

**UNIVERSITY OF CRAIOVA  
AGRICULTURAL FACULTY**

**SUMMARY OF DOCTORAL THESIS**

**STUDIES ABOUT INCREASING THE MULTIPLICATION  
COEFFICIENT OF SEED POTATOES BY USING MINITUBERS OF  
ROMANIAN VARIETIES UNDER ECOLOGICAL CONDITIONS OF  
THE RESEARCH AND DEVELOPMENT INSTITUTE FOR POTATO  
AND SUGAR BEET BRASOV**

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## **Summary of Doctoral Thesis:**

### **Studies about increasing the multiplication coefficient of seed potatoes by using minitubers of Romanian varieties under ecological conditions of the Research and Development Institute for Potato and Sugar Beet (I.C.D.C.S.Z.) Brasov**

#### **INTRODUCTION**

Researches were done with the purpose of studying the potential use of minitubers planted directly in the field and their behaviour under the ecological condition from Lazarea, Harghita county; the experiments were done in the clonal field of I.C.D.C.S.Z. Brasov, România.

These researches join the world concernings regarding the optimum stem density of potato crops by directly field planting of minitubers (Lommen, W.J.M. si Struik P.C.1995; 1996; Dolnicar,P.,1996 ; Roztropowicz S., Szutkowska, M.,Wierzejska, A., & Zarzynska, K., 1996 ; )

This paper presents a synthesis of the main results obtained in the period 1998 – 2000 regarding the main stems number per hectare, seed yield, total yield and the total tubers number from Runica, Roclas, and Rustic varieties.

Quality and yield improvement of seed potato is a permanent imperative. Because of its vegetative multiplication, potato favours the spreading of viral, bacterial and fungal infections from one generation to another, progressively diminishing the vigour, quality and quantity of potato yield.

Minitubers are small tubers, with a diameter of 5-35 mm which can be produced all year long in “insect proof” areas. They seem to be the most adequate to be used in the first year of multiplication in the field, aiming to obtain Prebase seed with good quality and quantity traits.

From the technical point of view, the fewer years of field multiplication, the lower is the possibility of infection with diverse pathogens, and the higher is the quality of the seed. Minitubers have been introduced in the most important potato producing countries (The Netherlands, Sweden, Belgium, France, Germany etc.), the new production scheme implying 6 years, instead of 10 years in the case of the traditional system. Researches in Romania concerning minituber utilization have started in 1996, by planting them directly in the field, and have tried to solve the problem of quality and quantity of seed potato by reducing the necessary period to obtain certified seed, as it is the case of the greatest seed potato producing countries.

Minitubers have a lower capacity to pierce the soil and fewer reserve matters, therefore a detailed study of their size, density, planting depth, and a requirement targeted crop strategy.

Researches made at the National Centre of Clonal Material Production Lazarea have shown that the most suitable potato cultivation areas are characterized by short cooler springs, frequent rainfalls, a lot of fog and dew, an intense air circulation, leading to low aphid and virus spread.

## MATERIAL AND METHODS

The researches were done in the period 1998 – 2000 at The Centre for Clonal Material production from Lazarea, Harghita County, affiliated to I.C.D.C.S.Z. Brasov. The altitude of the experimental field was 1000 – 1200 m above sea level.

The soil type is a typical luvic brown very deep, loamy with reasonable stone content. The physical aspect of the soil is normal and the soil surface is covered with stones in a percentage of 10 – 20%.

During 1998-2000, in the growing season, the average monthly temperature surpassed by 1,2-1,5°C the multiannual average temperature of 11,9°C. Although planting was late, during 1-25 of May, the strong solar radiation positively influenced the plant growth and matter accumulation, leading to obtaining a best quality seed.

Concerning the rainfalls during the growing season in 1998-2000, the multiannual average was much higher, of 409 mm.

In 1998, the rainfall amount during the growing season was 394,7 mm, with high differences from one month to another (july 120 mm, and august 55 mm).

In 1999 the rainfall amount during the growing season was 369,8 mm and much lower than the multiannual average, with great differences from one month to another. (june 103,3 mm and july 43,6 mm).

In 2000, the rainfall amount during the growing season was 315,4 mm and much lower than the previous year, meaning only 77,1% of the multiannual average (409 mm), with a deficit of 93,6 mm.

### Experimental plot lay-out and the surveyed variants

The experimental researches were done on the terrain named “Capâlna” owned by ICDCSZ Brasov, at 3 km north of Gheorgheni. The total area is 25,7 ha, from which 18,5 ha arable, portioned in 5 plots. These plots are not uniform from the point of view of area and soil structure.

Results assessment was made by polifactorial variance analysis for all studied variants. In order to compare the results, we used the multiple comparisons method, the Duncan test.

For researches a multiple factorial experiment was achieved with an arrangement of split-plots of type  $3A * 3B * 3C * 3R = 81$  variants in which the following factors ranks were studied:

#### Factors A (Variety)

$a_1$  – Runica - middle early variety, physiological maturity is achieved after appr. 75 vegetation days (Chiru,1998)

$a_2$  – Roclas - middle early variety, physiological maturity is achieved after appr. 80 vegetation days (Chiru,1995)

a<sub>2</sub> – Rustic - middle late variety, physiological maturity is achieved after appr. 108 vegetation days (Chiru,1995).

### **Factors B (Planting density)**

b<sub>1</sub>- 111000 plants/ha (75cm \* 12,5cm) = 11,1 plants/ m<sup>2</sup>

b<sub>2</sub>- 83000 plants/ha (75cm \* 16,5cm) = 8,3 plants/ m<sup>2</sup>

b<sub>3</sub>- 83000 plants/ha (75cm \* 20,0cm) = 6,6 plants/ m<sup>2</sup>

### **Factors C (minitubers size)**

c<sub>1</sub>- 5 – 15 mm;

c<sub>2</sub>- 15 – 25 mm;

c<sub>3</sub>- 25 – 35 mm.

Minitubers have been presprouted before planting; sprouts length being of 0,5 - 1 cm.

## **RESULTS OF RESEARCHES**

Concerning the emergence, great differences were noticed between the varieties and between the different minituber categories. Also, we noticed that the emergence percentage increases no matter the variety, with the size of minitubers and is in inverse ratio to their densisty.

The average emergence in Runica variety during 1998-2000 was 80,9%, lower than Roclas (93,3%) and Rustic (93,7%) varieties.

In all years, and all varieties, the highest average emergence was achieved when minitubers had an middle size (15.25 mm) and big size (25.35 mm).

This fact is due to the higher number of sprouts, their vigorousness.

The number of main stems was variety specific, due to size of planted minitubers , and to the viable eyes number.

During all the 3 years, in all the varieties, the average number of stems/plant was different, the highest being achieved with the big and middle category.

In all varieties, the difference of stem number /plant was significant, respectively, distnctly significant, starting with the lowest calibre to the highest.

The individual influence of minitubers shows that there is a direct correlation between the size of planted minitubers, the number of viable eyes the number of stems and the number of tubers.

In respect to the tubers/plant, their quantity and weigh raise directly proportional with the size of planted minitubers.

In **Runica variety**, during the 3 years, 1998-2000, of the average tuber number/plant was 9.5, with a weigh of 370 g/plant. In all years, the average tuber number/plant was the greatest in the case of the greatest calibre (12 tubers/plant), weighing 483 g/plant.

The average seed tuber number/plant (30-55 mm calibre) raised from 2.9 tubers/plant (5-15 mm calibre) to 6.5 (25-35 calibre). The minitubers of small calibre achieved 160 g/plant, and the greatest calibre 357 g/plant.

As an average, unica variety formed 4 tubers/stem. The highest number of tubers/stem was recorded at the small calibre.

In **Roclas variety**, during the 3 years, the average number of tubers/plant was 13.4 with a weigh of 421 g/plant. In all years, the average tuber number/plant was the greatest in the case of the greatest calibre (14.7 tubers/plant), weighing 466 g/plant.

The average seed tuber number/plant (30-55 mm calibre) raised from 4.9 tubers/plant (5-15 mm calibre) to 6.7 (25-35 calibre). The minitubers of small calibre achieved 259 g/plant, and the greatest calibre 343 g/plant.

As an average, unica variety formed 4 tubers/stem. The highest number of tubers/stem (4.2) was recorded at the small calibre.

In **Rustic variety**, during the 3 years, the average number of tubers/plant was 11.7 with a weigh of 379 g/plant. In all years, the average tuber number/plant was the greatest in the case of the greatest calibre (11.0 tubers/plant), weighing 382 g/plant.

The average seed tuber number/plant (30-55 mm calibre) raised from 4.5 tubers/plant (5-15 mm calibre) to 5.9 (25-35 calibre). The minitubers of small calibre achieved 247 g/plant, and the greatest calibre 312 g/plant.

As an average, unica variety formed 3.7 tubers/stem. The highest number of tubers/stem (4.3) was recorded at the small calibre (4.1) and middle calibre.

**The number of main stems** was variety specific due to tubers size planted and planting density, the differences were significant among varieties, tubers size used and planting density. For all three varieties, the highest number of main stems was obtained with the tuber size 25 – 35 mm.

The highest number of main stems was achieved at Roclas variety (table 2) (286.000 main stems/ha), followed by Rustic variety (table 3). ( 270.000 main stems/ha ). Runica variety had the lowest 224.000 main stems/ha (table 1).

The average main stems number achieved with 25 – 35 mm minitubers size was 335.000 main stems /ha, for 15 – 25 mm minitubers size the average, main stems was 263.000 and 182.000 main stems for 5 – 15 mm minitubers size (table1).

For all varieties, the main stems number increases in the same time with the increase of planting density, the maximum was recorded at 111.000 minitubers/ha. The statistical significance of the differences caused by increasing in density at different tuber size is specific for each variety.

For studied varieties, when 25 – 35 mm minitubers size were planted, the increase in the number of main stems was significant for each used level of planting density. The 3 levels of planting density are between 66.000 and 111.000 plants/ha. The maximum main stems for each variety was recorded at 111.000 plants/ha, (419.000 for Runica variety, 410.000 for Roclas variety and 387.000 Rustic variety).

When planting was made with 15 – 25 mm minitubers, significant increases of the main stems number were achieved only by using a plant density

of 111.000 plants/ha, the differences between levels of plant density (66.000 and 83.000 plants/ha) used were insignificant (tabela 1).

The average accumulated **total yield till** the haulm killing date, end of July, beginning of August, depending on cropping year, was 32,7 tones /ha for Roclas variety, 30,0 tones/ha, for Rustic variety and 25,7 for Runica variety (tabela 2).

The average yields differed significantly in accordance with the size of minitubers and ranked between 22,9 tones/ha and 34,0 tones/ha. The highest influence of minitubers size was on Runica variety yield (tabela 1).

The highest yields were recorded generally at high densities without being significantly different.

**The yields of seed** were 19,8 tones /ha for Roclas (tabela 2). variety 18,7 tones/ha for Rustic (tabela 3). and 14,8 tones /ha for Runica (tabela 1).

The highest yield of seed size 30 – 55 was obtained when planting was made with minitubers size 25 – 35 mm.

Increasing the plant density did not positively affect the standard seed potato yield, the highest yields were obtained at densities between 66.000 – 83.000 plants/ha.

The seed yield for all the three varieties increases in the same time with minitubers size and nutrition area. The highest seed yields ( Runica 23,1 tones /ha, Roclas 25,7 tones /ha Rustic 22,6 tones/ha) were achieved by planting 25 – 35 mm size of minitubers. Also for Roclas and Rustic varieties the same levels of yields can be achieved with 15 – 25 mm size of minitubers (tabela 2 and 3).

**The tubers number per unit area for studied** variants varied between 36,5 and 130 tubers /m<sup>2</sup> due to planting density and the size of minitubers used for planting.

The highest tubers number per unit area was achieved at Roclas variety (104,5 tubers /m<sup>2</sup>). For Rustic variety the average tuber number produced / m<sup>2</sup> was 91,0 and for Runica only 63,9 (tabela 1 and 3).

From big and middle size minitubers resulted in average 97,6 – 95,6 tubers /m<sup>2</sup>, number significantly higher number than the variants in which small minitubers were used (66,3 tubers /m<sup>2</sup>).

By increasing minitubers density per row in average the tubers number produced in average per unit area increases significantly. Different densities with different minitubers size results in different effects for each variety.

The seed tubers number has the same tendency with the total tubers number produced per unit area depending on the minitubers size used and planting density. The numbers of these tubers are 47 tubers/m<sup>2</sup> for Roclas, 43 tubers/m<sup>2</sup> for Rustic and 33,4 tubers/m<sup>2</sup> for Runica variety (tabela 1).

The tubers number, size 30 – 55 is higher if planting is made with minitubers size over 15 mm. The tubers number of this size increases in the same time with plants density on row.

**Influence of tuber size and planting distance on some yield items, per square metre and hectare in Runica variety**  
(Lazarea, Harghita county, average values, 1998-2000)

Table 1

Size of planting material (mm)	Nr. of plants/ lm	Variety Runica													
		Total yield		Seed production		Tuber yield under 30mm		Nr. of stems		Total tuber number per area unit		Seed total number per area unit		Number of tubers under 30 mm per area unit	
		t./ha	Duncan Test	t./ha	Duncan Test	Nr. / plant	Duncan Test	Nr. / plant	Duncan Test	total nr./ sq m.	Duncan Test	Nr.	Duncan Test	g / plant	Duncan Test
Average	8	15.6	ef	6.1	g	1.1	bc	150.400	ef	37.2	e	17.8	d	9.2	c
5-15	6	19.1	def	10.7	efg	1.0	c	132.000	f	42.2	de	22.4	cd	9.8	c
	5	14.8	f	8.6	fg	1.0	c	122.200	f	36.5	e	16.6	d	9.7	c
Average	x	<b>16.5</b>	<b>c</b>	<b>8.5</b>	<b>c</b>	<b>1.0</b>	<b>c</b>	<b>134.800</b>	<b>c</b>	<b>38.6</b>	<b>c</b>	<b>18.9</b>	<b>c</b>	<b>9.5</b>	<b>c</b>
15 - 25	8	27.3	bc	13.0	def	2.1	abc	256.300	c	72.6	bc	39.8	b	17.3	abc
	6	25.8	bcd	14.3	cde	1.4	bc	200.700	d	56.6	cd	31.2	c	12.3	bc
	5	23.1	cde	15.6	cd	1.7	abc	175.000	de	71.8	bc	29.0	c	13.5	bc
Average	x	<b>25.4</b>	<b>b</b>	<b>14.3</b>	<b>b</b>	<b>1.7</b>	<b>b</b>	<b>210.600</b>	<b>b</b>	<b>67.0</b>	<b>b</b>	<b>33.3</b>	<b>b</b>	<b>14.4</b>	<b>b</b>
25 - 35	8	37.0	a	17.8	bc	2.9	a	419.300	a	97.1	a	54.7	a	23.9	a
	6	36.9	a	22.3	ab	2.1	abc	306.700	b	79.0	b	46.1	b	17.6	abc
	5	31.7	ab	23.1	a	2.4	ab	257.800	c	82.5	ab	43.0	b	20.1	ab
Average	x	<b>35.2</b>	<b>a</b>	<b>21.1</b>	<b>a</b>	<b>2.5</b>	<b>a</b>	<b>327.900</b>	<b>a</b>	<b>86.2</b>	<b>a</b>	<b>48.0</b>	<b>a</b>	<b>20.6</b>	<b>a</b>
Average per variety	xx	<b>80.9</b>		<b>3.3</b>		<b>1.8</b>		<b>224.400</b>		<b>63.9</b>		<b>33.4</b>		<b>14,8</b>	

DI 5 % (variety\*size\*distance) **7.1 t/ha** **8.1 t/ha** 1,7t/ha 38.800 stems/ha 16.8 pcs/mp 8.5 pcs/mp  
8,1 pcs/mp

**Influence of tuber size and planting distance on some yield items, per square metre and hectare in Roclas variety**  
(Lazarea, Harghita county, average values, 1998-2000)

Table 2

Size of planting material (mm)	Nr. of plants/ lm	Soiul Roclas													
		Total yield		Seed production		Tuber yield under 30mm		Nr. of stems		Total tuber number per area unit		Seed total number per area unit		Number of tubers under 30 mm per area unit	
		t./ha	Duncan Test	t./ha	Duncan Test	Nr. / plant	Duncan Test	Nr. / plant	Duncan Test	total nr./ sq m.	Duncan Test	Nr.	Duncan Test	g / plant	Duncan Test
Average	8	28.6	bc	13.5	e	5.5	bc	268.100	c	101.1	b	44.3	cd	38.2	bcd
5-15	6	25.2	c	16.0	de	3.9	d	216.300	d	80.9	c	36.5	d	30.0	de
	5	24.3	c	18.6	bcd	3.7	d	177.000	e	73.0	c	35.4	d	26.6	e
Average	x	<b>26.0</b>	<b>b</b>	<b>16.0</b>	<b>b</b>	<b>4.4</b>	<b>c</b>	<b>220.500</b>	<b>c</b>	<b>85.0</b>	<b>b</b>	<b>38.7</b>	<b>b</b>	<b>31.6</b>	<b>c</b>
15 - 25	8	37.8	a	17.6	cde	7.1	a	348.900	b	130.6	a	57.3	a	50.8	a
	6	36.1	ab	22.6	ab	6.7	ab	281.500	c	113.6	ab	50.2	abc	45.3	ab
	5	34.7	ab	25.1	a	5.9	ab	248.900	cd	104.7	b	46.5	bc	39.1	bc
Average	x	<b>36.2</b>	<b>a</b>	<b>21.8</b>	<b>a</b>	<b>6.6</b>	<b>a</b>	<b>293.100</b>	<b>b</b>	<b>116.3</b>	<b>a</b>	<b>51.3</b>	<b>a</b>	<b>45.1</b>	<b>a</b>
25 - 35	8	36.8	a	17.3	cde	6.2	ab	410.400	a	125.1	a	54.8	ab	45.4	ab
	6	36.2	ab	22.0	abc	6.1	ab	340.700	b	113.3	ab	52.0	abc	42.5	ab
	5	34.6	ab	25.7	a	4.4	cd	283.700	c	99.4	b	48.7	abc	32.0	cde
Average	x	<b>35.9</b>	<b>a</b>	<b>21.7</b>	<b>a</b>	<b>5.5</b>	<b>b</b>	<b>344.900</b>	<b>a</b>	<b>112.6</b>	<b>a</b>	<b>51.9</b>	<b>a</b>	<b>40.0</b>	<b>b</b>
Average per variety	xx	<b>32,7</b>		<b>19,8</b>		<b>5,5</b>		<b>286,200</b>		<b>104,5</b>		<b>47,3</b>		<b>38,9</b>	

DI 5 % (variety\*size\*distance) **7.1 t/ha** **8.1 t/ha** 1,7 t/ha 38.800 stems/ha 16.8 pcs/mp 8.5 pcs/mp 8,1 pcs/mp

**Influence of tuber size and planting distance on some yield items, per square metre and hectare in Rustic variety  
(Lazarea, Harghita county, average values, 1998-2000)**

Tabel 3

Size of planting material (mm)	Nr. of plants/ lm	Soiul Rustic													
		Total yield		Seed production		Tuber yield under 30mm		Nr. of stems		Total tuber number per area unit		Seed total number per area unit		Number of tubers under 30 mm per area unit	
		t./ha	Duncan Test	t./ha	Duncan Test	Nr. / plant	Duncan Test	Nr. / plant	Duncan Test	total nr./ sq m.	Duncan Test	Nr.	Duncan Test	g / plant	Duncan Test
Average	8	27.4	ab	13.4	d	3.5	d	225.900	de	80.5	cd	39.6	bcd	24.5	d
5-15	6	26.2	ab	16.0	bcd	3.4	d	189.600	ef	74.1	d	35.0	cd	24.5	d
	5	24.6	b	18.5	abc	3.0	d	161.500	f	71.4	d	33.0	d	24.1	d
Average	x	<b>26.1</b>	<b>b</b>	<b>15.9</b>	<b>b</b>	<b>3.3</b>	<b>b</b>	<b>192.300</b>	<b>c</b>	<b>75.4</b>	<b>c</b>	<b>35.8</b>	<b>b</b>	<b>24.3</b>	<b>b</b>
15 - 25	8	34.4	a	14.8	cd	6.4	a	362.900	ab	120.1	a	49.0	a	47.0	a
	6	32.9	a	20.7	ab	4.9	bc	265.200	cd	102.6	ab	44.6	ab	36.6	bc
	5	32.1	ab	23.1	a	5.3	ab	228.900	de	106.0	ab	42.8	abc	38.3	b
Average	x	<b>33.2</b>	<b>a</b>	<b>19.5</b>	<b>a</b>	<b>5.6</b>	<b>a</b>	<b>285.700</b>	<b>b</b>	<b>109.6</b>	<b>a</b>	<b>45.5</b>	<b>a</b>	<b>40.6</b>	<b>a</b>
25 - 35	8	32.1	ab	16.8	bcd	3.7	cd	387.400	a	93.7	bc	51.8	a	27.7	d
	6	32.6	ab	22.4	a	2.7	cd	335.500	b	93.0	bc	49.8	a	28.8	cd
	5	28.3	ab	22.6	a	2.7	d	276.300	c	77.0	cd	43.4	abc	20.9	d
Average	x	<b>31.0</b>	<b>a</b>	<b>20.6</b>	<b>a</b>	<b>3.4</b>	<b>b</b>	<b>333.100</b>	<b>a</b>	<b>87.9</b>	<b>b</b>	<b>48.3</b>	<b>a</b>	<b>25.8</b>	<b>b</b>
Average per variety	xx	<b>30,1</b>		<b>18,7</b>		<b>4,1</b>		<b>270,400</b>		<b>91,0</b>		<b>43.2</b>		<b>30,2</b>	
Dl 5 % (variety*size*distance)		7.1 t/ha		8.1 t/h		1,7t/ha		38.800 stems/ha		16.8 pcs/mp		8.5 pcs/mp		8,1 pcs/mp	

The calculation was made using the function ECON of statistics program MSTAT-C (Nissen O., 1988) which, in addition to the calculation of the average profit of the variants, determines the profit variation during the 3 experimental years (standard aberrance, variance coefficients, minimum profit), respectively the economic risks of different variants utilized). The program makes also possible the separation of variants using marginal analysis.

For varieties Runica, Roclas and Rustic, the paper presents the economical effects of the studied variants with minitubers, the assessment of potential profit and the rate of expenses recamation in the first year for different minituber price, the assessment of the prebase planting material price.

*In Runica variety* when selling the Prebase potato with 30 mil lei, the maximum profit was achieved by the variant with big minitubers (25-35mm calibre) at a density of 83,333 plants/ha. At minitubers with this size, the profit was situated 264.7 and 305.8 mil lei/ha.

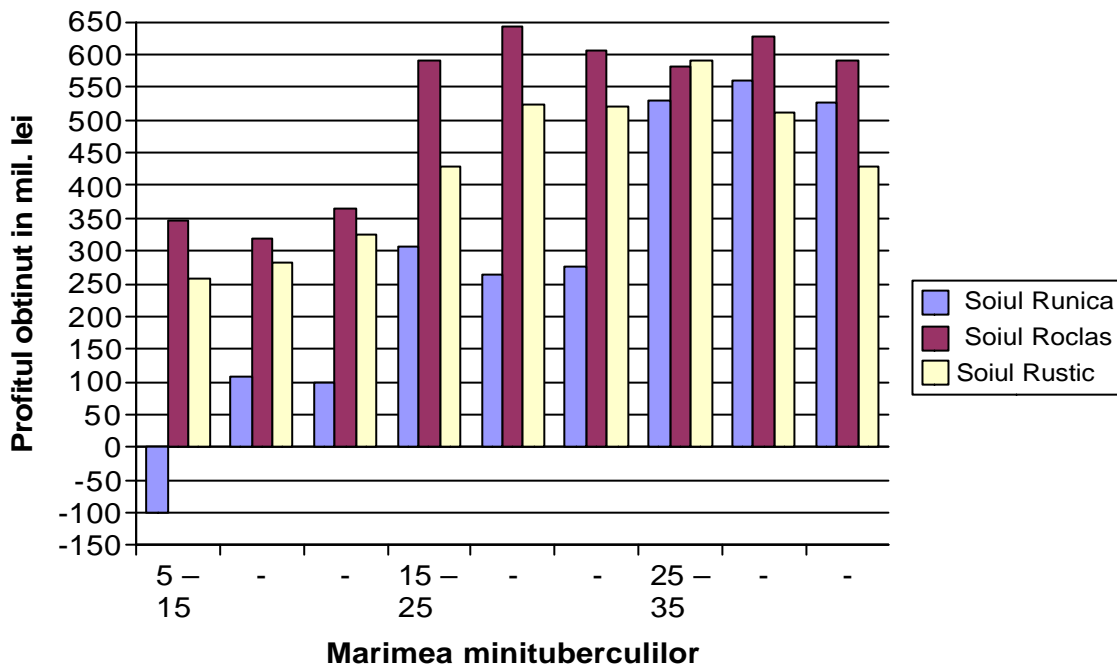
*In Roclas variety* the most profitable were the variants with minitubers 15-25 mm calibre, and the average profit ranked between 590 and 643.1 mil lei/ha. La acest soi cele mai profitabile au fost variantele la care s-au folosit minituberculi cu diametrul de 15-25 mm la care profitul mediu a variat între 590 si 643.1 mil lei/ha, fiind urmate de variantele la care s-au plantat minituberculi cu diamentru de 25-35 mm, cu profituri între 591.3 si 627.3 mil lei/ha.



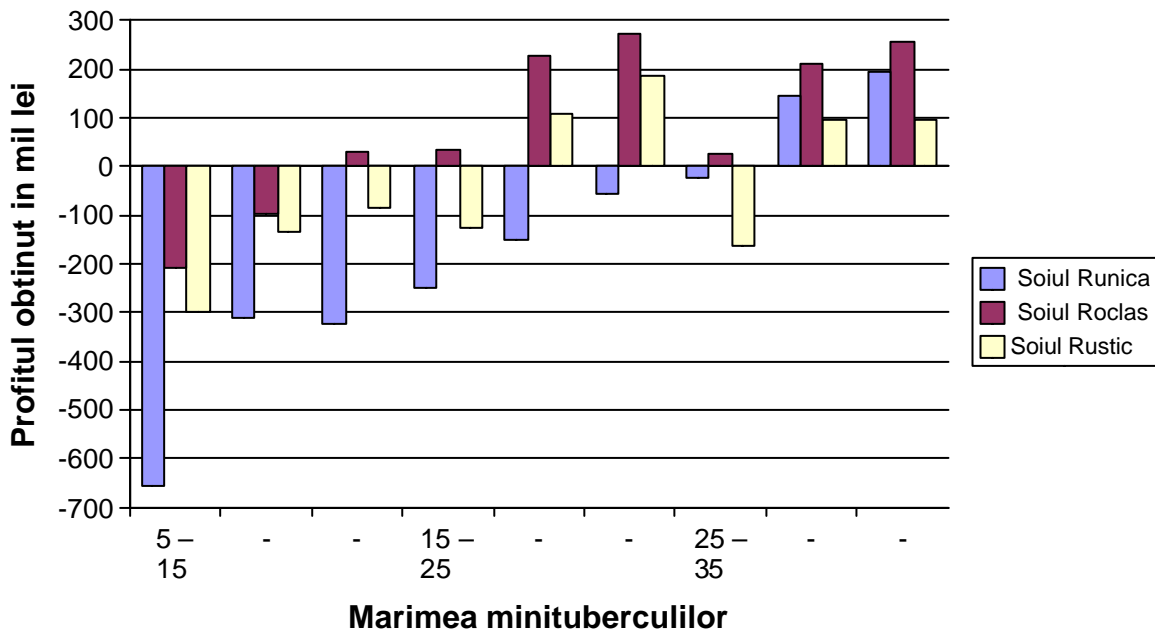
*In Rustic variety*, the highest profit of over 520 mil lei/ha and the most constant profit (CV=37.8%) was achieved by planting minitubers of 15-25 mm calibre.

By planting minitubers directly in the field profits between 258.7 mil lei/ha and 523.3 mil lei/ha. The highest and the most constant profit was attained at the variants with planted minitubers of 15-25 mm calibre, the average profit for this minituber calibre being of over 520 mil lei/ha and the variance coefficients were up to 37.8 %.

**Estimarea profitului la soiurile Runica, Roclas si Rustic la valorificarea de 30 mil/to la care valoarea minitubercuilor este de 5000 lei /buc**



**Estimarea profitului la soiurile Runica, Roclas si Rustic la valorificarea de 30 mil/to la care minitubercuilii au avut valoarea de 10 000 lei**



## CONCLUSIONS

The emergence was influenced by the size of planted minitubers and by climatic conditions. Minitubers of greater sizes had a better emergence.

The emergence percentage varied with the minituber size and density and with variety, Runica with 64.9-90%, Roclas 89.6-98.8% and Rustic 86.8-96.6%.

The number of main stems, influenced by minituber size and planting density was of 2.8-4.8 (Runica), 3.6-4.3 (Roclas) and 2.6-4.6 (Rustic).

The number of tubers/plant and the average weigh increases directly proportional to the minituber size and to nutrition space: Runica: 5.1-14 and 216-531, respectively; Roclas, 10.6-15.8 and 297-530, respectively; Rustic: 8.7-15.9 and 280-481, respectively.

Until the last decade of July and the first decade of August and dependind on the crop season there were average yields of 32,7 t/ha in Roclas variety, 30,0 t/ha in Rustic variety and 25,7 t/ha in Runica variety.

Average yields were significantly differenciated in dependence to minitubers size, ranking between 22,9 t/ha and 34,0 t/ha. The total yield was most influenced by minituber size in Runica variety. The highest yields were attained by the highest densities, without being significant.

The yields of seed calibre of 30 – 55 mm were 19,8 t/ha in Roclas variety, 18,7 t/ha in Rustic variety and 14,8 t/ha in Runica variety. The highest yield of seed calibre was obtained when planting minitubers of 25- 35 mm diameter.

Thickening did not positively influenced the seed potato yield. The highest seed yields are obtained at planting densities of 66 – 83.000 plants/ha.

Using the maximal densities for minitubers of 5-15 mm can lead to much lower yields.

## RECOMMANDATIONS

The conclusions that can be understood from this doctoral thesis show to the reader and to the potato specialist the hard and complex way that the Romanian scientific research must take along with potato producers in order to obttain a planting material free of diseases and a technological level aiming to increase yield, productivity and economic effectiveness of pone of the most important crops as potato is.

The surveyed varieties made clear the need to use minitubers of over 15 mm in order to attain a higher number of tubers per plant. In all the varieties by planting minitubers of 5 – 15 mm calibre a significantly lower tuber number was achieved (6 – 9 tubers).

Planting minitubers of 25 – 35 mm diameter at higher densities (11,2 plants/m<sup>2</sup>) had a negative impact on seed tuber number (30 – 55 mm). Minituber thickening on, passing over certain limits, negatively influences the tuber number of 30 – 55 mm calibre, including their quality.

Minitubers are more sensitive to climate conditions and it is therefore recommended to use presprouted biological material, of over 15 mm.

For the success of the planting material, of high biological and sanitary quality, when minitubers are planted directly in the field, the adequate cropping measures will be carefully taken.

When setting the densities the biological characteristics of each variety must be kept in mind.

In order to successfully finishing the growing season and for a high biological value of the future planting material, it is absolutely necessary to observe the isolation distances and the aphid killing treatments are the most important condition.

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