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RESEARCH REGARDING THE INFLUENCE OF SOME ROOTING STIMULATORS ON THE PRODUCTION OF SOLANO-FRUITING VEGETABLE SEEDLINGS

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Abstract

The experiment was conducted within a solarium, in Bucharest, in 2013. It was a two-factor experiment, in which factor A was represented by the species – tomatoes, capsicum and eggplants, while factor B was the stimulating product, Tecamin raiz 0.2% and Humusil 0.2%, applied at an interval of seven days after the pricking out, until planting the seedlings. The purpose of the experiment was to establish the influence of stimulating products on the growth of tomato, capsicum and eggplant seedlings and to evaluate the quality of the seedlings obtained through this experiment. The seedlings were produced on a peat substrate, with a pH value of 5.5-6.5. After processing the data, it could be observed that the stimulating products had a positive influence on the growth of tomato, capsicum and eggplant seedlings in what regards the height of the plant, number of leaves, thickness of the stem, volume of the root system and plant biomass. Strong correlations were established between the main parameters that characterize the quality of the seedling for all studied species, which allow recommending the used products for application in the technology for seedling production.

Key words*: tomato, pepper, eggplant, seedlings, rooting*

INTRODUCTION

Vegetables from the *Solanaceae* family are cultivated through planting the seedling, except for tomatoes that can be cultivated also through sowing directly into the field, for industrialization. An important aspect of the culture technology is represented by the production of seedling, which is used for obtaining qualitative seedling, with a vigorous root system that can sustain a rich aerial part, through increasing the capacity to absorb water and nutrients and through proper plant stability.
Seedling production can be made on various culture substrates, simple or mixtures, with nutrient solutions (Hoza, 1997) for ensuring the necessary nutrition. Substrates can be made of peat, various composts, perlite, vermiculite, vermicompost etc., in different proportions in order to ensure the necessary oxygen, optimum pH level and water retention capacity. The production of tomato and cucumber seedlings had very good results by using compost resulted from mushroom culture mixed with vermiculite in 2:1 ratio, and respectively with perlite in 4:1 ratio (Zhang et al., 2012). Vermicompost mixed with peat (Lazcano et al., 2009) was recommended as alternative for peat, with beneficial influences on the environment and on the quality of the tomato seedlings. Perlite, peat and peat mixed with perlite (Hoza, 1997) were successfully used for tomato, capsicum and eggplant. seedlings.
The quality of the seedling is also influenced by the level of the vegetation factors within the production space (Basoccu et al., 1992). The evaluation of the seedlings quality is performed by evaluating their height, thickness of the stem at package, number of formed leaves, volume of the root system etc. (Hoza, 1997).

MATERIALS AND METHODS

The experiment was conducted in a heated solarium for the production of Solano-fruiting vegetable seedling for field culture, in Bucharest, in 2013, using as biological material tomato, capsicum and eggplant seeds. Two products for stimulating the growth of the root system, namely Tecamin raiz and Humusil, were used,.
The experiment was a two-factor one, in which:

Factor A was represented by tomato, capsicum and eggplant seedlings.
Factor B was represented by rooting stimulators: Tecamin Raiz and Humusil.
The experimental variants were the following:

V_1 – a1b1 – tomato seedling stimulated with Tecamin Raiz;

V_2 – a1b2 – tomato seedling stimulated with Humusil;

V_3 – a1b3 – tomato seedling not stimulated;

V_4 – a2b1 – capsicum seedling stimulated with Tecamin Raiz;

V_5 – a2b2 – capsicum seedling stimulated with Humusil;

V_6 – a2b3 – capsicum seedling not stimulated;

V_7 – a3b1 – eggplant seedling stimulated with Tecamin Raiz;

V_8 – a3b2 – eggplant seedling stimulated with Humusil;

V_9 – a3b3 – eggplant seedling not stimulated.

During the research, observations and measurements were made regarding the following:

- the influence of biostimulators on the germination energy of the seeds;
- the influence of the biostimulators on the germination faculty of the seeds;
- the influence of the biostimulators on the seedling growth as height and number of leaves;
- the influence of the biostimulators on the average height of the seedling at planting, number of leaves, stem diameter at package, volume of the root system, average seedling weight, weight of aerial part, weight of the root system, determining the ratio between the aerial part and root system, determining the growth rate and age of the seedling.

The sowing was performed directly into alveolar pallets with 45 alveoli in peat substrate with pH value of 5.5-6.5.
Tecamin Raiz and Humusil biostimulators as 0.2% concentration were used every seven days after the pricking out until the final planting.

RESULTS AND DISCUSSIONS

The rooting stimulators had a positive influence on the germination energy of the seeds for all studied species (Table 1). In the case of tomatoes, five days after the sowing, the germination energy was different for the stimulated variants compared to the control (not stimulated variant), the highest recorded value being 45% when using Tecamin raiz, 40% with Humusil and 31% for the control. In the case of capsicum and eggplant, it could be observed that, eight days after the sowing, the percentage of the sprung plants was below 40%, the best results being recorded for the variants using Tecamin raiz.

Table 1. The influence of the rooting stimulators on the germination energy of the seeds

Variant	Percentage of sprung plants	Number of days from sowing
V_1	45	5 days
V_2	40	5 days
V_3	31	5 days
V_4	39	8 days
V_5	36	8 days
V_6	22	8 days
V_7	38	8 days
V_8	36	8 days
V_9	23	8 days

Analyzing the influence of the rooting stimulators at the end of the germination period, it was noted that over 90% of the seeds germinated for all variants, the best results however being recorded for the variants with stimulators (Table 2).

Table 2. The influence of the rooting stimulators on the germination faculty of the seeds

Variant	Percentage of sprung plants	Number of days from sowing
V_1	100	10 days
V_2	98	10days
V_3	93	10 days
V_4	95	21 days
V_5	92	21 days
V_6	90	21 days
V_7	96	21 days
V_8	93	21 days
V_9	91	21 days

Analyzing the seedling at final planting it can be noted that the stimulators influenced the growth of both root system and aerial part (Table 3).

The seedling height was great for all used species, having values of 20.1 cm for tomatoes, 17.9 cm for capsicum and 17.4 cm for eggplants.

Humusil also produced good results, the values being slightly lower than for Tecamin raiz. The number of leaves was correlated with seedling height, with values between 5.2 and 11.2 for the studied species. Using stimulators had a positive effect also on the growth in thickness of the stem.

Tecamin raiz had the best results for all species, the diameter in package being 6.8 mm for tomatoes, 6 mm for capsicum and 5.6 mm for eggplants. The growth of the root system was also influenced by the stimulators, the most obvious effect being recorded for the variants stimulated with Tecamin raiz, followed by Humusil, compared to the control variant for which the root system was poorly developed. For the tomatoes, the root system recorded 6.5 cm^3, for capsicum 5.9 cm^3 and for eggplants 4.5 cm^3. Analyzing the obtained results, it could be observed that the differences between the variants were statistically ensured (Table 3).

Table 3. Biometric characteristics of the seedling at optimum planting age

Variant	Seedling height (cm)	Number of leaves piece	Stem diameter at package (mm)	Volume of root system (cm^3)
Tomatoes				
V_1	20.1***	6.7*	6.8*	6.5*
V_2	18.2**	6.1N	6,3*	5.5*
V_3	16.2Ct	5.8Ct	5.2Ct	4.5Ct
DL 5%	0.35 cm	0.60 piece.	0.92 mm	0.92 cm^3
DL 1%	0.75 cm	1.31 piece.	2.01 mm	2.01 cm^3
DL 0.1%	2.57 cm	4.46 piece.	6.82 mm	6.82 cm^3
Pepper				
V_4	17.9 **	11.2**	6.0*	5.9**
V_5	16.4*	10.6**	5.7*	5.5**
V_6	15.8Ct	9.8Ct	5.0Ct	4.2Ct
DL 5%	0.34 cm	0.35 piece.	0.60 mm	0.35 cm^3
DL 1%	0.75 cm	0.76 piece.	1.31 mm	0.76 cm^3
DL 0.1%	2.54 cm	2.59 piece.	4.46 mm	2.58 cm^3
Eggplants				
V_7	17.4 **	6.4 N	5.6*	4.5**
V_8	16.0**	5.8N	5.3N	4.0*
V_9	14.5Ct	5.2Ct	4.8Ct	3.6Ct
DL 5%	0.61 cm	1.26 piece.	0.60 mm	0.35 cm^3
DL 1%	1.31 cm	2.74 piece.	1.31 mm	0.76 cm^3
DL 0.1%	4.49 cm	9.30 piece.	4.46 mm	2.58 cm^3

Calculating the correlation coefficient r^2, it was noted that positive correlations were recorded between the main parameters for seedling quality analysis, the value of the coefficients being higher than 0.78, highlighting strong correlations between the analyzed parameters, for all studied species (Figures 1, 2 and 3).

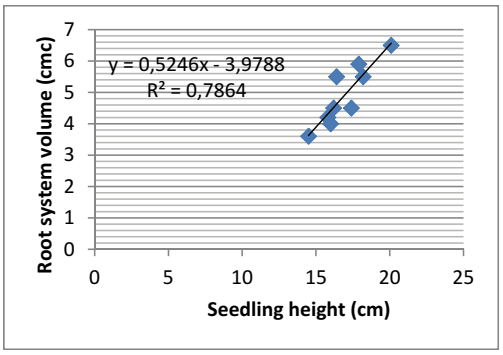

Figure 1. Correlation between seedling height and root system volume

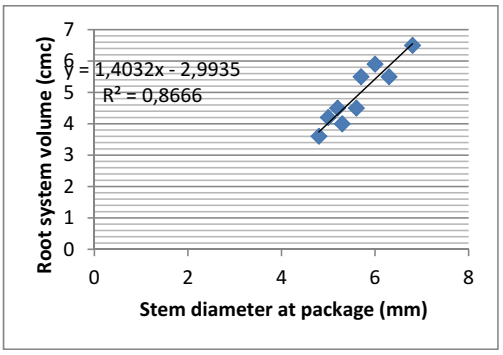

Figure 2. Correlation between root system volume and stem diameter at package

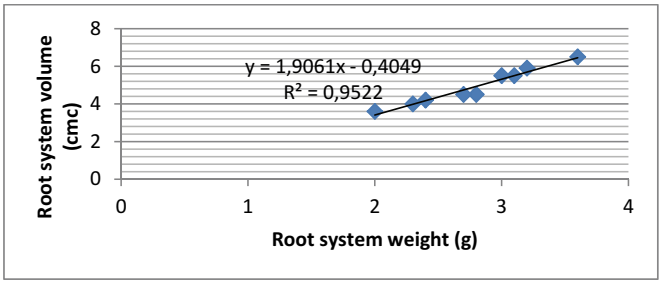

Figure 3. Correlation between root system volume and root system weight

From the point of view of the obtained biomass (Table 4), a growth of both aerial part and root system was observed.

The best results were obtained for the variants with Tecamin raiz, for all studied species.

Moreover, it was noted that for the variants for which the root system had a sharp growth the aerial part was also more vigorous, measured through its weight (Table 4).

Table 4. The biomass content of seedling at planting age

Variant	Seedling average weight (g)	Root system weight (g)	Aerial part weight (g)
V_1	16.0	3.6	12.4
V_2	13.7	3.1	10.6
V_3	11.5	2.8	8.7
V_4	11.7	3.2	8.5
V_5	10.2	3.0	7.2
V_6	8.9	2.4	6.5
V_7	12.3	2.7	9.6
V_8	10.5	2.3	8.2
V_9	8.5	2.0	6.5

The stimulators influenced the seedling growth, so that they reached the optimum parameters for planting – tomatoes after 40 days, capsicum and eggplants after 50 days.

The seedling produced with stimulators recorded a higher growth rate compared to the control, not stimulated variant (Figure 4), the highest values being recorded for the variants with Tecamin raiz, followed by the ones with Humusil, for all species.

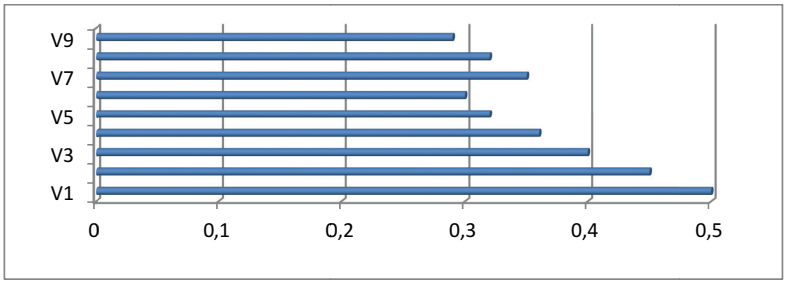

Figure 4. Growth rate of seedlings influenced by rooting stimulators

CONCLUSIONS

From the conducted research, the following conclusions can be drawn:

- Using peat as substrate can be indicated for producing tomato, capsicum and eggplant seedlings because it ensures an optimum air-water regime at root level, with positive effects on root growth and absorption capacity;
- Using root stimulators can be recommended, especially Tecamin raiz 0.2%, which stimulates both the growth of root system and aerial part thus contributing to the obtaining of seedling at planting parameters within a shorter period than not stimulated variants;
- It is recommended to ensure optimum vegetation conditions in strong correlation with the requirements of the vegetable species and growth phase.

REFERENCES

Basoccu L., Nicola S., 1992. Influenza dei fattori ambientali sulla crescita in vivaio e sulla produzione di alcune specie di orta. Giornate scientifiche SOI, Ravelo, p.158-160.

Hoza G., 1997. Cercetări agrochimice privind producerea răsadurilor de legume solanofructoase pe diverse substraturi de cultură cu soluţii nutritive. Teză de doctorat, Bucureşti.

Lazcano C., Arnold J., Tato A., Zaller J.G., J. Dominguez J., 2009. Compost and vermicompost as nursery pot components: effects on tomato plant growth and morfology, Spanish journal of agricultural research, 7(4), p. 944-951.

Zhang Run-Hua, Zeng-Qiang Duan, Zhi-Guo Li, 2012. Use of spent mushroom substrate as growing media for tomato and cucumber seedlings. Pedosphere, vol. 22 Issues 3, p. 333-342.