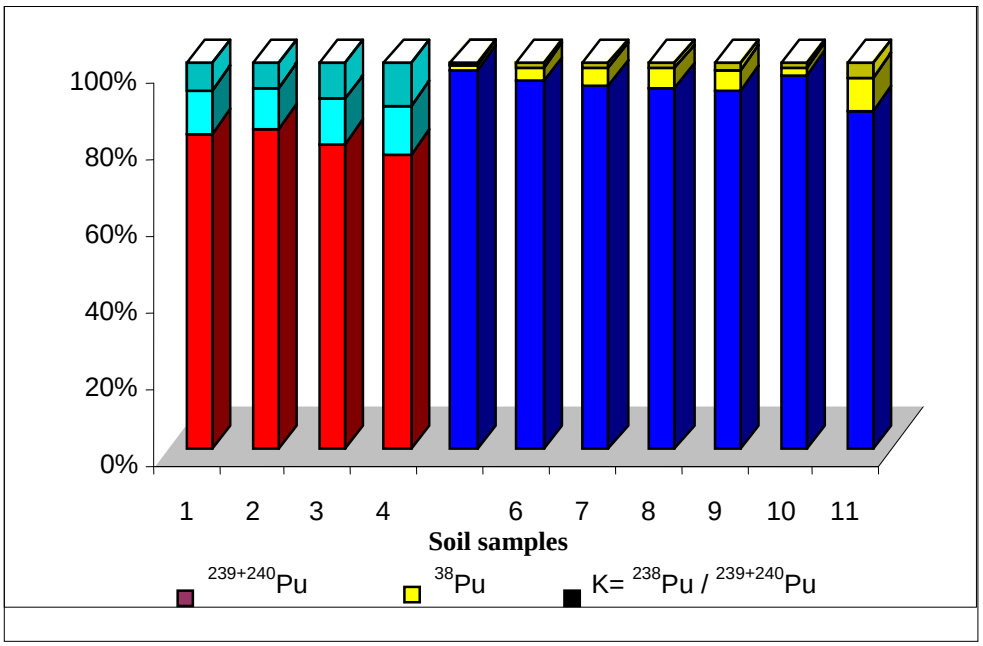

Fig. 3–Contents of $^{239+240}$ Pu, ^{238} Pu and isotopes relation ^{238} Pu / $^{239+240}$ Pu (K) in soil samples, from the regions of *NPP "Kozloduy"* and "*Rodopa"* mountain, Definitely of method *"Mineral acids"*

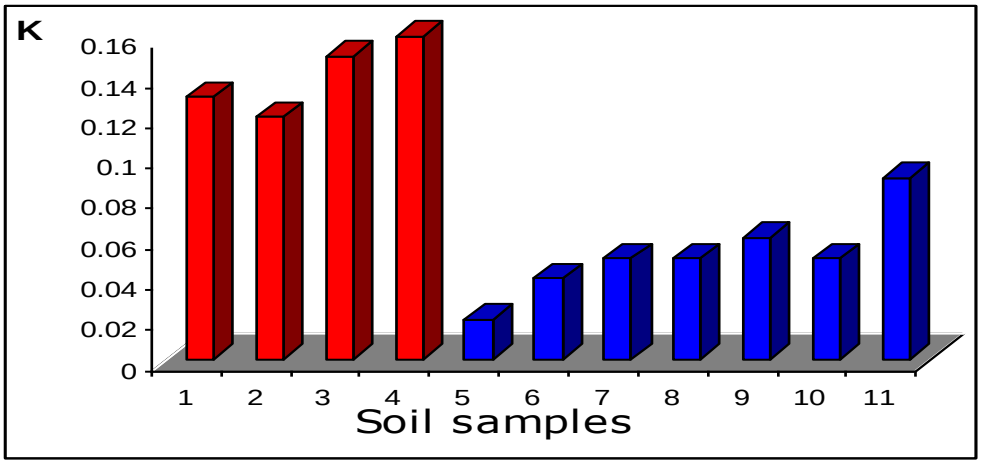

Fig. 4–Isotopes relation, ^{238} Pu / $^{239+240}$ Pu (K) in soil samples, from the regions of *NPP "Kozloduy"* and "*Rodopa"* mountain, definitely of method *"Mineral acids"*

CONCLUSIONS

1. For the first time in Bulgaria, radiochemically were determined the contents of plutonium and its isotopes in **Bulgarian soil samples.**
2. The plutonium-238 and plutonium-239+240 content is higher in alpine soils, as are those in the "*Rodopa"* Mountain, compared to the soils from the region of NPP "*Kozloduy".*
3. The determined plutonium relations demonstratively illustrate the validity of the methodology used.

4. The plutonium relations in the Bulgarian soils correlate as indicators with those in the literature, and are proof of the validity of the modified radiochemical methodology used buy us.

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COST ACTION 869 - MITIGATION OPTIONS FOR NUTRIENTS REDUCTION IN SURFACE WATER AND GROUND WATERS

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Keywords: nutrient losses; eutrophication; surface water; groundwaters

ABSTRACT

Eutroficarea apelor de suprafață şi contaminarea apelor subterane ca rezultat al aplicării masive de îngrăşăminte are un impact foarte grav asupra sănătății ecosistemelor din multe țări. Directiva Europeană legată de apă (WFD) necesită o îmbunătățire a calității apelor de suprafață; acest lucru va determina o reducere drastic ă a pierderilor de nutrienți din activitățile agricole, ceea ce va avea implicații pe termen lung în ceea ce priveşte durabilitatea sistemelor agricole. Principalele obiective ale Acțiunii COST sunt de a evalua ştiințific pretabilitatea şi costul diverselor opțiuni de reducere a pierderilor de nutrienți în apele de suprafață şi freatice la scara bazinelor râurilor. Lucrurile care s-au studiat au fost:

- *lacalizarea surselor critice de pierderi de nutrienți şi a rutelor de transport a apelor de suprafață şi freatice;*
- *identificarea zonelor unde activitățile de reducere a pierderilor de nutrienți pot fi făcute cu maximum de eficiență;*
- *dinamica temporală a pierderilor de nutrienți;*
- *influența nutrienților în procesele ecologice de control al fluxurilor acestor substanțe;*
- *evaluarea proiectelor terminate sau în derulare despre masuri de reducere a pierderilor de nutrienți.*

Abstract

The eutrophication of surface waters and the contamination of ground waters as a result of elevated nutrient inputs have a serious impact on ecosystem health in many countries. The EU water Framework Directive (WFD) requires an improvement to the quality of surface and ground waters; this may call for a drastic reduction in nutrient loss from agricultural and with the related implications for the long – term economic and environmental sustainability of agricultural systems. The main objective of this COST Action is to undertaken as scientific evaluation of the suitability and cost – effectives of different options for reducing nutrient loss to surface and ground waters on the river basin scale, including their limitation in terms of applicability under different climatic, ecological and geographical conditions. Topics to be studied are:

- *localization of critical source area of nutrient loss and transport routes in both surface and ground water catchments;*
- *identification of area where mitigation action are most likely to be effective at minimizing nutrient loss;*
- *temporal dinamycs of nutrient losses;*
- *the influence of nutrient on ecological processes in surface water and the role on ground water in controlling nutrient fluxes;*
- *evaluation of existing or finished project on mitigation .*

INTRODUCTION

The role of nutrients in the eutrophication of surface waters and the contamination of ground water has long been recognized. Negative effects of eutrophication include reduced biodiversity of aquatic ecosystems and surface water quality algal blooms that

restrict the use of surface waters for recreation and excesses nitrate concentration that impact on drinking water production. Toxic algal substances have caused fish kills and animal and human diseases in the past. Phosphorus (P) is the element that often determines the ecological status in most European inland waters. To date, European – wide efforts have meet the P problem be a combination of accidental (for example be diminishing industrial losses the through industrial decline) and targeted option (such as increasing the number of households that are connected with seewerage systems, and precipitating P in sewage water treatment plants). Despite these reduction water quality statuts remains poor in many rivers, lakes and estuaries. During the 1990's share of the total P input to aquatic systems attributed to agriculture increased to 50% or even 90% in many river basins.

MATERIAL AND METHOD

Within Europe, the Water Framework Directive will force catchments management authorities to improve the ecological statut of both surface and ground water. Since both P and N losses to surface and ground water are largely driven by agriculture, there is an urgent need to determine the realization ship between agriculture and chemical and ecological water quality because the first river basin management plans have to be set up within a few years and only cost – effective mitigation option should be implemented.

RESULTS

Mitigation options (tested options as well as potential new options) will be disused and formulated the deliverable will be recommendations for sustainable and integrated mitigation options that are derived from typical, representative situation within Europe and are generic and not site-specific. This action will bring together the current expert knowledge base – within a single COST Action. Consequently, cost-effectiveness under different conditions will be a major topic. Since P is the element that is limiting in most European inland waters, the focus of this action is on P losses. However, positive or negative influences of mitigation options on the loss of fine sediment nitrogen and pesticides either surface water environmental compartments such as ground water will be discussed during the action. Finally, ongoing outcomes of the disscutions within this COST Action will be reported to the new Board of the WFD dealing with the interaction between agriculture and water quality.

Objectives:

The main objective of this COST Action is to undertake a scientific evaluation of the suitability and cost-effectiveness of different options for reducing nutrients loss to surface and ground waters on the rivers basin scale, including their limitations in terms of applicability under different climatic, ecological and geographical conditions.

The evaluation will be used by water authorities in order to reach water quality targets set by the Water Framework Directive. They include:

- to develop methodologies for localizing critical source areas and hydrological transport routes within rivers basin.
- To study the temporal dynamics of nutrient loses and temporal controls on the scope for reducing nutrient losses
- To identify areas where mitigation actions are most likely to be effective from environmental social and economical perspective.
- To study example areas within Europe where mitigation options can be tested and the effects can be monitored
- To evaluate existing on finished project on mitigation: in terms of what worked and what did not work, and could be improved.

CONCLUSIONS

European research and development activities on reduction of nutrient loss to surface water from agriculture will be coordinated, focused and straightened within the present network. Exchange of information, young researchers and material as well as sharing research facilities trough short term scientific missions will significantly expand further knowledge and make more efficient use of national research funds.

Demonstration sites will provide the European states and water authorities with data for future recommendations in the management restoration of polluted waters, also taking into account potential ecological consequences of mitigation options.

This action is a wholly transnational and multidisciplinary collaboration that is beyond the scope of individual countries to provide the necessary finance, personnel and competence. This action supports the creation, improvement and consolidation of networks and partnerships between complementary research and advisory teams from and chemical and ecological water quality because the first rivers basin management plans have to be set up within a few years and only cost – effective mitigation option should be implemented.

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RESEARCHES CONCERNING BIOLOGICAL WEED CONTROL USING PERFORMABLE TECHNOLOGIES

CERCETĂRI PRIVIND CONTROLUL BIOLOGIC AL BURUIENILOR FOLOSIND TEHNOLOGII PERFORMANTE

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KEY WORDS: weed, control, active charcoal

ABSTRACT

In lucrarea de față sunt prezentate rezultatele cercetărilor privind controlul biologic al buruienilor prin absorbția pe cărbune activ specific a inhibatorilor de germinație ai semințelor de buruieni, şi utilizarea de stimulatori de germinație pentru declanşarea acesteia la începutul sezonului rece, cu suprimarea buruienilor prin frig, sau prin lucrări mecanice specifice începutului sezonului activ. Experiențele au fost desfăşurate atât în casa de vegetație, cât şi în câmpuri experimentale.

In this paper are presented results of the research regarding biological weed control by adsorbtion on active charcoal of germination inhibitors of the weed seeds and using germination stimulators for its starting in the early cold season, killing the weeds by cold or by specific mechanical practices in the early growing season. This research had been realized both in the greenhouse and experimental plots in the field.

INTRODUCTION

The active charcoal is a good catalyzer of many chemical and biochemical reactions playing a benefic role in soil in the biodegradation process of pesticide residues, of organic substances induces by the plant remaining extrudates incorporated in soil and organic substances produced by plants in the plant-soil interaction. Besides the utilization in other fields, the use of the active charcoal in agriculture is strongly influenced by the climatic and environmental conditions. The environmental factors such as: soil moisture, day-night temperature variation, multimonthly and annual variation which influence the adsorbtion and desorbtion process in cycles with high time values (tens to hundreds days).

The active charcoal may be used for adsorbtion of germination inhibitors of the weed seeds and reduction of pesticide residues stored in soil. Adding the active charcoal in soil is observed a quantitative increase of the organic matter, the increase of the contact surfaces with micro-organisms and of the efficiency by fixing molecular nitrogen.

MATERIALS AND METHODS

The researches had been realized both in the climatic chamber and two experimental plots in the Biophan natura naturans field, Băiculeşti, Curtea de Argeş, România.

Vegetal remains and finished produce resulted from the intensive cultured of the maize were represented the raw material for obtained vegetal charcoal. After harvesting, the maize was dried in the air and then breaked up in small fragments (10-15 mm length) for maintained the spongy texture of the plant. The vegetal fragments of maize (roots,

stems, leaves, ears) had been treated thermic, in laboratory conditions, in porcelain crucible covered with lid, at three temperatures: 400 ^{0} C, 650 ^{0} C and 850 ^{0} C.

In the climatic chamber was organized experimental variants for establishing the influence of the active charcoal on the germination of *Setaria glauca*. The experiments were fited in the climatic chamber with these parameters: in the day – 12 hours – 20^0 C, in the night – 12 hours – 14^0 C, air humidity between 75% - 95%. There were realized four variants, each with five repetitions.

V1 – sifted soil (meshes are squared about 1 mm length) – 30 g (5 repetitions);

V2 – sifted soil (30 g), active charcoal (3 g) – 5 repetitions;

V3 – sifted soil (30 g) with 100 seeds of *Setaria glauca* (5 repetitions);

V4 – sifted soil (30 g), active charcoal (3 g) and 100 seeds of *Setaria glauca* (5 repetitions).

RESULTS AND DISCUSSION

In case of variants **V1** and **V2** was not observed germinated seeds, in 25 days for none of repetitions at the parameters from climatic chamber.

In case of **V3**, the obtained mean for germinative energy was 37,8%, with a standard deviation of 9,364 (**table 1**). In case of germinated seeds in the soil mixted with 1/10 active charcoal, the germinative energy was 41,6% (**V4**) and the standard deviation 8,47.

The statistic interpretation with SPSS programme using independent t - test was demonstrated that not exist significant differences between **V3** and **V4** variants, regarding germinative energy: t=0,673, p>0.05 (**table 2**). The active charcoal, in this case had not a significant influence on the germinative energy of *Setaria glauca*.

Fig. 1. Initial texture of the dried vegetal remains from maize

Fig. 2. The texture after thermic treatment of the dried vegetal remains from maize

In case of determination of germinative faculty, the registered mean was 64,6% for **V3**, standard deviation being 15,076. In the presence of active charcoal (**V4**), the germinative faculty present big value (81,6%), with a standard deviation of 2,3.

Using independent t – test for establishing the differences between variants was demonstrated that exist significant differences: t=2,492, p<0.05 (**table 2**). The active charcoal (proportion 1/10) produced a stimulation of germinative faculty of *Setaria glauca* (**fig. 3**).

Table 1

The influence of active charcoal upon the seed germination of *Setaria glauca*

	Variant	Number of repetitions	Mean	Standard deviation	Standard error of the mean
Germinative energy	V3	5	37,8000	9,36483	4,18808
	V4	5	41,6000	8,47349	3,78946
Germinative faculty	V3	5	64,6000	15,07647	6,74240
	V4	5	81,6000	2,30217	1,02956

Table 2

Statistic interpretation of results concerning the influence of active charcoal upon the seed germination of *Setaria glauca*

	Independent t - test		
	Value of t	Threshold of signification	Difference between means
Germinative energy	-,673	,520	-3,80000
Germinative faculty	-2,492	,037	-17,00000

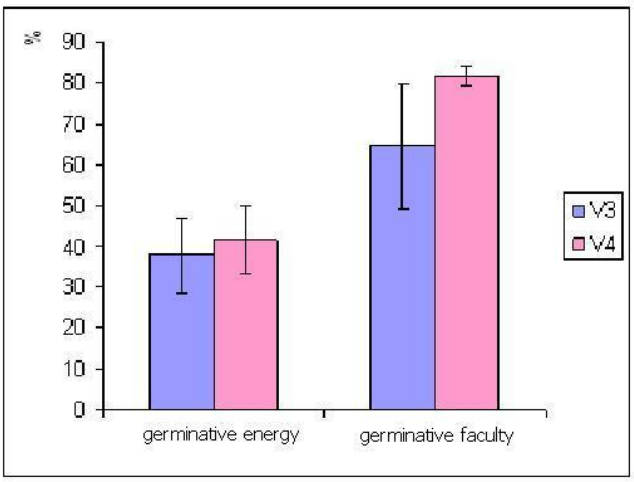

Fig. 3. Graphic representation of results concerning the influence of active charcoal upon the parameters of germination at *Setaria glauca*

In the experimental plots, using active charcoal as amendment was observed an early spring development of weed species, in comparison with untreated variant.

CONCLUSIONS

These researches realized both in the climatic chamber and experimental plots in the field revealed that active charcoal may be used for adsorbtion of germination inhibitors

of the weed seeds and for its starting in the early cold season, killing the weeds by cold or by specific mechanical practices in the early growing season. This alternative system can be used for the weed biological control in the vegetable growing, medicinal plants, strawberry and wheat crops.

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SANDY SOIL TILLAGE FOR CROPPING ZEA MAYS EVERTA PERLA 625 POP CORN CROP

NICOLA I., NICOLA ELIOARA

Keywords: tillage, soil management, soil erosion, pesticides, norms.

ABSTRACT

The paper presents the tillage and soil management operations for the preparation of the sands soils in order to alleviate the soil erosion, reminisce of several pesticides for a healthy crop complying with the UE norms. The popcorn crop is seen as a cash loco crop.

În lucrare sunt prezentate lucrările de pregătire a solului, specifice pentru solurile nisipoase din Sudul Olteniei. Combaterea deflației eoliene şi respectarea noemelor impuse de UE, în ceea ce priveşte tratamentele chimice şi fitosanitare cu efect asupra remanenței în sol, plantă şi produs.

MATERIAL AND METHOD

The soil, as a component of the ecosystem, represents a biological opened system which is full of life. Because of the important resources, the soil permanently interacts to human activities and applied technology.

Factor **A**: destruction of the existing herbage, approximate 85% on the sowed area

Factor **B**: using a minimum farming system

1 – Sowed, using U-445+CPU

2 – Preparing the germinal bed, CPCG+U650

3 – Sowing, SPC 8+EF is used

Factor **C**: the sowed plant

1 - Evert maize

RESULTS AND DEBATES

Buctril ™ Universal was used. It has, as an active substance, the following: bromoxynil 280g/l + 2,4D (as esters) 280g/l, third group of toxicity. Thus, the following were combated: Xantium spp., Cirsium arverse, Cynodon dactylon, Digitaria sanguinalis, Galium aparine.

The recommended dose is of 0.8l/ha when the field is full of herbages because it penetrates the soil in less than an hour and the effects are visible from the beginning.

The field is 85% infested with mono/dicotyledonous herbages. As an effect of using the respective herbicides, the existing herbages were 97% destroyed.

Picture 1. Mono/dicotyledonous herbages before treating the soil.

Picture 2. Dicotyledonous herbages before sowing Perlat 625 maize

Picture 3. Sandy soil prepared for sowing.

Certified and Gaucho 600 FS treated seed, having as an active substance imidaclopyrid 600g/l – concentrated suspension - , was used for sowing.

After sowing, the product forms a protection hallo around the seeds and it operates directly against the pests in the soil. Gaucho penetrates the bean and, from here, the plant and it acts, by ingestion, on the pests which attack the plants in the first vegetation period.

Thanks to insecticides used during the experiment, the results were of 98% and the estimated production/ha were also obtained.

Picture 4.Sowing Perlat 625

Picture 5. Sowing Perlat

After the filed was prepared, it was sowed. Perlat 625 was used, which, at the beginning had a good springing, but, because the sandy soil was not irrigated, the plants seared, the corn cobs were small, the beans were stunted, the rows were incomplete, although the soil acted well during the farming.

CONCLUSIONS

1. In order to obtain a better production, irrigating the crop is necessary.
2. It is imperative that insecticides be used for treating maize beans against different kinds of corn diseases.
3. Using herbicide for fighting pest control which have active substance accepted by EU.
4. Farming the soil must be performed in order to maintain it.

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POP CORN CROP ZEA MAYS EVERTA PERLAT 625 AS A BENEFIT SOURCE

Nicola i., Nicola Lelioara

Keywords: popcorn, expandantion, consompation capitalisation.

ABSTRACT

Rezultatele prezentate în lucrare sunt obținute prin cercetări efectuate pe solurile nisipoase din Sudul Olteniei, fiind luat în cultură convarietatea Everta Perlat 625. La această convarietate boabele sunt galben-portocaliu, luciase, mici, cu vârful boabelor rotunjit. Endospermul are textură cornoasă (sticloasă) care permit expandarea acestora pentru utilizarea lor în alimentație cunoscute sub forma de ;,floricele de porumb".

The paper presents the crop technology of the pop corn crop on the sands soil from the western part of Oltenia, its importance as a food crop, determination on expansion degree at different moistures and temperatures for the wide consumption capitalization.

MATERIAL AND METHOD

The results presented in this work are acquired by research effectuated within crop was studied. Within this co variety the beans are yellow-orange, shining, little, and have the bean's apex rounded. The endosperm has corneous texture (glassy), excepting a small region around the embryo, and MMB is of 68-80 grams.

50 000 plants/ha were sowed on a sandy soil, using a non-irrigated system, resulting a production of 819 kg beans/ ha.

Studied parameters:

Parameter **A**: sowed plant;

1 – Perla 625 pop corn

Parameter **B**: fertilizer dose;

1 – Using the reserve that exists in the soil

Parameter **C**: irrigation system;

1 – Non-irrigated system

RESULTS AND DEBATES

Table 1

Characteristics of the soils where the experiments took place

Soil type	pH	Ah Me/100g/ soil	Sb Me/100g/ soil	H %	N2 %	P2O5 Mg/100g/ soil	K2O Mg/100g/ soil
V1.sandy	6.66	0.52	16.00	2.16	0.052	3.6	13.5
V2.sandy	6.62	0.44	2.8	1.92	0.053	3.3	14.6
V3.sandy	6.60	1.05	16.0	3.06	0.050	5.6	14.0

Because of the unfavorable conditions during the studied year, an 819kg/ha production was obtained, without using chemical fertilizers and within a non-irrigated system.

Picture 1. Perlat 625 corn cobs, at their physiological maturity

ANALYSIS OF EXPANSION WITHIN THE LABORATORY

After the maize beans were ingathered (100 beans), they were subjected to determinations of expandability at 60°C and 25% humidity. In this way it is performed the first determination, using gas flame, and, after a period of 2 minutes, it results: 32 very well expanded beans, 30 medium expanded beans and 38 unexpanded beans. If the exposure time increases the beans are burnt.

The determination is taken again but an electric stove is used this time. The expansion period is of 4 minutes and the results are the following: 62 expanded beans, 15 medium expanded beans and 23 unexpanded beans. For the ingathered beans in these humidity conditions which return to consumption, a slower and longer heating (4 minutes), but:

Table 2

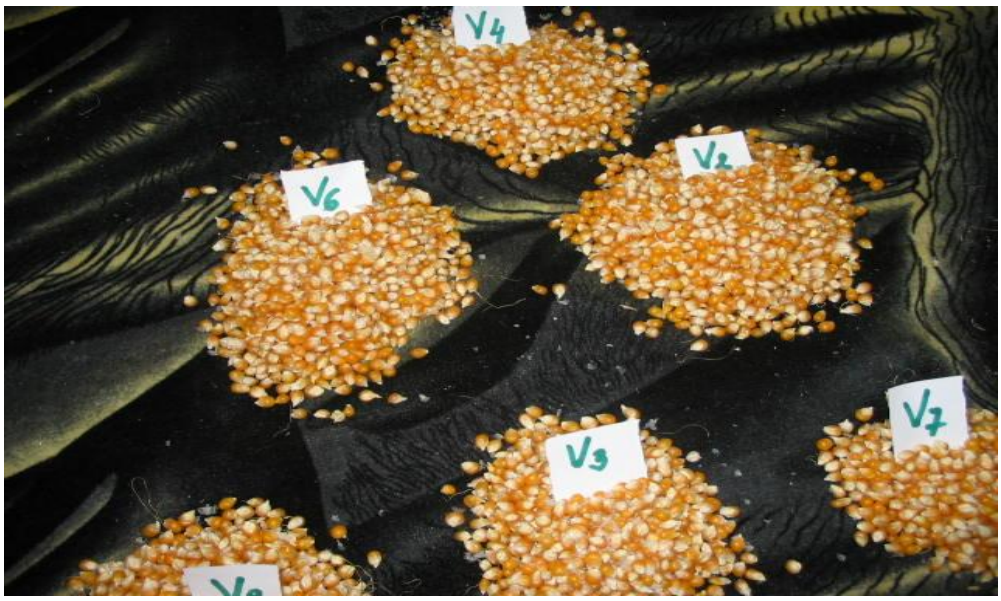
The expansion results of pop corn beans depending on Humidity (H) and Temperature (T)

Quantity	H %	T°C	Time of exposure	Source of heating	Degree of expansion		
100 beans	25%	60°C	2 minutes	Gas flame	Very well	Medium	Unexpanded
					32	30	38
100 beans	25%	60°C	4 minutes	Electric stove	62	15	23

Picture 2 Maize beans subjected to determinations at a 25% H

For acquiring better results, it is recommended that the corn cobs are ingathered when they reach their physiological maturity and the humidity of beans is of 12.9%.

Picture 3.Perlat 625 corn cobs ingathered at 15.1% humidity.



Picture 4.The process of drying the beans down to 12.9% humidity

The same determinations are effectuated, using an electric stove and the following results are obtained:

For a quantity of 100 beans at 12.9% humidity, using gas flame, after a period of 1 minute, the following results are obtained: 87 very well expanded beans, 11 medium expanded beans and 2 unexpanded beans. The determination is repeated, but this time an electric stove is used and the following type of beans are obtained: 78 very well expanded beans, 10 medium expanded beans and 12 unexpanded beans.

Picture 5 Maize beans subjected to determinations at a 12,9% H

Table 3

The expansion results of pop corn beans depending on Humidity (H) and Temperature (T)

Quantity	H %	T°C	Time of exposure	Source of heating	Degree of expansion		
100 beans	12,9 %	60°C	1 minutes	Gas flame	Very well	Medium	Unexpanded
					87	11	2

100 beans	12,9 %	60°C	2 minutes	Electric stove	78	10	12

Picture 6.The process of Perlat 625 beans expansion at different temperatures

The same determinations are effectuated, using an electric stove and the following results are obtained:

For a quantity of 100 beans at 12.9% humidity, using gas flame, after a period of 1 minute, the following results are obtained: 87 very well expanded beans, 11 medium expanded beans and 2 unexpanded beans. The determination is repeated, but this time an electric stove is used and the following type of beans are obtained: 78 very well expanded beans, 10 medium expanded beans and 12 unexpanded beans.

CONCLUSIONS:

- Using the pop corn on a large scale in order to obtain financial advantages.
- For acquiring better and more economical results, the maize ingathering and preserving until it reaches the value of 13% humidity within beans production.
- The use of natural gas or other high caloric power sources as a source of expansion.
- In order to obtain a better result, it is recommendable to use a certain dose of fertilizers and an irrigated crop system.

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FAZELE DE CREŞTERE ŞI DEZVOLTARE A VIȚEI-DE-VIE ÎN VEDEREA ÎNTOCMIRII FENOCALENDARULUI VITICOL. METODA EXPERIMENTALĂ

PHASES OF VINE'S INCREASE AND DEVELOPMENT IN VIEW OF THE ELABORATION THE VITICULTURE FENOCALENDAR. METHOD EXPERIMENTAL

M. Nicolae, Elena Nicolae, A. Dulugeac

Key words:daily bioritm, dried substance's acumulation, active temperature, fenophase, techological viticol optimized fenocalendar (FTVO).

ABSTRACT

The researchs insided in the Viticol Research Center of Drăgăşani, since the 1977-1998 folowed up a sequencetial knowing of daily bioritm of the dried substance accumulationon the trunk which depends on thermal radiation (observations, remarks, determinantions, analyses: the ussualy temperature, the active temperature and the operative temperature) for the main fenophases, stades and the fenologichal microstades on a side and the elaboration techological viticol optimized fenocalendar(FTVO).

Cercetările inițiate în Stațiunea Drăgăşani, în perioada 1977-1998 au urmărit cunoaşterea secvențială a bioritmului zilnic al acumulării substanței uscate pe butuc în dependența cu radiația calorică (observații, determinări şi analize: temperatura ordinară, temperatura activă şi temperatura eficace), la principalele fenofaze, stadii şi microstadii fenologice, pe de o parte şi elaborarea fenocalendarului tehnologic viticol optimizat (FTVO).

OBJECTIVES.MATERIAL AND METHOD

Deepening the knowledge processes of vegetative growth and training in viticulture crops has been in the last half-century target of intense research specialist in the world (Kondo 1955, Huglin 1958, Lazarevski 1961, black in 1964, Pouget 1963, 1965, Julliard 1966 Bouard, Pouget 1971, Conde, Ciolacu 1992) to achieve their dirijării through modeling and simulation (Conde and collaborators in 1992, Cazacu 1992) in order to numerical modeling and simulation and optimization technology culture vine by applying sequences agrofitotehnice at moments fenoclimatice optimal (Baggiolini 1952, Eichhorn, Lorenz 1977, Lancashire in 1991, Erez, Dejeu, 1995 and summoned Fregoni 1998).

Fenoclimatice studies and research have been conducted mainly on selected variety Crâmposie / Kober 5BB, and other vinifera varieties, aiming to accumulation of dried substance on the stump and developing technology fenocalendarului wine optimized (FTVO). Processor pace of growth and dezvoltrare intramuguralã and extramuguralã was made across the biological cycle vegetative and reproductive periods, phases and stage phenology, as the research methodology established biofizice (fenoclimatice).

ECOSYSTEMS VITICOL

The interpretation in a new vision of experimental data older or newer from Drăgăşani resort, on accumulation by vine nutritional substance with a major role in NUTRISAM, allowed developing conceptual model of growth and vine-by rodirii -setting pace of life and daily storage in the butucului substance dried, nitrogen, phosphorus and potassium.

Exerting a permanent exchange of substances with natural or technological change through fizilogice and metabolic processes, vine appears as "ecological subsystem" integrated ecosystem in the vineyard, but also as "bioenergetic system" open with "input-output "Energy.

- Variety vinifera / stock: Crâmpoşie selected / Kober 5BB, Victoria, Calin, Italy
- Leadership semihigh: Lenz Moser, the stem Guyot
- Plantation Age: 20 years (1978)
- The type of soil: eumezobazic brown and brown argiloiluvial pseudorendzinic
- An vineyard in 1997 / 1998
- Tmperatra daily average (7°°, 13°°, 19°°, 24°°)
  - Annual average temperature : 11,3 °C
  - Mimimal absolute temperature : -16,0 °C
  - Absolute maximum temperature : 37,7 °C
  - Annual Temperature : 1995 ore
  - Annual Precipitation : 664 mm

Results include:

- Bioclimatograma vineyard year 1997 / 1998
- Distribution and evolution of cumulative growth sprout
- Cumulative distribution and evolution of the substance stored in the dried-grape inflorescenses
- The relationship between biophysics heat rate asset or phenology evolution and accumulation of dried substance on the scion (wood, leaves, grapes)
- The evolution of the vine photo published on cycles, period, phase and stage phenology
- Original scoring systems and encoding stages and microstadiilor phenology contained in FENOCALENDARUL TECHNOLOGY VITICOL OPTIMIZE (FTVO).

Table no 1

Technology phases

Item	Phase / stage phenology	Period calendar	Morphophysiological dominant process	Dominant biochemical process
1	2	3	4	5
1	Bud Summer	May to October	Organogenesis germ primary (active, latent) Diferenger germ of the rod	Biosynthesis substances bioregulatoare growth (auxine or inhibitors)
2	Bud winter	November-December to March	Differentiation of germ rod Vital slowly process	
3	Preantheza	April toJjune	Vegetative growth of undergrowth and blooming Differentiation of florist	Biosynthesis plastic substances and energy
4	Antheza (florid)	June	Blooming flowers and related	Biosynthesis
5	Postantheza	June-July to August	Growth grapes and grains	Biosynthesis organic acids (protein substances)
6	Maturation of grapes and	July/August-October/November	Ripe grapes and aging Aging wood	Biosynthesis carbohydrate

	wood			

Table no 2

Evolution relationship fenoclimatice during vegetation

Item	Phase and interphase	Morpho-physiological processes prevailing	Thermal threshold (limits Σ°C aggregate)	Average daily rate of accumulation SU (limits mg/ twig)
1	2	3	4	5
1	Crying	Start physiological, beginning movement seve	42-90	1-2
2	Bud	Growth intrabud	90-250	2-18
3	Unbud	Beginning Extra-start growth bud	250-287	18-30
4	Unbud-florid	The annual growth (phase I)	287-842	30-1040
5	Florid	Antheza	842-1217	1040-2080
6	Florid-mellow	The annual growth (phase II)	1217-1382	3100-980
7	Mellow-maturation	Maturation of grapes and wood	1382-3614	2940-200
8	Fall leaves	Migration reserve substances in the many years	3614-3660	200-100

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EXPERIENȚA ROMÂNIEI ÎN IMPLEMENTAREA NORMELOR EUROPENE PRIVIND MANAGEMENTUL GUNOIULUI DE GRAJD

THE ROMANIAN EXPERIENCE IN THE IMPLEMENTATION OF EUROPEAN REGULATIONS REGARDING MANURE MANAGEMENT

I. Panoiu, S. Udrescu, C. Simota

Keywords: manure, nitrate pollution, Nitrate Directive

ABSTRACT

The European Community has taken legislative measures regarding water pollution with nitrates. The most important is the Directive no.91/676/EEC regarding water protection against nitrate pollution from agriculture sources, and its implementation in Romania will produce major changes in the agriculture. In Romania there has been designated 251 vulnerable zones (NVZ communas).

This paper aims to present the progress made in the implementation of the Nitrate Directive in Romania before and after joining the European Union and the difficulties faced during this complex process.

Comunitatea Europeana a luat masuri legislative privind poluarea apelor cu nitrati. Cea mai importanta este Directiva nr.91/676/EEC cu privire la protectia apelor impotriva poluarii cu nitrati din surse agricole, a carei implementare in tara noastra va produce schimbari majore in agricultura. In Romania au fost desemnate 251 zone vulnerabile. Această lucrare îşi propune să realizeze o succintă prezentare a progresului făcut de țara noastră în implementarea Directivei Nitraților, atât înainte cât şi după integrarea în Uniunea Europeană şi a dificultăților întâlnite pe parcurs.

INTRODUCTION

The Nitrate Directive 91/676/EEC related to water protection against pollution with nitrates from agriculture sources was fully adopted through the following national legislation acts:

- Governement Decree nr. 964/2000 for the aproval of the Action Plan for the water protection against pollution with nitrates from agriculture sources and for starting up the Commision and Support Group for the implementation of the Action Plan for the protection of waters against pollution with nitrates from agriculture sources;
- Joint Ministerial Order nr. 452/2001 and 105.951/2001 of the minister of waters and environment and the minister of agricultere, food and forest for the aproval of the rules for organisation and functioning, aims and componence of the Commision and Support Group for the implementation of the Action Plan for the protection of waters against pollution with nitrates from agriculture sources
- Decree nr.740/2001of the minister of waters and environment for the aproval of the persons members of the Commision for the implementation of he Action Plan for the protection of waters against pollution with nitrates from agriculture sources;
- Joint Ministerial Order nr.1182/1271//2005 for the aproval of the new Code for Good Agriculture Practices;
- Joint Ministerial Order nr.241/196/2005 for the approval of the list containing the localities by counties where there are sources of nitrates from agricultural activities and of the list containing the localities from the basin/hydrographical spaces where there are sources of nitrates from the agricultural activities;
- Ministerial Order nr.1072/2003 regarding the monitoring system of the surface water and groundwater from the agricultural sources;

- Joint Ministerial Order nr.242/197/2005 regarding the monitoring system of the soil from the vulnerable and potential vulnerable zones;
- Commision Decision nr.22518/2007 for the implementation of theAction Plan regarding Action Programme for the vulnerable zones.

MATERIALS AND METHOD

According to the Nitrate Directive (91/676/EEG), the Romanian soils and groundwater bodies need to be protected against nitrate pollution originating from agriculture. To design action plans for monitoring and protecting the soils and groundwater bodies, the Romanian territory has been subdivided in zones with equal potential vulnerability (Nitrate Vulnerable Zones or NVZ's). Based on the assessed vulnerability, fertilisation norms have been introduced, and codes of good agricultural practice have been implemented, such as regulations related to nutrient balance, manure storage and spreading of manure (max. 170 kg $N_{organic}$/ha/yr).

The Research Institute for Soil Science and Geochemistry of Bucharest (RISSA) performed a previous delineation of NVZ's in Romania which was mainly based on the soil map. The characteristics of the soil according to the variables runoff and leaching capacity, provide the nitrate vulnerability of the region. As such this method provided for every soil type vulnerability scores for different criteria (e.g. wet front hydraulic conductivity; maximum available water; the general soil type; presence of an impermeable layer, etc.). By combining all these criteria for each soil type, general vulnerability scores were assigned.

Whereas the method of RISSA mainly considers the leaching capacity of the soil, the vulnerability of groundwater is also affected by the stability of nitrate in the groundwater. Similar to the method of RISSA, this stability can also be assessed as a function of different criteria such as hydraulic conductivity of groundwater layers, the hydraulic gradient and the presence or absence of reducing compounds. All these criteria can be combined in a general vulnerability score for groundwater, considering both the leaching capacity of the soil and the stability of nitrate in the groundwater reservoir.

For the evaluation of nitrate vulnerable zones more GIS databases have been used including: Soil (1:200,000) : pedotransfer functions related to solute movement could be derived from data included in soil GIS; Climate (grid: 10' x 10' 1960-2000 and climate change forecasts); Land Cover (CORINE 2000, LCCS-FAO 2002); DTM (raster 100 m and 30 m resolution); Watersheds and rivers; Aquifers (depth, type, origin, characteristics of vadose zone); NUTS4 (Comuna) administrative boundaries; Number of animals in individual farms (statistic from the Ministry of Agriculture and Rural Development based on 2002 year); Number of animals in livestock complexes (data from Romanian Water Authority): actual and potential (historic data); Average yields at NUTS4 level based on Romanian Land Evaluation system; Long time records of nitrate contents in aquifers in ANAR wells.

Using this methods and databases a delineation of 251 vulnerable zones (communa) has been achieved.

RESULTS AND DISCUSSION

One of the main demands of this directive for our country is to set and develop a national integrated monitoring system of surveillance, control and decision for pollution decreasing. The monitoring system will combine two interactive components: water subsystem and soil subsystem.

Efforts have been made to propose an efficient and cost effective system of monitoring, taking into account the facts that: the main sources of drinking water in the

rural areas are shallow wells situated within the inhabited areas; at present surface waters are less, or only indirectly, threatened by pollution from agricultural sources than groundwater; at present the highest nutrient pressure is found within in the rural centers and on land in the immediate vicinity of the villages, rather than on more remote agricultural land; monitoring will take place on a collective basis, rather than on an individual basis; therefore monitoring measures applicable to individual farms such as animal complexes for instance in the framework of their operating licenses, are not included; monitoring of nitrates in the soil can at the same time serve the purpose of improving the fertilizer recommendations in areas where such tools are in general not available or affordable for the majority of the farmers (in particular the smallholdings).

At present no comprehensive central database, whether digital or analog, is available on the water quality of the numerous shallow water wells that are used by large parts of the rural population for their daily water supply.

At present, the National Administration “Apele Romane” (Romanian Waters) administers a network of 1205 piezometric measuring points, scattered more or less evenly over the national territory. In line with the geographic distribution of the freatic groundwater bodies, the mountain regions have fewer monitoring points. The network density is also low in the whole of the Dobrogea region. In the Banat basin and in particular in the Buzau-Ialomita basin, the number of wells is relatively high.

The National Administration “Apele Romane” (Romanian Waters) is disposing digital data (GIS) on surface water monitoring from a network consisting of 1450 sections , from which 315 are in / or downstream of NVZ comunas.

A system of soil quality monitoring has been established in Romania as part of the National System of Environment Quality Monitoring, but for several reasons failed to produce the expected results. Since 1992, a new soil monitoring system for both agricultural land and forest land has been put in place. The network comprises a grid of 942 sites, with a spacing of 16 k x 16 km, 670 whereof are on agricultural land and 272 on forest land, and is structured according to the rules of the Convention on Long Range Transboundary Pollution. At the intersection of every grid, a 400 m x 400 m square is defined for recording a range of soil and terrain parameters, including soil organic matter and available phosphorus. The system is compatible with the Pan European soil network.

All NVZ comunas are required to provide a list of the shallow drinking water wells present on their territory. In the first year of the campaign, all the selected wells (estimated at 14.000) should be visited and measured at least once.

Based on the results of the first year of indicative nitrate screening, wells will be classified in the following categories:

- 0 - 10 ppm nitrate and no exceeding of other parameters: water considered fit for consumption, no priority for further monitoring
- 10 - 25 ppm nitrate and no exceeding of other parameters: considered fit for consumption, second priority for further monitoring
- 25 - 50 ppm nitrate and no exceeding of other parameters: water considered fit for consumption, first priority for further monitoring
- 50 - 100 ppm nitrate: water considered unfit for consumption, well should be taken out of service (for human consumption) until level of nitrate has dropped below the norm
- > 100 ppm nitrate: water from this well should be declared unfit for human consumption

Screening and monitoring of the drinking wells is in progress using portable multiparameter probes allowing instant measurement and registration for a number of strategic parameters such as nitrate content, CEC and pH. In a later stage, where and when applicable, monitoring can be extended to comprehensive laboratory analyses for drinking water, including microbiological parameters or organic substances.

An interactive process of elaboration of the Action Programme has taken place including the local community viewpoints using questionnaires and discussion at the River Basin Commitees of the draft Action Plans and including the feedbacks in the final version.

The aim of the questionnaires sent to the mayors of the NVZ communa was to gather complementary information concerning a number of topics mainly related to the:

- production, storage and use of manure and other sources of plant nutrients
- agricultural practices
- organic waste management
- the presence of other specific sources of nitrate pollution
- water supply and waste water management.

177 mayors from 251 NVZ communa have answered to the questionnaires.

The questionnaire survey summary reveals useful information regarding the use of manure and other types of fertilisers, the animal housing systems, the manure storage, transport and disposal, water and hygienic facilities.

Manure is predominantly used in home gardens, rather than on the field. Very few households are making use at present of compost or nightsoil to fertilise their gardens, and even fewer are using it as a fertiliser on field crops.

A considerable number of households are familiar with the use of commercial fertilisers, for garden crops an even more for field crops. The use of fertilisers however is seldom based on soil analysis.

Covered stables with a hard floor are the most common housing system for cattle and pigs (about 80%). Cows are more often kept on a straw bedding than pigs.

In almost 30 %of the communas, straw beds are cited as the most common methods for housing sheep and goats. In 60 % or more of the communas, the same animals are mainly kept in the open air of in stables without floor.

Poultry manure, including from ducks and geese is difficult to collect as most animals are kept in the open air, in stables without floor.

In 90 % of the communas, manure storage is reported to take place mainly in the open air and on an unprotected soil.

Straw beds under the manure storage are very seldom placed. Less than 10 % report that some form of soil protection is used by a majority of the smallholdings. 65% of the mayors even report that none of the households in the communa is using any kind of soil protection. Field storage of manure is uncommon.

Mixing manure with household waste is a common practice in a minority of the communa’s only (25%).

Very few farmers are reported to store liquid manure in indoor or outdoor containers, or to use any means of transport to bring the sludge to the field. However, this may be the result of the way the question was formulated. It is unclear indeed how many farms are actually producing liquid manure.

In three quarters of the communas, a minority of the farmers has access to tractor services for the transport of manure, and horse carts remain the main way to assure this transport.

In a few communas only, mainly handcarts are used for this purpose.

In almost half the communas, a majority of the farmers is leaving the manure that is not applied on their own fields on the soil.

In less than 20 %, mixing the manure with other household waste is the main way of disposal.

Direct disposal of surplus manure into the river is reported in very rare cases only. Disposal in uncontrolled (wild) deposits appears to be more frequent.

Only 30 % of the mayors report that manure not used on the own garden or field is made available to other farmers as the dominant way of eliminating the manure by non-

users. This would mean that at present a great deal of the manure produced is not used as a fertiliser.

For 50 % of the households, groundwater from individual wells is the main form of drinking water supply. Public wells provide another 10 %. Public water supply systems serve only 28 % of the households.

Half of the households discharge their waste water onto or into the soil, and only very few into the river.

Only 6% is connected to a sewer system.

Pit latrines with the possibility to recover the faeces are used by 55% of the households. This is in sharp contrast with the number using nightsoil as a fertiliser. Apparently an important potential source of plant nutrients is not being used, and instead is threatening the groundwater in the villages.

For each communa, actions fitted to the natural and socio-economic conditions have been established, actions like: interdiction periods for applying manure based on the interval between earliest freezing of the soil (autumn) / latest freezing (spring); application of the Code of Good Agriculture Practices; nutrient management plans for small householdings; evaluation of the land for manure spreading from animal complexes (if any); evaluation of grass strips area around the surface waters; measures to prevent soil erosion and run-off diferentiated according with land use and slope; potential for development husbandry.

CONCLUSIONS

As a Member State of the European Community, Romania identified, on its territory the surface waters and groundwater affected or liable to be affected by pollution, in accordance with the procedure and criteria set out in the Directive (in particular when nitrate concentrations in groundwater or surface waters exceed 50 mg/l) and the vulnerable zones which contribute to pollution. It has been established a code of good agricultural practice to be implemented by farmers on a voluntary basis, as defined in Annex II to the Directive. Action programmes have been established and implemented for vulnerable zones. These include the measures set out in the code of good practice, as well as measures to limit the application of any nitrogenous fertilisers to the soil and to set limits for the spreading of livestock manure.

The process of monitoring water quality, applying standardised reference methods to measure the nitrogen-compound content is in progress.

The implementation of the government policy to reduce the pollution of soils, groundwater and surface water by nutrients from agricultural sources in the Nitrate Vulnerable Zones requires also a powerful instrument to assess, and to monitor and evaluate the impact of the measures taken on the quality of the environment.

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AGRICULTURA CONSERVATIVĂ – TEHNOLOGIA CU AVANTAJE MULTIPLE

CONSERVATION AGRICULTURE – THE MULTI-ADVANTAGE TECHNOLOGY

Mirela Paraschivu, Gabriel Păunescu, M. Paraschivu

Keywords: no-tillage, residue, crop rotation, bed-planting, resource conserving

ABSTRACT

Pentru o lungă perioadă de timp agricultura a fost asociată cu plugul. Probabil cel mai profund efect negativ al lucrărilor solului în întreaga lume este reprezentat de degradarea solului datorită eroziunii vântului şi apei. În ultimii ani agronomii au recunoscut problemele asociate cu lucrările excesive ale solului şi s-au orientat spre dezvoltarea unor sisteme care să protejeze resursele naturale ale solului. Unul dintre aceste sisteme este şi Agricultura Conservativă, care în general este caracterizată printr-un sistem minim de lucrări ale solului (obiectivul fiind zero tillage sau no-tillage), reținerea unei cantități adecvate de resturi vegetale pe suprafața solului (cel puțin 30%) şi diversificarea optimă a rotației culturilor. Începând cu anul 1990 pe baza experiențelor de lungă durată CIMMYT-ul a demonstrat avantajele Agriculturii Conservative şi împreună cu partenerii lor din întreaga lume ajută la adoptarea acestui sistem de conservare a resurselor naturale. Printre avantajele agriculturii conservative demonstrate la CIMMYT în Mexic, pot fi menționate reducerea eroziunii solului, o mai bună infiltrare şi conservare a apei in sol, un nivel ridicat al producției, creşterea conținutului de materie organică în sol, reducerea emisilor de CO_2, crearea de condiții favorabile pentru dezvoltarea antagoniştilor şi prădătorilor, susținerea unei noi stabilități ecologice, reducerea volumului de muncă şi a inputurilor. Zero tillage a arătat un mare potențial în controlul biologic şi sistemul integrat de management al bolilor şi dăunătorilor. Printre cei care vor adopta primii Agricultura Conservativă vor fi fermierii receptivi la noile sisteme de producție alternative cu scopul de a reduce costurile,a îmbunătății prductivitatea şi a-şi ameliora solurile. De asemenea, acestia vor fi primii care vor promova Agricultura Conservativă în comunitățile din care provin. Tocmai de aceea ne-am propus sa facem o trecere în revistă a multiplelor avantaje promovate de Agricultura Conservativă, precum şi a impactului pe care această tehnologie îl are pe termen lung asupra culturii, solului, conservării apei şi a economiei în ansamblu a fiecărei ferme.

For a long time agriculture was associated with plow. Probably the most profound negative effect of tillage worldwide has been and remains the loss of soil due to soil erosion by wind and water. But in the last years the agronomists recognized the problems associated with excessive tillage and attempted to develop systems that protected the soil resources. One of these systems is Conservation Agriculture which is generally characterized by reduced tillage (with zero tillage as a goal), retention of adequate amounts of crop residues on the soil surface (at least 30%) and introduction of more diversified and economically viable crops rotations. Since 1990 using long term trials CIMMYT has showed the advantages of Conservation Agriculture (CA) and together with their partners has helped the adoption of this save resources system. The benefits of conservation agriculture include better water infiltration and retention of moisture, reduced erosion, higher yields, increased soil organic matter, reduced CO_2 emissions, favorable conditions for the development of antagonists and predators and foster new ecological stability, saving in labor and machinery. Zero tillage shows great potential for use in biological control and integrated pest and diseases management. Innovative farmers, who

are looking for alternative production systems in order to save money and improve their productivity and their soils, are probably the ones who will adopt CA first. They will also be the ones to promote CA in their communities. We review some of the CA advantages and how CA practices can impact for long term the crop, soil, water conservation and farm economies.

INTRODUCTION

For a long time agriculture and tillage were considered synonymous. Tillage has been a part of agriculture since its beginning almost 10000 years ago and served several important purposes: preparation of the seed bed, reduction of compaction for soil aeration and better root growth, weed control, incorporation of fertilizer and organic amendments and burial of the crop residue (Lal, 1987). Probably the most profound negative effect of tillage worldwide has been and remains the loss of soil due to soil erosion by wind and water. About 80% of agricultural land in the world suffers from moderate to severe erosion, with soil losses of 30-40 tons /ha /year (Pimentel at al., 1995). Crop residues are turned under by tillage and without residues on the soil surface, wind and water move the fine soil particles as dust and sediment. The net result is a loss of crop productivity worldwide (Larson et al., 1983). The increased bulk density and decreased pore space in degraded soil makes it difficult for adequate root penetration and nutrient uptake. Soil sediments caused by run-off erosion also reduces water quality. But in the last years the agronomists recognized the problems associated with excessive tillage and attempted to develop systems that protected the soil resources.

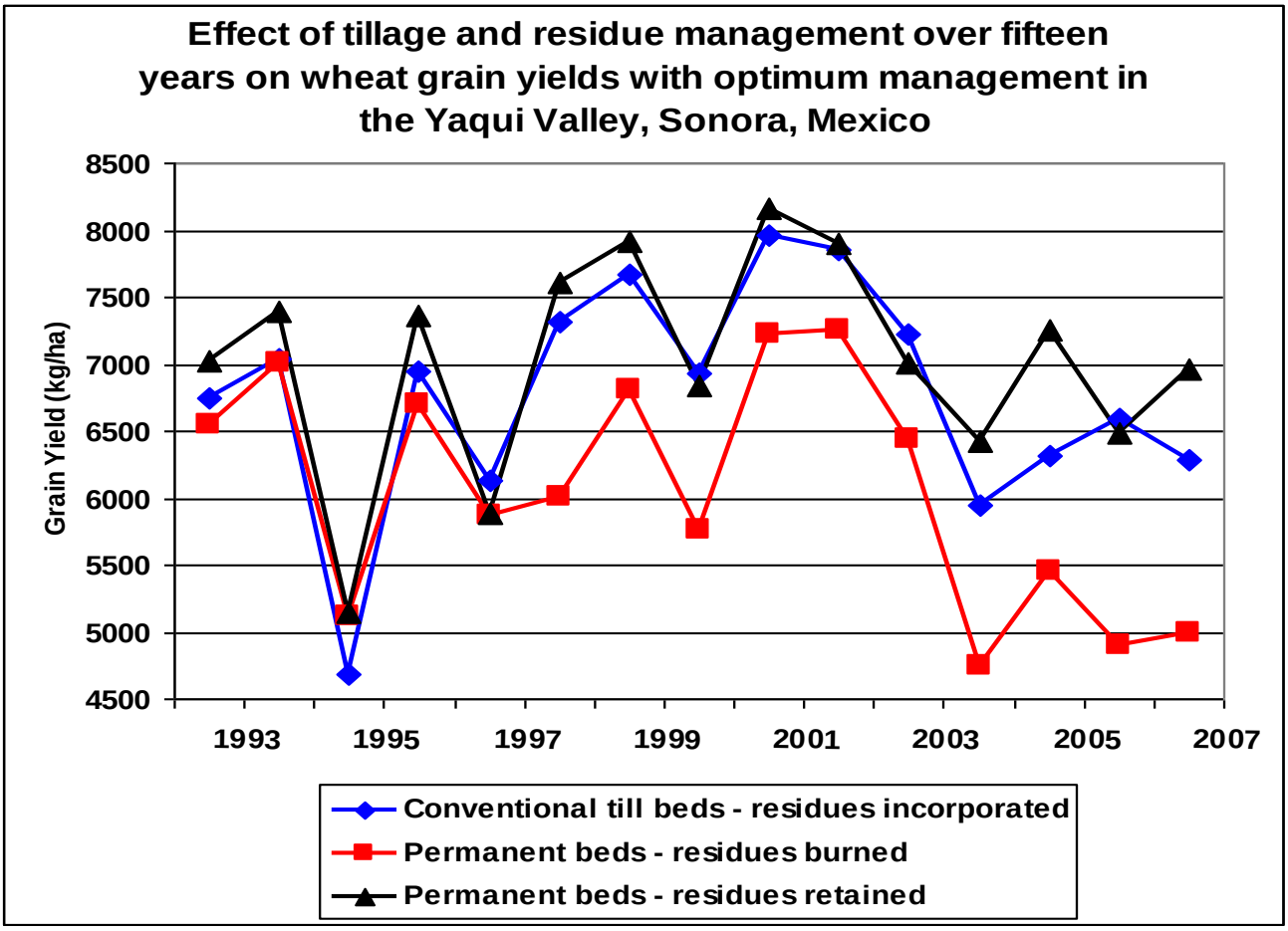
One of these systems is Conservation Agriculture (CA) which is generally characterized by reduced tillage (with zero tillage as a goal), retention of adequate amounts of crop residues on the soil surface (at least 30%) and introduction of more diversified and economically viable crops rotations (Wall, 2006). The application of one or more of these principles are referred to as Resource Conserving Technologies (RCT`s) such as in the maize-wheat farming systems in Mexico. Conservation Agriculture is one promising and widely-adaptable form of sustainable agricultural intensification. Given its potential to reduce rural poverty and increase the sustainability of agricultural production, especially for farmers with limited resources and concerned about their soils quality, Conservation Agriculture is particularly relevant to the mission of the International Maize and Wheat Improvement Center (CIMMYT) which participated in developing no-tillage technology since 1970s and Conservation Agriculture technology since 1990s. Based on CIMMYT (Mexico) experiences with no-tillage, residue management and crop rotation in the present paper we review some of the advantages of the adoption of Conservation Agriculture technology especially in developing regions.

Agronomic, economic and environmental benefits

The experiments conducted to CIMMYT are focus on the sustainability of maize and wheat cropping systems under conventional and zero tillage (no-tillage) with and without residues, among varied other treatments, to elucidate the principles and performance of CA. For years CIMMYT and their partners have also promoted sowing on raised beds and, where feasible, permanent beds to enhance productivity and the efficiency of use of resources (water, fertilizer), as well as to foster the rational intensification and diversification of cropping. Bed planting is being tested and adopted on significant areas in northern Mexico, South Asia, the Central Asian Republics and China, to mention a few countries and region. Planting wheat and maize on raised-beds is an innovative option that can help improve rainwater use efficiency and reduce soil erosion (Limon Ortega et al., 2000). On the top of the permanent beds the soil is left undisturbed from harvest to planting and the new crop is seeded directly into the previous stubble using a drill specifically designed to place fertilizer and seed precisely into the same row but at different depths. Planting and fertilizer is done in one operation, with no seedbed

preparation, leaving most or all residues from the previous crop on the surface after planting. Permanent raised beds permit the implementation of crop residue strategies to maintain a permanent soil cover for greater rainwater capture and conservation. The extra advantage of permanent raised bed planting over no-tillage on the flat is that more varied weeding and fertilizer application practices are possible by trafficking in the furrow bottoms and the N fertilizer can be banded through the surface residues reducing potential N volatilization losses (Limon-Ortega et.al, 2000). Moreover, it controls machine traffic, limiting compaction to furrow bottoms, allows the use of lower seeding rates than with conventional, flat planting systems and reduces crop lodging, especially for small grains (Sayre et al, 2005). Significant yield differences between the tillage and residue management treatments have been observed for wheat. Highest wheat yields have been obtained with permanent beds combined with residue retention (Table no.1). The lowest grain yields were obtained in the conventional tillage bed with residue burned.

Table no.1



Source: Ken D. Sayre (2007)

Particularly when permanent beds are used and residues is kept on the soil, the practice improves soil fertility and structure, reduces erosion and water requirements and facilitates mechanical and manual weeding, allowing farmers to ease up on herbicide use.

After 5 years of no-tillage permanent bed planting (PB) with crop residue retention in Central Mexico, the soil had significantly higher aggregate stability when compared to conventional tilled raised beds. Lower aggregate stability in the topsoil of conventionally tilled beds is explained by 1.4 less organic matter stored when compared to the permanent bed planting system (Govaerts et al., 2007). The proportion of free micro aggregates (53-250 µm) was greater in soils conventional tilled indicating macro aggregate disruption by

management disturbances. In addition, C storage in micro aggregates was found to be greater in permanent beds (18.58 g C kg^{-1}) when compared to conventional beds (15.25 g C kg^{-1}) (Lichter et al., 2008). Bed planting reduces costs with 25% and 20-40% in irrigation water use, compared with flood irrigation. Bed planting is most successful when researchers, farmers and local equipment manufactures communicate well.

The residues play an important role in CA because water infiltration and soil moisture levels were greater under no-tillage when residues are left in the field then residues was removed. Higher infiltration rates and favorable moisture dynamics supported up to 30% yield increase (Govaerts et. al, 2007).The residues reduces evaporation in several ways: by reducing solar heating of the soil, by keeping drying winds off the surface, by insulating the soil to keep it cooler and by intercepting some of the water as it evaporates. Research has show that residues can reduce water losses from evaporation by 50%, saving as much as 7 to 9 centimeters, increasing yields in dry land production or decreasing irrigation costs in irrigation production (Jasa, 2006). No-tiilage and crop rotation increased the diversity of microbial life and decreased the parasitic nematodes compared to conventional tillage. In the long term no-tillage with residues retention creates favorable conditions for the development of antagonists and predators, and fosters new ecological stability (Govaerts at al., 2007).No tillage thus shows great potential for use in biological control and integrated pest management.

Adoption

Generally, CA adoption data by countries is in many cases lacking and scattered but it has been estimated that no tillage is practiced in about 95 million hectares around the world, of which about 50 % is found in non-OECD countries (Derpsch, 2008). Farmers began to adopt no-tillage relatively quickly when a variety of herbicides became readily available in the late 1980s, especially in parts of North and South America and Australia. The indicators suggest that the uptake has been much slower, so far, in Africa and Asia. In the absence of the comparative statistics on CA (because in many countries CA is not separately recorded by agricultural statistical systems) table no.2 shows the expansion of no-tillage farming since 1980s when CA covered a small area, but extended rapidly during 1990s.

Table no.2

Evolution of no-till farming in the world

Year	Global area (million ha)
1973/1974	2,8
1983/1984	6,3
1996/1997	38,7
1999/2000	59,9
2000/2001	70,4
2007/2008	95

Source: Derpsch (2008)

More than 70 million hectares is founded in four countries: USA, Brazil, Argentina and Australia. The largest area of under on-till is found in the USA, more than 24 million hectares (Conservation Technology Information Center, 2005), but the proportion of cultivated land under no-till in Brasil, Argentina and Paraguay, which corresponds to the above definition of CA, is substantially greater than that of the USA and continues to increase. CA has been successfully introduced into large scale crop livestock in Central Asia, especially in the Indo-Gangetic Plains of South Asia, through the interaction of researchers in national and international organizations.

The Conservation Agriculture technology is relative complex and farmers require time to fully understand and integrate CA into their existing farming system. Dixon and de Oliviera conceptualized four phases of the individual farm adoption process. During the initial phase investment is required for new equipment and some times limiting, the costs may rise and the yields may even fall. During phase 2 the costs remain fairly high, buy the yields begin to rise in line with farmer personal experience. In phase 3 crop yields have reached the expected levels and the costs have reduced. By this stage farmers have usually learnt to manage CA adequately, expanded CA to most or all their land and have found productive use for resources freed up to CA, especially labor and machinery. In phase 4 the benefits of CA are realized including better soil moisture capacity, increased soil organic matter, reduced weed and pest pressure and productive use of resources, especially labor and machinery. The full benefits of Ca appear after a significant period, in some settings as much as 5 years. In this sense, Ca should be viewed as a medium to long-term investment.

Several factors facilitate CA adoption when an adequate package is available. First, the sunk costs associated with no-tillage are small. The specialized components of no-till are a planter and knowledge. The other specialized inputs are the farmer`s investments in learning about technology, which include the farmer time, the costs of information (specialized literature and participating to special events) and field trials. Other important advantage is that CA technology can be adopted partially or in stages. In many cases farmers have tried CA on a small area until they manage the system. Farmers can learn about the technology over time.

As for the other system CA adoption is delayed by some restrictions. One of the most difficult restrictions to overcome is that CA requires a complete departure from conventional farming practices. Many researchers, university professors and government officials also found it difficult to change their professional practices, especially after they had invested many years in working with conventional tillage. The transition to no-till reaches a critical point in the third year, when factors particular for each farm (especially the evolution of weed and pests populations) need to be addressed (Javier Ekboir, 2001). Sometimes, the farmers revert to conventional tillage when they cannot solve their problems. The CA requires substantial adaptation to local conditions. Plant varieties adapted to no-tillage system may not be available. Often the seed companies and national breeding programs develop plant varieties for traditional producing systems and more productive cropping environments. Only few research institutions breed plant varieties specifically for no-tillage conditions, although specially adapted varieties may perform better. For example, wheat varieties perform very different when planted on beds or in the traditional system, but breeders started to develop wheat varieties for bed planting only recently. However, little has been done through genetics and breeding to take full advantages of the higher yield potential in CA.

CONCLUSIONS

Whether or not genetic yield potential continues to increase all farmers in developing countries need crop management technologies that provide immediate major reductions in production costs, while insuring enhanced long-term sustainability by reversing soil degradation from extensive tillage and crop residue removal. The development and deployment of appropriate conservation technologies require more support, even if it means shifting resources for other, more upstream research efforts. Compared to conventional tillage, no-tillage has numerous advantages record, numerous positive assessments of conservation agriculture by both farmers and scientists in many countries, who highlight simultaneous micro-economic advantage (e.g., increased farm incomes and reduced risk), social and environmental advantages (e.g., enhancement of

soil resources, improved soil structure, better water infiltration and consequently reduced water runoff and soil loss). Economic advantage is important, conservation tillage (no-tillage) reduce costs by 20-35% compared to conventional tillage.CA reduces inter-seasonal yield variability in low rainfall areas, principally by limiting yield reductions in dry years. In principle, this feature distinguishes CA from many other modern production technologies that increase yield variability. By a coordinated efforts using this strategy CA adoption should be a reality in these prime focus environment by 2025 for over 80% of the wheat based systems. Thus, wheat will continue to be a major, staple food for billions of inhabitants around the world.

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STUDIES ON THE ENVIRONMENTAL HAZARDS IN DRINKING WATER EVALUATION FROM CARAS SEVERIN DISTRICT BY *ALLIUM SATIVUM* L. BIOASSAY

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Key words: environmental hazard, drinking water, plant bioassay, *Allium sativum* L.

ABSTRACT

To evaluate the pollution and genotoxicity of drinking water in four villages from Caras Severin District (Comoraste, Gradinari, Ciudanovita, Brosteni,).*Allium sativum* test was used as bioassay. Meristematic tissues of plants generally show patterns of cytotoxic response similar with those of embryogenic tissues of vertebrates. Plants bioassays are most sensitive in detecting the environmental hazards in water and can serve as the first alert for their presence. The drinking water was collected from the fountains of the population from considered area and the content in ammonium, nitrites and nitrates was analyzed As biological material were used four landraces of *Allium sativum* L.: Cenad (Tm),Faget (Tm),Piscul Nou (Dj),Sebis (Ar). There were registered the differences in plants development between different water type in comparison with control (distillated water) as well as between the four *Allium sativum* L. landraces.

Pentru evaluarea poluarii si a genotoxicitatii apei potabile in patru localitati ale Judetului Caras Severin (Comoraste, Gradinari, Ciudanovita, Brosteni) a fost utilizat testul Allium. Tesuturile meristematice ale plantelor au in general modele ale raspunsului similare cu cele ale tesuturilor embriogene ale vertebratelor. Biotestele vegetale sunt cele mai sensibile in detectarea hazardelor de mediu ale apei si pot servi ca o prima alerta a prezentei lor. Apa potabila a fost colectata din fantanile populatiei din zona considerata si a fost analizata pentru continutul in amoniu, nitriti si nitrati. Ca material biologic pentru biotest au fost utilizate 4 populatii locale de *Allium sativum* L: Cenad (Tm),Faget (Tm),Piscul Nou (Dj),Sebis (Ar). Au fost inregistrate diferente in ceea ce priveste dezvoltarea plantelor timp de 21 de zile intre diferitele tipuri de apa potabila in comparatie cu varianta Control (apa distilata) dar si intre cele patru populatii locale analizate.

INTRODUCTION

Water, in natural status is never pure. It contains several chemical and biological elements, characteristic ones, and which are considered, somehow natural elements. The water can have a major influence on human health and also in the plants. The presence of the hight levels of ammonium, nitrates and nitrites have a several negative effects for human, animal and plants as follows: irritant and congestive effect for mucous digestive membrane, noxious effect for endocrine glands, hepatotoxic and neurotoxic effects, cromosomial disorders on plants also. Meristematic tissues of plants generally show patterns of cytotoxic response similar with those of embryogenic tissues of vertebrates. Plants bioassays are most sensitive in detecting the environmental hazards in water and can serve as the first alert for their presence.

The *Allium* test has been applied to evaluate the quality of underground, surface waters and effluents in a simple way through the study of macroscopic parameters, such as the values for root growth inhibition, cytological parameters such as aberrations cellular metaphase and anaphase and cellular division inhibition (Vesna et al., 1996 and Fiskesjö,

1998). Inhibition of root lenght is suitable for evaluation of substances in various concentrations. The simplicity of the *Allium* test procedure is the reason for its recommendation by international environmental protection agencies for estimating enviromental pollution and toxicity caused by industrial effluents, non-treated municipal or domestic waste water.

The aim of this paper was to estimate the *A. sativum* sensitivity to ammonium compounds or other pollutants that not analyzed yet, from fountain drinking water collected from Caras Severin District villages susceptible to have water pollution problems.

MATERIALS AND METHODS

As biological material were used bulbs of four landraces of *Allium sativum* L.: Cenad (Tm),Faget (Tm),Piscul Nou (Dj),Sebis (Ar).

The test has been done using four different types of fountain waters - low deep drills from Caras Severin county . In order to follow the ammonium, nitrates and nitrites levels in the surface waters there has been collected samples from four villages low deep drills, in October(Table 1).

The experimental variants of water samples

Table 1

Variant	Village	The depth of collecting the water sample (m)
V1	Control – distilled water	-
V2	Comorâşte,	9
V3	Grădinari	8
V4	Ciudanovița	10
V5	Broşteni	7

Biometrical observations were done regarding: the number of roots, roots lenght, coleoptil lenght, leaves lenght, to ten bulbs for each experimental variant, once at 5 days. The experimental data proccesing was done with statistic program STATISTICA 7: ANOVA test, correlations, significance of the differences with DUNCAN test.

RESULTS AND DISCUSSIONS

The surface waters contains ammonium resulted from decomposition of organic substances and slurry. The surface waters polution with ammonium compounds and other ones is generated by many factors, some of them are: waters passing trough the solvable bedrocks; surface waters passing trough the area with soil erosions; hidrofile and acvatic vegetation growing. We can conclude that is no natural enviroment which does not have nitric compounds.

Nitrates are natural compounds of the soil generated from organic substances mineralization of animals and plants. The ploughed soil degradation by using a high quantities of chemichals in order to increase the production and continous decline of soil fertilization can represent a major threat to the feed security of human population. The pollution is asociated mainly with industry, not knowing the aspect that agriculture has a major contribution on waters polution, especialy with nitrites (N and P compounds)(Press

Office of Enviroment and Waters Management Ministry, Enviroment Ministry, published in 30 august 2006).

Nitrates (NO_3^-) can be major problem, their concentration in drinking water being frequently higher than admisible limits, in Romania. The presence in drinking water of the nitrates, as well as of nitrites and ammonium proves that was a long term pollution procees, that continue and can became an environmental hazard. The Law 311/2004, regarding the quality of the drinking water limits the content in nitrates to maximum 50 mg/l. This maximum limit was overpass only in the water sample collected from Gradinari village (V2 (Table 2) where the concentration is more than twice higher. Even the compounds with nitrates are not highly toxic, the resulted methabolic products are potentially dangerous.

The content in ammonium, nitrates and nitrites (mg/l), 2007-2008

Table 2

Compound	Variant/village/depth	Month 2007/2008				
Ammonium (mg / l)		Octomber	December	February	May	July
	2. Grădinari -8 m	0,54	0,61	0,96	0,83	0,79
	3. Comorâşte -9 m	0,129	0,116	0,196	0,102	0,122
	4.Ciudanovița -10 m	0,19	0,28	0,27	0,21	0,22
	5. Broşteni– 7 m	0,02	0,02	0,04	0,03	0,02
Nitrates (mg / l)	2. Grădinari -8 m	109,6	103,3	109,4	132,2	127,7
	3. Comorâşte -9 m	28,8	29,7	39,6	43,3	41,8
	4.Ciudanovița -10 m	7,8	12,0	13,7	20,0	14,9
	5. Broşteni– 7 m	29,9	28,8	31,1	35,0	32,2
Nitrites (mg / l)	2. Grădinari -8 m	0,29	0,31	0,28	0,40	0,38
	3. Comorâşte -9 m	0,06	0,05	0,10	0,11	0,10
	4.Ciudanovița -10 m	0,03	0,02	0,03	0,04	0,04
	5. Broşteni– 7 m	0,01	0,03	0,03	0,04	0,01

Organogenesis processes. Analysis of variance revealed the fact that the observed characters are depended very signicantly both by the genotype, as well by the content in ammonium, nitrates and nitrites from the water samples (Table 3).

The effect of the genotype, water sample and their interraction on the analyzed characters

Table 3

Analysis of Variance. Effects are significant at p < ,05000			
Factor	Character	F	p
Landrace	Roots no/bulb	4,50641	0,004081
	Roots length	53,85656	0,000000
	Coleoptiles length	13,98325	0,000000
	Leaves length	18,48596	0,000000
Water	Roots no/bulb	18,79185	0,000000
	Roots length	17,51365	0,000000

	Coleoptiles length	10,88951	0,000000
	Leaves length	16,08995	0,000000
Landrace x water	Roots no/bulb	22,06674	0,000000
	Roots length	47,74452	0,000000
	Coleoptiles length	28,76554	0,000000
	Leaves length	51,93667	0,000000

The rhisogenesis process debuted in the first three days after the experiment begining in Control variants in the first 4-5 days in the other experimental variants. It was observed that a high concentration in ammonium (V2) dramatic decreased the morphogenesis of the roots meristems, while the high content in nitrites and nitrites inhibated the roots meristems, but stimulated the growth in lenght of the roots. This afirmation is sustained also by the correlations found between the content in ammonium, nitrates and nitrites and the biometric characters of the plants (Table 6). It was observed that landraces Cenad and Sebis (c) were most sensitive to water pollution, with determined compounds, the registered differences in comparison with Control (de) being significant. Low values for the number of roots, correlated with a dramatic inhibition of the growth, was observed to the landrace Faget in the variant with water from Ciudanovita (a). This reaction indicates another type of pollution, with heavy metals and/or radionucli due to the fact, that nearby the village is a preserved uranium exploatation. Further investigations the fountain water have to be done, in order to establish the pollutant agent.

The rhisogenesis process, depending on genotype and the experimental variant, 15 days

Table 4

Landrace	Water sample	Roots no/bulb		Roots length (mm)	
		Mean ± Studded.	Sign*	Mean ± Std.dev.	Sign*
Cenad	V1	9,11 ± 1,02	de	26,17 ± 12,05	be
	V2	7,80 ± 1,52	c	78,47 ± 6,23	f
	V3	9,74 ± 1,52	de	55,32 ± 22,69	d
	V4	7,14 ± 1,03	c	67,50 ± 25,33	e
	V5	9,44 ± 2,01	de	82,44 ± 9,45	f
Faget	V1	11,44 ± 0,92	e	26,22 ± 9,18	bc

	V2	8,76 ± 1,52	d	61,76 ± 17,78	de
	V3	10,10 ± 1,02	e	29,50 ± 9,43	bc
	V4	3,00 ± 1,07	a	8,50 ± 3,42	a
	V5	8,13 ± 2,07	cd	24,6 ± 4,39	b
Sebis	V1	8,67 ± 1,95	d	34,33 ± 11,81	c
	V2	4,25 ± 1,00	b	57,88 ± 3,56	de
	V3	9,10 ± 1,02	d	74,75 ± 9,31	ef
	V4	10,71 ± 1,52	e	68,76 ± 28,80	ef
	V5	8,76 ± 1,52	d	56,94 ± 12,64	de
Piscu Nou	V1	11,14 ± 1,01	e	18,86 ± 8,71	b
	V2	7,80 ± 1,52	c	19,93 ± 9,79	b
	V3	9,67 ± 1,53	d	62,28 ± 15,80	d
	V4	10,16 ± 2,48	e	16,32 ± 7,27	a
	V5	9,13 ± 3,20	d	23,93 ± 8,04	bc

The coleoptile started the development, 10 days after the bigining of the expeiment at 30% from the bulbs, in variants V1, V2 and V3 and later, in the other two variants. It was observed a dramatic inhibition of the process to landraces Faget and Sebis, on water sample V4 and V5 (Table 5). There was observed that is a significant negative correlation between the content in nitrites and time periode for coleoptile devlopment (Table 6). In general the leaves growth is stimulated by the high content in ammonium compounds.

The foliar organogenesis process, depending on genotype and the experimental variant,

Table 5

Landrace	Water sample	Coleoptiles length (mm) 12 days		Leaves length (mm) 21 days		No. of days for coleoptiles developm
		Mean ± Std.dev.	Sign*	Mean ± Std.dev.	Sign*	

						ent
Cenad	V1	16,00 ± 5,35	cd	60,0 ± 4,28	d	12
	V2	19,50 ± 0,53	d	150,0 ± 3,78	g	11
	V3	45,50 ± 9,09	e	161,5 ± 2,67	g	10
	V4	5,50 ± 2,67	b	74,5 ± 32,61	d	15
	V5	7,50 ± 0,53	b	56,0 ± 35,28	d	15
Faget	V1	3,00 ± 2,14	b	25,5 ± 8,02	e	15
	V2	11,50 ± 2,67	c	100,5 ± 3,74	b	12
	V3	9,50 ± 2,67	c	15,0 ± 3,21	c	13
	V4	0,00 ± 0,00	a	30,0 ± 1,51	a	18
	V5	0,00 ± 0,00	a	0,0 ± 0,00	c	25
Sebis	V1	17,50 ± 8,02	cd	47,0 ± 23,52	e	12
	V2	4,00 ± 1,07	b	95,0 ± 3,78	f	15
	V3	21,00 ± 19,24	d	128,5 ± 29,40	b	12
	V4	0,00 ± 0,00	a	9,5 ± 4,17	c	18
	V5	9,50 ± 4,81	c	71,0 ± 24,69	c	17
Piscu Nou	V1	5,00 ± 2,14	b	54,0 ± 7,48	d	13
	V2	3,50 ± 0,53	b	43,0 ± 2,27	e	13
	V3	5,00 ± 2,14	b	87,5 ± 24,05	d	13
	V4	17,00 ± 5,35	cd	68,0 ± 28,86	d	12
	V5	3,00 ± 0,00	b	67,5 ± 3,74	d	15

*For differences significance was used Duncan test, level of confidence 5%

The Correlations between ammonium compounds and biometrical characters

Table 6

Correlations Marked correlations are significant at p < ,05000 N=60					
	Roots no/bulb	Roots length	No. of days for coleoptile's development	Coleoptiles length	Leaves length
Ammonium	**- 0,4484**	0,2394	- 0,2202	-0,0205	**0,3567**
	p=0,000	p=0,065	p=0,091	p=0,877	p=0,005
Nitrates	**- 0,3719**	**0,3284**	- 0,2240	0,0502	**0,4380**
	p=0,003	p=0,010	p=0,085	p=0,703	p=0,000
Nitrites	**- 0,3720**	**0,2815**	**- 0,3127**	0,0767	**0,4417**

	p=0,003	p=0,029	p=0,015	p=0,560	p=0,000

CONCLUSIONS

- The most polluted sample of drinking water, with ammonium compounds, was found in Comoraste village;
- The sensitivity of the analyzed landraces is different, the most sensitive was Faget landrace and is recommended to be use in further investigations;
- The high content in ammonium compounds inhibited the roots meristems morphogenesis;
- The high content in ammonium, nitrites and nitrates stimulated the growth of the roots and leaves;
- The high content in nitrites induced an early development of the coleoptiles;
- The water samples from Ciudanovita and Brosteni have to be analyzed for heavy metals and radionuclides, due to the fact that ammonium compounds concentrations didn't justify the severe inhibition of the plants development.

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CERCETĂRI PRIVIND COEFICIENȚII DE TRANSFORMARE AI EVAPORAȚIEI DIN EVAPORIMETRELE BAC CLASA A ÎN CONSUM DE APĂ LA CULTURA DE FASOLE

RESEARCH CONCERNING THE CROP CONVERSION COEFFICIENTS OF THE CLASS A PAN EVAPORATION INTO WATER CONSUMPTION AT THE BEAN CROP

C. V. Popescu, C. Bora, C. Popescu, E. Petrescu

Keywords: evaporation, Class A evaporation pan, crop coefficients, bean crop

ABSTRACT

Cercetările au fost efectuate la cultura de fasole în regim irigat şi la neirigat pe preluvosolul roscat de la SCDA „SIMNIC". Au fost determinate consumul de apă la cultura de fasole prin metoda bilanțului apei în sol, evaporația apei din evaporimetrele BAC clasa A şi coeficienții de corecție ai evaporației din evaporimetre în consum de apă: raportul dintre consumul de apă al culturii în câmp la evaporație. Coeficienții obținuți vor fi folosiți în prognoza şi avertizarea aplicării udărilor. Valorile medii ale coeficienților pentru cultura de fasole au fost: Luna Mai – 0, 45; Iunie – 0, 62; Iulie – 0, 72; August – 0, 39.

The research has been carried out at the bean crop in irrigated regime and rain fed conditions on the reddish preluvosoil from the Research and Development Agricultural Station „SIMNIC". There were determined the bean crop water requirements through field water balance theory's methods, the evaporation from Class A Pan evaporimeters, and the crop's converting coefficients based on their definition - the ratio of water consumption/requirement of the crop to the Pan evaporation. The obtained coefficients are to be used in irrigation scheduling. Their average monthly values for the bean crop were: May – 0, 45; June – 0, 62; July – 0, 72; August – 0, 39.

INTRODUCTION

The research was carried out at the bean crop in irrigated and rain fed conditions on the reddish preluvosoil from the Research and Development Agricultural Station „SIMNIC" between 1996-1998, aiming the establishment of the bean crop water requirements and the crop's water consumption conversion coefficients.

MATERIAL AND METHOD

In the experimental plot, the monthly and total bean crop water requirements were determined according to the field water balance theory:

- accurate measurements of the soil moisture at depths of 75 cm and 150 cm – using the gravimetric method at the most important crop stages like crop establishment, harvest, after rainfalls higher than 10 mm and every 10 days;
- measurements of the rainfall,
- accurate management of the irrigation.

In the same time the evaporation was determined using daily measurements on three Class A pan evaporimeters. The pans were arranged and maintained according to the standards.

The daily measurements were used to determine the monthly values – as a basis for establishing the crop coefficients.

RESULTS

From the data presented in table 1, the average value of the reference evapotranspiration from the evaporimeters for the research period was 6.289 m^3/ha.

The maximum value was determined in 1998 (6.605 m^3/ha), when the crop had a longer vegetation period and also, the average monthly temperatures were higher than the multi annual average value with 0.8 ^{0}C up to 1.6 ^{0}C in June, July and August.

The minimum value was registered in 1997 (6.014 m^3/ha), when the average temperatures of July and August were reduced with 1.1 ^{0}C and respectively 1.2 ^{0}C to the multi annual average value.

Meanwhile, along with the temperatures, the wind regime of each period influenced directly the recorded data. Decreased or increased values of the wind speed determined, along with the temperature, decreased or increased values of the evaporation from the BAC evaporimeters.

Table 1

Evaporation determined at the Class A pan compared to the bean crop water consumption determined through the field water balance method (m^3/ha/day) and the correction coefficients

Year	Period	Nr. of days	Field consumption		Pan evaporation		Coefficient
			Total	Daily	Total	Daily	
1996	06.05-31.05	26	646	25	1706	65,5	0,38
	01.06-30.06	30	1108	37	1867	62,2	0,59
	01.07-31.07	31	1534	49	2075	66,9	0,74
	01.08-08.08	8	192	24	599	74,8	0,32
1997	05.05-31.05	26	648	25	1512	58	0,43
	01.06-30.06	30	1139	38	1763	59	0,65
	01.07-31.07	31	1521	49	2007	65	0,76
	01.08-18.08	18	394	22	732	41	0,54
1998	01.05-31.05	31	741	23,9	1329	42,8	0,55
	01.06-30.06	30	1144	38	1827	60,9	0,63
	01.07-31.07	31	1538	49,6	2265	73	0,68
	01.08-14.08	14	380	27	1184	84	0,32
Average	01.05-31.05	31	678	22	1516	55	0,45
	01.06-30.06	30	1130	38	1819	61	0,62
	01.07-31.07	31	1531	49	2116	68	0,72
	01.08-12.08	12	322	24	838	67	0,39

Analyzing the data from table 1, we can observe that in **May**, the average value of the evaporation was equal to 1.516 m^3/ha. The maximum value for the month was reached in 1996 (1.706 m^3/ha) and the minimum value in 1998 (1.329 m^3/ha). The daily average value for this month was equal to 55 m^3/ha, with a maximum value registered in 1996 – 65, 5 m^3/ha and respectively a minimum value - 42, 8 m^3/ha registered in 1998.

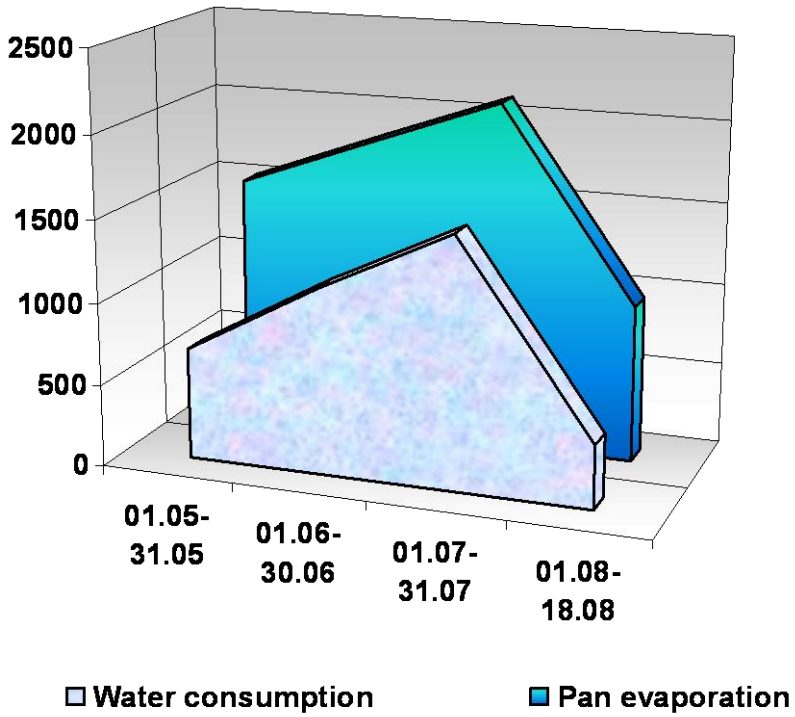
In **June**, the average value of the evaporation was equal to 1.819 m^3/ha. The maximum value for the month was reached in 1996 (1.867 m^3/ha) and the minimum value in 1997 (1.763 m^3/ha). The daily average value for this month was equal to 61 m^3/ha, with close values, a maximum value registered in 1996 – 62, 2 m^3/ha and respectively a minimum value - 59 m^3/ha registered in 1997.

In **July**, the average value of the evaporation was equal to 2.116 m^3/ha. The maximum value registered was in 1998 – 2.265 m^3/ha and respectively the minimum value in 1997 - 2007 m^3/ha. The average daily evaporation for the month of July was equal to 68 m^3/ha, with a maximum value in 1998 - 73 m^3/ha and respectively minimum values - 65 m^3/ha registered in 1997.

For the month of **August**, the value of the pan evaporation was equal to 732 m^3/ha in 1997 on 18 days period of time and 1,184 m^3/ha in 1998 on 14 days period of time. In 1996, the value of the evaporation was 599 m^3/ha on 8 days period of time. The average daily evaporation for the month of August was equal to 67 m^3/ha, with a maximum value in 1998 – 84, 5 m^3/ha and respectively minimum values - 41 m^3/ha registered in 1997, on the corresponding periods of time.

As we can observe in table 1 and in figure 1, the month of July was the month with the highest values of the daily and monthly evaporation.

Figure 1. Bean crop water use and Pan evaporation in the research period



Regarding the crop coefficients, for the month of **May**, the average value of the coefficient for the research period was 0, 45. The maximum value determined was in 1998 (0, 55) and respectively the minimum value determined was for 1996 (0, 38).

For the month of **June**, the average value of the coefficient for the research period was 0, 62. The maximum value determined was in 1997 (0, 65) and respectively the minimum value determined was for 1996 (0, 59).

For the month of **July**, the average value of the coefficient for the research period was 0, 72. The maximum value determined was in 1997 (0, 76) and respectively the minimum value determined was for 1998 (0, 68).

For the month of **August**, the average value of the coefficient for the research period was 0, 39. The maximum value determined was in 1997 (0, 54) and respectively the minimum value determined was for 1996 and 1998 (0, 32).

CONCLUSIONS

By dividing the monthly crop water use determined to the reference evapotranspiration – obtained from direct measurements of the evaporation from the Pan evaporimeters, there were obtained the crop coefficients.

Their average monthly values for the bean crop were decreasing:

May – 0, 45; June – 0, 62; July – 0, 72; August – 0, 39.

These data can be used by the territorial units involved in the operation of irrigation schemes from Dolj department Nedeia – Măceşu (northern area), Zănoaga and irrigation schemes from Olt department. Each unit, in characteristic points, can install 1-3 Pan evaporimeters respecting the standard procedure to read the necessary measurements in order to be able to use the coefficients and determine the irrigation application time.

So, all the water users can benefit from this fast irrigation prognosis and reduce their labor volume, electric consumption waste and costs, even save their crops.

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CERCETĂRI PRIVIND ESTIMAREA EVAPOTRANSPIRAȚIEI POTENȚIALE PRIN METODA THORNTHWAITE ŞI DETERMINAREA COEFICIENȚILOR DE CORECȚIE LA CULTURA DE FASOLE

RESEARCH CONCERNING THE POTENTIAL EVAPOTRANSPIRATION ESTIMATE USING THE THORNTHWAITE EQUATION AND THE BEAN CROP CORRECTION COEFFICIENTS

C. V. Popescu, C. Bora, C. Popescu, C.A. Roşculete

Keywords: evapotranspiration, Thornthwaite equation, crop coefficients, bean crop

ABSTRACT

Cercetările au fost efectuate în condiții naturale şi în regim irigat pe preluvosolul roşcat de la SCDA "SIMNIC" la cultura de fasole. Au fost estimate folosind metoda Thornthwaite evapotranspirația potențială ETP lunară şi zilnică şi determinați coeficienții lunari de transformare (k_c) ai evapotranspirației în consum de apă.

Valorile medii lunare ale coeficienților de corecție pe perioada cercetată au fost: Mai - 0, 65; Iunie - 0, 75; Iulie - 0, 93; August – 0, 50. Coeficienții de corecție estimați (k_c) prin metoda Thornthwaite pot fi folosiți la dimensionarea sistemelor de irigație.

The research has been carried out in irrigated and rainfed conditions on the reddish preluvosoil from the Research and Development Agricultural Station „SIMNIC" at the bean crop. There were estimated through the Thornthwaite method the monthly and daily reference evapotranspiration, and determined the monthly correction factors (K_C) into water consumption.

The average monthly values of the correction factors for the research period were: May - 0, 65; June - 0, 75; July - 0, 93; August – 0, 50. The correction factors (k_c) estimated through the Thornthwaite method are to be used in the design methodology of the irrigation systems.

INTRODUCTION

The research has been carried out in irrigated and rainfed regime on the reddish preluvosoil from the Research and Development Agricultural Station „ŞIMNIC" between 1996-1998, at the bean crop. Besides the soil water balance analysis and the water consumption of the bean crop, during the research we estimated the monthly and daily potential climatic evapotranspiration, using the Thornthwaite method.

MATERIAL AND METHOD

Potential evapotranspiration is the amount of water that could be evaporated from land, water, and plant surfaces if soil water were in unlimited supply. Its calculations are based on standard weather station data. Climate data used in this analysis were acquired from Işalnița CRAIOVA weather station derived from 45 years (1954 - 1998).

It was determined PET for the Agricultural Research and Development Station Şimnic CRAIOVA, using the Thornthwaite method which is based on an empirical relationship between potential evapotranspiration and mean air temperature.

While this method is not the most accurate, and may lack theoretical basis, it can provide reasonably accurate estimates of potential evapotranspiration.

Potential evapotranspiration can be calculated using the Thornthwaite water balance method using the following formula:

$$\mathbf{PET} = \mathbf{160} \times \left(\frac{\mathbf{10t}}{\mathbf{I}} \right)^{\mathbf{a}} \times \mathbf{k_e}\,, \qquad \text{where:}$$

PET – monthly potential evapotranspiration (m^3/ha);

t – mean monthly temperature, in ^0C;

K_e – correction factor according to the latitude;

I - a heat index for the given area which is the sum of 12 monthly index values ***i,*** where ***i*** is derived from mean monthly temperatures using the following formula:

$$i = (t_n / 5)^{1,541}$$

where:

t_n – mean monthly multi-annual temperature, in ^0C;

a - an empirically derived exponent which is a function of I:

$$a = 0,000000675\ I^3 - 0,0000771\ I^2 + 0,01792\ I + 0,49239$$

$ETR_0 = ETP \times K_p$ where:

ETR_0 – real optimum evaporation determined in the field (m^3/ha);

K_p – correction factor according to the crop and the cropping area.

PET was calculated for the growing season months (May through September).

RESULTS AND DISCUSSIONS

From the data presented in tables 1, 2, 3 and 4 and from the figure 1, we observe that, in average, in the research period, the values of the daily evapotranspiration estimated using the Thornthwaite formula have an increasing trend starting with the month of April (16, 3 m^3/ha) to the month of July (52, 8 m^3/ha), the values decreasing to the month of September to 26, 5 m^3/ha.

Regarding the evolution of the yearly daily evapotranspiration for the research period, we observed the same trend of the values.

Monthly, the daily evapotranspiration estimated with the Thornthwaite method varied as follows:

- For the month of **May**, the values were between 32,9 m^3/ha in 1998 and 40,3 m^3/ha in 1996, years when the temperatures were inferior by 1^0C – 1998 and respectively superior by $1,5^0C$ – 1996 to the mean multi-annual temperature;
- For the month of **June**, the values were relatively the same, between 48,1 m^3/ha in 1997 and 51,8 m^3/ha in 1998;
- For the month of **July**, the values were between 49,9 m^3/ha in 1997 and 55,6 m^3/ha in 1998;
- For the month of **August**, the values were between 43, 7 m^3/ha in 1997 when the temperature was by $1,2^0C$ less than the mean multi-annual temperature and 52, 3 m^3/ha in 1998, when the registered temperature was by $1,6^0C$ higher than the multi-annual mean.

There were determined the monthly correction factors by dividing the estimated values of the evapotranspiration using the Thornthwaite formula to the daily water consumption obtained by the soil water balance method.

The average values of the correction factors for the research period were increasing and then decreasing to the end of the growing season as follows:

- in May - 0,65; in June - 0,75; in July - 0,93; in August – 0,50.

Table 1

Evapotranspiration estimated with the Thornthwaite formula and the water consumption in the field (m^3/ha/day) and the correction factors – mean values 1996 – 1998

Consumption	Month						Correction factors				
	IV	V	VI	VII	VIII	IX	IV	V	VI	VII	VIII
Thornthwaite	*16,3*	*36,6*	*50,2*	*52,8*	*47,7*	*26,5*					
Bean crop	*...*	*24*	*38*	*49*	*24*	*...*	*...*	*0,65*	*0,75*	*0,93*	*0,50*

Table 2

Evapotranspiration estimated with the Thornthwaite formula and the water consumption in the field (m^3/ha/day) and the correction factors – values 1996

Consumption	Month						Correction factors				
	IV	V	VI	VII	VIII	IX	IV	V	VI	VII	VIII
Thornthwaite	*17,7*	*40,3*	*51,8*	*52,9*	*47,3*	*25,4*					
Bean crop	...	24,8	36,9	49,5	24	...	...	0,61	0,71	0,94	0,50

Table 3

Evapotranspiration estimated with the Thornthwaite formula and the water consumption in the field (m^3/ha/day) and the correction factors – values 1997

Consumption	Month						Correction factors				
	IV	V	VI	VII	VIII	IX	IV	V	VI	VII	VIII
Thornthwaite	*9,7*	*36,7*	*48,1*	*49,9*	*43,7*	*26,9*					
Bean crop	...	24,9	38	49,1	21,9	...	...	0,68	0,79	0,98	0,50

Table 4

Evapotranspiration estimated with the Thornthwaite formula and the water consumption in the field (m^3/ha/day) and the correction factors – values 1998

Consumption	Month						Correction factors				
	IV	V	VI	VIII	VII	IX	IV	V	VI	VII	VIII
Thornthwaite	*21,4*	*32,9*	*50,8*	*55,6*	*52,3*	*27,3*					
Bean crop	...	23,9	38,1	49,6	27,1	...	...	0,73	0,75	0,89	0,52

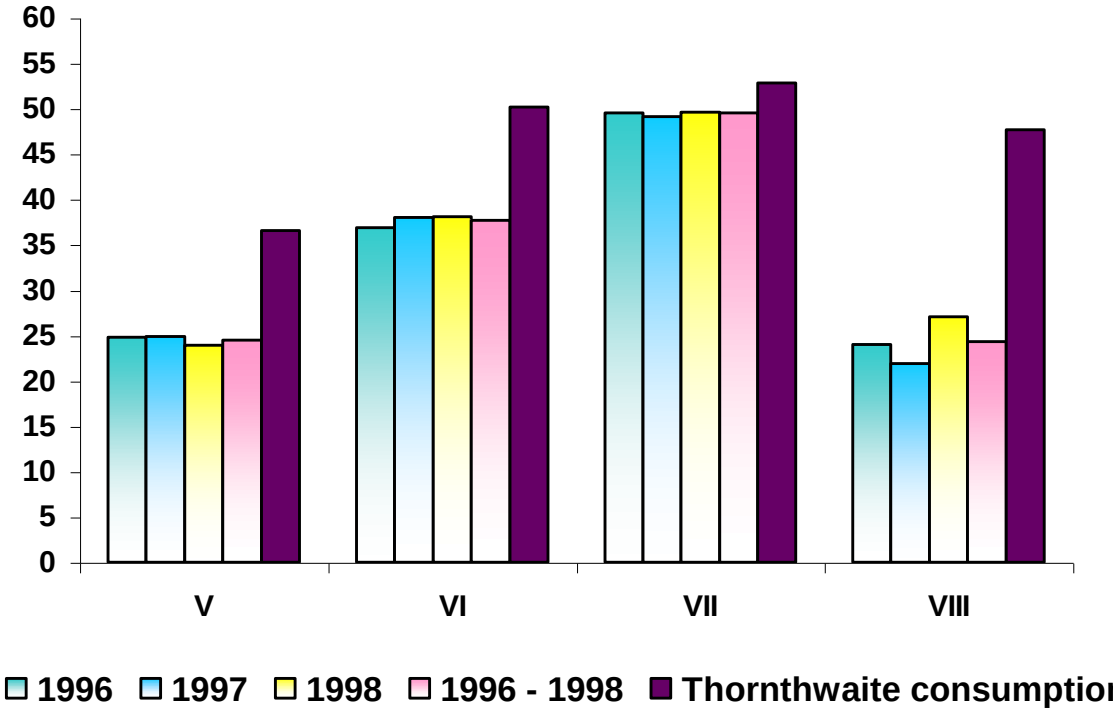

Figure 1. Average daily water consumption (m^3/ha/day) and the estimated consumption using the Thornthwaite method for the bean crop

CONCLUSIONS

The values of the correction factors are depending of the seeding period, development rate of the crop, the length of the growth stage of the plants, frequency of the irrigation and the climatic factors (temperature, rainfall, wind etc.) facts already mentioned in the scientific literature.

The average monthly values of the correction factors for the research period were:

- May - 0, 65; June - 0, 75; July - 0, 93; August – 0, 50.

In the conditions of the Oltenia plain and in Romania, the correction factors (k_c) estimated through the Thornthwaite method are to be used in the design methodology of the irrigation systems.

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EFECTUL STRUCTURII SI ROTATIEI CULTURILOR ASUPRA EROZIUNII PE TERENURILE ARABILE IN PANTA

THE EFFECT OF STRUCTURE AND CROP ROTATION UNDER THE EROSION ON THE SLOPE ARABLE LEND

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Keywords: erosion, crop structure, crop rotation

ABSTRACT

Lucrarea prezintă cercetările efectuate în cadrul C.C.D.C.E.S. Perieni privind pierderile de sol prin eroziune la diferite culturi şi in diferite rotații.

În centrul Europei, la 45° latitudine nordică se întâlnesc unele dintre cele mai importante hazarde naturale pentru viața omului, al căror remediu sunt măsurile de îmbunătățiri funciare. Hazardele naturale denumite ca atare de geonomia modernă sunt: geomorfologic; hidrologic şi climatic. Fenomenele erozionale prin modul lor de a se manifesta, amploare diferită foarte variabilă în timp variind cu condițiile naturale, certifică faptul că ele fac parte din aceste hazarde naturale. Remedii specifice pentru hazardele naturale, ca genuri de lucrări de îmbunătățiri funciare pot fi: hazard geomorfologic – lucrări şi măsuri de combaterea eroziunii solului, lucrări de îndiguiri; hazard hidrologic - lucrări şi măsuri de combaterea eroziunii solului, lucrări de regularizare: îndiguiri şi acumulări şi hazard climatic - lucrări de irigații; lucrări şi măsuri de combaterea eroziunii solului. Amenajările de combaterea eroziunii solului, prin măsuri şi lucrări, îşi aduc contribuția la remedierea tuturor hazardelor naturale. Cel geomorfologic prin atenuarea eroziunii de suprafață şi de adâncime, cel hidrologic prin reducerea torențializării cursurilor de apăiar cel climatic prin reducerea scurgerilor lichide şi implicit reținerea şi mai buna valorificare a precipitațiilor.

Ca măsuri de combaterea eroziunii solului au fost studiate, în cadrul C.C.D.C.E.S. Perieni, şi prezentate efectul structurii şi rotației culturilor asupra eroziunii.

Sistemul de agricultură adecvat terenurilor în pantă este condiționat de structura şi rotația culturilor. Stabilirea sortimentului de culturi trebuie făcut în funcție de două criterii: gradul de protecție al solului şi nivelul producțiilor. Eficacitatea sistemelor de cultură este condiționată de valoarea pantei terenului. Prin aplicarea măsurilor de combatere a eroziunii solului apa din precipitații este mai bine utilizată prin reducerea scurgerilor lichide cu 11-30%

This paper deals with the researches made in the frame of C.C.D.C.E.S. PERIENI concerning of the soil lost through erosion on different crop structure and crop rotation

In the middle of Europe, at 45° north latitude, there is some of the most important natural risk for human life, who can be remedied by improvements land measure. The natural risk named from modern genomic are: geomorphologic, hydrological and climatic. Erosion phenomena's through their manifest mode, very different amplitude in time and space concordant with the natural conditions certify he fact that these make part of natural risk. Specifically cure for natural risk, like kind of land improvement works can be: geomorphologic natural risk – works and measure of erosion control, dike works; hydrological natural risk - works and measure of erosion control, dike works; high flood attenuated works and reservoirs; climatic natural risk – irrigation works; works and measure of erosion control.

Land improvement works, through measure and control works, bring the contribution through cure to all range of natural risk: the geomorphologic natural risk through attenuate sheet and gully erosion; the hydrologic natural risk through decrease the

high flood level of rivers; the climatic natural risk through attenuate the runoff and implicit through retention and better reclaim of rainfall.

Like measure for prevent and control of soil erosion it was studied, in the frame of C.C.D.C.E.S. Perieni, and are presented the effect of structure and crop rotation under erosion.

An adequate agricultural practice on slope land is conditioned from crop system structure and crops rotation. The establishing of sort of crops on slope land must be made in depended from tow criteria: soil protection and crop level. The erosion effectiveness of crop systems, on slope land, is conditioned by range of slope value. A proper cultivation structure mixed with erosion crop system reduced erosion and sediment effluence with 20%; Through land improvement measure are better capitalize water from rainfall, the runoff are reduced with 11 – 30%.

INTRODUCTION

In 1987 - report "Our Common Future", also known as the "Brundtland Report" (after the name of the chairwoman of the committee during that period: Gro Harlem Brundtland, Prime Minister of Norway), proposes the term SUSTAINABLE DEVELOPMENT concept as an integrated policy and the decision in environmental protection and economic growth in the long term. It also provides the definition became the most familiar of sustainable development: "development that fulfills the requirements of the present without compromising the ability of future generations to meet their own need"

In our country, meet some of the most important natural risks to human life, whose remedy measures are improvement of land. Natural risks named as such by modern genomic are geomorphologic, water and climate; erosion phenomena by way of a manifest, very different scale variable over time with varying natural conditions are a consequence of these natural hazard.

Land reclamation works of soil erosion, through measure and works, contribute to remedy the full range of natural risks:

- geomorphologic risks by reducing erosion of surface and depth;
- hydrologic risks by reducing torrentially watery;
- climate risks by reducing runoff and implicit better retention and use of precipitation.

A simple measure to prevent soil erosion is the structure and crop rotation

MATERIAL AND METHOD

In the C.C.D.C.E.S. Perieni was conducted research on long-term effect of the structure and crops rotation by collecting runoff at special events, the three types of crops rotation at the optimal fertilization level for the area studied:

Rotation of two years: Wheat / Corn

Rotation of three years: Wheat / Corn / Soybeans

Rotation five years: Wheat / Corn / Soybeans / Beans / Brome grass

Also was taken in consideration monoculture of wheat and corn as main mode crop use for private households in the hilly areas.

The scheme rotation of five years is shown for intervals of 10 years to highlight plot position cultivated with crops (Brome grass) that provides a very good protection throughout the year, even when special rain events occur that can find the rest of the land discovered (ploughing, ready for seeding, or immediately after harvest).

Rotation for five years: Winter wheat / Corn / Beans / Soybeans / Brome grass

Year	S1	S2	S3	S4	S5
1995	Wheat	Corn	In	Brome grass I	Beans
1996	Corn	Beans	Soybeans	Brome grass II	Wheat
1997	Soybeans	Wheat	Corn	Brome grass III	Beans
1998	Corn	Soybeans	Beans	Brome grass IV	Wheat
1999	Beans	Corn	Wheat	Soybeans	Brome grass I
2000	Wheat	Soybeans	Beans	Corn	Brome grass II
2001	Soybeans	Corn	Wheat	Beans	Brome grass III
2002	Corn	Beans	Soybeans	Wheat	Brome grass IV
2003	Beans	Wheat	Corn	Brome grass I	Soybeans
2004	Wheat	Soybeans	Beans	Brome grass II	Corn

It was reveal the number of events that have caused leaks and erosion, the amount of rainfall that caused these events, the level of runoff and erosion recorded, and runoff coefficients average who was realised in the circumstances of monoculture of wheat or corn and three types of turns.

RESULTS OBTAINED

Admitting an erosion admissible of 8 tons / ha year, after lengthy research years, we can see how erosion by water and runoff are affected by cultures (Table. 1).

Regarding erosion, Brome grass and winter wheat protect the best soil, followed by soy beans and on the last place is corn.

Table 1

Soil and nutrients losses, average on long terms , registered at CCDCES Perieni and soil losses calculated for an admitted erosion of 8 tons / ha / year

Crop	Erosion	
	to / ha	% from Permissible calculated
Permissible calculated	8,00	100,00
Brome grass	0,03	0,38%
Wheat	0,37	4,63%
Soybeans	6,29	78,63%
Beans	5,05	63,13%
Corn	7,51	93,88%
Blak fallow	38,69	483,63%

Table 2

Runoff of monocultures of wheat or corn

1995 / 2004	Number of events	Rainfall that caused runoff (mm)	Runoff (mc/ha)	Erosion (to/ha)		Runoff coeficient
	pe perioada de 10 ani				media	
Wheat	13	281,7	312,5	3,119	0,312	0,048
Corn	31	932,2	1966,0	68,720	6,872	0,112

With the data presented in Table 2, we can assess the influence of crops of wheat and corn in monocultures on erosion by the loss through leakage and erosion.

Culture of wheat in monocultures ensure a good erosion protection, for a period of 10 years were lost on average per hectare 0312 to/ha year, value under the permissible limit erosion, about 4.6% of permissible erosion value on the year.

At the same time average rate of runoff has a very low value, 0.048, which indicate a good use even of torrential rainfall, thus the appearance possibility of torrentially phenomena it was reduced.

In contrast, the cultivation of corn in monocultures does not provide a good erosion protection, for a period of 10 years were lost on average per hectare 6.872 to/ha year, value slightly below of allowable limit erosion, around 93.9% of the admissible value on year.

At the same time average rate of leakage has a high value, of about 2.5 times higher than the monoculture of wheat, 0.112, thus indicate a weaker use of uncommonly rainfall having a low effect on reducing the possibility appearance of torrentially phenomena.

Table 3

Runoff in the rotation for two years: Winter wheat / Corn

1995 / 2004	Number of events	Rainfall that caused runoff (mm)	Runoff (mc/ha)	Erosion (to/ha)		Runoff coeficient
	pe perioada				media	
Wheat	13	281,7	312,5	3,119	0,312	0,048
Corn	31	932,2	1966,0	68,720	6,872	0,112
Average	22	607,0	1139,3	35,920	3,592	0,080

Winter wheat and corn crops, in rotation of two years, wheat/corn provides a same erosion protection as in the case of monoculture. In a period of 10 years have been lost on the average annual per hectare 0.312 to/ha of soil to wheat respectively 6.872 to/ha of soil to corn.

What are shows is that just by simply alternate crops in the same area average annual soil losses are much lower reaching averaged 3.592 tons / ha which represents 49.40% of the admissible value on year.

At the same time average rate of runoff has a low 0.08 value which indicates a good use even unusually rainfall thus reducing the possibility of appearance of torrentially phenomena.

Table 4

Runoff in the rotation for three years: Winter wheat / Corn / Soybeans

1995 / 2004	Number of events	Rainfall that caused runoff (mm)	Runoff (mc/ha)	Erosion (to/ha)		Runoff coeficient
	pe perioada				media	
Wheat	26	670,5	1199,2	33,847	3,385	0,082
Corn	34	825,3	1538,5	64,55	6,455	0,111
Soybeans	28	506,2	1188	21,932	2,193	0,087
Average	29	667,3	1308,6	40,110	4,011	0,093

Crops of wheat and corn in rotation for three years wheat / corn / soybeans ensure an erosion protection same as in the case of monoculture. In a period of 10 years have been lost on the average annual per hectare 0.312 to / ha to wheat respectively 6.872 to / ha to corn. Regarding the soybean crop in the same period provided an erosion protection even better than wheat, were lost annually on average 2.193 to / ha.

What are shows is that just simply by rotating crops on the same area average annual losses are much lower reaching averaged 4.011 to / ha which represents 50.14% of the admissible value on year.

At the same time average rate of runoff is low values 0.093 which indicate a good use even unusually rainfall thus reducing the possibility of appearance of torrentially phenomena.

Table 5

Runoff in the rotation for five years:
Winter wheat / Corn / Beans / Soybeans / Brome grass

1995 / 2004	Number of events	Rainfall that caused runoff (mm)	Runoff (mc/ha)	Erosion (to/ha)		Runoff coeficient
	pe perioada				media	
Wheat	13	281,7	312,5	3,119	0,312	0,048
Corn	31	932,2	1966,0	68,720	6,872	0,112
Soybeans	21	627,5	1870,2	35,706	3,571	0,124
Brome grass	18	322,6	282,0	0,388	0,039	0,022
Beans	28	660,0	1512,5	35,683	3,568	0,094
Average	23	564,8	1188,6	28,723	2,872	0,080

Crops of wheat and corn in rotation for five-year wheat / corn / beans / soybeans / brome grass ensure an erosion protection same as in the case monoculture. In a period of 10 years have been lost on the average annual per hectare 0.312 to / ha to wheat respectively 6.872 to/ ha to corn. As regards soybeans in the same period provided a medium erosion protection, were lost on average annually 3.571 to / ha to soybeans 3.568 to / ha to beans, while Brome grass ensure the best erosion protection have lost on average annually 0.039 to / ha.

Obviously that is just simply by rotating crops on the same area average annual losses are much lower values reaching 2.872 to / ha which represents 35.90% of the maximum admissible value on year.

At the same time average rate of runoff is a low value 0.080, which indicate a good use even unusually rainfall thus reducing the appearance of torrentially phenomena.

Summarized as regards the erosion phenomenon and reducing the appearance of torrentially phenomena, Table 6, observed the effect of the structure and crop rotation on arable land erosion on the slope.

Tabelul nr. 6

Runoff (averaged over a period of 10 years 1995/2004)

Rotation	Erosion (to/ha)	Runoff coeficient
Wheat monoculture	0,312	0,048
Corn monoculture	6,872	0,112
Rotation for two years: Winter wheat / Corn	3,592	0,080
Rotation for three years: Winter wheat / Corn / Soybeans	4,011	0,093
Rotation for five years: Winter wheat / Corn / Beans / Soybeans / Brome grass	2,872	0,080

CONCLUSIONS

Crop rotations reduced by about 50% of soil losses monoculture compared to the corn that protects the very poor soil and runoff coefficients decrease by approximately 10% compared to the same culture, which indicate a potential reduction of the torrentially phenomena within river basins;

The agricultural system on slope land is conditioned by the structure and proper crop rotation;

Crops structure on slope land must be chosen based on two criteria: the erosion protection and level of production;

An adequate crops structure combined with a conservation crop systems reduce erosion and sediments effluence by 20%.

By complex works and measures for erosion protection unusually rainfall are better used, runoff is reduced by 11 - 30%.

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UNELE CARACTERISTICI MICROMORFOLOGICE ŞI MINERALOGICE ALE CERNOZIOMULUI DE LA CARACAL

SOME MICROMORPHOLOGICAL AND MINERALOGICAL CHARACTERISTICS OF THE CHERNOZEM FROM CARACAL

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Key words: micromorphology, mineralogy, Chernozem

SUMMARY

Caracteristicile fizice şi chimice ale solurilor favorizează adsorbţia unor poluanţi proveniţi de la diferiţi fertilizanţi chimici aplicaţi la sol, datorită, pe de o parte cantităţii şi calităţii argilei, iar pe de altă parte conţinutului de materie organică.

Lucrarea are ca scop prezentarea unor caracteristici micromorfologice ale cernoziomului cambic de la Caracal, respectiv organizarea spaţială a constituenţilor solului la diferite nivele ierarhice (asamblaje elementare şi plasmice), în directă legătură cu caracteristicile mineralogice, şi anume, cantitatea şi calitatea argilei coloidale.

Datele analitice arată un conţinut de argilă de 38,6% în orizontul de suprafaţă Ap (0-28cm) şi de 40,3% în orizontul Am (28-56cm). Cantitatea de materie organică este relativ mare în partea superioară a profilului de sol, având valori de la 3,28% în orizontul Ap la 3,04% în Am. Aceste valori evidenţiază o cantitate mare de plasmă prezentă în matricea solului, care, la nivel microscopic, este organizată în asamblaj elementar intertextic (în orizonturile Ap şi Am) şi intertextic-plectoamictic (în partea inferioară, mai tasată orizontul Ap). În ciuda predominanţei illitului în cadrul compoziţiei mineralogice a profilului, a fost observată o tendinţă de creştere a raportului illit/smectit în orizonturile studiate. Această tendinţă este reflectată şi de tipul de asamblaje plasmice, care, în orizontul Ap sunt predominant sillasepice-insepice, iar în Am apar şi cele in-schelsepice.

Caracteristicile micromorfologice şi mineralogice ale solului îi induc acestuia trăsături fizice şi chimice specifice.

The physical and chemical characteristics of soils favor the adsorption of some pollutants arising from different chemical fertilizers applied to soil, due to the quality and quantity of clay and organic matter.

This paper emphasized some micromorphological characteristics of the Cambic Chernozem from Caracal, the spatial organization of soil constituents at different hierarchical levels (elementary and plasmic fabric), directly connected with the soil mineralogy, clay quantity and quality respectively.

The data showed a clay content of 38.6% in the upper Ap horizon (0-28cm) and 40.3% in the lower Am horizon (28-56cm), of the maximum development of the plant roots. The organic matter content is high, either in the surface Ap horizon (3,28%), or deeper in the Am horizon (3,04%).

These values pointed out a high quantity of plasmic material in soil matrix, organized at microscopic level as intertextic elementary fabric (in Ap and Am horizons) and intertextic-plectoamictic (in the lower part of the Ap horizon).

Despite of the fact that clay mineralogical composition is dominated by illite, it can be observed an increase trend of the illite/smectite ratio in the surface horizons. The plasmic fabric reflects this trend, which are manly silla-insepic in Ap horizon and into Am horizon also appear the in-schelsepic fabrics.

The micromorphology and mineralogy of the studied soil induced its specific physical and chemical characteristics.

INTRODUCTION

All the soil functions are conditioned by the characteristics which are induced by clay minerals, the smallest constituents, with very high surfaces of reaction. The clay represent, undoubtedly, the most active part of the soil by their multiple ecological functions and influence either the ecological threat of the soil or its fertility. These minerals, together with the organic matter, carry on a substantial influence on the sorbtion-desorbtion processes, imposing the availability for the plants of the fertile or toxic elements.

In this respect, the quantitative or qualitative implication of the clay minerals on soil fertility represents a major objective of the researchs.

The physical and chemical characteristics of the soils, also favor the adsorption of some pollutants arising from the different chemical fertilizers applied to the soil, due to the quality and quantity of clay and organic matter. Thus, even in the researchers of foliar fertilization with mineral and organic substances, the characteristics of the soil are important indicators, which showed the pollution risk in the environment.

The paper emphasized some micromorphological characteristics of the Cambic Chernozem from Caracal, the spatial organization of soil constituents at different hierarchical levels (elementary and plasmic fabric), directly connected with the soil mineralogy, clay quantity and quality respectively.

MATERIALES AND METHODS

The studied soil was a Vermic Chernozem formed in loess like deposits, located in Caracal, the Southwestern part of Romania. The landscape is plane and the absolute altitude is 95 m. The climate is characterized by a mean annual temperature of 11.0^{o}C, a mean annual rainfall of 522 mm and an annual evapotranspiration potential of 698 mm. The natural vegetation is Quercus forest (*Quercus cerris*, *Q. frainetto*, *Q. pubescens*) and *Festuca valesiaca*, *Bothriochloa ischaemum*. The land use is arable (xxx, 1976).

For the micromorphological analysis, undisturbed soil were sampled, air drayed and impregnated with epoxidic resins. Thin sections (25 - 30 μm) have been prepared from the impregnated soil samples and studied with the Documator (20 X) and the optical microscope (50 - 500 X) in PPL (plaine polarised light) and XPL (cross polarised light). The Kubiena (1938), Brewer (1964) and Bullock (1985) terminology was used.

The mineralogical composition of the clay fraction < 2 μm were performed by the X ray diffraction, using the intensity of the diffraction lines characteristics for the identified clay minerals (Crăciun and Găță, 1986).

OBTAINED RESULTS

The micromorphological study analyzed the spatial ierarchical organization of the fine and coarse constituents of the soil into the elementary fabric, and further, the spatial organization of the colloids (clay domains) into the plasmic fabric of the Cambic Chernozem.

The mineralogical study focalized on the quantity and quality of clay minerals which are presents into the upper part of the soil profile (0-50cm), intensively explored by the plant roots, corresponding to the ***Ap*** (with two layers ***Ap_1*** and ***Ap_2***) and ***Am*** horizons.

The micromorphological study of the upper ***Ap_1*** layer of the soil, pointed out the presence of a matrix composed by the Fe-humic-clayey plasma (< 0.002 mm) and a high variety of scheleton grains (> 0.002 mm). The spatial organization of the soil matrix constituents (plasma and scheleton), called *elementary fabric*, is intertextic and locally granular.

The intertextic elementary fabric is, from the agricultural point of view, the best fabric, with the best spatial organization of the soil constituents (Răducu et al., 2002). The lower solubilization of the humic substances, as well as the durable connections wit the clay minerals, explained the higher stability of the structural aggregates and the pore walls in Mollisoils. This type of fabric formed due to the fact that the majority of the colloidal constituents are flocculated or in an insoluble estate.

The plasmic constituents are organized, into the intertextic fabric, as a porous groundmass of flocculated or crumbled colloids, or as intergranular bridges binding together the scheleton grains. The lax organization of the colloidal mass allowed preserving a porous space for a good aeration and soil solution circulation, and a high biological activity into the soil.

The *plasmic fabric* of the the upper Ap_1 layer is sillasepic and insepic. The presence of the mineral and organic „impurities” impede the optical orientation of the clay domains.

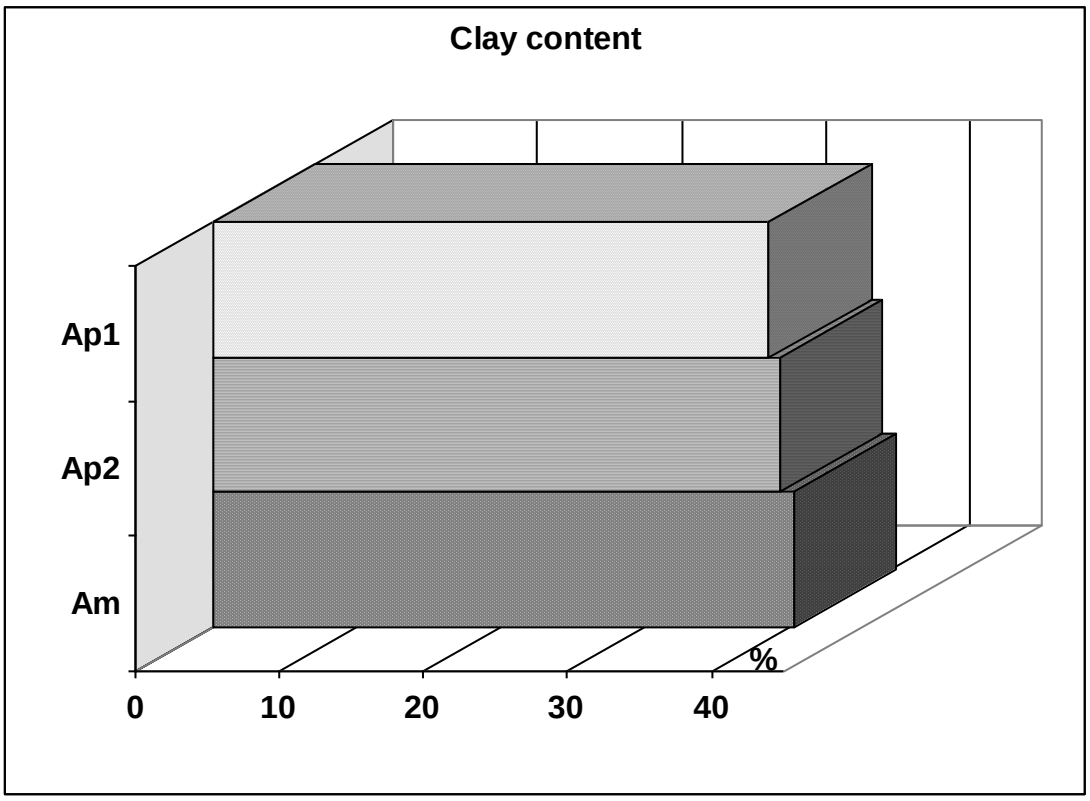

Fig. 1. The content of the clay (< 0,002 mm) in the upper horizons of the Cambic Chernozem.

The micromorphological image showed a uniform distribution of plasmic material into the matrix, emphasizing a high stability, due to the type of clay minerals, which is illite, in spite of the smectite (the most mobile clay fraction). The clay strongly connected with the organic constituents and are trapped together into the aggregates, giving the stability of the plasma.

The data showed 38,6% of clay content (Fig. 1) and 3,28% of organic matter in the Ap (0-28cm) horizon.

From the quantitative point of view, the mineralogical analysis detected, in the studied horizons, the same types of clay minerals (in the 2μ fraction): smectite (montmorillonite), illite and caolinite, with the illite prevalence, while, from the quantitative point of view, some differences appeared (Fig. 2). Despite of the fact that clay mineralogical composition is dominated, in all horizons by illite (Fig. 2), it can be observed an increase trend of the illite/smectite ratio in the surface Ap horizon, as a result either of a natural (bioaccumulation) or an anthropic (K fertilization) cause.

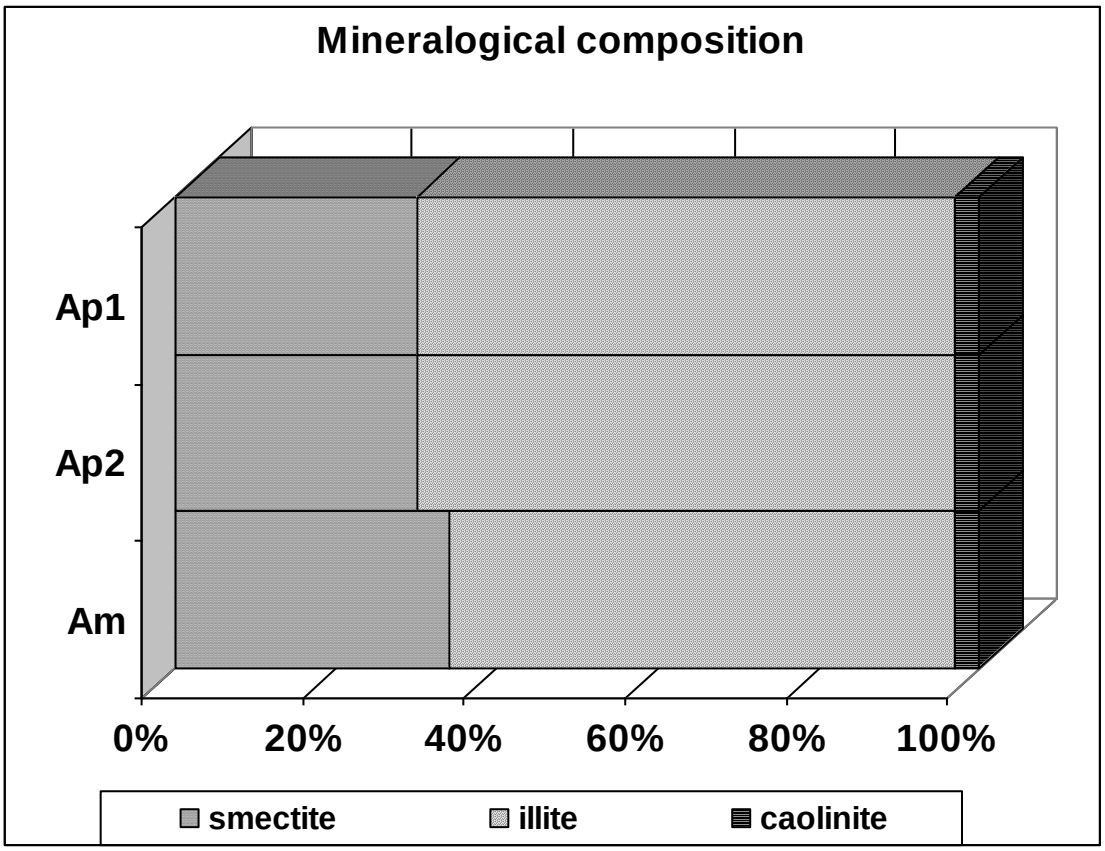

Fig. 2. The mineralogical composition of clay minerals (< 0,002 mm).

The illite dominance, highly influenced the spatial organization of the plasmic material, as well as the orientation of the clay domains, which is very low. The spatial organization of the soil constituents, further influenced the micro- and macrostructure types.

In the ***Ap_2*** layer, the soil is more compacted, and the elementary fabric is intertextic-plectoamictic. The plectoamictic fabric is more compacted than the intertextic fabric and the mineral grains are embedded in a peptized plasmic mass. The quantity and the quality of the clay are the same as in the Ap_1 surface layer (Fig. 1 şi 2).

The data of the **Am** horizon showed a small increase of the clay value (40,3%) comparing with the upper Ap horizon (Fig. 1), while the organic matter content is lower (3,04%). As a result, the elementary fabric is also intertextic and sporadically granular. The plasma is Fe-humic-clayey and formed silla-insepic plasmic fabric and locally in-schelsepic. A special characteristic of this horizon are the impure clay coatigs which appear sporadically on some pore walls.

In this hoizon the illite is also dominant, while the illite/smectite ratio have lower values (Fig. 2) comparing with the Ap horizon.

The mineralogical and micromorphological data showed the strongly connexion between the clay mineral and the organisation of the soil constituents at different ierarchical level: the type and the proportion of the colloids impose the type of the elementary and plasmic fabrics.

CONCLUSIONS

- ✓ From the micromorphological and the mineralogical point of view, the differences between the studied horizons were very small, either from the clay quality and quantity, or from the type of the spatial organisation.
- ✓ The soil constituents have a spatial ierarchical organisation: *1) elementary fabric* (*intertextic* în the Ap and Am horizons and plectoamictic in the more compacted Ap_2 layer); *2) plasmic fabric* (silla-insepic in Ap and Am horizons and localy in-schelsepic in Am horizon).
- ✓ The dominant clay type (illite) imposed the types of the ellementary and plasmic fabric.
- ✓ It was observed an increase trend of the illite/smectite ratio in the surface horizon, which could be a result either of a natural (bioaccumulation) or an anthropic (K fertilization) cause.

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INFLUENȚA UNOR DOZE DIFERITE DE AZOT PE FOND CONSTANT DE FOSFOR ASUPRA PRODUCȚIEI DE PORUMB PENTRU BOABE ÎN CONDIȚII DE IRIGARE ŞI LUCRARE DIFERITĂ A SOLULUI

THE INFLUENCE OF SEVERAL NITROGEN DOSES ON CONSTANT PHOSPHORUS BACKGROUND OVER THE CORN YIELD IN IRRIGATION CONDITION AND DIFFERENT TILLAGE

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Key words: nitrogen doses, tillage, corn yield, irrigation.

ABSTRACT

În lucrare se prezintă rezultatele de producție obținute la cultura de porumb pentru boabe în condiții de irigare, lucrare diferită a solului şi sub influența unor doze diferite de azot pe fond constant de fosfor.

Astfel, producțiile obținute s-au încadrat între 4510 şi 11127 kg/ha, după cum urmează:

- *între 5538 şi 11127 kg/ha atunci când lucrarea de bază a solului s-a realizat cu cizelul la 22-25 cm. adâncime, în funcție de nivelul de fertilizare;*
- *între 4510 şi 10243 kg/ha, când solul s-a lucrat cu plugul obişnuit la adâncimea de 22-25 cm., în funcție de sistemul de fertilizare;*
- *între 4620 şi 10457 kg/ha , când solul s-a lucrat cu cizelul la adâncimea de 8-10 cm. În acest caz se poate constata că valorile producțiilor medii sunt apropiate de cele obținute în variantele lucrate cu plugul obişnuit la aceeaşi fertilizare aplicată.*

The paper presents the results obtained with the grain corn crop in irrigation condition and different tillage and under the influence of several nitrogen doses on constant phosphorus background.

The grain corn crop gives constant and high yields when irrigated during the growing period yet when fertilized. Such way, the yields were as follows:

- *with the basis tillage by chisel at 22-25 cm depth there were recorded yields of 5,538 – 11,127 kg/ha in function of the fertilization level;*
- *with the normal plow at 22-25 cm there were obtained yields of 4,510 – 10,243 kg/ha;*
- *with the shallow tillage by chisel at 8-10 cm has given close yields to plow of 4,620-10,457 kg/ha.*

INTRODUCTION

Corn is one of the crops that as regard the water needs within the vegetation period and fertilizing give high and constant yields.

As regard the nutrition, the corn plant consumes high quantities of nitrogen and phosphorus and as a result, the applying of fertilizers is needed on all soil types.

The fertilizing give a good result if it well done along with the other farming measures that enhances the results of fertililizers (Mocanu R. and colab.)

The fertilizers increase the corn yield on all soil types, even they have a good fertility (Popescu C. and Popescu I., 1995).

The capitalization of the nutrients by the corn crop highly depends of the climat conditions. The corn yield is related by the moisture conditions depending of the distributing of the rainfall during the vegetation period as well as of irrigation.

The multiple using make the corn one of the most valuable crops nationally and worldwide.

MATERIAL AND METHOD

The polifactorial trial has been located on the argic chernozem from SCDA Caracal with the following crops in stationary rotation of three years: wheat – corn – sunflower.

The trial has had the following factors:

The A factor – irrigation

The B factor – tillage method with three graduations

- b1 – plowing at 22-25 cm + harrowing for corn and the seedbed preparation was made by two discing and one combinatory tillage.
- b2 – chisel at 22-25 cm + harrowing for corn and chisel at 8-10 cm + harrowing for seedbed preparation;
- b3 – chisel at 8-10 cm + harrowing.

The C factor – the nitrogen fertilization on a constant phosphorus background of P80 with 4 graduations:

- c1 – N0
- c2 – N70
- c3 – N140
- c4 – N210.

The vegetal debris were chopped and incorporated into the soil.

The experiment was set up using the subdivided plots methods.

The phosphorus fertilizers were applied every autumn (as simple superfosphate with 20& P_2O_5) before plowing and the nitrogen as ammonium nitrate with 33.5% nitrogen.

There was sown the Olt corn hybrid at 70 cm between rows and 70.000 plants per hectare, the seed was treated by Furadan, 28 liters per tone.

The soil is chernozem which has a moderate acid reaction in the arable layer, average supplied by nitrogen and high available phosphorus content. As regard the potassium content it is well supplied. The reserve of nutrients varies on the soil profile. There have been made two mechanical and one manual works. The harvesting was made manually and the yield was transformed in kg/ha at STAS moisture.

RESULTS

The calculation of the average corn yields in function of the researched factors (irrigation, tillage and fertilization) has shown that the plants respond differentiate to the farming researched measures.

- Irrigation

In the experimental conditions of SCDA Caracal when the water was given at 50% of AWC the yields for the three basis tillage have differ along with the fertilizer doses and climatic conditions.

In this manner, when plowing at 22-25 cm + harrowing, the corn yields have increased on fertilizer doses from 4,510 kg/ha with the control variant to 10,243 kg/ha with N210 dose, statistically significant (table 3, figure1.1).

The basis tillage made at 22-25 cm + harrowing has conducted to superior corn yields even in 2004 (difficult year for agriculture) with values of 5,538 to 11,127 kg/ha (table 3, figure1.2).

The soil preparation by chisel at 8-10 cm + harrowing has determined in between yields compared with the plowing and chisel at 22-25 cm yet close to plowing (in 2003 on four levels of nitrogen fertilization were even higher). The yields were between 4,620 and 10,457 kg/ha (table 3, figure 1.3).

- Concerning the tillage the average yields have recorded increasing when chisel was used at 22-25 cm + harrowing (7,039 kg/ha) and 8-10 cm + harrowing (6,619 kg/ha) over the usual plow at 22-25 cm + harrowing (6,533) - (table1).

Table 1

The influence of the tillage on the corn crop (average 2003 - 2005) - kg/ha

Tillage	Years			Average kg/ha	Diff. %	Diff. kg/ha	Sign.
	2003	2004	2005				
Plow 22 – 25 cm	3983	6691	8925	6533	100	0 (control)	
Chisel 22 – 25 cm	4409	6943	9766	7039	108	+ 506	
Chisel 8 – 10 cm	4370	6283	9203	6619	101	+ 86	

DL 5% = 575 Kg/ha
DL 1% = 953 Kg/ha
DL 0.1% = 1782 Kg/ha

- Regarding the nitrogen fertilization, the average yields have increased along with the increasing of the nitrogen doses from 5,171 kg/ha with the control variant to 6,308 kg/ha when 70 kg N/ha were applied, corresponding to 140 kg N/ha and 8,192 kg/ha with the maximum nitrogen dose, 210 kg/ha (table 2).

The values of the corn yields outputs were statistically ensured at 1 and 0.1%.

Table 2

The influence of the nitrogen fertilization on the corn crop yield (average 2003 - 2005) - kg/ha

Nitrogen doses	Years			Average kg/ha	Diff. %	Diff. kg/ha	Sign.
	2003	2004	2005				
N_0	2677	4726	8111	5171	100	0 (mt)	
N_{70}	3642	6328	8953	6308	122	+ 1137	x x
N_{140}	4938	7251	9492	7227	140	+ 2056	x x x
N_{210}	5760	8295	10520	8192	158	+ 3021	x x x

DL 5% = 607 Kg/ha
DL 1% = 919 Kg/ha
DL 0.1% = 1478 Kg/ha

CONCLUSIONS

1. When irrigated, the highest corn yields were obtained with chisel tillage at 22-25 cm + harrowing with all fertilization levels, from 5,538 to 11,127 kg/ha and then the plowing with yields reaching 4,510 to 10,243 kg/ha and the shallow tillage by chisel which was in between the previous two yet very closet o plowing (from 4,620 to 10,457 kg/ha).
2. The fertilization with different nitrogen doses has conducted to the obtaining of increasing yields along with the nitrogen doses.
3. The researching data indicates the replacing the plow with the chisel as shallow and better keeping tool, creating of a loosing layer of soil without capillarity that will prevent water lose and enhancing the soil capacity for rainfall water.

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Table 3

The influence of tillage and fertilization on constant phosphorus background in irrigation conditions (50% of AWC) on corn yield in 2003 – 2005 period

Tillage	Nitrogen fertilization	2003				2004				2005			
		Kg/ha	Relative value %	Dif. abs. Kg/ha	Signification	Kg/ha	Relative value %	Dif. abs. Kg/ha	Signification	Kg/ha	Relative value %	Dif. abs. Kg/ha	Signification
Plowing by plow 22-25 cm + harrowing	N_0	4510	100	0 (mt)		5313	100	0 (mt)		8057	100	0 (mt)	
	N_{70}	7210	160	+2700	xxx	7247	136	+1934	xxx	9078	113	+1021	xxx
	N_{140}	9560	212	+5059	xxx	8367	157	+3054	xxx	9427	117	+1370	xxx
	N_{210}	10140	225	+5630	xxx	9803	184	+4480	xxx	10243	127	+2186	xxx
Plowing by chisel la 22-25 cm + harrowing	N_0	5677	100	0 (mt)		5538	100	0 (mt)		8803	100	0 (mt)	
	N_{70}	6910	122	+1233	xxx	7377	133	+1839	xxx	9570	109	+767	xxx
	N_{140}	9920	175	+4243	xxx	8367	151	+2829	xxx	10667	121	+1864	xxx
	N_{210}	10450	184	+4773	xxx	9804	177	+4266	xxx	11127	126	+2324	xxx
Plowing by chisel	N_0	5590	100	0 (mt)		4620	100	0 (mt)		8333	100	0 (mt)	

la 8-10 cm + harrowing	N_{70}	6983	125	+1393	xxx	6840	148	+2220	xxx	9107	109	+774	xxx
	N_{140}	10010	179	+4420	xxx	7257	157	+2637	xxx	9583	115	+1250	xxx
	N_{210}	10390	186	+4800	xxx	9107	197	+4487	xxx	10457	125	+2124	xxx

DL 5% = 191 Kg/ha
DL 1% = 262 Kg/ha
DL 0.1% = 357 Kg/ha

DL 5% = 295 Kg/ha
DL 1% = 404 Kg/ha
DL 0.1% = 551 Kg/ha

DL 5% = 210 Kg/ha
DL 1% = 287 Kg/ha
DL 0.1% = 391 Kg/ha

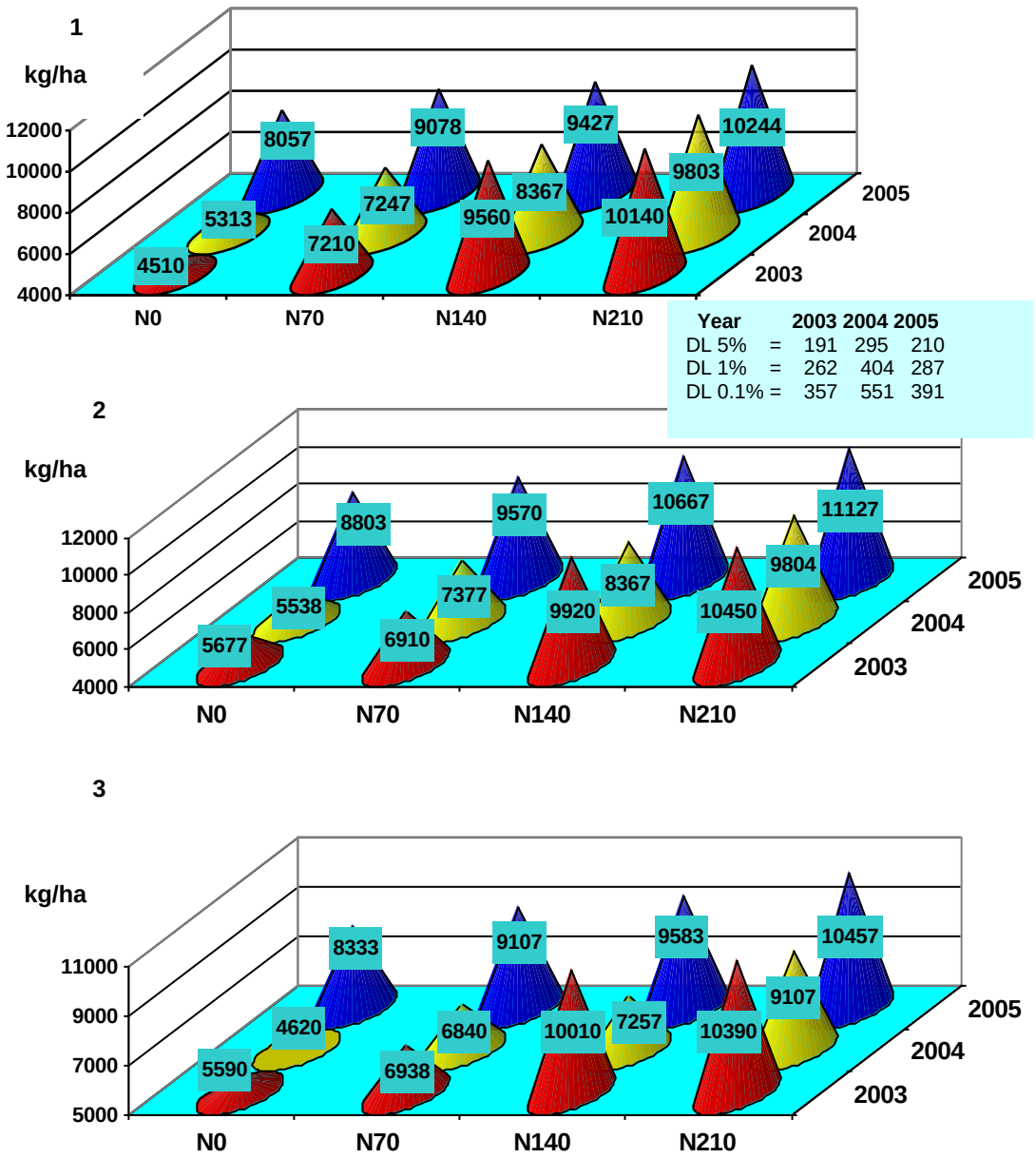

Figure 1. The influence of tillage and fertilization on constant phosphorus background of P80 in irrigation condition (50% of AWC) on the corn yield within 2003-2005 period.

1. **plowing by plow at 22 - 25 cm depth + harrowing;**
2. **plowing by chisel at 22 - 25 cm depth + harrowing;**
3. **plowing by chisel at 8 - 10 cm depth + harrowing.**

ASPECTE PRIVIND CAUZELE VARIATIILOR DE PH ALE UNUI PRELUVOSOL ROSCAT SUB INFLUENTA INGRASAMINTELOR CHIMICE

ASPECTS ON THE CAUSES OF THE PH VARIATIONS ON A REDDISH PRELUVOSOIL UNDER THE INFLUENCE OF CHEMICAL FERTILIZERS

Roşu Viorica, Mocanu R., Becherescu C.

ABSTRACT

Timp de patru ani, sub o cultură de grâu şi porumb, în asolament, s-au aplicat îngrăşăminte cu azot – uree, azotat de amoniu şi nitrocalcar (la aceeaşi doză de azot), îngrăşăminte cu fosfor – superfosfat simplu şi îngrăşăminte cu potasiu – sare potasică. La sfârşitul experimentărilor s-a constatat o scădere a pH – ului solului cu 2-9%. Ea se datorează condițiilor pedoclimatice şi a îngrăşămintelor folosite. Se dă explicația fenomenelor.

Abstract

During four years, under a wheat and corn crops, in rotation there were applied nitrogen fertilizers – urea, ammonium nitrate and nitrocalcar (with the same nitrogen dose), phosphorus fertilizers – simple superphosphate and potassium fertilizers – KCl. At the end of the experiment there was noticed a decrease of the soil pH by 2-9%. It is due to the soil and clime conditions and the fertilizers. There is given a comprehensive explanation of the phenomena.

MATERIAL AND METHOD

Within the 2004-2008 perioad at the Didactical Station of Banu Maracine – Craiova, on a reddish preluvosoil, there was alternativelly cropped corn, H5 Florencia hybrid and wheat, Dropia variety. These crops have been fertilized by simple nitrogen fertilizers in N120 kg/ha, KCl in 120 kg/ha dose and simple superphosphate in 72 kg/ha dose. There was determined the soil pH both before and after experiments.

RESULTS AND DISCUSSIONS

The experimental data are written in the table 1.

Table 1

The pH variations under the influence of applied fertilizers

#	The fertilizer type and dose	pH values		% pH f over pH i	pH variations	
		Initial pH_i	Final pH_f		Total: natural conditions + fertilizers	Partial: fertilizers only
1	Not fertilized control, Ctr	6.90	6.75	97.84	-2.16	0.00
2	Ammonium nitrate, N120	6.95	6.54	94.13	-5.87	-3.71
3	Urea, N120	6.88	6.27	91.06	-8.94	-6.78
4	Nitrocalcar, N120	6.74	6.39	94.77	-5.23	-3.07
5	KCl, 100 K2O	6.70	6.50	96.97	-3.03	-0.87
6	Simple superphosphate, 72 P2O5	6.52	6.39	98.05	-1.95	0.21

From the first table there can be noticed that, after finishing the researches:

- for the not fertilized variant, the pH decreases by 2.16%. This decrease represent the general tendency of acidifying of soils from SDE Banu Maracine in its the specific conditions;
- subtracting from the total pH (column 5) the value of the control pH of 2.16 equals the pH variation due only to fertilizers (column 6).

The variation of the soil pH under the influence of fertilizers is due to the physiological reaction of fertilizers. These are produced by two mechanisms: the microbiological oxidation of the nitrogen fertilizers and the selective uptake by the root of the nutrients in large, small and very small quantities of the primary macroelements (N, P, K), of the secondary macroelements (Ca, Mg, S) and microelements (Cu, Fe, Zn, Mn, Mo, B).

The microbiological oxidation of the ammonium ion that is catalyzed by the bacterial enzymes takes place after the following reactions:

$2NH_4^+ + 3O_2 = 2NO_2^- + 2H_2O + 4H^+$ (Nitrosomonas)

$2NO_2^- + O_2 = 2NO_3^-$ (Nitrobacter)

$2NH_4^+ + 4O_2 = 2NO_3^- + 2H_2O + 4H^+$

For the fertilizers that were used these reactions are:

$2NH_4NO_3 + 4O_2 = 4HNO_3 + 2H_2O$

$CO(NH_2)_2 + 4O_2 = 2HNO_3 + H_2CO_3$

The physiological acidity of the two fertilizers (Onudi, 1985) is of 0.84 kg $CaCO_3$/kg of urea and of 0.63 kg $CaCO_3$/kg of ammonium nitrate. The potassium chlorine (from KCl) acidifies the soil by preferential uptake of the potassium ion. Asigning the plant root by R, the selective uptake sketch can be represented as follows (Becherescu C., 1998; Mocanu R., 2007).

$$R\left|\begin{matrix}H^+\\HO^-\end{matrix}\right. + K^+Cl^- = R\left|\begin{matrix}K^+\\HO^-\end{matrix}\right. + H^+Cl^-$$

Solutia solului Acidifiere

Similarly, $CaHPO_4$ that is a minoritary component in the simple superphosphate or $CaCO_3$ from nitrocalcar forms into the soil $Ca(OH)_2$ and increases the soil pH. The nitrocalcar that was used in our experiments has 28% nitrogen and it has a physiological, calculated reaction of – 0.324 kg $CaCO_3$/kg of fertilizer.

Of the presented reaction there results that the number of moles of H^+, nH that is formed within the soil is 4n for urea, 2n for ammonium nitrate and 1 for KCL; where n = the number of K moles of pure fertilizer per hectare. This number can be calculated from the purity of fertilizers that is experimentally determined: 46.50% for urea; 34.50 %for N for the ammonium nitrate, 28% for nitrocalcar and 42.2% K_2O for KCl. There is a correlation between the H^+ ion quantity that has remained into the soil and the variation of the pH:

Fertilizer	K moles H^+	The variation of the pH, Δ pH
Urea	17.1428	-6.78
Ammonium nitrate	8.5712	-3.31
Nitrocalcar	6.8568	-3.07
KCl	2.1275	-0.87

Also, there is a correlation between the H^+ ion quantity that has remained into the soil and the pH variations.

The H^+ ion ratio	The pH variation ratio

$\frac{n_H urea}{n_H ammoniumnitrate} = \frac{17.1428}{8.5712} = 2.00$	$\frac{\Delta pHurea}{\Delta pHammoniumnitrate} = \frac{6.78}{3.31} = 2.04$
$\frac{n_H urea}{n_H nitrocalcar} = \frac{17.1428}{6.8568} = 2.50$	$\frac{\Delta pHurea}{\Delta pHnitrocalcar} = \frac{6.78}{3.07} = 2.21$
$\frac{n_H urea}{n_H KCl} = \frac{17.1428}{2.1275} = 8.08$	$\frac{\Delta pHurea}{\Delta pHKCl} = \frac{6.78}{0.87} = 7.79$

The presented data explains the mechanism of soil acidifying under the influence of fertilizers. The simple superphosphate has neutral physiological reaction. It has determined a decrease of soil pH, of +0.21% due to an increased content of $CaHPO_4$.

CONCLUSIONS

- after four years of experiments, with all variants, the soil pH decreases;
- the decreasing of pH for the nitrogen fertilizers and KCl is almost proportional with their physiological acidity;
- the simple superphosphate record a slow increase according with its neutral physiological reaction. As a whole, the pH value increases due to the influence of the soil and clime conditions.

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INFLUENȚA MODULUI DE FOLOSINȚĂ ŞI A SISTEMULUI DE LUCRARE ASUPRA PROPRIETĂȚILOR SOLULUI

INFLUENCE OF SOIL USAGE AND SOIL TILLAGE SYSTEM ON SOIL PROPERTIES

T. Rusu, P. Gus, Ileana Bogdan, Paula Ioana Moraru, A. Pop

Keywords: soil usage, soil tillage, soil properties

ABSTRACT

Caracteristicile solului se află într-o stare de echilibru relativ cu mediul înconjurător dar prin luarea în culturã a terenurilor agricole se influențează direcția de evoluție şi reproducerea fertilității solului sau dimpotrivă degradarea acestuia. Lucrarea prezintă evoluția proprietăților preluvosolului vertic prin utilizarea ca arabil (prin sistemul convențional de lucrare a solului) timp de 40 de ani (1960-2000), comparativ cu profilul solului folosit ca fâneață, din acelaşi teritoriu ecologic omogen. Modificările determinate la terenul arabil, comparativ cu folosința fâneață, constau în diferențierea morfologică a profilului de sol, accentuarea diferențierii texturale (indicele de diferențiere texturală creşte de la 1,12 la 1,20), scăderea hidrostabilității structurale de 69,7-85,0% la 58,6-63,3% pe adâncimea 0-30 cm, diminuarea rezervei de humus de la 151 t/ha la 134 t/ha (0-50 cm), creşterea tasării solului şi accentuarea fenomenului de pseudogleizare în orizontul A/Bw.

Cercetările efectuate urmăresc apoi modificarea proprietăților solului arabil prin aplicarea timp de 5 ani (2001-2005) a 4 sisteme de lucrare a solului (convențional, paraplow, cizel, grapă rotativă). Aplicarea sistemelor minime de lucrare a solului determină creşterea conținutului de humus şi creşterea stabilității hidrice a macroagregatelor solului cu 4,7-13,6%, pe adâncimea 0-30 cm, față de sistemul clasic.

The soil features are in relatively balance estate with the environment, but, the agricultural working of the fields influences the evolution pattern, soil fertility or soil degradation. The present paper presents the evolution of haplic luvisols vertic in its 40 years (1960-2000) use as arable soil (with conventional working system), in comparison with its profile in hay field use, within the same ecologically homogenous terrain. The changes observed on the arable field, compared with those observed in hay field, are: morphological differentiation of soil profile, profound texture differentiation (the texture differentiation index increase from 1.12 to 1.2), structural hydro stability decrease from 69.7-85% to 58.6-63.3% on 0-30 cm depth, decrease of humus reserve from 151 t/ha to 134 t/ha (0-50 cm), increase of soil compaction and increase of pseudo-gleization phenomena in A/Bw horizon.

The researches follow then the changes of arable soil properties by a 5 years application (2001-2005) of 4 working systems of soil (conventional, paraplow, chisel plow and rotary harrow). The appliance of minimum tillage systems determine an increasing of the humus content and an increasing of the hydro stabile aggregates content with 4.7-13.6% on 0-30 cm depth towards the classical system.

INTRODUCTION

Soil – the result of pedogenetic factors actions (which determines the physical, chemical and biological features), modifies in time both under natural factors and cultivation technologies influence. The cultivation technologies amplify or diminish the changes in the soil variable features, leading to disturbances of the specific equilibrium. When thinking of ensuring the optimum demands for growth and development of cultivated plants, one must relate to the local effects that the cultivation technology might have on

soil. Any intervention on soil has to be linked to soil properties, based on the known fact that the soil is a system that functions well only in certain limits.

The national speciality literature (Miclăuş, 1970; Chiriță, 1974; Canarache, 1990; Florea, 1994, 1997, 2003; Miclăuş et al., 1995; Neamțu, 1996; Rusu, 2001; Guş et al., 2004) and the foreign one (Duchaufour, 1994; Ursu, 1994; Nour et al., 2004) often refers to the changes that occur under the influence of use pathway: forest, grassland, arable. It was shown that installing grassland instead of forest, leads to an increase of soil natural fertility. The second hardening – after forest disappearance – induces qualitative changes like: improve soil reaction, structure and nature of humus (enriching in huminic acids) the term progradation being often used.

The subsequent use of these soils as arable ones induces onto soil several techno-genetic pressures more and more obvious. It is a complicated matter to appreciate how much the transformation degree and the sense of these changes – positive or negative – can affect the following evolution of arable soils. These soils show recent solification processes, another energy balance compared to virgin soils, due to different inputs and outputs. The literature is contradictory in presenting the directions towards the cultivation technologies lead, every direction being consequence of the geographic area, cultivated specie, level of development and used agriculture management.

The long use of soils in conventional agriculture, which was intensive and excessively subjected to mechanical and chemical treatment, has its contribution to their degradation: the structure is damaged, the humus content falls, the soil became acid, the compaction grows, the permeability is reduced etc. On the other hand, the correct use of fertilisers, amendments and other agrotechnical and pedologic measures can improve the fertility indices of arable soils, with positive effects. The influence of cultivation on soils is undisputable, but id differentiated by the type and intensity of applied technology.

MATERIAL AND METHODS

The studies were done within the University of Agricultural Sciences and Veterinary Medicine in Cluj Napoca, on a north exposure slope, with a weak to moderate inclination (5-7% slope angle), having ground water deeper then 10 m from lithological point of view, the terrain belong to Sarmation stage, with gravel strata of river origin among bloating clays. The soil is a vertic preluvosoil (STRS, 2003), with an arable horizon of 25-30 cm. The profile of the arable soil is: Ap-A/Bw-Btyw-Bty-B/C-C. The profile of hardened soil is: Atel-Ao-A/B-Btyw-B/C-C. The description of soil profiles was done according to the 2003 Romanian Taxonomy System and the 1987 ICPA methodology. These areas were was our research presents a medium multi annual temperature of 8.2^0C medium of multi annual rain drowns: 613 mm**.**

The experimental soil tillage systems were as follows (2001-2005):

Classic system: V_1 *– classic plough + disc –2x*

Minimum tillage systems: V_2 *– paraplow + rotary harrow*

V_3 *– chisel plow + rotary harrow*

V_4 *– rotary harrow*

To quantify the change in soil properties under different tillage practices, determinations were made for each cultivar (maize - *Zea mays* L., soy-bean - *Glycine hispida* L. Merr., wheat - *Triticum aestivum* L.) in four vegetative stages (spring, 5-6 leaves, bean forming, harvest). Soil parameters monitored included soil water content (gravimetric method), soil bulk density (determined by volumetric ring method using the volume of a ring 100 cm^3), water stable aggregates (Czeratzki method), soil permeability (using the Infiltrometer method) and humus content (Walkley-Black method, year 2005). The average result values, obtained in the vegetal phases were statistically processed,

taking into consideration the last three cultivation years within the crop rotation. The results were statistically analysed by ANOVA and Duncan's test (PoliFact, 2002). A significance level of $P \leq 0.05$ was established a priori.

RESULTS AND DISCUSSION

After a comparative analysis of arable and hardened soil belonging to the grassland use, it can be observed the change in morphological properties. In the stratum worked with agricultural machines, an Ap horizon is developing in 22-28 cm depth, with uniform colour, with a structure and settlement different from the grassland use. The clay illuviation phenomena is present in both profiles and determines formation of thin layers of illuviated clay on the surface of structure elements belonging to A/B and Btyw horizons. Also is observed a differentiation in hydromorphism intensity. The pseudogleization, which is caused by rain water infiltration and stagnation in impermeable horizons, is manifested starting with the A/Bw horizon and continues with Btyw horizon from the arable soil, while in the hardened soil, this phenomenon is observed exclusively in the Btyw horizon. In the lower part of the soil profile, starting with the Btyw horizon, it cannot be observed differences of morphological type.

The soil structure (and of course the features depending on it), as and morphologic index which characterize different genetic types of soil (its horizons) is different for the grassland soil, showing superiority as form and size. The evolution of the grassland soil structure and its better shape contributes to framing this type of soil in the class of moderate vulnerable soils, susceptible to degradation processes (because of the moderate fragility, lack of calcium carbonate and low content of humus – all found in the haplic luvisols from the Cluj hilly area). The degradation observed on arable profile is in fact a modification of aggregates form, meaning apparition of edges and angles, thick settlement, increase of dusty material content – which under rain drops action is getting muddy, passing through several steps of plasticity and finally, after drying, getting hard and cracking, giving birth to cracks of 4-5(8) cm size. The soil structure is different especially in the superior horizons in both profiles, namely middle-big granulous for the hardened soil and small-middle granulous for the arable soil. The lab analysis for hydro stability of soil macrostructure (HS, %; table 1, year 2000) in the two soil use ways shows a greater degree of hydro stability in Atel (85%) and Ao (72.5%) horizons, compared to Ap (58.6%) horizon. The weak bond between physical particles of soil is related to the smaller humus content (the main bonding material) in the arable stratum. On 0-50 cm depth it can be observed a greater reserve of humus, namely 151 t/ha for grassland and falling to 134 t/ha for arable soil.

Soil reaction is another feature that changes significantly on soil profile because of the cultivation technologies. It can be observed a fall in the pH of arable soil with 0.03-0.07 units in the 0-20 cm depth and an increase with 0.52-0.87 units in Btyw horizon (30-70 cm). The base saturation degree (V%) presents similar changes, in direct relation with soil pH.

The soil supply with nitrogen is influenced by the agro-technical measures; large amounts of nitrogen were registered on the arable field, as a consequence of fertilisers. The increase of soil reaction in the sub-arable stratum (30-70 cm depth) is possibly due to the fall of humus content and C/N ratio in the arable soil, caused by a strong mineralization. The Ca ions, resulted in the mineralization of organic substances within the worked horizon, levigate on the soil profile ending in horizon Btyw. In the same time, the intense evapo-transpiration process within the soil that remains uncovered by vegetation, and also the ascension of carbonates from the profile base towards the middle, can be another cause for changes in pH and increase of saturation degree in this horizon of

arable soil. Some differences are registered in total phosphorous supply. Thus, the hardened soil is characterized by a small-extremely small supply of mobile P, and the arable soil has a better supply caused by the applied fertilisers during agricultural technologies.

The observations made show an intensification of texture differentiation in arable soil (where the texture differentiation index – Idt – is 1.2 compared to 1.12 for the hardened soil). The literature confirms that this stratification of arable soil profile is owed to physical, chemical and biological changes that occur. The decrease of clay content and increase of dust content in the worked superior horizon leads to a reduced possibility to form structural aggregates.

The settlement of sol, expressed through bulk density (BD, g/cm^3) and total porosity (PT, %), changes by way of use. Thus, while in the grassland soil these values are specific to the soil type, in the arable field, the BD values registered in the autumn, after harvesting are bigger, both in the arable and sub-arable strata, a slight compaction being observed. The total porosity is decreasing in the Ao horizon from 49-53% to 48% in Ap horizon.

Table 1

Evolution of the vertic haplic luvisols properties in arable and hayfield use ways

Use / Depth, cm		pH (H_2O)	Humus, %	N total, %	P mobile, ppm	V, %	Clay %	Idt	HS, %	BD, g/cm^3	PT, %
ARABLE	0-10	5.17	2.70	0.245	16	71	41.95	1.20	58.6	1.39	48
	10-20	5.19	2.78	0.264	17	71	40.25		63.3	1.40	48
	20-30	5.26	2.21	0.215	6	74	40.55		62.5	1.43	47
	30-50	6.21	1.35	0.178	2	90	40.30		-	1.42	47
	50-70	6.37	-	-	-	92	47.85		-	1.46	46
	70-120	5.82	-	-	-	90	49.30		-	-	-
H AYFIELD	0-10	5.20	3.91	0.231	2	81	47.35	1.12	85.0	1.27	53
	10-20	5.26	3.86	0.233	2	81	47.65		72.5	1.37	49
	20-30	5.80	2.44	0.214	1	88	49.10		69.7	1.39	48
	30-50	5.69	1.00	0.194	0.9	90	53.05		-	1.40	48
	50-70	5.60	-	-	-	87	48.00		-	1.43	43
	70-120	5.70	-	-	-	89	47.95		-	-	-

Long-term field experiments provide excellent opportunities to quantify the long-term effects of soil tillage systems on soil structure, humus and water conservation. Intrinsic soil properties such as humus content and texture, along with applied tillage practices combine to modify the soil structure, porosity, permeability and water capacity. The results clearly demonstrate that minimum tillage systems promote increased humus content (13.9-22.1%) (Table 2) and increased hydro-stabile aggregate content (4.7-13.6%) at the 0-30 cm depth compared to conventional tillage. The increase of organic matter content and humus content is due to the vegetal remnants partially incorporated and adequate biological activity in this system. The soil fertility and hydro stability of the macro-aggregates were initially low, the effect being the conservation of the soil features and also their reconstruction, with a positive influence upon the permeability of the soil for water. More aggregated soils permit more water to reach the root zone. This not only increases productivity, it may also reduce runoff, and thus erodibility potential.

Table 2.

The influence of soil tillage system upon humus content (H., %; 0-30 cm), water stability of structural macro-aggregates (W.S.A, %; 0-30 cm), bulk density (B.D., g/cm^3, 0-50 cm) and water supply accumulated in soil (W, m^3/ha; 0-50 cm)

Soil tillage systems	Classic plough + disc –2x	Paraplow + rotary harrow	Chisel plow + rotary harrow	Rotary harrow
Humus, %	2.48 a	2.94 ab	3.02 b	2.82 ab
Signification (%)	$^{wt.}$(100)	*(118.6)	*(122.1)	^{ns}(113.9)
W.S.A., %	63.67 a	68.33 b	66.67 ab	72.33 c
Signification (%)	$^{wt.}$ (100)	* (107.3)	*(104.7)	**(113.6)
B.D., g/cm^3	1.32 a	1.35 a	1.34 a	1.35 a
Signification (%)	$^{wt.}$ (100)	^{ns}(102.4)	^{ns}(101.7)	^{ns}(102.4)
W, m^3/ha	850 a	901 b	870 a	859 a
Signification (%)	$^{wt.}$ (100)	*(106.0)	^{ns}(102.3)	^{ns}(101.0)

Note: wt – witness, ns – not significant, * signification positives, ^{0} signification negatives, a, ab, b, c - Duncan's classification.

On haplic luvisols, a soil with a moderately developed structure and average fertility, the quantity of water accumulated was 1-6% higher under paraplow (b), chisel plow and rotary harrow tillage, compared to conventional tillage. The minimum soil tillage systems and the replacement of ploughing by paraplow, chisel and rotary harrow work minimise soil aeration. The bulk density values at 0-50 cm increased by 1.7-2.4% under minimum tillage systems. This raise was not significant in any of the experimental variants. Multiple comparing and classification of experimental variants align all values on the same level of significance (a). Soil infiltration and soil water retention are higher when working with paraplow and chisel plow variant with values of 5.54 (c) and 5.08 (b) l/m^2/min, respectively (Fig. 1). By contrast, the amount of water retained by traditional tillage was 4.25 (a) l/m^2/min. The paraplow and chisel plow treatments were more favourable for infiltration and water retention. Positive effects on the saturated hydraulic conductivity of the paraplow (35.7 cm/h) and chisel plow (31.5 cm/h) treated soils were observed compared with the traditional tillage (29.4 cm/h) of the soil.

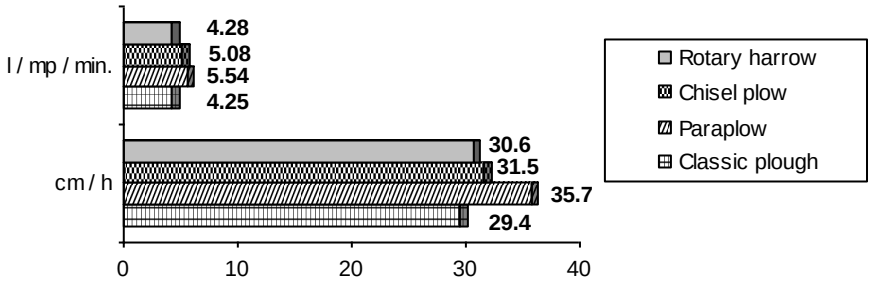

Fig. 1. **The influence of soil tillage system upon soil permeability**

CONCLUSIONS

By comparative analysis of evolution of variable features in vertic haplic luvisols from Cluj hilly area, both in arable and natural grassland use, it can be observed modifications on soil profile, in the arable and sub-arable strata, with more intensity in first 20-25 cm. The modifications registered in arable field can be synthesized as follows:

1. The worked stratum (Ap) has a different structure and settlement compared to hayfield field. Also, the size of structural aggregates and the hydro stability are reduced in comparison to those in hayfield: the hydro stability decrease from 85% to 58.6% on 0-10

cm depth and from 72.5% to 63.3% on 10-20 cm depth; the same effect can be observed also in the 20-30 cm depth where the decrease is from 69.7% to 62.5%.

2. The texture differentiation is intensified, the texture differentiation index grows from 1.12 to 1.2. The pseudogleization phenomenon is accentuated in A/Bw horizon.

3. The drop of humus reserve in the first 50 cm of depth, 151 t/ha in the grassland profile compared to 134 t/ha in the arable profile, is a consequence of intensifying the mineralization processes. A slight soil compaction is observed in the arable and sub-arable horizons, showed by the increase of bulk density from 1.27-1.43 g/cm^3 to 1.39-1.46 g/cm^3

4. pH drops in the Ap horizon from 5.20 to 5.17 and rise in the sub-arable horizon with 0.52 units. The P supply increase in the Ap horizon from 2 to 16-17 ppm as a result of fertilisers' application.

The appliance of minimum tillage systems determine an increasing of the humus content and an increasing of the hydro stabile aggregates content with 4.7-13.6% on 0-30 cm depth towards the classical system. Minimum tillage, with or without straw, resulted in enhanced soil moisture conservation and moisture availability during crop growth. Availability of soil moisture during the crop growth resulted in better plant water status.

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VARIABILITY OF SOME SOIL PROPERTIES RELATED TO SOIL CONSERVATION FOR A SWELL-SHRINK SOIL FROM SOUTHERN ROMANIA

VARIABILITATEA UNOR PROPRIETATI ALE SOLURILE GONFLANTE DIN SUDUL ROMANIEI LEGATE DE CONSERVAREA SOLULUI

I. Seceleanu, Cr. Paltineanu, V. Mocanu, S. Dumitru, V. Cotet

Keywords: vertisol, fine sand content, clay content, humus content.

ABSTRACT

Variabilitatea spațială a ecosistemelor este dependentă de modificarea unuia sau mai multor factori pedogenetici. În cartarea solurilor, omogenitatea unităților cartografice de sol este esențială pentru delimitarea acestora.

În acest studiu, obiectivul este prezentarea microvariabilității spațiale a unor proprietăți ale solului, cum ar fi alcătuirea granulometrică, respectiv conținutul de nisip fin şi de argilă, sau conținutul de humus aparținând solurilor formate pe argile gonflante din partea de sud a României şi evidențierea caracteristicilor geostatistice ale acestor soluri. Pentru a prezenta variația spațială a proprietăților solului la diferite adâncimi, a fost folosită metoda kriging. Pe baza abordării metodelor statistice şi geostatistice de abordare a insuşirilor fiecărei solului pe diferite adâncimi, lucrarea pune în discuție trăsăturile specifice ale vertosolului studiat, legat de conservarea resurselor de sol din partea de sud a României, din Podişul Getic şi partea centrală a Câmpiei Române.

The spatial variability of the eco-systems changes with modification of one or more pedo-genetic factors. In soil survey, the homogeneity of soil mapping units is essential for high-quality delimitation. This study has the objective of showing the spatial micro-variability of some soil properties like particle-size distribution fractions, i.e. the fine sand content and clay content, as well as the humus content, for a swell-shrink soil of southern Romania and to find the soil geo-statistical characteristics. For this study a 3-m square-shaped soil profile was performed to a 2-m depth. Measurements were taken on transects in a systematic manner in four directions represented by the square sizes. So, soil samples were collected from each soil horizon from the four transects. Six vertical sampling sections per square side were carried out. Each sampling section was spaced 50 cm apart along each square side. The depths were the followings: 0-10; 20-30; 35-45; 80-90; 95-105; 115-125; 135-145; 165-175; 185-195 cm. Semi-variograms and autocorrelation coefficients were calculated for each depth and showed. From the genetic view point this vertisol still seems to be active. The depth of each soil horizon and the other soil properties studied are variable along transects, while the coefficient of variation (CV) presents values that are lower than 15% for both the fine sand content and clay content. However, the humus content shows superior CV values. In the semivariograms the range was found to be approximately 100 – 150 cm for the particle size distribution fractions for some depths, and the semivariance was as a white noise for others. In order to show the spatial variation of the soil properties at various depths, the kriging method has been used, Surfer Program. Based on both statistical and geostatistical approach of each soil depth, the paper discusses the specific features of the vertisol studied related to the conservation of soil resources in the Getical Plateau and central part of the Danube Plain in southern Romania.

INTRODUCTION

The spatial variability of the eco-systems changes with modification of one or more pedo-genetic factors. In soil survey, the homogeneity of soil mapping units is essential for high-quality delimitation. It has been generally considered that with increasing in soil profile density, the separated soil mapping units uniformity increases together with the precision of soil mapping. This is true especially in the case of the same trend of variation for other environmental elements influencing soil formation. Studies on soil classification and survey using properties defining variability were carried out worldwide (e.g. Webster and Butler, 1976; Webster and Burgess, 1984). In Romania, soil variability studies were done especially at larger scales (Paltineanu and Hianu, 1997), but small-scale studies investigating dimensions of the representative elementary volume (REV) were scarcely performed.

The objective of this study was to show the spatial micro-variability of some soil properties like particle-size distribution fractions, i.e. the fine sand content and clay content, as well as the humus content, for a swell-shrink heavy-clay soil of southern Romania, and to find the soil geo-statistical characteristics.

MATERIAL AND METHOD

For this study a 3-m square-shaped soil profile was performed to a 2-m depth in a swell – shrink, heavy-clay Typical Vertisol (Vertic Chernozem in FAO, ISRIC, 1998; Vertic Hapludolls in Soil Taxonomy, 1999) located in Dobrotesti, southern Romania, in an arable land use plot. The soil was previously described in detail by Seceleanu et al. (1992).

Swell-shrink heavy clay soils are located specifically in the southern part as well as western part of Romania. The particle size distribution in the case of these soils usually shows values higher than 45 %g/g and mainly between 50 and 60% g/g for the clay content which has a particle diameter smaller than 0.002 mm.

Measurements were taken on transects in a systematic manner in four directions represented by the square sizes of the soil profile. So, soil samples were collected from each genetically-formed soil horizon from the four transects.

Six vertical sampling sections per square side were carried out. Each sampling section was spaced 50 cm apart along each square side. The depths were the followings: 0-10; 20-30; 35-45; 80-90; 95-105; 115-125; 135-145; 165-175; 185-195 cm.

Semi-variograms and autocorrelation coefficients were calculated for each depth for the fine sand content, clay content and humus content. It is worth to mention here that the coarse sand content of these soils was practically nil, and the silt content varied essentially between 20 and 30 %g/g. The extreme particle size distribution factors, i.e. the sand and clay content were shown in this study as they were considered the most important in soil classification. Horizontal isolines of these three soil characteristics were obtained by kriging (Cressie, 1990; Deutsch and Journel, 1992) using the SURFER Program (Surfer 8 Program, Surface Mapping System, Golden Software Inc 2002).

All the soil properties studied here were processed to produce statistical parameters which were then compared to reveal soil characteristics.

RESULTS AND DISCUSSIONS

3.1 Statistical parameters of the soil properties studied

From the genetic point of view, this swell-shrink soil still seems to be active. The depth of each soil horizon and the other soil properties studied are variable along transects (Table 1). However, the coefficient of variation (CV, %) for the dimensions of horizons was below 10%, with the maximum value (about 9%) for the Ao horizon within the topsoil, and the other ones with figures below 6.5%.

Table 1.
Soil horizons and depths (cm) of the Typical Vertisol of southern Romania in the four transects studied

Soil horizons	Ap	Ao	ABy	By	BCy	Cca
Soil depth (cm)	19.5	15.2	14.5	70.8	17.2	62.8
Cumulative depth (cm)	19.5	34.7	49.2	120.0	137.2	200.0
Standard deviation (cm)	1.3	3.3	2.3	5.4	8.6	10.5
Coefficient of variation (%)	6.5	9.4	4.7	4.5	6.2	5,3

We tried to see how big the order of magnitude for these parameters and the range within each genetically-determined soil horizon were. The first of the three physical soil properties studied here was the fine sand content. It was found that, on average, the fine sand soil content across the soil profile ranged between 22 and 27% g/g, with a minimum of 19.4% in the subsoil and a maximum of 34.1% in topsoil, Table 2. CV for all the soil horizons ranged between 5% and 13.5%, generally with the highest values in the topsoil.

The soil clay content (particle size-distribution < 2 μm) varied from 44 – 48 % g/g in the topsoil to around 50 – 51 % g/g deeper in the first 100 cm soil depth and decreased slowly to 49 %g/g down to the subsoil (Table 2). As shown, only a very small amount of the soil clay content migrated from topsoil to ABy, By1 and By 2 horizons, while the other horizons deeper in the subsoil had a constant clay content value of 49% g/g.

This soil clay content which determines the most important soil physical properties in the case of vertisols showed the lowest CV between the soil horizons.

The humus content of the soil ranged from 3.5% g/g in the topsoil to 1.7% g/g around the depth of 1.0 m, while in the second 100 cm depth the humus content value varied between 1.3 and 0.7% g/g (Table 2). Thus, from all the properties approached the humus content showed the highest CV values that ranged from about 8% to 22% g/g.

3.2 Geostatistical approach

The semi-variograms for the three soil properties discussed are shown in figure 1 for the first four horizons. In this semi-variogram, the range was found to be approximately 100 – 150 cm for the particle size distribution fractions of the soil fine sand content, clay content and humus content, respectively, for some depths, and the semivariance was as a white noise for others. Consequently, REV in such soils might be a cube having a side of 1 m to 1.5 m, but this is only a rough estimate that could be further discussed.

In order to show the spatial variation of the soil properties at various depths, the kriging method has been used, Surfer Program, figure 2 through 7.

Figure 2 shows the spatial variability for the soil fine sand content within horizon A. The horizon showing the highest values is the topsoil and ranges from 22.2 % to 34.1 %g/g with an average of 27.3% g/g and a CV of 12% g/g (as shown in Table 2). The other horizons show a similar isoline density and implicitly a similar spatial structure of this indicator within the vertisol studied; however, the spatial variability decreases deeper in the soil profile (figure 3) and this is much lower in the By1 horizon. This could be explained by the fact that more mixtures in soils usually occur at the soil surface.

Table 2.

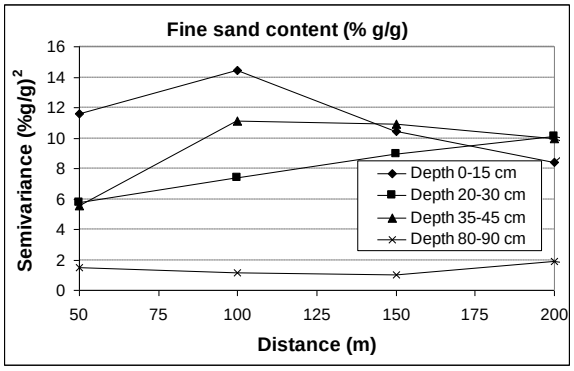
Statistical parameters of some soil properties (%g/g) studied for the Typical Vertisol of southern Romania in the four transects studied

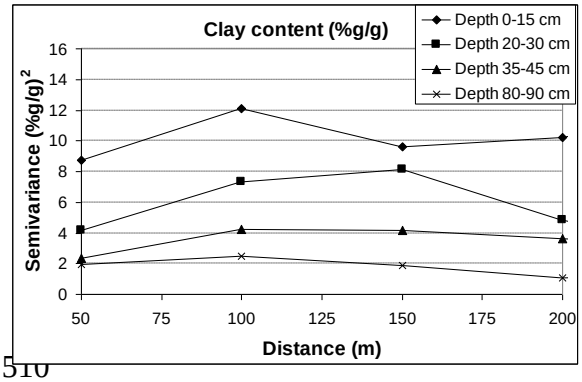
Soil horizon		Ap	Ao	ABy	By1	By2	By3	BC	Cca1	Cca2
Depth of soil sample (cm)	Values	0-15	20-30	35-45	80-90	90-105	115-125	130-145	160-175	185-200
Fine sand content	Maximum	34.1	31.6	28.5	24.9	27.7	31.2	27.3	26.7	29.0
	Minimum	22.2	19.5	17.5	20.3	21.3	21.7	22.7	19.4	20.3
	Average	27.3	24.9	22.6	22.7	23.7	25.9	25.0	23.3	24.1
	St. deviation	3.4	3.4	3.0	1.1	1.8	2.9	1.4	2.0	2.2
	Coefficient of variation (%)	12.4	13.5	13.3	5.0	7.4	11.1	5.5	8.6	9.3
Clay content	Maximum	53.0	52.8	54.4	53.8	54.6	50.9	50.2	53.5	51.8
	Minimum	40.3	44.7	47.7	47.7	47.4	43.6	46.8	47.2	46.1
	Average	44.1	48.5	51.3	51.1	50.6	48.6	48.7	49.4	49.0
	St. deviation	2.8	2.4	1.8	1.5	1.5	1.8	0.8	1.6	1.6
	Coefficient of variation (%)	6.4	5.0	3.4	2.9	3.0	3.8	1.7	3.3	3.2
Humus content	Maximum	4.25	3.12	2.33	2.03	1.79	1.43	0.98	1.13	0.89
	Minimum	1.51	1.27	1.75	1.39	0.81	0.71	0.63	0.66	0.65
	Average	3.50	2.40	2.00	1.70	1.30	1.00	0.80	0.80	0.70
	St. deviation	0.7	0.4	0.2	0.2	0.3	0.2	0.1	0.1	0.1
	Coefficient of variation (%)	19.0	17.4	7.8	10.9	20.0	21.7	12.4	15.2	8.6

The same aspects of spatial variability within the four horizons, this time for the soil clay content, can be seen in figure 4 and 5. The clay content increases from the topsoil to the deeper horizons and the last two horizons, ABy and By1, have almost the same value (51% g/g, as already shown in Table 2). It is also apparent here that the soil clay content has a similar spatial structure in the By1 horizon as shown for the fine sand content.

The discussions on the possible effects due to this high spatial variability of the particle size distribution could be multiple. This variability could arise either from the geological heterogeneity of the soil parental material or from the soil evolution. One might also mention here the presence of the gilgai relief in such soils, specifically in pastures or other undisturbed land uses. In the same time Romanian swell-shrink heavy clay soils also show horizontal heterogeneity for other soil properties, e.g. the intensity of the pseudogleyzation within the soil profile and various values of the soil hydraulic conductivity.

The soil humus content presents a higher spatial variability within the first two horizons where its source, the major part of the plant roots exists. Unlike the Ap and Ao horizons, ABy and By1 show a lower spatial variability and a dramatic decrease in the humus content is noted from the topsoil to the deeper soil horizons (figure 6 and 7, and Table 2).





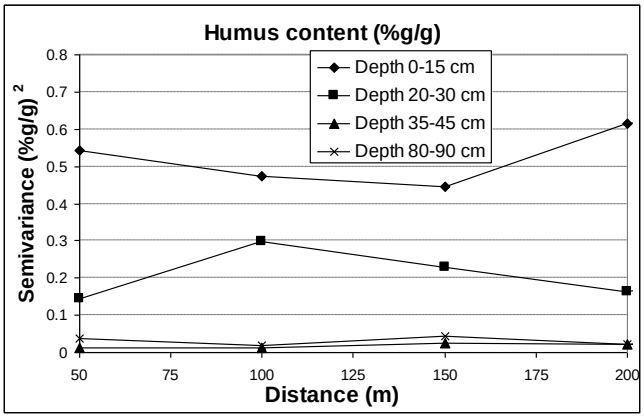
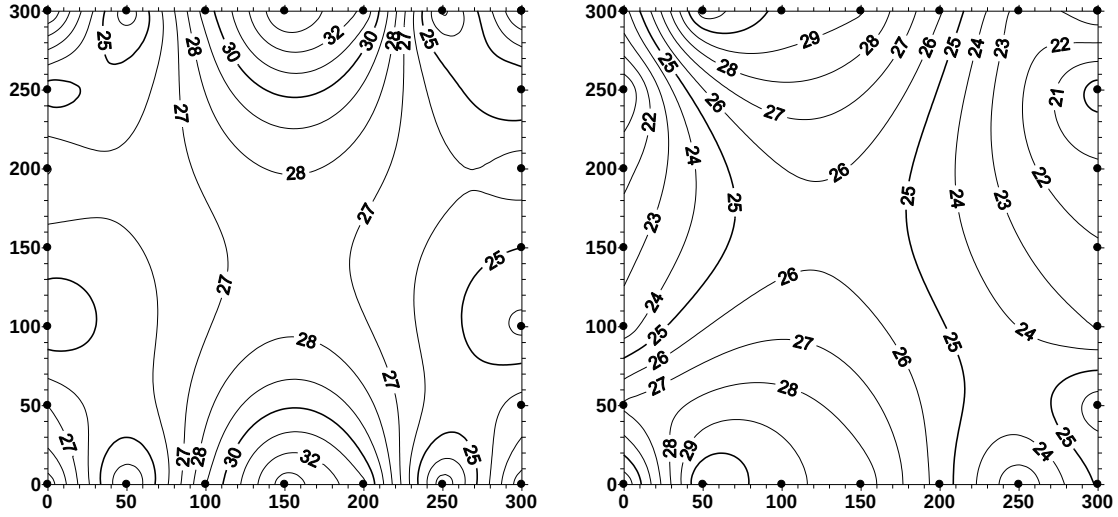


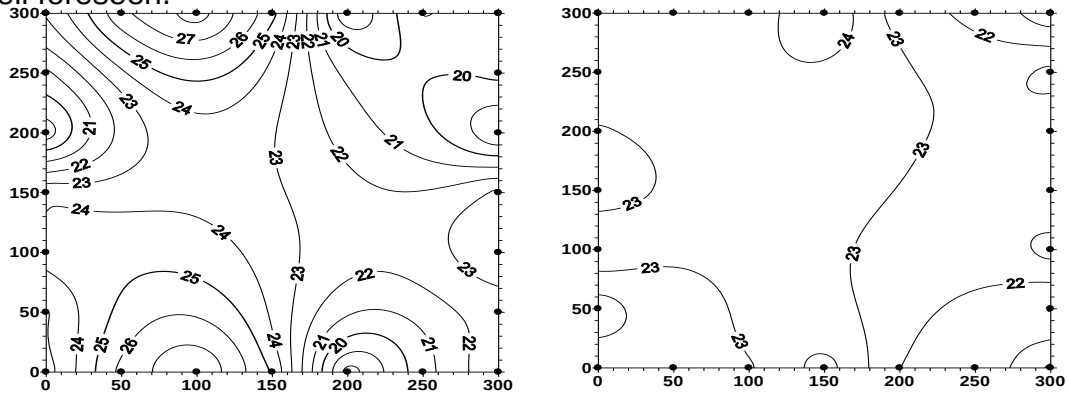
Figure 1. Semi-variograms of the fine sand content, clay content and humus content, respectively, for a Typical Vertisol at Dobrotesti, Southern Romania, in the four transects studied



Ap horizon, 0-15 cm depth Ao horizon, 20-30 cm depth

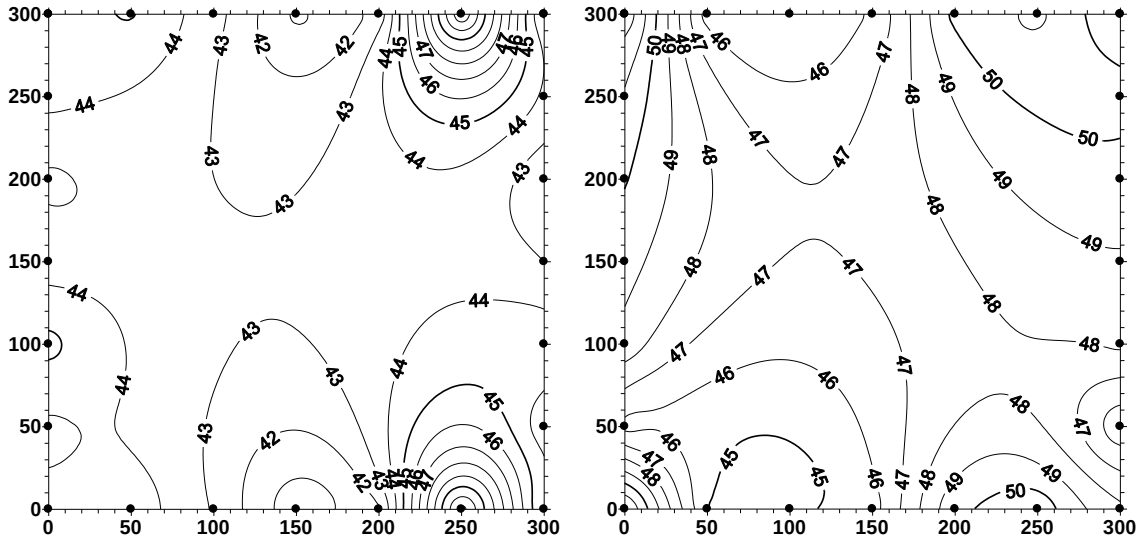
Figure 2. Spatial variability of the soil fine sand content (% g g^{-1}) for a Typical Vertisol at Dobrotesti, Southern Romania, four 300-cm transects per soil depth, A horizon; black points show here and further on the position of soil profiles in the transects

Based on both statistical and geostatistical approach of each soil depth, the paper discusses the specific features of the vertisol studied related to the conservation of soil resources in the Getic Plateau and central part of the Danube Plain in southern Romania. In light of the climatic global changes the soils described here could suffer some modifications and their evolution might be towards an even higher heterogeneity of their physical and chemical properties due to the more extreme weather character with more frequent floods, waterlogging and droughts. The consequences of such an evolution are still not well foreseen.



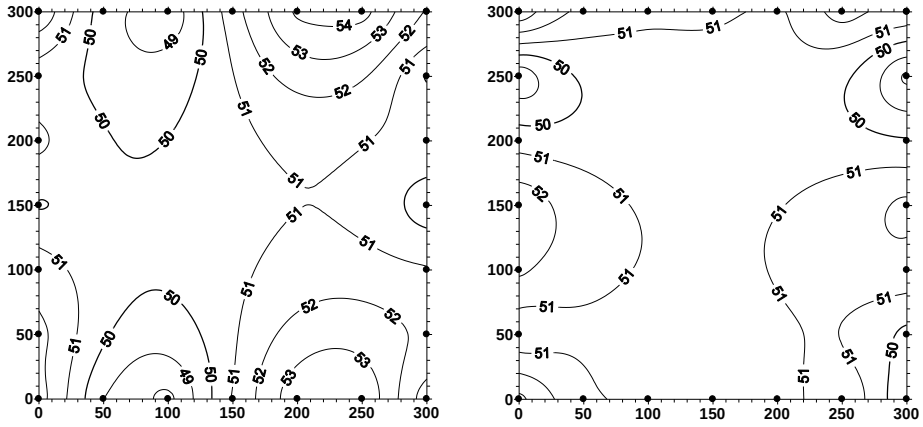
ABy horizon, 35-45 cm depth By1 horizon, 80-90 cm depth

Figure 3. Spatial variability of the soil fine sand content (% g g^{-1}) for a Typical Vertisol at Dobrotesti, Southern Romania, four 300-cm transects per soil depth, ABy and By1 soil horizons



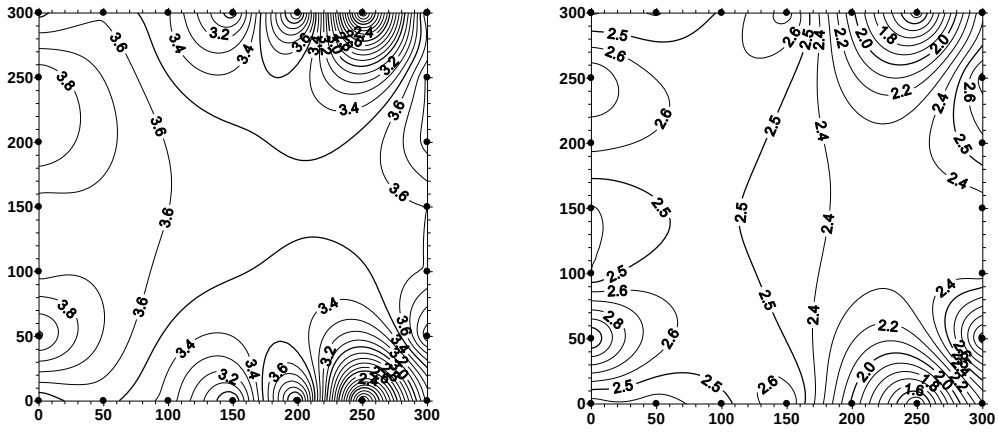
Ap horizon, 0-15 cm depth Ao horizon, 20-30 cm depth

Figure 4. Spatial variability of the soil clay content (% g g^{-1}) for a Typical Vertisol of Southern Romania, four 300-cm transects per soil depth, A horizon;



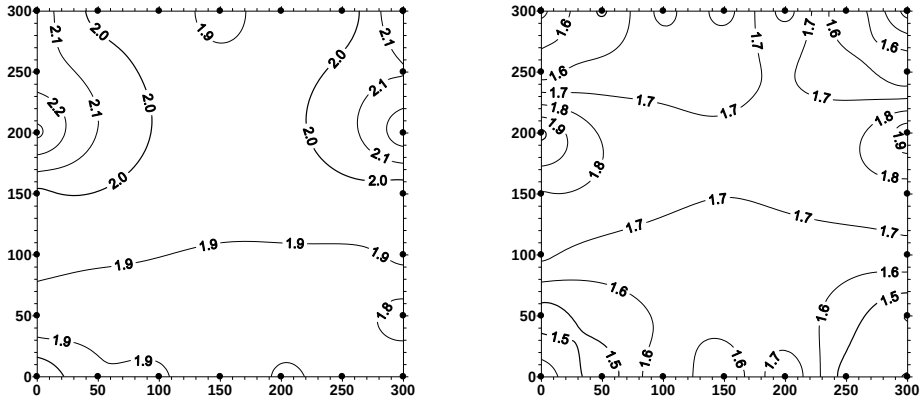
ABy horizon, 35-45 cm depth By1 horizon, 80-90 cm depth

Figure 5. Spatial variability of the soil clay content (% g g^{-1}) for a Typical Vertisol of Southern Romania, four 300-cm transects per soil depth, ABy and By1 soil horizons



Ap horizon, 0-15 cm depth Ao horizon, 20-30 cm depth

Figure 6. Spatial variability of the humus content (% g g^{-1}) for a Typical Vertisol of Southern Romania, four 300-cm transects per soil depth, A horizon



ABy horizon, 35-45 cm depth By1 horizon, 80-90 cm depth

Figure 7. Spatial variability of the humus content (% g g^{-1}) for a Typical Vertisol of Southern Romania, four 300-cm transects per soil depth, ABy and By1 soil horizons

CONCLUSIONS

The semi-variograms for the fine sand content, clay content and humus content showed a range of approximately 1.0 – 1.5 m.

The possible effects due to this high spatial variability of the particle size distribution could be multiple, and this variability could arise either from the geological heterogeneity of the soil parental material or from the soil evolution.

Romanian swell-shrink heavy clay soils also show horizontal heterogeneity for other soil properties, e.g. the intensity of the pseudogleyzation within the soil profile.

The evolution of the swell-shrink soils from this area might be towards an even higher heterogeneity of their physical and chemical properties due to the more extreme weather character with more frequent floods and droughts.

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MONITORIZAREA INTEGRATA A RAULUI JIU-PRINCIPII SI MODALITATI DE REALIZARE

THE INTEGRATED MONITORING OF JIU RIVER-THE PRINCIPLES AND WAYS TO MADE

I. Stanca, Daniela Liana Dudau, I. R. Sarbu

Keywords: surveillance, operational and investigation monitoring.

ABSTRACT

Activitatea de monitoring este o tinta importanta pentru gospodarirea integrata a resurselor de apa. Evaluarea calitatii apei a devenit astazi un instrument important pentru evaluarea spatio-temporala, in ceea ce priveste evaluarea tenditelor concentratiilor de poluanti si pentru bugetul substantelor chimice din apa. Toate aceste lucruri sunt foarte importante in cazul prevenirii poluarii accidentale atat pentru comunitatile locale cat si pentru protejarea ecosistemelor acvatice.

The monitoring activity is an important target of integrated waters management. Water quality assessment became today an important tool of temporally and spatial evaluation, regarding tendencies of pollutants concentrations and for a chemical substances water budget.

All this things are important for accidentally pollution prevent in rivers, for local communities and for water ecosystems.

INTRODUCTION

The requirements to the Framework Water Directive 2000/60/EEC implementation activity refer to the development and harmonization of the assessment system of the ecological condition for all surface waters (rivers, lakes, coastal waters). The existing classification systems until now are not sufficiently developed and we are in a situation that needs urgent research of the biological indicators of quality and testing the classification methods before any attempt to harmonize.

In this context, the redesigning of the monitoring system aims to ensure the decision support in the area of integrated water management by knowing at national level the status of surface waters and ecological resources.

In accordance with the European provisions in the field, other aspects of aquatic ecosystem (besides water) are monitored: sediment, algae, fish. macro invertebrates, zooplankton in accordance with the European directives. A special attention is paid to monitoring priority dangerous substances, which present a risk for the human health and the environment in compliance with the provisions of Directive 76/464/EEC.

The monitoring system of water quality in the Jiu river basin is represented by 4 subsystems: flowing water subsystem, lake subsystem, underground water, subsystem wastewater subsystem (pollution sources)

4 investigationenvironments are tracked: water, suspension materials,sediments, biota

MATERIAL AND METHOD

In order to characterize the state of aquatic ecosystems for the Jiu river, it was taken into account of the actual requirements of Framework Water Directive 2000/60/EEC, that bring in the forefront the monitoring of quality biological elements needed to classify the ecological state, thus:

Surface waters - **rivers**:
- composition and abundance of aquatic flora
- composition and abundance of benthic invertebrate fauna
- composition abundance and age structure of fish fauna

Surface waters - **lakes**:
- composition, abundance and biomass phytoplankton
- composition and abundance of aquatic flora
- composition and abundance of benthic invertebrate fauna
- composition abundance and age structure of fish fauna

In this paper we took in account the analyses of the physical-chemical, biological, bacteriological parameters as well as the hydro-morphological alterations of Jiu river; examining in an integrated way the state of the aquatic ecosystems on its whole extension.

The analyzed material was represented by the information related to aquatic biota, physical-chemical and hydro-morphological parameters, information existing in the laboratory compartment and in the Jiu Monitoring office.

By analyzing all the parameters required by art. 8 of the Water Framework Directive 2000/60/EEC, it was extended the monitoring network to fully cover all waters appointed for Jiu river from spring to the confluence with the Danube River.

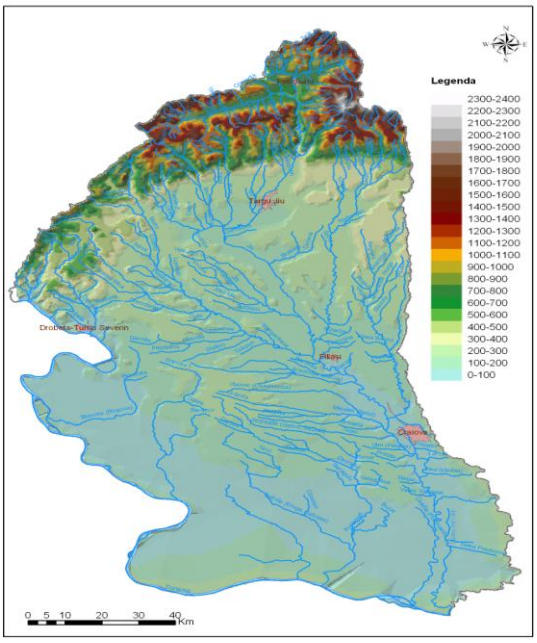
General presentation of the Jiu river

Jiu river basin has a surface of 16712.9 km^2 with a length of the hydrographic network of 4954 km and an average density of 0.29 km/km^2. Almost 21% of the length of this hydrographic network manifests the draining phenomenon.

The relief is predominated by hills and plains, with small areas of the mountain, with a temperate continental climate (average annual temperature of 10.5 ° C) and average annual rainfall ranging between 400 mm and 1200 mm per year (Fig 1.1).

In Jiu river basin the arable land and forests represent a surface of 15042.8 km^2 respectively 90.2% of total surface.

(*Fig. 1.1)*



The main relief units in Jiu river Basin

Monitoring network in Jiu River Basin

The network for the monitoring system of stream surface waters consists of:

- the background monitoring network - reference sections - correspond to the locations where the anthropogenic influence is less than 10% (or quasi natural or natural state of bodies of water);

- the monitoring network for the potable water collection -drinking sections - are those sections where communal management units capture surface water in order to treat it and distribute it to population and industry;

- monitoring of the border rivers network - protocol with Yugoslavia and Bulgaria

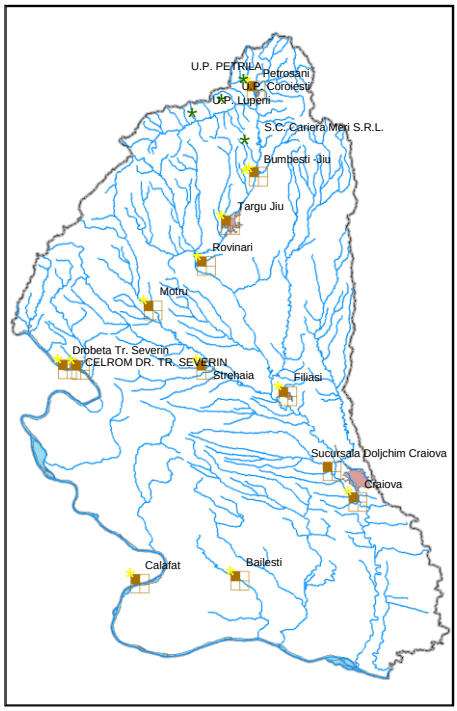
- monitoring network of surveillance - quarterly frequency

- operational monitoring network-monthly frequency

In waste water monitoring sub-system, are monitories all pollution sources with a directly evacuation in a natural tributary (are evaluated).

The most important pollution sources are the big city without water treatment plant (Fig. 1.2).

(Fig.1.2)



The main water pollutions sources in Jiu river

Within the wastewater subsystem, all pollution sources with direct evacuation in natural environmental receptor (it is tracked: the volumes evacuated, harmfulness quantities, the situation of the wastewater treatment plants, other impositions included in the authorization of water management). The next stage is to do a budget of pollutants and to suggest measures that can be applied in order to improve the state of waters in the critical points.

Integrated monitoring must take into account the protected areas (especially Nature 2000 network as well as the limits of the areas with important species from economic point of view- for instance salmons), the management of which is developed taking into account this aspect, too.

RESULTS AND DISCUSSIONS

Applying all these criteria to Jiu River, we can bring into discussion the following sites that comply with the requirements of the water integrated management, especially with the Framework Water Directive and European legislation in the field (table 1):

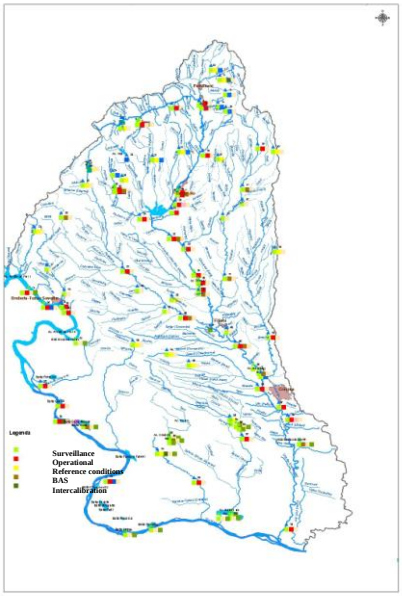
Jiu river monitoring system in FWD context ***(Table 1)***

RIVER	Name of section	PROGRAM	PROTECTED AREAS	NET
Jiu	Upstream Rostoveanu confluence	Surveillance	Fish monitoring Habitats and Species	Reference
Jiu	Downstream Braia confluence (Lupeni locality)	Surveillance	Fish monitoring	
Jiu	Iscroni	Operational	Fish monitoring	
Jiu	Livezeni	Operational	Fish monitoring Habitats and Species	
Jiu	Racari locality	Operational	Fish monitoring	Best Available Sit
Jiu	Malu Mare locality	Operational	Fish monitoring Vulnerable Zone	
Jiu	Zaval locality	Operational	Fish monitoring Habitats and Species	

Main pollutants (wastewaters slopped in Jiu River and monitoring the main physical-chemical parameters): hazardous substances, MTS, bacteriological parameters, others.

Integrated assessment of all parameters characteristic to each investigation environment determines in the end the appreciation of the ecological state of Jiu river, as it is represented in the next figure (fig. 1.3).

Fig.1.3



Monitoring network of Jiu River Basin

CONCLUSIONS

In order to make decisions in the field of water management to be consistent and effective, it is necessary to take into account the integrated monitoring of the aquatic environment. The application made for the water bodies of Jiu river presented in this paper can be extended for rivers with smaller surfaces, too.

In order to take decisions, it is important the fact that the actual state of aquatic ecosystems can be evaluated only in terms of aquatic biota which shows both pollution on the long term, (when it exists), and the solidity of aquatic ecosystem in general.

Monitoring the physical-chemical parameters is necessary only for the punctual and momentary characterization of the chemical status of water, without being necessarily a final, permanent situation for a long and average term.

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INFLUENȚA DECOPERTĂRILOR DIN ZONA HUSNICIOARA ASUPRA MEDIULUI ÎNCONJURĂTOR

THE INFLUENCE OF SURFACE MINING FROM HUSNICIOARA ON THE ENVIRONMENT

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Keywords*: *sterile dump, quarry, land degradation, soil profile.

ABSTRACT

Lucrarea prezintă caracteristicile pedologice şi agrochimice ale haldei de steril Husnicioara în suprafață de 190 ha. Sunt prezentate efectele poluante ale haldei Husnicioara asupra mediului înconjurător.

The paper presents the pedological and agrochemical features of the sterile dump Husnicioara, District Mehedinti that has a surface of 190 ha. There are presented the polluting effects of the sterile dump Husnicioara on the environment.

INTRODUCTION

Nowadays, there is a multitude of factors that can destroy the soil, and to disrupt certain ecological equilibrium among them, between them and from them and the whole biosphere.

One of the most aggressive and destructive factors of the soil is the surface mining which can determine essential changes of the geomorphology and natural hydrology of the affected zone, determining ecological changes, especially of the edaphic factors. The surface mining of the lignite produces total or partial changes on the soil on a period that, in most of the cases, overpasses 10-15 years. There are taking place the inversion of the different geological strata, the natural migration of the nutritive elements of the soil, the acceleration of the erosion process, the degradation of the landscape, in the place of the productive terrains resulting sterile dumps. They form after uneven deposition of the sterile material of the coal deposit. Within the deposition process, due to the technological fluxes from the quarries there can not be respected a certain succession of sterile deposition, that to comply with the initial lithology. This is why, the deposition is considered to be chaotic, resulting a heterogenous mixing of rocks that have different lithological features even on small distances. Also, the impact of the mining activity has determined a series of changing on the coal deposits, on waters (streams and watertable), on the climate, vegetation and social communities.

MATERIAL AND METHOD

As The Husnicioara quarry belong to the ME Mehedinti. It is located near the Husnicioara village, in the East part of the Turnu Severin town, at a distance of 17 km away of it. The climate is Cfax, that characterises a subhumid zone with mild winters and hot summers, three months per year (June, July and August). Within this zone are felt Mediterranean influence, the annual temperature is 11.6 °C, and the multiannual average value of the rainfall is 661 mm. The vegetation – before mining – the woods were composed in variable proportion of oak in the dominant level. Within the Western part there was cherry tree, lime tree, sycamore maple. The herbaceous vegetation was well represented by secondary lawns that were set up in the place of the oak woods.

After the surface mining and the formation of the sterile dumps, the vegetation is totally modified. Such way, the woody vegetation completely disappears by clearing the 151 ha and the herbaceous vegetation is strongly reduced.

The Husnicioara, along with the nearby sterile deposits, since the beginning of the exploitation occupy a surface of 614 ha (table 1).

Table 1

The surfaces occupied by the Husnicioara quarry and the nearby sterile dumps (Huidu, 2002)

#	Specification	The occupied surface (ha) of which:					
		Total		Agricultural		Woods	
		ha	%	ha	%	ha	%
1	Quarry	329	53,6	143	43,5	186	56,5
2	Sterile dumps	285	46,4	194	68,1	91	31,9
3	Total	614	100	337	54,9	277	45,1

No matter the mining technology, the surface quarries modify the natural lithological structure on a 2-3 m depth at 150-200 m. Besides the terrain that is located within the exploitation perimeter large surfaces are definitively occupied by sterile depositation that can have 15-20 m height, up to 90-100 m. In order to characterize pedologically and agrochemically there were made two soil profiles of which there were taken samples. Their analysis was made using methods that are accepted in our country.

RESULTS AND DISCUSSIONS

Initially, within the zones that are affected by the Husnicioara quarry there were the following soil types:

- reddish preluvosoil
- typical, pseudogleysated preluvosoil
- pseudogleysated luvosoil
- vertic pseudogleysated luvosoil
- albic pseudogleysated luvosoil
- typical eutricambisoil

The soil unit nr. 1 US_1

Name: entiantrosoil

Surface: 283.4 ha

General conditions of formation

Relief: sterile dump

Bedrock: silt, sand

The depth of the water table: deeper than 10 m

Vegetation: herbaceous associations

Pedological characteristics

Table 2

The granulometric composition of the deposited materials (Husnicioara quarry)

Nr. profile	Strata (cm)		Analiza mecanică					
			Thick sand %	Fine sand %	Silt %	Physical clay %	Colloidal clay %	Texture
9	S_1	0-23	21,5	75,3	0,3	3,0	2,9	N
	S_2	23-37	39,3	51,9	3,2	7,6	5,6	NL
	S_3	37-62	45,5	47,3	4,0	7,1	3,2	N
	S_4	62-128	30,9	62,1	3,7	5,4	3,3	N
10	S_1	0-25	70,0	21,0	7,0	3,9	2,0	NL
	S_2	25-50	44,8	30,4	16,6	10,2	8,2	LN
	S_3	50-75	46,2	28,3	17,4	12,2	8,1	LN-LA
	S_4	75-150	50,0	26,8	16,6	9,0	6,6	LN
Minimal values			**21,5**	**21,0**	**0,3**	**3,0**	**2,9**	**N**
Maximal values			**70,0**	**75,3**	**17,4**	**12,2**	**8,2**	**NL**

The soil unit nr.2 US_2

Name: typical antropical protosoil
Surface: 1.6 ha
General conditions of formation
Relief: sterile dump
Bedrock: silt, sand
The depth of the water table: deeper than 10 m
Vegetation: herbaceous associations

On the basis of the data from the table 1 there results that the entiantrosoils from the sterile dumps of the Husnicioara quarry have the following pedological characteristics: the texture is silt-sandy, silty or sandy with a high content of thick sand (21.5 – 70.0%) and fine sand (21.0 – 75.3%), lower of silt, (0.3-12.2%) and of physical and colloidal clay (2.9 – 12.2%). The bonitation mark is 15, the antropic protosoil being enframed in the V-th class.

Table 3.

The main agrochemical features

(Husnicioara quarry)

Nr. profile	Depth (cm)	Chemical features					
		pH (H_2O)	$CaCO_3$	Humus %	Nt %	P ppm	K ppm
9	0-23	8,7	4,8	0,40	0,16	6,96	44,86
	23-37	8,9	4,8	0,50	0,16	4,52	39,95
	37-62	9,0	3,2	0,40	0,20	5,09	33,24
	62-128	8,0	2,4	0,40	0,08	11,09	33,21
10	0-25	8,1	3,9	0,40	0,16	14,05	42,44
	25-50	7,9	4,0	0,20	0,08	11,98	49,50
	50-75	8,2	4,2	0,30	0,11	15,93	50,85
	75-150	8,2	4,2	0,30	0,12	13,03	30,31

The influence on the quantitative water resources from the drinkable watertable used by adjacent lo

On the basis of the data from the table 3 there results that the entiantrosoils from the sterile dumps of the Husnicioara quarry have the following agrochemical characteristics:

- the reaction is weak to moderate alkaline (pH = 7.9 – 9.0)
- the lime content is low to moderate (3.2 – 4.8%)
- the humus and total nitrogen content is extremely low (0.2 – 0.5%), respectively (0.08 – 0.20 %), the sterile dumps being very low supplied with nitrogen
- the soluble phosphorus is also low (4.52 – 15.93 ppm P) being very low supplied with phosphorus
- low and middle supplied with available potash (30.31 – 50.85 ppm K)

Analysing the data from the third table it can be noticed that the sterile dumps from Husnicioara quarry have a low degree of fertility. This fact assumes special measures to fertilize them in order to be recultivated.

The impact of the mining exploitation on the environment

The surface mining quarries have a strong harmful effect on the environment on: air, water, flora, fauna, the landscape and the loco communities, the cultural patrimony, the health of the populace and the agriculture (Mocanu R., 1994).

The air pollution takes place by the following ways:

a) Solid suspension emanation (rock dust from the quarry, transport devices, coal dust, ash from the power plants for heating.
b) By gases emanation (methane, explosion gases, cars gases, gases from the power plants)

The impact on the water

The mining activity does induce changes in the surface as well on the water table. These effects consist of:

- the harmful effect on the hydrographyc and hydrogeologic regime because of the mining buildings and the permanent spreading of the quarry perimeter.
- co communities.
- The harmful effect on the quality of the waters that flow into the streams because of the residual waters resulted from the mining activity.

The impact on the climatical conditions

The surface quarries influences the atmosphere by temperature changing, light, humidity, rainfall, bioclimatical regime of the microclimate and the mezoclimate, the contamination with gaseous, liquid and solid emissions. The drought phenomenon is intensified due to the increasing of the soil temperature, the decreasing of the air relative humidity, the decreasing of the landscape capacity to ease the wind speed, the increasing of the amplitudes of the temperature.

The perimeters of the lignite quarries are a potential polluting environment. The exhausted dust form lenticular clouds during the winter and during the summer make the surroundings opaque increasing the indirect radiation while the direct one if filtered.

The impact of the surface quarries on the landscape and the relief

The surface mining completely changes the landscape. In this manner, the former hills became plains and the former lowland became hills.

The impact of the surface mining on the agriculture

The strongest impact of the surface mining is done on the agricultural activity through:

- the reducing the productive surface over 15 years
- the affecting the soil from the nearby zones of the mining perimeters or on the transport terraces by the solid or liquid residues
- the reduction of the woods surfaces
- the destroying of the agricultural and woody vegetation with harmful effects on the flora and fauna

The impact on the flora and fauna

The impact produced by the mining activity on the flora and fauna is local and of a long term and refers to:

- the destroying of the natural flora and fauna as a result of the removing the upper soil layer
- the diminishing of the woody surfaces by clearings and totally disappearing of the forester ecosystem from these places
- the diminishing of the wood quantity after the mining activity stops.
- the diminishing of the structure and function of the local ecosystems till the disappearing of certain species or even associations of species.
- The reinstallation of the vegetation on the sterile dumps yet with a different structure.

The diverse pedoclimatical and relief condition that existed on the surface mining quarries have permitted the installation of rich and diverse vegetation.

The first plants that appear are the annual species, less pretentious that by their characteristics can stabilize the sterile dump and prepare the land for the installation of the specific vegetation of the zone.

Meanwhile, on the affected surface, a new type of vegetation has been installed, different from the initial one. The slow recovery of the soil permits the installation of the specific vegetation that includes a high number of perennial species.

Within the quarries and on the surface of the sterile dumps there will appear a new type of herbaceous vegetation. The vegetation starts to develop 2 years after the mining activity stops. At the beginning there will be less pretentious species and adapted to the poor and shallow soils as: Equisetum palustre, Ononis spinosa, Tussilago farfara.

CONCLUSIONS

1. The sterile dumps from Husnicioara, District Mehedinti have a surface of 190 ha.
2. The surface mining quarries produce a high impact on the environment, affecting the watertable and streams, the air, the landscape and the loco communities.
3. The highest impact is made on the soil, determining its degradation and taking it out of the production activity for a period of over 15 years.
4. The agrochemical features of the sterile dumps show that they have an alkaline reaction, are very scarce in nitrogen, phosphorus and potash.
5. The fertility degree of the sterile dumps from the Husnicioara quarry is very low that assumes special measures of fertilization by increasing the organic matter content by different organic fertilizers and composts.

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THE REMANENT EFFECT OF THE MERLIN DUO AND GARDORPRIM PLUS GOLD 500 SC HERBICIDES APPLIED TO SUNFLOWER CROPS

Şarpe, N., Poienaru St.

Keywords: Merlin Duo, Gardoprim Plus Gold 500 SC, remanent effect.

ABSTRACT

The remanent effect of herbicides was studied by many foreign researchers: Hurle 1980, Hime and coll. 1991, Wuerzer 1985.

In Romania, the largest number of experiments regarding the remanent effect of herbicides based on atrazin and simazin upon various crops have been made by dr. Şarpe and his collaborators. During the past 10 years, studies have been also made regarding the remanent effect of dicamba and 2,4-D herbicides upon various crops, namely maize, sunflower, sugar beet and flax for linseed and linen.

*The experiments regarding the remanent effect of Merlin Duo and Gardoprim Plus Gold 500 SC are the **first ones of this type and unique** in Romania – being carried out in the Flood Plain of the Danube river.*

*In the years 2007-2008, experiments were performed at the Agrofam-Holding Agricultural Company from Fetesti, Ialomita County, situated in an area with alluvionary-type soil specific to the aforementioned Flood Plain, the aim being to study the remanent effect of the herbicides **Merlin Duo,** which contains 37,5 g/litre isoxaflutol + 375 g/litre terbuthylazin, **Gardoprim Plus Gold 500 SC,** which contains 312,5 g/litre S – metalochlor + 187,5 g /litre terbuthylazin.*

The Merlin Duo herbicide was applied in doses of 3 and 6 litres per hectare, and the Gardoprim Plus Gold 500 SC was applied in doses of 5 and 10 litres per hectare. Both herbicides were applied in July, after the wheat was harvested. After application, the herbicides were incorporated by disking 15-18 cm deep into the ground. In the spring of 2008, before sunflower was sowed, the land was laboured 10 cm deep by the disk and the combinator.

Based on the observations made every month during the vegetation stage and on the yield obtained, the authors have reached the conclusion that the Merlin Duo and Gardoprim Plus Gold 500 SC did not present any remanent effects on the alluvial soil from the Flood Plain of the Danube river.

INTRODUCTION

The remanent effect of herbicides has been studied by many foreign researchers. In France, Beraud and coll., quoted by Ghinea (1987), studied the effect of trifluralim herbicide applied to rape crops in doses of 1,000 and 2,400 g/ha and find out that wheat yield did not diminish in comparison with the wheat yield recorded in case of crops sowed after raped untreated with herbicides. Hurle, K., Walker, A., (1980) studied the interaction of different herbicides with the soil. In Belgium, Salambier I. (1975) did not identify any toxic effects nor differences in terms of yield recorded in case of winter wheat crops sowed after potatoes treated with metobromuron, metriluzin, linuron + terbacil and linuron + cyanazin. Studying the persistence of some herbicides on a clayish soil from Italy on a few test plants: wheat, maize, sugar beet, lettuce and zucchini, Cesari and collab. (1975) assert that the most persistent are the herbicides based on simazin, atrazin, diuron and benztiazuron.

In Romania, the largest number of experiments regarding the remanent effect of herbicides have been made by Şarpe and his collaborators (1981, 1987).

The herbicide Gesaprim 50 WP, based on atrazin, applied in doses of 5 and 10 kg/ha to maize crop son the chernozem soil from Fundulea proved not to be phytotoxic for the winter wheat, rape, flax and sunflower crops. In his PhD. thesis, Mr Iulian Şarpe (2005) studied the remanent effect of several herbicides: Icedin Super, which contains 100 g/l dicamba + 300 g/l 2,4-D acid, Glean 75 DF which contains 75% chlorsufuron and Grodyl, which contains 75% amidosulfuron. The remanent effect of the Glean 75 DF herbicide was extremely evident on sunflower crops while no phytotoxic symptoms were observed as far as the herbicides Icedin Super and Grodyl are concerned. At the Şimnic Research Station, situate don a podzol soil type, the most powerful effect of the Glean 75 DF herbicide was on sugar beet. In the variant treated with 15 g/ha, the yield of biomass diminished by 90%, and in the variants treated with 25-35 g/ha doses, the biomass production was totally compromised. However, at the Teleorman Station, situated on a chernozem-type soil, much richer in humus, the remanent effect of the Glean 75 DF herbicide was very weak or it was practically absent. Thus, in case of winter wheat treated by 15 g/ha, after which sugar beet was sowed in the spring, a 42,300 kg/ha root yield was recorded, whereas the yield recorded with the reference plot was 42,380 kg/ha – the two values being practically equal.

MATERIALS AND METHODS

At the Agrofam-Holding company from Feteşti, situated in the Flood Plain of the Danube river, on an alluvionary-type soil which contains 3,5 – 4,0 % humus and 35 – 40% clay, the following herbicides were used to study the remanent effect on sunflower crops:

1. **Merlin Duo –** which contains 37,5 g/litre isoxaflutol + 375 g/litre terbuthylazin.
2. **Gardoprim Plus Gold 500 SC** – which contains 312,5 g/litre S-metalochlor + 187,5 g /litre terbuthylazin.

After the winter wheat was harvested, a 15 to 18-centimeter-deep disking operation was performed by means of a BISO heavy disk. Both herbicides were applied by means of RAU equipment. After application, the herbicides did not incorporate into the soil. In spring, the soil was submitted again to a 15-cm-deep disking operation, and before sowing another 10-cm-deep intervention was made by means of a combinator machine. The type of sunflower sowed for this experiment was the Justin hybrid produced at the National Institute for Agricultural Research from Fundulea.

The experiment was displayed by the linear method with 3 repetitions, because all the works were executed mechanically. After the sunflower sprouted, the researchers monitored the plants and observed the level of phytotoxicity, granting grades according to the scale established by the EWRS (European Weed Research Society). At the same time, measurement were made to determine the density of the sunflower plants and the seed yield per hectare, calculated according to the STAS humidity.

RESULTS OF THE RESEARCH

In table 1 we present the results regarding the density of the sunflower plants, recorded for the Justin sunflower hybrid.

Analyzing the data presented in table 1, we shall find out that the density of the plants in the 3-4 leaves stage in the variants treated by the herbicide Merlin Duo in doses of 3,0 and 6,0 litres per hectare was of 45,750-45,800 plants per hectare, and in the variant which was not treated the density recorded was of 45,700 plants per hectare. Similar results were also recorded in the variants treated by the herbicide Gardoprim Plus Gold 500 SC. In the plots treated by 5.0 litres and 10.0 litres per hectare, the density recorded in case of both doses was of 45,700 plants per hectare – the density being equal to the one recorded in case of the untreated reference plot.

Table 1

Determination of sunflower plant density recorded for the Justin hybrid Agrofam – Holding, Feteşti 2007 – 2008

Herbicides applied after the winter wheat has been harvested	Doses Litres / ha	Sunflower plant density
In the 3-4 leaves stage		
1. Untreated (reference plot)	-	45,700 /ha
2. Merlin Duo	3,0	45,750/ha
3. Merlin Duo	6,0	45,800 /ha
4. Gardoprim Plus Gold 500 SC	5,0	45,700 /ha
5. Gardo prim Plus Gold 500 SC	10,0	45,700 /ha
In the 8-10 leaves stage		
1. Untreated (reference plot)	-	45,690/ha
2. Merlin Duo	3,0	45,750 /ha
3. Merlin Duo	6,0	45,780 /ha
4. Gardoprim Plus Gold 500 SC	5,0	45,700 /ha
5. Gardoprim Plus Gold 500 SC	10,0	45,690 /ha
In the 50%-in-blossom stage		
1. Untreated (reference plot)	-	45,690 /ha
2. Merlin Duo	3,0	45,750 /ha
3. Merlin Duo	6,0	45,780 /ha
4. Gardoprim Plus Gold 500 SC	5,0	45,700 /ha
5. Gardoprim Plus Gold 500 SC	10,0	45,690 /ha
Upon harvesting		
1. Untreated (reference plot)	-	45,685 /ha
2. Merlin Duo	3,0	45,730 /ha
3. Merlin Duo	6,0	45,780 /ha
4. Gardoprim Plus Gold 500 SC	5,0	45,790 /ha
5. Gardoprim Plus Gold 500 SC	10,0	45,690 /ha

The density recorded in the phase when the sunflower plants had 8-10 leaves was not much different form the one recorded in the 3-4 leaves stage. Very little differences were recorded in case of the variants treated by the herbicides Merlin Duo and Gardoprim Plus Gold 500 SC as compared to the untreated variant, in whose case the number of plants was 45,690 compared to the level of density of 45,700 plants recorded in the 3-4 leaves stage.

At the same time, in the in-blossom phase, the density recorded for the untreated variant was of 45,690 sunflower plants per hectare. In the variants treated by the herbicides Merlin Duo in doses of 3.0 and 6.0 litres/ha, the density was of 45,750-45,780 plants per hectare. In case of the variants treated by doses of 5.0 and 10.0 litres/ha of

Gardoprim Plus Gold 500 SC, the density of sunflower plants was practically equal to the one recorded in case of the variant treated by the herbicide Merlin or of the untreated variant. The last density measurement was made before harvesting. For the variants treated by the herbicide Merlin Duo in doses of 3.0 and 6.0 litres/ha, the density recorded was of 45,730-45,780 sunflower plants per hectare, and in the variants treated by the herbicide Gardoprim Plus Gold 500 SC in doses of 5.0 and 10.0 litres/ha the density was of 45,790-45,690, while in case of the untreated variant, the density recorded was of 45,685 sunflower plants per hectare. We can therefore draw the conclusion that the herbicides Merlin Duo and Gardoprim Plus Gold 500 SC **did not reduce** sunflower plant density when applied to the Justin sunflower hybrid.

The phytotoxic effect of the herbicides Merlin Duo and Gardoprim Plus Gold 500 SC was observed in 3 distinct stages of the sunflower plants (3-4 leaves, 8-10 leaves and in the in-blossom stage). The results recorded are presented in table 2 hereinbelow.

Table 2

The phytotoxic effect caused by the herbicides Merlin Duo and Gardoprim Plus Gold 500 SC Agrofam – Holding, Feteşti 2007 – 2008

Herbicides applied after the winter wheat has been harvested	**Doses Litres / ha**	**EWRS grades**
In the 3-4 leaves stage		
1. Untreated (reference plot)	-	1.0
2. Merlin Duo	3.0	1.0
3. Merlin Duo	6.0	1.5
4. Gardoprim Plus Gold 500 SC	5.0	1.0
5. Gardo prim Plus Gold 500 SC	10.0	1.0
In the 8-10 leaves stage		
1. Untreated (reference plot)	-	1.0
2. Merlin Duo	3.0	1.0
3. Merlin Duo	6.0	1.0
4. Gardoprim Plus Gold 500 SC	5.0	1.0
5. Gardoprim Plus Gold 500 SC	10.0	1.0
In the 50 %-in-blossom stage		
1. Untreated (reference plot)	-	1.0
2. Merlin Duo	3.0	1.0
3. Merlin Duo	6.0	1.0
4. Gardoprim Plus Gold 500 SC	5.0	1.0
5. Gardoprim Plus Gold 500 SC	10.0	1.0
EWRS grades: 1.0 without any phytotoxic symptom 1.5 very weak phytotoxic symptoms (insignificant) 9.0 a rate of plant destruction of 80-90%.		

Analysing the data presented in table 2, we can assert that the herbicides Merlin Duo and Gardoprim Plus Gold 500 SC did not have a phytotoxic effect upon the sunflower plants. When assessing the level of phytotoxicity in the 3-4 leaves stage, and only in the variant treated by Merlin Duo in a dose of 6.0 litres/ha, the EWRS grade conferred was 1.5, because some plants presented insignificant symptoms of phytotoxicity – leaves presenting a slight yellowish colour.

When assessing the level of phytotoxicity in the 8-10 leaves stage and in the in-blossom stage, these symptoms (yellowish leaves) have disappeared. We can therefore state that the herbicides Merlin Duo and Gardoprim Plus Gold 500 SC **did not have any phytotoxic** symptoms upon sunflower plants.

The results regarding the seed yield are more important. In table 3 hereinbelow, we present the seed yield recorded at the Justin sunflower hybrid.

Table 3

Seed yield recorded at the Justin sunflower hybrid Agrofam, Feteşti, 200-2008

Herbicides applied after the winter wheat has been harvested	**Doses Litres/ha**	**Yield**	
		Kg/ha	**%**
In the 3-4 leaves stage			
1. Untreated (reference plot)	-	2,780	100.0
2. Merlin Duo	3.0	2,795	100.3
3. Merlin Duo	6.0	2,788	100.0
4. Gardoprim Plus Gold 500 SC	5.0	2,798	100.4
5. Gardo prim Plus Gold 500 SC	10.0	2,788	100.0
DL 5% = 192 kg /ha; DL 1% = 312 kg /ha; DL 0,1 % = 427 %			

The seed yield recorded in the variants treated by the herbicide Merlin Duo in doses of 3.0 and 6.0 litres/ha was of 2,799-2,788 kg/ha, and in the untreated variant (reference plot), the seed yield was 2,786 kg/ha – which entitles us to state that the yields recorded were practically equal. Similar results were recorded for the plots treated by the herbicide Gardoprim Plus Gold 500 SC – the seed yield recorded in this case amounting to 2,798-2,788 kg/ha.

CONCLUSIONS

1. Sunflower plant density did not diminish pursuant to the treatments by application of the herbicides Merlin Duo and Gardoprim Plus Gold 500 SC. With both herbicides, the density was of over 45,000 sunflower plants per hectare, being practically equal to the one recorded in case of the untreated variant (reference plot).

2. Neither of the aforementioned herbicides, namely Merlin Duo and Gardoprim Plus Gold 500 SC have caused any phytotoxic symptoms to the sunflower plants.

3. The sunflower seed yields recorded in case of both herbicides, namely Merlin Duo and Gardoprim Plus Gold, were practically equal to the one obtained from the untreated reference plot.

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NEW RESULTS REGARDING THE NO-TILLAGE SYSTEM APPLIED TO WINTER BARLEY CULTIVATED IN THE FLOOD PLAIN OF THE DANUBE RIVER

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Key words: winter barley, no-tillage system, conventional system, Gaspardo Gigante 900 sowing machine

ABSTRACT

During the ages, the superior plants from the spontaneous flora (savage form) of wheat, barley, maize, etc. grew on **land that had never been ploughed**. Man invented various tools to labour the land before and after sowing, for two main reasons: to fight the weeds which are big water and nutrients consumers and to be able to incorporate the organic and mineral fertilizers.

Plant cultivation **without ploughing** the land is and idea that belongs to the Americans and the English and dates back in the 1930s. In England, many farmers use the no-tillage system and apply it in the following way: they treat meadows with Gramoxone and then in autumn they sow wheat or barley in unploughed land, using special seeders for this purpose, of course.

In Romania, the first experiments with winter wheat cultivated in unploughed land, after maize, were made at the Prodagra Agricultural Company, Arad County, in the years 1999-2001, by Andrei Ion and Şarpe Nicolae (2004), the 3-year average yield recorded being 4320 kg /ha in the no-tillage system.

The experiments with winter barley cultivated in the no-tillage were continued by Nicolae Şarpe (2004) at the Agrofam-Holding Freteș ti, Ialomiț a County, in the specific conditions of the Flood Plain of the Danube River, the yield recorded being 4830 kg/ha in the conventional system and respectively 4840 kg/ha in the no-tillage system, in which the crop was sowed by a Gaspardo Gigante 900 sowing machine.

INTRODUCTION

Utilization on an ever larger scale and intensification of mechanization, which is of course a process that cannot be denied, also presents some **negative reverses** in the sense that **by running successively over the land** by tractors and farming machinery, the soil is **strongly pressed down and its structure is altered**, which influences in a negative way the evolution of plants and ultimately leads to the diminution of the crop.

Plant cultivation in unploughed land, that is in the no-tillage system **has been and is still being studied** by a large number of researchers from the USA, Brazil, Argentina, Great Britain, Germany, etc.

In the USA, the said "**no-tillage farming"** has become a current practice (Philips and Young 1973). Mister Köller (1999), a professor at the Hohenheim University from Stuttgart, Germany, makes the following remark: "in order to reduce the volume of work, energy and costs, it is necessary to reduce the volume of tillage operations **to one or at most two runs by the tractor over the land".**

Berpsch (2001), who participated to the "First World Congress of Conservation Agriculture", asserts that in the USA the no-tillage system is practiced on 21 million hectares, which represents 36,6 % of the total of the cultivated land. Latin America comes in second place from this point of view. In this region, the no-tillage system is practiced on

27 million hectares, and on the whole, all over the world, in the year 2000 the system was practiced on 62 million hectares. At the moment, the no-tillage system is probably practiced on over 100 million hectares.

In Romania, the first experiments with **maize** cultivated in the no-tillage were made back in the **year 1965**, and the first experiment with **winter wheat** was made in **1999** (Şarpe 1989; 2004). At the Prodagro Agricultural Company, Arad County, the winter wheat was cultivated in the no-tillage system after the maize crop. The 3-year average yield obtained (1999 – 2001) was 4320 kg/ha in the conventional system and respectively 4830 kg/ ha in the no-tillage system.

In the interval 2005-2008, the experiments with winter barley cultivated in the no-tillage system were continued at the “Agrofam – Holding” Feteşti, Ialomița County.

MATERIAL AND METHOD

The experiment with winter barley cultivated in the no-tillage system in comparison with the conventional system was carried out at the “Agrofam – Holding “ Feteşti, Ialomița County, in the conditions specific to this area, which appertains to the Flood-Plain of the Danube River. Here the soil is of an aluvionary type, its arable layer containing 3,5 – 3,6 % humus and over 38% clay.

In both no-tillage and conventional systems, the winter barley was cultivated after genetically modified soybean. In the no-tillage system, the winter barley was sowed by a Gaspardo Gigante 600 sowing machine directly in the soybean stubblefield. In the conventional system, after the soybean had been harvested, the land was ploughed and harrowed. Then, until the month of October two disking operations were performed. Another run over the land was finally made before sowing, this time with the combinator.

As all the soil-labouring operations, respectively sowing and harvesting by Claas combine were performed mechanically, the experiment was laid out according to the linear method in 3 repetitions, the plots used having an area of 10,000 square meters. The type of barley used all these years is the so-called “Liliana” variety, created at the National Institute for Agricultural Research from Fundulea, Călăraşi County. All these years, the “Liliana” barley type was treated in both the no-tillage and conventional system in spring, towards the end of the offshooting phase, by applying Icedin Super, a combined herbicide which contains 100 g /litre dicamba + 300 g/litre acid 2,4 – D.

RESULTS AND DISCUSSIONS

In table 1 hereinbelow we present the average results recorded in the years 2005-2008 at the “Agrfofam – Holding”, Feteşti.

Analysing the data presented in table 1, we shall notice that the “Liliana” barley variety tolerated very well the Icedin Super herbicide. At the same time, the Icedin Super herbicide controlled the annual and perennial weed species up to a 99-100%. The average barley yield in the two systems, conventional and no-tillage, calculated for four years, was 4.6830 kg/ha in the conventional system and respectively 4.840 kg/ha in the no-tillage system – **being practically the same**.

However, there were big differences in terms of fuel consumption recorded.

Table 1

Selectivity, efficacy and barley yield SA "Agrofam-Holding", Feteşti 2005-2008

DOMINANT WEED SPECIES					
1. Cirsium arvense		*5. Sonchus oleracea*			
2. Senecio vernalis		*6. Polygonum convolvulus*			
3. Poligonum amfibium		*7. Convolvulus arvensis*			
4.Sonchus arvensis		*8. Capsella bursa pastoris*			
Applied herbicides	Rates l/ha	Selectivity EWRS grades	Weed control %	Yield	
				Kg/ha	%
CONVENTIONAL SYSTEM					
1. Untreated	-	1,0	0	4.050	100
2. Icedin Super	1,0	1,0	99	4.830	115
NO-TILLAGE SYSTEM					
3. Untreated	-	1,0	0	4.100	100
4. Icedin Super	1,0	1,0	100	4.840	114

The results recorded in this respect are presented in table 2 hereinbelow.

Table 2

Fuel consumption in liters per hectare SA "Agrofam-Holding" Feteşti, 2005-2008

CONVENTIONAL SYSTEM		**NO-TILLAGE SYSTEM**	
Mechanical works performed	Consumpt. l/ha	Mechanical works performed	Consumpt l/ha
1. Autumn ploughing + harrowing	30.0	1. _____	—
2. Autumn disking + harrowing	13.0	2. _____	—
3. Autumn disking + harrowing	12.0	3. _____	—
4. Laboured by the combiner	5.0	4. _____	—
5. Sowing by SUP 29	4.0	5. Sowing by Gigante 600	5,0
6. Application of Icedin Super	1.5	6. Application of Icedin Super	1,5
7. Harvesting by Claas combine	16.0	7. Harvesting by Claas combine	16,0
TOTAL CONSUMPTION	**81.5**	**TOTAL CONSUMPTION**	**22.5**
Amount of Diesel fuel saved in the no-tillage system = 59 litres			

Analysing the data from table 2, we shall find out that in the no-tillage system a lesser level of fuel consumption was recorded, the amount of **59 liters/ha of Diesel fuel being saved** as compared to the conventional system.

In table 3, we present the economic efficiency, analyzing the costs of mechanical works performed in the conventional and no-tillage system.

Table 3

Cost of mechanical works in the two systems: conventional and no-tillage

SA "Agrofam-Holding" Feteşti 2005-2008

CONVENTIONAL SYSTEM		**NO-TILLAGE SYSTEM**	
Mechanical works performed	Cost RON /ha	Mechanical works performed	Cost RON/ha
1.Autumn ploughing + harrowing	2,300	1. _____	—
2. Autumn disking + harrowing	390	2. _____	—
3. Autumn disking + harrowing	370	3. _____	—
4. Laboured by the combiner	150	4. _____	—
5. Sowing by SUP 29	240	5. Sowing by Gigante 600	250
6. Application of Icedin Super	150	6. Application of Icedin Super	150
7. Harvesting by Claas combine	1,300	7. Harvesting by Claas combine	1.300
TOTAL EXPENSES	**4,900**	**TOTAL EXPENSES**	**1,700**

The 4-year average cost of the mechanical works performed in the **conventional system** was **RON 4,900 per hectare**, whereas in the **no – tillage** system it was only **RON 1,700 lei per hectare**.

CONCLUSIONS

1. The Icedin Super herbicide was tolerated very well by the "Liliana" barley variety and the ratio of its controlling the annual and perennial weeds amounted to 99-100%.

2. The 4-year average wheat yield recorded was 4,830 kg/ha in the conventional system and 4,840 kg/ha in the no-tillage system – **so in both systems the yield obtained was practically the same.**

3. However, there were big differences in terms of fuel consumption. The consumption recorded in the conventional system for all the mechanical works performed, harvesting by combine included, amounted to 81 litres/ha, while in the no-tillage system the consumption recorded was only 22 litres/ha.

4. Consequently, there were also big differences in terms of costs of mechanical works. These costs amounted to **RON 4,900 per hectare** in the conventional system and only to **RON** 1,700 **per hectare** in the no-tillage system.

Strategies recommended for chemical weed control in winter barley crops

In case of winter barley cultivation, the strategy is much simpler than in case of maize. When the winter barley is cultivated by applying the no-tillage system, then the best herbicides synthesized in the world should be used.

STRATEGY No. 1
It is indicated for winter barley crops infested by species of **dycotiledonous** annual and perennial weeds.

The non-polluting herbicides recommended for Strategy No. 1:

Herbicides	Rates L, g/ha	Time of application
1. ICEDIN SUPER (100g/l dicamba+290g/l acid 2.4-D)	1.0	Post emergent
2. CEREMIN (100g/l dicamba + 300g/l acid 2.4-D)	1.0	Post emergent
3. PREMIANT (100g/l dicamba + 300g/l acid 2.4-D)	1.0	Post emergent
4. ARIL SUPER SL (100g/l dicamba + 300g/l acid 2.4-D)	1.0	Post emergent
5. DIALEN SUPER 464 SL (100g/l dicamba + 300g/l acid 2.4-D)	0.9	Post emergent
6. ARRAT (50% dicamba+25% tritesulfuron)	150 g	Post emergent

All the herbicides mentioned hereinabove will be applied when the dicotyledonous (annual and perennial) have sprung *en masse* and the wheat plants are in the offshoting phase, and until the formation of the first internode; in extreme cases (when the treatment couldn't be applied because of the rain), the treatment can be continued until the phase when the formation of the second internode begins.

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ZONE VULNERABILE LA POLUAREA CU NITRATI IN BAZINUL HIDROGRAFIC JIU

NITRATE VULNERABLE ZONES IN JIU RIVER BASIN

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Keywords: Nitrates Directive, nitrate vulnerable zones, river basin.

ABSTRACT

Scopul Directivei Nitrati, adoptata de Uniunea Europeana in anul 1991 are scopul de a reduce poluarea produsa de nitratii proveniti din surse agricole si de a preveni aceasta poluare pe viitor.

Directiva Nitrati impune statelor membre sa identifice apele care sunt sau pot fi poluate cu nitrati proveniti din surse agricole, sa identifice zonele vulnerabile la poluarea cu nitrati.

In Zonele Vulnerabile la poluarea cu nitrati, fermierii trebuie sa implementeze programe de masuri ce includ perioade de restrictie in aplicarea de ingrasaminte si detinerea unui calendar al acestor masuri.

The goal of Nitrates Directive, adopted by the European Union in 1991, purpose to reduce water pollution caused by nitrogen from agricultural sources and to prevent such pollution in the future.

The Nitrates Directive impose to member states to identify waters which are or could become polluted by nitrates and to designate as Nitrate Vulnerable Zones (NVZs) all land draining to those waters and contributing to the pollution.

In the Nitrate Vulnerable Zones, farmers must implement an action programme of measures which include restricting the timing and application of fertilizers and manure, and keeping accurate records.

INTRODUCTION

The Nitrates Directive 91/676/ EEC has two major objectives: to reduce water pollution caused or induced by nitrates from agricultural sources and to prevent in the future such pollution.

The Directive's main requirements to the Member States are:

- to designate as Nitrate Vulnerable Zones all land draining to waters that are affected by nitrate pollution.
- to establish a voluntary code of good agricultural practice to be followed by all farmers through the country.
- to establish an Action Programme of Measures for the purpose of improving the water quality in areas affected by the nitrate loss from agriculture. The Action Programme should be applied either within the nitrate vulnerable zone or through the whole country.

The designation of nitrate vulnerable zones is made according to Article 3 (2), of the Nitrates Directive.

Activities like agriculture, forestry, mining, construction and urban life contribute to diffuse pollution, including diffuse water pollution. Various pollutants deposited on land, roads and spaces are washed into watercourses by rain. Consequently, the local climate, geology and other natural phenomena can influence the size and extent of the problem. In agriculture, diffuse pollutants include silt from soil erosion, nutrients from the application of fertilizer or spreading of manure, and pesticides from the handling and application of the chemicals.

MATERIAL AND METHOD

In the evaluation of nitrate vulnerable zones, from agricultural sources, was used a methodology that includes much information from different national institutions:

- The territorial and administrative boundary, at commune level (based on the 1:850.000 administrative maps), elaborated by Geo System.
- Land use by FAO classification elaborated by the Geographical Institute of the Romanian Academy in collaboration with CRUTA and the National Institute of Research and Development for Pedology, Agrochemical and Environmental Protection (I.C.P.A.) Bucharest.
- Digital land model elaborated by National Institute of Hydrology and Water Management (I.N.H.G.A.) Bucharest.
- The soil capacity of production (mean values of long series of climatic years) evaluated by the National Institute of Research and Development for Pedology, Agrochemical and Environmental Protection (ICPA).
- Information on the soil cultivation, by crop type, at the agricultural commune level. This data base was elaborated by the Ministry of Agriculture, Forests and Rural Development.
- Information on the number and animal type from each individual farm, at agricultural commune. This data base was also elaborated by the Ministry of Agriculture, Forests and Rural Development.
- Information on the number and animal type from animal farms (present number and maximum capacity of the farms) also the assessment of the treatment of waste water. The data base was elaborated by National Administration ” Apele Romane ”.
- Soil maps (scale 1:1.000.000 and 1.200.000) elaborated by the National Institute of Research and Development for Pedology, Agrochemical and Environmental Protection (ICPA).
- Climate information. Series of weather data for periods larger than one year. The data was delivered by the National Meteorology Agency using the data from over forty-seven meteorological stations on the territory of Romania.
- The inventory of Groundwater bodies: the characteristics of aquifer and unsaturated zones. The data base was organised in Geographical Informational System by the National Institute for Hydrology and Water Management.
- The piezometer level and nitrates concentration from groundwater bodies. Data base delivered by National Administration ” Apele Romane”.
- Information about Surface water bodies, data base organised in Geographical Informational System, delivered by National Administration ” Apele Romane”.

In conclusion, the evaluation of nitrate vulnerable zones was induced by the characteristics of the main environmental factors: soil, climate, ground and surface water bodies; the evaluation of nitrogen balance from agricultural activities and the overlapping of spatial information in Geographical Informational System.

Using this methodology, in Romania have been designated 255 nitrate vulnerable zones from agricultural activities, which represent 8,64 % from the country surface and 13,93 % from agricultural surface of Romania.

RESULTS AND DISCUSSIONS

In this paper was analyzed the study case for the vulnerable zones in Jiu River Basin.

The hydrographical area of Jiu River Basin covers a surface of 16712,9 km^2 with a length of the rivers network of 4954 km and an average density of 0,29 km/km^2. On 21 % of the river network the drought phenomenon is developed.

The relief is mainly of hills and plains with small areas of mountain, with a temperate continental climate (the mean annual temperature is of $10,5^0C$) and mean annual precipitations between 400 mm and 1200 mm per year.

A surface of 15091,7 km^2 from Jiu River Basin is covered with arable land and forests. This area represent 90,3 % from the total area.

Administrative, Jiu River Basin covers integral the counties: Dolj, Gorj, Mehedinti and partial Hunedoara county. The present population within this zone is about 1,560 millions inhabitants, from which 0,860 millions inhabitants (55 %) live in the urban area. From the total population, 54,84 % (96,5 % in urban area, 7,5 % in rural area) is connected to centralised system of water supply and 12,08 % (21,82 % in urban area, 0,005 % in rural area) is connected to the waste water treatment plants. The total theoretical water resource from the hydrographical area is of 4089 millions m^3 /year, and the specific resource is of 2603 m^3 / inhabitant /year, which place this area under the average for Romania.

A number of 67 important reservoirs with a total volume of 147, 61 millions m^3 were build to provide the water supply for different users, especially for human consumption.

Due to the economical development between the years 1960-1989, the water quality decrease very much comparative with the reference state from 50's. After 1989, the state of water quality improved due to the decline of socio - economic activities and of appliance of economical mechanism in water field, including the "the polluters-pays" principle. (Data available in the Jiu River Basin Management Plan, 2004 Version).

In Jiu River Basin were designated four nitrate vulnerable zones. The list with these zones is available in the Romanian legislation in the Common Order no. 241/196/2005 elaborated by the Ministry of Environment and Water Management and the Ministry of Agriculture, Forests and Rural Development. (Table no.1).

Table no.1

List of Nitrate Vulnerable Zones in Jiu River Basin

Commune	County	Relief	Agricultural area	Arable area	Nitrates source at the commune level	
			hectares	hectares	Present sources	Historical sources
Balesti	Gorj	Hill	5662	4078	*	
Isalnita	Dolj	Plain	2114	1833		*
Garla Mare	Mehedinți	Plain	5485	4783	*	
Pristol	Mehedinți	Plain	3958	3269	*	

The vulnerable zones were split in: vulnerable zones from present sources and vulnerable zones from historical sources.

In designation of the vulnerable areas from historical sources was used one more criteria. If in those areas existed for many years big animal farms, according to expert judgement, the soil and the groundwater were affected.

The Nitrate vulnerable zones from Jim River Basin are represented bellow (figure no.1.) as a map using the Geographical Informational System (GIS).

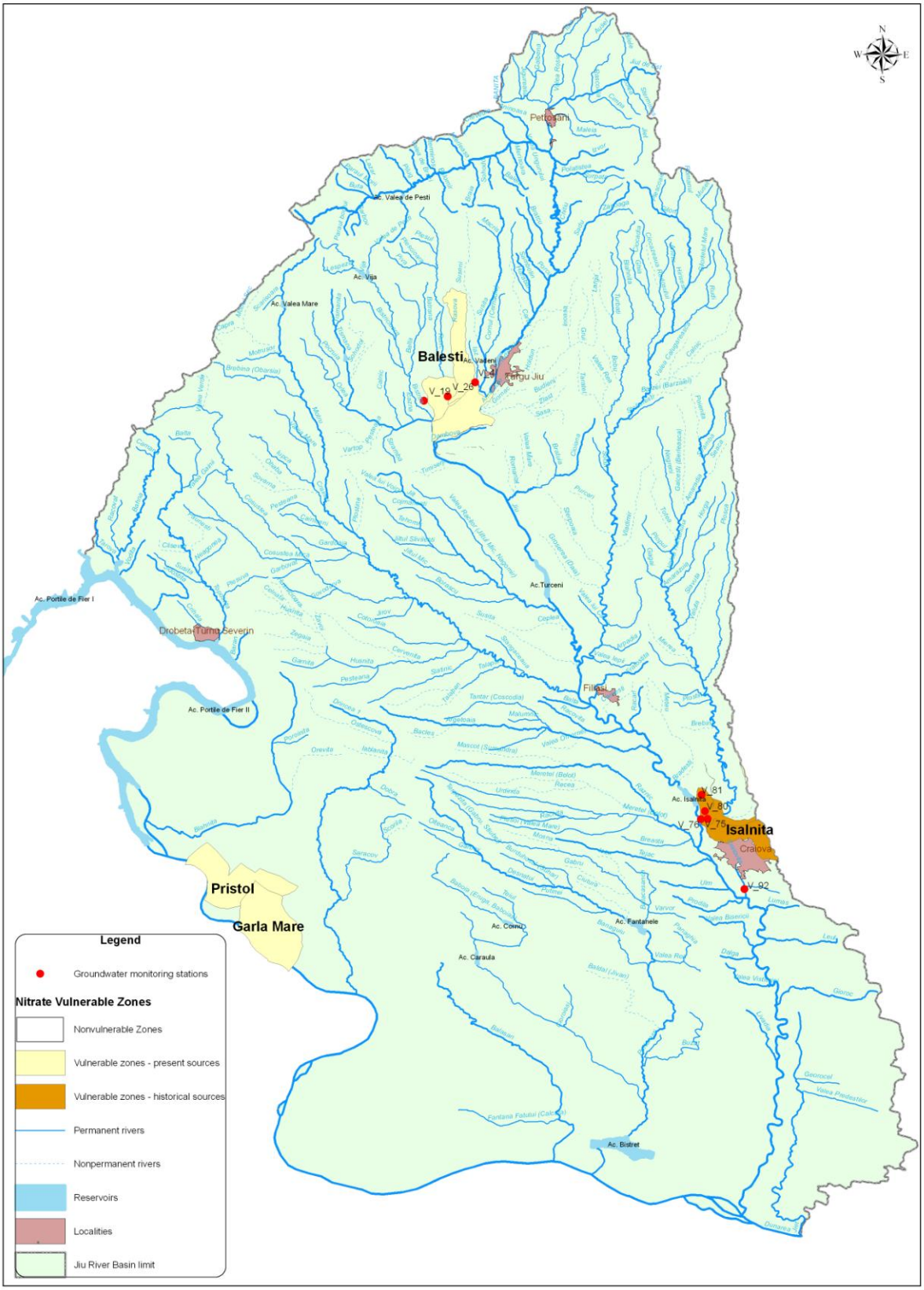

Figure no.1 Nitrate Vulnerable Zones in Jiu River Basin

From the total surface of Jiu River Basin (1671219 hectares), 17912 are vulnerable at nitrates pollution (1,03 %), according to figure no. 2

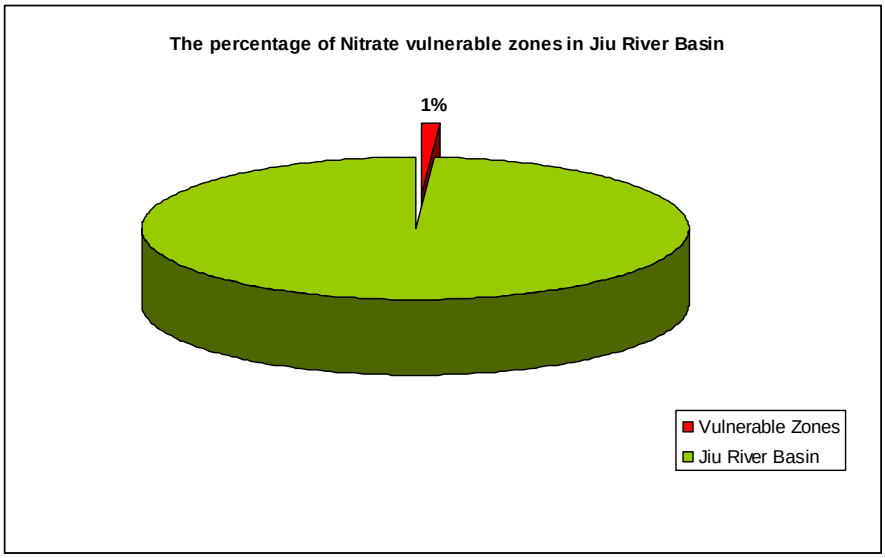

Figure no.2

In every vulnerable zone, the chemical status of groundwater is evaluated using monitoring stations from the National Groundwater Network.

It is showed in the next table (table no.2.) that the concentration of nitrate is fluctuating, from 8,10 mg/l to 2889,4 mg/l for the mean value and between 10 mg/l and 3695 mg/l for the maximum value.

The current legislation impose a maximum limit of 50 mg/l for the concentration of nitrate in ground waters.

Table no.2

Groundwater Monitoring Stations

Monitoring station name	Vulnerable zone	Geographical location		Sampling period/no. of samples	Nitrate concentration (mg/l)	Nitrate concentration (mg/l)	Target of Nitrate conc., acc. to Nitrate Directive (mg/l)
		Longitude	Latitude		Max value	Mean value	
Telesti F1	Balesti	23,09	44,98	2004-2007/8	25,59	11,91	50
Telesti F2	Balesti	23,10	44,99	2004-2007/8	17	13,67	50
Telesti F3	Balesti	23,11	44,99	2004-2007/8	10	8,10	50
Telesti F6	Balesti	23,16	45,00	2004-2007/8	12,2	10,95	50
Isalnita F5	Isalnita	23,66	44,41	2004-2006/5	129	68,61	50
Isalnita P2	Isalnita	23,72	44,41	2004-2007/8	61,9	40,15	50
Isalnita P3	Isalnita	23,68	44,39	2004-2007/9	42	31,90	50
Isalnita P4	Isalnita	23,72	44,38	2004-2007/7	156,6	106,11	50
Isalnita P5	Isalnita	23,73	44,37	2004-2007/7	49,6	44,38	50
Isalnita P6	Isalnita	23,71	44,37	2004-2007/7	3695	2889,4	50
Isalnita P10	Isalnita	23,72	44,34	2004-2007/8	40,3	24,76	50
Isalnita P11	Isalnita	23,71	44,34	2004-2007/9	30	24,80	50
Podari F5	Isalnita	23,81	44,27	2004-2006/6	51	28,52	50
Pristol F1	Pristol	22,69	44,21	2004-2007/4	40,5	32,26	50

Pristol F2	Pristol	22,69	44,22	2004-2007/4	53,1	31,25	50
Vanatori F1	Garla Mare	22,93	44,23	2005-2007/3	73,2	31,66	50
Vanatori F3	Garla Mare	22,94	44,24	2005-2007/3	30,14	21,21	50
Vanatori F4	Garla Mare	22,91	44,25	2005-2007/3	86,5	33,10	50

CONCLUSIONS

It is very important to implement the programmes of measures for nitrate vulnerable areas. This measures must simultaneously respect the next conditions:

- Crop rotations, soil winter cover, catch crops, in order to limit leaching during the wet seasons.
- Use of fertilizers and manure, with a balance between crop needs, nitrogen inputs and soil supply, frequent manure and soil analysis, mandatory fertilization plans and general limitations per crop for both mineral and organic nitrogen fertilization.
- Appropriate nitrogen spreading calendars and sufficient manure storage, for availability only when the crop needs nutrients, and good spreading practices.
- "Buffer" effect of non-fertilized grass strips and hedges along watercourses and ditches.
- Good management and restriction of cultivation on steeply sloping soils, and of irrigation.
- Groundwater monitoring, nutrients analysis and evaluation of the pollution stages.

The vulnerable areas will be revaluated at least once at four years. In the mean time it is needed to supervise and disseminate information regarding to the nitrate pollution from agricultural sources, to inform the farmers about the code of good agricultural practice.

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CERCETĂRI PRIVIND INFLUENȚA FERTILIZĂRII ASUPRA PRODUCȚIEI ÎN CAZUL SOIURILOR : CABERNET SAUVIGNON, FETEASCĂ REGALĂ ŞI MUSCAT OTTONEL ÎN CONDIȚIILE CENTRULUI VITICOL RECAŞ

RESEARCH REGARDING FERTILIZATION INFLUENCE UPON GRAPES YIELD IN CASE OF CABERNET SAUVIGNON, FETEASCA REGALA AND MUSCAT OTTONEL VARIETIES IN RECAŞ VITICULTURAL CENTER CONDITIONS

Iasmina Savescu, Mircea Goian

Cuvinte cheie: fertilizare, soiuri, producție

REZUMAT

Fertilizarea viței de vie este o secvență tehnologică care trebuie foarte bine cunoscută, clarificată şi care în ciuda numeroaselor cercetări efectuate, poate fi perfecționată în continuare.

Scopul acestei lucrari este acela de sublinia influenta fertilizarii minerale şi oragnice asupra productiei strugurilor la soiurile Cabernet Sauvignon, Feteasca Regala şi Muscat Ottonel. Cercetările se desfăşoară in anii 2006 si 2007 în conditiile Centrului viticol Recas. Experiențele având un caracter staționar s-a acordat o mare atenție câmpului experimental care prin însuşirile solului, poziționare , corespunde cerințelor viței de vie față de factorii de mediu.

În viticultură, pentru obținerea de producții mari este obligatorie folosirea îngrăşămintelor mai ales ca vița de vie ocupă în general terenuri cu o fertilitate redusă.

Adoptarea unui sistem de fertilizare rațional care să conducă la un echilibru între creştere si fructificare , între cantitate şi calitate , fără a avea efecte asupra sănătății şi a longevității butucilor necesită o documentare adecvată, iar influența factorilor ecologici se cere monitorizată.

Variantele experienței sunt:V1 - martor, V2 - fertilizare organică (gunoi de grajd 30t/ha), aplicat in primul an; V3 – $N_{150}P_{100}K_{100}$., aplicate pe expoziție sudică şi pe teren plan pentru fiecare soi în parte .Variantele sunt aşezate după metoda blocurilor randomizate. Fiecare variantă cuprinde 30 de butuci în trei repetiții.

Pe anul 2007 dintre cele trei soiuri producția la hectar cea mai mare a fost dată de soiul Fetească Regală, urmat de Muscat Ottonel şi de Cabernet Sauvignon. Pe anul 2006 ponderea a fost aceeaşi în ceea ce priveşte mărimea producției. Comparativ în cei doi ani producțiile sunt diferite. Producția la hectar, în ambii ani experimentali, la soiurile studiate, este superioară martorului. Cele mai ridicate productii s-au obținut la varianta fertilizată mineral.

ABSTRACT

Vine fertilization represents a technological sequence which must be very well known, clarified and which despite all reserches made can be still improved.

The aim of this research is to emphasize mineral and organical fertilization influence upon grapes yield in case of Cabernet Sauvignon, Feteasca Regala and Muscat Ottonel varieties. Research was made during 2006 and 2007 in Recas viticultural centre conditions. Experiments having a stationary character it was giving big attention to the experimental field which by soil features, positioning, corresponds to vine needs as concerns environmental factors.

In viticulture in order to obtain high yields fertilizers use is compulsory especially that vine occupies fields with a reduced fertility. The approvment of a rational fertilising system which will lead to an equilibrium between growth and fructification, between quantity and quality without any side effects upon health and vines longevity, requires an adequate documentation, and ecological factors influence is to be monitorized. Experimental plots were: V_{1-} control, V_2- organic fertilizers and V_3-mineral fertilization(N150P100K100) applied on south exposition and plane ground for each variety. Plots are arranged using random blocks method. Each plot has 30 vines in three repetitions.
In 2007 the highest yield/hectar was obtained in case of Feteasca Regala variety, followed by Muscat Ottonel and Cabernet Sauvignon varieties. In 2006 the share was identical as concerns yield's size. Yields in the two years of experimentation registered the highest values on plane ground. Yield /hectare is superior to the control in both experimental years, in case of the studied varieties. The highest yields were registered in case of V_3.

INTRODUCERE

Conceptul actual de fertilizare la vița de vie leagă fertilitatea efectivă a solului de cerințele nutritive alea cestei plante, iar optimizarea soluțiilor de fertilizare în aceste domeniu se bazează pe relația sol-plantă.

În realizarea acestei cercetări s-au efectuat experiențe cu soiuri de vin şi îngrăşăminte în vederea determinării şi stabilirii dependenței care se formează între utilizarea mijloacelor de sporire a producției, îngrăşămintele, şi capacitatea soiurilor de a le valorifica, în vederea atingerii eficienței maxime.

MATERIAL ŞI METODĂ

Cercetările s-au desfăşurat în cadrul plantației viticole din cadrul SC Cramele Recaş, Ferma 2. Am utilizat soiurile de struguri pentru vin Fetească Regală, Cabernet Sauvignon şi Muscat Ottonel, care au fost plantate la o distanță de plantare 2 m între rânduri şi 1,2 m pe rând, rezultând un număr de 4166 butuci/ha. Portaltoii soiurilor sunt din grupa Berlandieri x Riparia Kober 5BB. Metoda statistică :analiza variantei.

Variantele experienței sunt:V1 - Mt (fertilizat foliar); V2 - fertilizare organică (gunoi de grajd 30t/ha, semifermentat), aplicat toamna, înainte de începerea cercetării, o singură dată; V3 – $N_{150}P_{100}K_{100}$., aplicate pe expoziție sudică şi pe teren plan pentru fiecare soi în parte .Variantele sunt aşezate după metoda blocurilor randomizate. Fiecare variantă cuprinde 30 de butuci în trei repetiții.

Producția de struguri a fost determinata prin recoltarea strugurilor pe variante şi repetiții, la coacerea acestora, rezultatele fiind interpretate statistic.

REZULTATELE CERCETARII

În urma cercetărilor efectuate în câmpul experimental au fost determinate producțiile la hectar înregistrate Inregistyrate în cazul soiurilor Cabernet Sauvignon, Fetească Regală şi Muscat Ottonel în anii 2006 şi 2007 exprimate în kg/ha.

În cazul soiului Cabernet Sauvignon în anul 2006 pe expoziție sudică producția la ha a fost de 9588 în cazul variantei martor fertilizată cu îngrăşăminte foliare şi de 9938 kg/ha în cazul variantei fertilizate cu N_{150} P_{100} K_{100}. In cazul variantei fertilizate cu NPK producțiile obținute au variat distinct semnificativ față de martor. Pe teren plan deasemenea cea mai mare producție a fost înregistrată în cazul variantei fertilizate cu îngrăşăminte complexe producția fiind de 8980 kg/ha, care prezintă deasemenea diferențe distinct semnificative față de martor.

In ceea ce priveşte anul 2007, producțiile sunt ca şi în anul 2006 mai mari pe expoziția sudică decât pe teren plan.Cele mai mari producții sunt realizate în cadrul variantei fertilizate mineral.

Tabel 1

Producțiile (kg/ha) înregistrate la soiul Cabernet Sauvignon în anii 2006 şi 2007

Varianta	2006							
	Expozitie sudică				Teren plan			
	Productia Kg/ha	Valori relative %	Diferențe Kg/ha	Semnificație	Productia Kg/ha	Valori relative %	Diferențe Kg/ha	Semnificație
Martor	9588,00	100,00	-	-	8630,00	100,00	-	-
GG	9180,00	95,74	-408,00	00	8435,00	97,74	-195,00	0
NPK	9938,00	103,65	350,00	**	8980,00	104,06	350,00	**
DL5%=170.22 DL1%=281.66 DL0.1%=527.20					DL5%=191.93 DL1%=317.58 DL0.1%=594.44			
Varianta	2007							
	Expozitie sudică				Teren plan			
	Productia Kg/ha	Valori relative %	Diferențe Kg/ha	Semnificație	Productia Kg/ha	Valori relative %	Diferențe Kg/ha	Semnificație
Martor	7990,00	100,00	-	-	7380,00	100,00	-	-
GG	7780,00	97,37	-210,00	0	7212,00	97,72	-168,00	-
NPK	8390,00	105,01	400,00	**	7769,00	105,27	389,00	*
DL5%=171.37 DL1%=283.56 DL0.1%=530.75					DL5%=301.26 DL1%=498.49 DL0.1%=560.06			

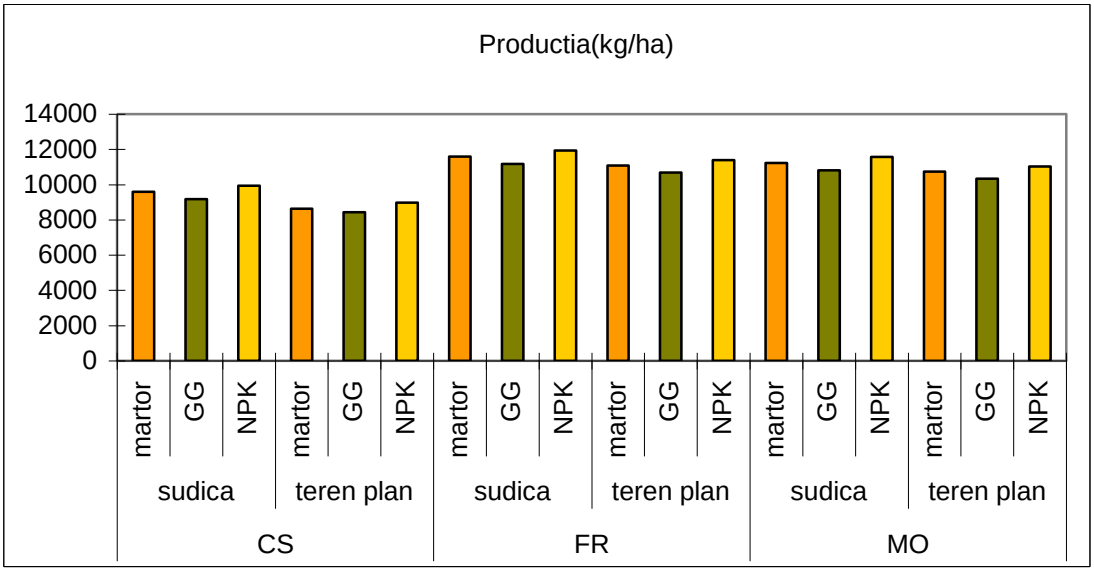

Fig 1 **Producțiile celor trei soiuri în anul 2006**

Soiul Feteasca Regală este un soi ce valorifică bine aproape toate tipurile de de sol, dar care are nevoie de umiditate asigurată.

Şi în cazul acestui soi producțiile cele mai mari au fost obținute atât pe teren plan cât şi pe expoziție sudică în varianta fertilizată cu NPK, care diferă distinct semnificativ fată de martor pe expoziție şi pe teren plan. Intre ani cele mai mari producții au fost înregistrate în anul 2006, în anul 2007 acestea fiind mai mici. Cea mai mare producție pe expoziție sudică în 2006 a fost de 11931 kg/ha, în 2007 de 10041 kg/ha, iar în anul 2006 pe teren plan a fost de 11393kg/ha, iar pe 2007 pe teren plan de 9532 kg/ha.

Tabel 2

Producțiile (kg/ha) înregistrate la soiul Fetească Regală în anii 2006 şi 2007

Varianta	2006							
	Expozitie sudica				Teren plan			
	Productia Kg/ha	Valori relative %	Diferențe Kg/ha	Semnificație	Productia Kg/ha	Valori relative %	Diferențe Kg/ha	Semnificație
Martor	11581,00	100,00	-	-	11073,00	100,00	-	-
GG	11170,00	96,45	-411,00	000	10683,00	96,48	-390,00	00
NPK	11931,00	103,02	350,00	**	11393,00	102,89	320,00	**
	DL5%=124.34 DL1%=212.36 DL0.1%=397.49				DL5%=163.46 DL1%=270.48 DL0.1%=506.27			
Varianta	2007							
	Expozitie sudica				Teren plan			
	Productia Kg/ha	Valori relative %	Diferențe Kg/ha	Semnificație	Productia Kg/ha	Valori relative %	Diferențe Kg/ha	Semnificație
Martor	9651,00	100,00	-	-	9120,00	100,00	-	-
GG	9441,00	97,82	-210,00	0	8930,00	97,92	-190,00	-
NPK	10041,00	104,04	390,00	**	9532,00	104,52	412,00	**
	DL5%=200.05 DL1%=331.03 DL0.1%=619.60				DL5%=209.09 DL1%=345.99 DL0.1%=647.60			

Pe ani, soiul Muscat Ottonel, cele mai mari producții le-a avut pe expoziție sudică, mai mare în 2006 decât în anul 2007, cea mai bună variantă fiind cea cu fertilizare cu NPK.

La fel ca în cazul celorlalte soiuri între ani producția mai mare a fost înregistrată în anul 2006 pe expoziție sudică mai mare decât pe teren plan, în 2007 producția fiind de 9581 kg/ha pe sud şi de 8890 kg/ha ambele mai mari în varianta de fertilizare mineral.

Tabel 3

Producțiile (kg/ha) înregistrate la soiul Muscat Ottonel în anii 2006 şi 2007

Varianta	2006							
	Expozitie sudica				Teren plan			
	Productia Kg/ha	Valori relative %	Diferențe Kg/ha	Semnificație	Productia Kg/ha	Valori relative %	Diferențe Kg/ha	Semnificație
Martor	11217,67	100,00	-	-	10740,00	100,00	-	-
GG	10809,00	96,36	-408,67	000	10332,00	96,20	-408,00	00
NPK	11571,00	103,15	353,33	**	11030,00	102,70	290,00	**
	DL5%=123.57 DL1%=204.47 DL0.1%=382.72				DL5%=136.59 DL1%=226.02 DL0.1%=423.05			
Varianta	2007							
	Expozitie sudica				Teren plan			
	Productia Kg/ha	Valori relative %	Diferențe Kg/ha	Semnificație	Productia Kg/ha	Valori relative %	Diferențe Kg/ha	Semnificație
Martor	9251,00	100,00	-	-	8630,00	100,00		-
GG	9060,00	97,94	-191,00	0	8435,00	97,74	-195,00	0
NPK	9581,00	103,57	330,00	**	8980,00	104,06	350,00	**
	DL5%=161.11 DL1%=266.59 DL0.1%=499.00				DL5%=376.75 DL1%=623.41 DL0.1%=1186.86			

Pe anul 2007 dintre cele trei soiuri producția cea mai mare a fost dată de soiul Fetească Regală, urmat de Muscat Ottonel şi de Cabernet Sauvignon.(Fig. 4.17)

Pe anul 2006 ponderea a fost aceeaşi în ceea ce priveşte mărimea producției.

O posibilă explicație ar fi pentru anii 2007 şi 2006 faptul că valorile producției obținute în cazul aplicării gunoiului de grajd în ambii ani de experimentare sunt cele mai mici, întrucât accesibilitatea elementelor nutritive din acesta este mult mai mică în comparație cu cea din îngrăşământul foliar (Mt) şi îngrăşământul complex $N_{150}P_{100}K_{100}$ .In anul 2006 pe tot parcursul anului a plouat mai puțin ca în 2007 iar vița de vie a valorificat acest lucru.

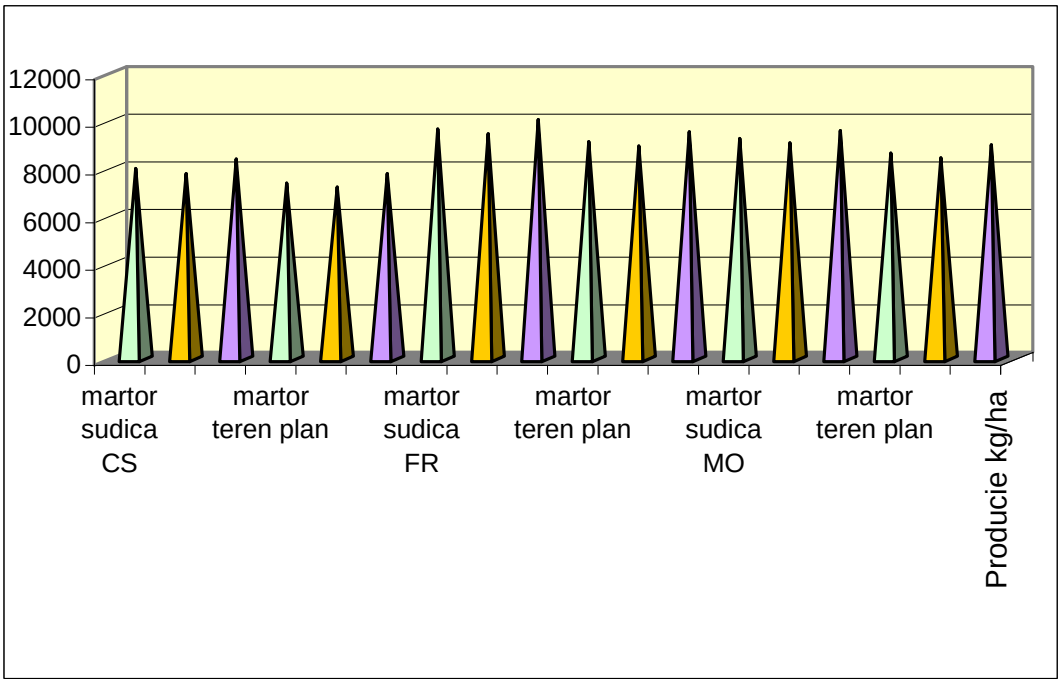

***Fig.2* Producțiile celor trei soiuri în anul 2007**

In special pentru anul 2007, cantitatea mare de materie organică din sol poate determina complexarea unor microelemente necesare viței de vie în vederea fructificării. Ca urmare aceste elemente se vor afle în forme insolubile şi inccesibile plantelor. Ele pot fi puse la dispoziția viței de vie doar în urma mineralizării complete a materiei organice.

O alta posibilă explicație ar putea fi aceea că datorită aplicării gunoiului de grajd în stare semifermentată, azotul din acesta este consumat de microorganismele din sol care participă la descompunerea în continuare a gunoiului de grajd şi nu de către vița de vie.

CONCLUZII

În urma desfăşurării cercetărilor putem concluziona faptul că toate cele trei soiuri au inregistrat în urma fertilizării producțiile de struguri cele mai ridicate în cazul variantei fertilizate mineral, atât pe expoziție sudică cât şi pe teren plan.

Între soiuri, pe cei doi ani de experimentare, cea mai mare producție a fost dată de soiul Fetească Regală, urmat de soiul Muscat Ottonel şi de Cabernet Sauvignon.

În concluzie, problema fertilizării viței de vie reprezintă o secvență tehnologică care trebuie tratată cu maximum de responsabilitate şi care în ciuda numeroaselor cercetări efectuate, poate fi perfecționată în continuare.

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