INTRODUCTION

RESEARCH ON THE INFLUENCE OF SOME STIMULATING FACTORS ON THE GROWTH AND DEVELOPMENT IN SOME VEGETABLE PLANT SPECIES

The place and role of the vegetable growing as a branch of the agricultural production are determined by the climate and soil favorability of our country for the growth and development of many species of vegetable plants, the long tradition and expertise of the growers, the large number of specialists in this field, the prior accumulation of the material and technical basis which can be improved without too much effort, the existance of significant markets, represented by the public consumption and the canning factories.

The scientific research in vegetable crop seeks to intervene in some technology sequences to improve their metabolism, with the purpose of enhancing the growth and development processes, finally materializing through quantitative and qualitative productions.

OBJECTIVES

The research objectives concern:

- the influence of some stimulants on the rate of seed germination;
- the influence of some stimulants on the growth of seedlings and growing plants;
- the influence of some stimulants on the physiological and biochemical processes in vegetable plants studied;
- the influence of the products used on some elements of growth and fructification in vegetable species under investigation;
- the influence of the products used on elements that define the quality of fruit in cucumbers and tomatoes;
- the establishment of correlations between the elements of growth and fructification and the variants studied.

RESULTS OBTAINED

1. Research on the influence of some types of structurally modified water on the processes of seed germination and growth of cucumber seedlings

For the research there were used seeds of the hybrid Maribelle and eight types of structurally modified water to stimulate the seed germination.

The results obtained show that the average values of the three repetitions highlight the differences between the variations in the type of water used.

The percentage of germinated seeds was between 67% in M_2 (distilled water) and 90% (types 25 ppm, 60 ppm and 105 ppm of structurally modified water).

The percentage of non-germinated seeds was 10-33%, with small differences between the two phases of the tests.

There was an increase in the number of seedlings in the seed-lobe stage, the higher values being obtained at V_2 (modified water 25 ppm) and V_3 (modified water 60 ppm), and the light water (LW) and deuterium water, 1.0% D_2O.

The differences in the average weight of 10 plants is due to the mass accumulation of the increase rate in the treatment applied.

The witness V_1 (144 ppm) has lower values, surpassed by all the variants that used structurally modified water with values that ranged from 0.143 g (V_6) and 1.119 g (V_2) in the average weight of the 10 seedlings.

2. **Research on the influence of some types of structurally modified water and processes of electromagnetic waves on seed germination and growth of cucumber seedlings.**

The poly-factor experience of the type A x B, experimental variations resulting from the combination of the graduation of two factors namely.

There were put to be wetted seeds of the Maribelle F_1 hybrid for 24 hours, with intervals of half an hour for airing at every six hours of wetting.

After the biological material has undergone two treatments, it was seated at the Jacobsen germinator in two repetitions.

There were made observations and biometric measurements at 5 days from the placing of the seeds on their germination and vegetative mass weight of 20 seedlings.

Regarding the germination, the values are very different and difficult to interpret because the best value is recorded at the non-stimulated physical witness and where the seeds were wetted in distilled water.

We must emphasize that at the graduations b_3, the electromagnetic intensity was higher and the seed germination was lower than the values of b_1 and b_2 even, which means that as the intensity of treatment increases, the effects are weaker.

The differences between the variants studied and the witness (a_1b_1) in relative values are 5-25%, representing only 75-95% of its value.

The values from the graduations b_3 show that as the intensity of treatment increases, the results start to decline, and this aspect might arise the problem of the decrease of the electromagnetic stimulation duration.

The average weight of the vegetative accumulations are very different, both within each graduation of the factor A and between the graduations of the factor B, but with greater differences in plants subjected to electromagnetic stimulation.

For the factor A, the highest values are recorded when seeds were wetted in water Π and in LW water.

In the factor B graduations, the graduation with intensity I_1 is slightly higher than the intensity I_2, both in terms of cucumber seed germination and the growth of the vegetative mass in seedlings, except for the use of the light water for the moistening of the seeds.

Compared with the witness a_1b_1, the percentage increases of the vegetative mass of the weight of 20 seedlings are up to 575% in a_4b_2.

3. Research on the influence of the use of some growth-stimulating substances on the process of fructification at the cucumbers grown in green houses

In terms of solariums, in short fruited cucumber (Maribelle F_1) there have been conducted research on the influence of the use of some synthetic chemicals (stimulators, retardations and fertilizers) on plant growth and development and production obtained, both in terms of quantity and quality.

The experience has been placed in a tunnel type solar as randomized block method in three repetitions.

Vermorel treatments were applied, those administered during the growing season is made as follows: first three weeks after planting and every two to three weeks between them.

There were made observations and biometric measurements on the influence of the products used in the growth of plants and their development process, quantitative measurements on the productions obtained and, for changes in leaf and fruit, physiological and biochemical analysis were performed on the intensity of the photosynthesis, the amount of assimilating pigments, leaf content in total solids, total nitrogen, P_2O_5 and K_2O, the content of fruit in total solids, soluble solids, total nitrogen, P_2O_5 and K_2O, total acidity, vitamin C and total sugar.

The fructification process is evidenced by the production obtained during the testing cycle, which in terms of solariums relates generally to surface m^2, but also by the number and size of the fruit according to the cultivation used depending on the destination of the production respectively.

Being grown in the spring-summer cycle I, in solariums, the main destination of the production in the research conducted was fresh consumption and possibly the pickled temporary preservation, for consumption in summer.

For the years of the research (2006-2007), the productions obtained were recorded by harvesting conducted daily, taking into account that the growth of the fruit is very fast.

Given the main direction of the capitalization of the production, the harvesting were performed when the fruit were between 6-9 cm in length.

The Cropmax and Procaina products behaved very well.

Also the production obtained from the V_6 is valued, where plants were treated with fertilizer Bionat, which really is the most reasonably priced compared to other products and therefore better for use.

The differences of production from the witness ranges from 0.30 kg/m^2 CCC to 0.66 kg/m^2 in Atonik and, in Biona 0.78 kg/m^2, 0.98 kg/m^2 in Procaina and 1.01 kg / m^2 Cropmax.

The percentage increases are between 10.71 to 36.07%, statistically being assured as very significant in Cropmax treatments, significantly distinctive at Procaina and Biona, significant at Atonik and insignificant at Cycocel.

In 2007, the witness had a production of 2.66 kg/m^2, and at the variants treated the values ranged from 2.96 to 3.46 kg/m^2, with the best values on Cropmax and Biona.

The Cropmax treatments, followed by those with Biona, had the largest percentage increases (from 33.33 to 28.57%), recording similar values at the application of Procaina (25.64%).

The lowest average production growth was recorded by applying Cycocel, this being 10.99%.

Regarding the elements of fructification, the average number of fruit per plant, as the average for the years of research, range from 52.5 at V_1 (Mt.) and between 55-68 for the variants treated, with absolute increases from 2.5 to 15 , 5 fruits per m^2 and relative values of 4.8 to 29.5%, revealing V_4, V_3 and V_6.

Also in terms of the average of the two years of study, the fruit weight ranged from 44.7 g/ fruit to variants treated by applying CCC to 62.3 g / fruit when administered Procaina. We established some physiological indicators of the cucumber plants, respectively the clorofilian index and sweating and photosynthesis processes for three of the five variants, with the untreated witness.

The clorofilian index variation was set at three levels of the plant, respectively on the basis, on the middle and top of the plant, in two stages of determination.

The two determinations were made after the application of the three treatments in culture, one week between them.

From the data obtained and presented, it appears that all variants have been treated with higher values compared to the untreated witness.

For the determinations were used leaves from the average plant height at the respective data.

We tried to establish the clorofilian index at three levels of cucumber plant, to highlight the differences between treatments, the level of action and the morphological status of the plant.

At the first determination, the values are slightly lower compared to the second and can be attributed to the climate differences in the days and stages of determination.

In both stages of determinations, the best results were obtained in variant receiving CCC.

The clorofilian index relates only to chlorophyll „a".

The photosynthetic activity, determined in two stages highlights the differences between the versions, for both phases of determinations.

In the first stage, 15 days after planting, the values expressed in mg percentage s.u./dm^2 leaf, at 3 hours, are of 42.0 mg s.u./dm^2 leaf at V_1- Mt and between 46.2 - 62.4 mg s.u./dm^2 leaf at the variants treated with the highest value and considerable difference from the witness, at V_4 (Cycocel treatment), something that is correlated with the previously determined clorofilian index. Appreciable values were recorded also at the treatments with Procaina and Cropmax respectively, for this stage.

For the second stage of determination, the results of treatments carried out are similar to those obtained initially, only that their values are higher because the development phase of the leaves is higher and therefore the intensity of the photosynthesis is stronger.

Based on tests carried out were determined aspects regarding the content of the leaves in percent and in the mineral elements N, P_2O_5 and K_2O, also in the same stages.

For the first stage, the leaf content in percent has values between 9.26 to 10.80 g at % s.p., increasing in phase II at 10.80 to 12.80 g at % s.p., with lower values in phase I, because the leaves at the moment of the determinations are younger compared to stage II, where the values increase, the plant having adult leaves. In both cases the tests were related to an average sample per plant.

The accumulation of s.u.t. from the leaves are put on account of the photosynthetic process intensity and chlorophyll components that influence this process.

The content of the cucumber leaves in mineral elements, after the values obtained by measurements in the two stages differ between the determination stages and between variants.

Between the stages of determination, the values are higher in the second, for the same variant.

At the same stage, the nutrient content values differ less between variants.

Regarding the total N, in the first stage the values are 3.26 to 3.96% s.u., and in the second between 4.32 to 4.92% s.u., the P_2O_5 content varies between 0.86 - 1.06% s.u. in the first stage and from 1.42 to 2.02% s.u. in the second and K_2O has values between 1.20 to 1.42% s.u. in the first phase and 2.02 to 2.96% s.u. in the second.

Under general aspect, the Cropmax, Procaina and Bionat treatments have the best values.

There were determined also some chemical components in the cucumber fruit, respectively the content in s.u.t., s.u.s., mineral elements and biochemical components.

S.u.t. content expressed in g/100 g fresh substance ranged from 3.4 to 4.2, with the highest values in treatments with Cropmax (4.2 g/100 g s.p.), Procaina (4.1 g/100 g s.p.) and Bionat respectively (4.0 g/100g s.p.).

The values of the content in S.U.S. range from 3.12% in V_1 (Mt) and up to 3.84% in treatment with Cropmax. The differences between the versions are appreciated, but not very significant. There are recorded differences between the variants and the content of the fruit in mineral elements. The observed values are 3.62 to 4.26% of s.u. for N, between 1.74 to 2.40% of s.u. for P_2O_5 and between 2.52 to 2.92% of s.u. for K_2O.

Generally there are recorded great rises in treatments with Cropmax, Procaina and Bionat.

Regarding the biochemical content, there are some differences depending on the treatment options.

Titratable acidity varies between 0.07 to 0.12%, vitamin C from 8.46 to 9.82 mg/100 g s.p., and sugar content between 1.62 to 2.02%.

Although the values are not too high, there are some differences between versions.

Based on those determined and analyzed under the biochemical, physiological and chemical aspect one can say that the products used to treat the plants had specific influences in relation to their mechanism of action.

The best results, in general appearance, were recorded in treatments with Cropmax, Bionat and Procaina, but also with the Cycocel, in terms of elements that are related to its specific action.

S.u.t. content of fruit in variants was reported in the output produced per unit area (m^2 or ha) to determine the nutrient intake of the mineral and biochemical components.

Under general aspect, the cucumber fruits have a low percent of s.u.t., in this case ranging from 3.4 to 4.2%. Reported to the average productions in the years of research, at m^2 or ha, the values are different and significant on variants. The production of s.u.t. at ha is between 920 - 1529 kg, with quite appreciable differences between the versions and percentage compared to the witness, respectively 228-609 kg in all treated variants. Of these increases of s.u.t. there are highlighted those in V_3 (Cropmax) with an increase of 609 kg / ha, followed by V_5 and V_6, respectively Bionat and Procaina with 486-484 kg / ha.

4. Research on the influence of some fertilizers applied foliarly on the processes of growth and fructification in tomatoes grown early in the field.

On the early tomatoes grown in the field (Ioana F_1), there was conducted research about the influence of foliar fertilizers on plant growth and development and production obtained, both quantitatively and qualitatively.

The experience has been placed in the field, according to the randomized block method, in three repetitions.

Treatments with Vermorel were applied in the vegetation period as follows: first a month after planting and two at intervals of one month between them.

There have been many observations, biometric measurements, quantitative measurements and physiological and biochemical analysis of the following elements:

- plant height and diameter, number of leaves per plant (until weeding);
- number of fruit harvested per plant;
- oxidation-reducing enzyme activity (catalase and peroxidase)
- carbohydrate and amino acid content of leaves;
- early and total productions obtained;
- total solid and soluble substances N, P_2O_5, K_2O, total acidity, vitamin C and total sugar in fruit.

For 2006, the data shows that plant height ranged from 1.30 m in witness and between 1.34 to 1.40 m, in the other variants, with small percentage differences between the variants, the percentages

from V_1 being only 3.1 to 7.7%, which means that all types of fertilizers behaved almost the same in experimental conditions.

Regarding the plant stem diameter, no differences from the witness values were too high, registering an increase of 5.3 to 13.1% in percentage at foliar fertilized variants, the largest being with the Biofit treatments, followed by the application Biofit + humic acids.

Average number of leaves per plant was almost equal for all variants.

For 2007, the data has only minor differences compared to 2006, determined by the way the plants behaved in relation to climatic conditions.

But the differences are not significant, the plant height being 1.28 m at V_1 and from 1.30 to 1.48 m to the other variants, more evident percentage increases occurring in V_3 (Biofit), 15.6% and V_6 (Folamin 232 + humic acids), of 10.94%, otherwise the differences are smaller.

The plant diameter on weeding lies at 12.22 mm in V_1 (Mt) and from 12.80 to 13.96 mm in variants treated, with percentage increases of 4.75 to 14.24%, revealing the variants 3 (Biofit), 6 and 7 (Folamin + humic acids).

The average number of leaves per plant is similar to the previous year values because weeding was conducted after five inflorescences, and they have a specific appearance, after a constant number of leaves.

Since the differences between the two years are not too high, and the plants behaved consistently, there has not been established the years average, but under general aspect, it is highlighted, from these points of views, V_3 (Biofit) and V_6 and V_7 (Folamin + humic acids).

The total number of fruits per plant, as average of the two years, had absolute values from 26.66 to 33.99, and the differences from the witness were 1.95 to 7.33, the percentage increases being 7,31 to 27.49% in treatments with Folamin + humic acids realizing the best value.

The average number of fruits harvested with an average weight is highlighted in the productions that were obtained in the variants studied.

The enzymatic activity in the leaves, by determining the oxidation-reducing enzymes, catalase and peroxidase presented higher values in the first round, compared to the second stage (for the same variation) explained by the decrease of the enzymatic activity of leaves and changes in the plant, with increased fruit fructification and maturation, which explains the the production results to be presented.

The peroxidase values for fertilized variants, have exceeded the witness, reaching the highest values at V_6 (Folamin + humic acids), followed by V_3 (Biofit). The peroxydases are primarily favoring the photosynthetic process of plants.

This activity is maintained also in the second phase, but the values are lower overall the experience, the witness being overtaken by all variants fertilized.

These lower values in the second stage of the determinations could ascribe to the intensification of the accumulation process, the plants being bigger, with a more intensive process of fructification and moving toward maturity of physiological ripeness.

The catalase activity for the two phases, expressed as ascorbic acid oxidation on 3 '/1g s.p., mainly affecting the respiratory processes of plant and the values show different determinations for the first phase, with the highest value in V_1 (mt) of 384 ml O_2 released in 3 '/1g s.p. and between 147-252 ml O_2 released in 3 '/ 1g s.p. at the variants treated, and in the second phase, the values are generally similar between the variants, probably due to a balanced production or climate.

The carbohydrate content is expressed in densitometric total units, number of fractions, densitometric units on fractions and densitometric units on the fraction of total U.D..

The total densitometric units, at the first determination have very different values compared with the witness, which have a value of 1350 total U.D., two variants registering much lower values, respectively V_3 (Biofit) and V_6 (Folamin 232 + humic acids), variants where there are found to have achieved very good values of a quantitative and qualitative production.

Perhaps these issues created a higher consumption of carbohydrates in the process of accumulation.

For the second stage of determinations, under general aspect, the values are slightly lower and can be attributed to carbohydrate consumption in the metabolic processes.

In V_3 (Biofit), the value remains lower that of the the witness and other variants. Except the version 4 where there is growth of the densitometric units (1650 to 978 in V_1 - witness), in the other variants the values are almost similar, but smaller than the first stage, the explanation may be attributed to the activities of plants.

Values are also set in U.D. for the two factions, with different values on each stage. They were determined both under absolute and relative aspect.

For the two years of research, harvesting have been followed and conducted on variants and repetitions, establishing their values in terms of total output and earliness.

The average of the early productions in the years of research ranges from 10.05 t / ha in V_1 (Mt), ranging between 13.65 to 16.30 t / ha for fertilized variants, with differences in absolute production of 3.60 - 7.25 t / ha and an increase in percentage considered high, from 35.82 to 62, 19%.

These increases are substantial and can be attributed to the positive action of the extraroot fertilization.

In terms of total output, the environments are at the level of 25.7 t / ha in V_1 (Mt) and from 27.6 to 30.5 t / ha in the other variants.

Between variants, the values are closer and the average of the years show the same general aspects as in every year.

The percentage increase of the total production is at levels of 7.39 to 18.68%, mainly because the early productions recorded appreciable growth.

By highlighting the results of the production obtained during research as well as their average value can be concluded, by that point, that the treatments applied were effective, and the products Biofit, Folamin + humic acids were the most favorable for research and production and can be recommended for implementation in practice.

In tomato fruits there were conducted some biochemical determinations, to examine the influences of the treatments applied to some elements that determine the fruit quality.

Under general appearance, there are highlighted considerable differences between the variants, which can be attributed mainly to the treatments used, but can be determined also by the hybrid or the climatic conditions of the formation period and the maturity of the fruit.

The fruit content in s.u.t. is considered good for an early hybrid, at the level of the variants being situated within the range of 4.96 to 5.64%, all fertilized variants exceeding the witness and of these, the variants 3; 6 şi 7, had larger increases.

The fruit content in s.u.s. is, in general, lower than that s.u.t. (normal aspect), but from this point of view, there are differences between the variants, and they correlate broadly following the general appearance of the fruit content in S.U.T..

The content values in s.u.s. range from 3.36% in V_1 (Mt) and between 3.86 to 4.98% in foliar fertilized variants, generally emphasizing the same variants, respectively V_3 (Biofit), V_6 (Folamin 232 + humic acids) and V_7 (Folamin 234 + humic acids).

The total nitrogen, expressed in percentage of dry matter, with values of 2.48 mg% of s.u. and 3.32 mg% of s.u. do not indicate a specific influence of treatment on this element because the values do not show this and in particular the development of the accumulations.

Regarding the fruit content in P_2O_5, the values obtained are 1.26 mg% of s.u. to witness and between 1.32 to 1.54 mg% of s.u. in the foliar fertilized variants, with some differences from V_1, but not at levels too high and with slight differences between the variants, registering small increases in V_3, V_6 and V_7.

The same small differences are also found in the fruit content of K_2O, where the witness records 2.16 mg% of s.u. and the variants treated between 2.28 to 2.98 mg% of s.u., for all three variants recording small increases in the overall experience.

Regarding the fruit content of the biochemical components, namely vitamin C, acidity and reducing sugars, the data are presented below.

If at the witness, the vitamin C content is 15.20 mg / 100 g s.p., the foliar fertilized variants recorded values of 17.20 to 28.10 mg/100g s.p., being detached the values of the variants 3 (Biofit) and V_6 (Folamin 232 + humic acids).

In this respect, it seems that the fruit quality can be improved through the mechanism of action of treatments.

The acidity levels in tomato fruit has some lower values in the fertilized variants compared to the witness. The witness recorded a value of 0.42 mg / 100 g s.p. and the other variants values ranging from 0.34 to 0.48 mg / 100 g s.p.

CONCLUSIONS

1. The use of some structurally modified types of water in the processes of seed germination and growth of cucumber seedlings underlines that these determines the increase of the germination percentage and the number of plants in the seed-lobe phase, the differences being determined by the growth rate of the treatment applied;

2. It is recommended to use water types Π and LW;

3. By making complex the cucumber seed wetting achieved with structurally modified water types, with subsequent submission of the biological material used for electromagnetic radiation with intensities I_1 and I_2, regardless of the water used, there is a reduction of the experimental results obtained with the increase of the intensity of the electromagnetic field;

4. The best results occurred in combinations of the water Π and the intensity I_2 of the electromagnetic radiation;

5. The use of substances with different effects and influences on the cucumbers culture in solariums reveals that in all respects, physiological, chemical, biochemical, qualitatively and quantitatively, Cropmax treatments gave the best results;

6. In early tomato crop, the use, in vegetation, of the foliar fertilizer was beneficial, because all elements related to the earliness of the production, its total amount, the nutrient content, the biochemical and physiological determinations show that the best results are obtained using the following foliar fertilizers or combinations thereof: Biofit (1%), Folamin 232 + humic acids (0.5%) or Folamin 234 + humic acids (0.5%).

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