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STUDY REGARDING THE INFLUENCE OF THE BIO STIMULATOR BIOSEED ON BELL PEPPER SEED GERMINATION

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Abstract

The study was conducted in Hortiviticol Systems Bioengineering Department, University of Agronomic Sciences and Veterinary Medicine - Bucharest. The purpose of this study was to test the product BioSeed 3 + and to recommended the best concentration for shortening and economic pepper seed germination. Research results have shown that the wetting of pepper seeds for 60 minutes before sowing in solutions of different concentrations BioSeed 3+ resulted in a shorter period of germination. The forming and growth rhythm of the roots was accelerated for all treated variants. This is a relevant aspect as the development of a vigorous radicular system leads to obtaining an appropriate sapling. Germination time for all treated variants of the pepper seeds was shortened which helps obtain quality seedlings earlier. Keeping in mind the species specific requirements regarding the germination temperature and timeframe, this provides an advantage as it saves on the energy required for heating the environment where the seedlings are produced.

Key words: germination, organic product, pepper seeds.

INTRODUCTION

Farming is one of the most important branches of agriculture and the most parts the cultures started by seedling.
Using some organic products for speeding germination of seeds is a goal pursued by most growers. If sweet pepper seeds are planted without simulating they take a very long time to germinate. We know many techniques to simulate the sweet pepper seed [1,2]. So, sweet pepper seed pre-treated by far germinated quicker than untreated seeds [4].
Reduction of producing seedlings, especially for greenhouse crops, help to reduce of energy costs.
For sustainable agriculture are searching after numerous ways to ensure a quality seedling using organic products [5].

MATERIAL AND METHOD

The study was made at the Horticulture Faculty Bucharest at the Hortiviticol Systems Bioengineering Department. We used seeds of pepper, Opal cultivar to testing the germination, in controlled condition, in germinator.
Product tested: BioSeed 3+, in three different concentrations defined here in as C1, C2 and C3.
BioSeed 3+ is a new product, wholly plant derived, made from 100 % natural plant-fruit extracts and oils, designed for use in horticulture.
All starting materials come from a closed ecological cycle produced without synthetic or chemical agents or fertilisers.
Producer: Wise Use International BV Holland. The BioSeed 3+ composition: Ca: 9,6 – 19,2 mg/l; Co: 19,2 – 24 mg/l; Cu: 0,048 - 0,01mg/l; Fe: 0,56 – 0,8mg/l; Mg: 1,6 - 2,4mg/l; K: 88 – 120 mg/l; S: 16 – 32 mg/l; Urea: 0,8 – 1 mg/l; Essential Oils - 28 mg/l; Acid Oils: 0,02 – 1,2 %; Ph: 9,4; Density: 1,05kg/l.
Experiment: Humectation with BioSeed 3+ for 60 minutes.

The experimental variants were: V1 – Control Group – seeds dampened in distilled water; V2 – Seeds dampened in C1 concentration; V3 - Seeds dampened in C2 concentration; V4 - Seeds dampened in C3 concentration;
The germination was tested in a germinator at 30 ^{o}C during the daytime and 20 ^{o}C during the night-time, in conformity with the germination determination standard for pepper seeds. Data was retrieved after 5 days for the registration of the germination energy and for the final data after 10 days.
The following was determined:

- The number of germinated seeds after 3, 5, 8 and 10 days;
- The length of the roots;
- The height of the stems;
- The growth rhythm of the roots and stems
- The statistical interpretation of the results using the variance analysis.

RESULTS AND DISCUSSIONS

Experiment I - The testing of bell pepper seed germination on a substratum of filtering paper. Based on the data retrieved the following was determined after three days of sowing, the lowest number of germinated bell pepper seeds was found for the 4th Variant – the C3 Biorootz solution. The highest percentage of germinated bell seeds (22%) was found for the 2nd Variant – C1, table 1.

Table 1.Number of germinated pepper seeds and percent of germination

Variant	No. of germinated seeds	Germination percent	No. of germinated seeds	Germination percent	No. of germinated seeds	Germination percent	No. of germinated seeds	Germination percent
	After tree days		After five days		After eight days		After ten days	
	No.	%	No.	%	No.	%	No.	%
V_1Ctrl G	7,33	15	14	28	21	42	41	82
V_2 - C1	11,0	22	27	54	43	86	46	92
V_3- C2	7,67	15	26	52	46	92	47	94
V_4 - C3	5,33	11	31	62	47	94	47	94

After six days, the highest germination percentage was registered by V4.
The percentage of seed germination was also maintained after eight days from sowing.

Also, from a statistical point of view, a considerable difference was notable between the germination and the control Variant (V1).

Table 2.The percentage of germinated seeds as opposed to the control group after three days treatment

Variant	Germination percent as opposed to V_1 %	Difference		Significance
		Percent of germination	% as opposed to V1	
V_1 Ctrl	14.67	0.00	100.00	Ctrl
V_2 - C1	22.00	3.67	150.00	*
V_3 - C2	15.34	0.33	104.55	N
V_4 - C3	10.66	-2.00	72.73	N
	DL5% = 2.710		DL5% in % = 36.9545	
	DL1% = 4.100		DL1% in % = 55.9091	
	DL01% = 6.530		DL01% in %= 89.0455	

Six days after sowing the differences are distinct as opposed to the control group, the germinated seeds with V3-C1 being at 85,71% and the V4-C3 ones at 121,43% (see table 3).

Table 3. The summary of the results for the germinated seeds percentage on 6 days after sowing

Variant	Germination percent as opposed to V_1 %	Difference		Significance
		Percent of germination	% as opposed to V1	
V_1 Ctrl	28	0.00	100.00	Ctrl
V_2 - C1	54	26.00	192.86	***
V_3 - C2	52	24.00	185.71	***
V_4 - C3	62	34.00	221.43	***
	DL5% = 1.130		DL5% in % = 4.0357	
	DL1% = 1.720		DL1% in % = 6.1429	
	DL01% = 2.740		DL01% in %= 9.7857	

At the eight days after sowing, the percentage of germinated seeds was 94% for V4, a difference of 123,81% over the control group (V1).
All the treated variants showed higher germination values than V1, with percentages of over 104% (see table 4).

Table 4.The summary of the results for the germinated seeds percentage after eight days from sowing

VARIANT	Germination Percentage (%)	DIFFERENCE (% sem.)	(%)	SIGNIF
V(0) average	78.50	36.50	186.90	***
V(1)	42.00	0.00	100.00	Ctrl
V(2)	86.00	44.00	204.76	***
V(3)	92.00	50.00	219.05	***
V(4)	94.00	52.00	223.81	***
DL5% =	1.700	DL5% in % =	4.0476	
DL 1% =	2.580	DL 1% in % =	6.1429	
DL 01% =	4.110	DL01% in %=	9.7857	

Ten days after sowing the differences were up to 14, 63% compared to the control group V1, which shows that the bell pepper seeds germinated in a shorter timeframe in the treated variants. The control group germinated in a longer timeframe compared to the rest of the treated variants.

Table 5. The summary of the results for the germinated seeds percentage after ten days from sowing

VARIANT	Germination Percentage (%)	DIFFERENCE (%)	(%)	SEMF
V(0) average	90.50	8.50	110.37	***
V(1)	82.00	0.00	100.00	Ctrl
V(2)	92.00	10.00	112.20	***
V(3)	94.00	12.00	114.63	***
V(4)	94.00	12.00	114.63	***
DL5% =	0.980	DL5% in % =		1.1951
DL1% =	1.490	DL1% in % =		1.8171
DL01% =	2.370	DL01% in %=		2.8902

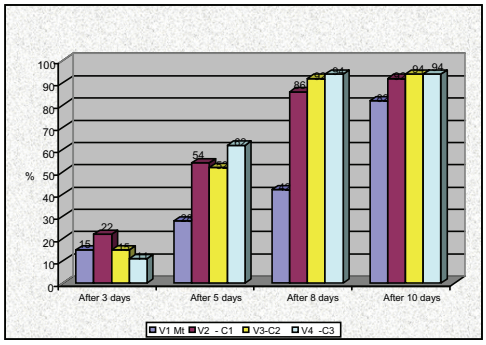

Fig. 1. Percentage of germinated bell pepper seeds

Bell pepper seedlings presented differences even after only 5 days from sowing. The highest was registered at V4.

Table 6. Average height of seedlings – mm

Variant	Average height of seedlings:		
	After 5 days	After 8 days	After 10 days
V_1 Ctrl	0.0	4.11	6.25
V_2 - C1	1.0	8.33	11.5
V_3 - C2	2.0	6.00	10.8
V_4 - C3	2.0	6.33	21.2

After 10 days from sowing the growth of the seedling was of 21,2 mm, and from a statistical point of view the differences were significant as per V1 (see Table 7).

Table 7. The meaning regarding the height of bell pepper seedlings after 10 days

Variant	Medium height of seedlings (mm) after 10 days	Difference		Significance
	mm	mm	%	
V_1 Ctrl Gr	6.25	0.00	100.00	Ctrl Gr
V_2 - C1	11.50	5.25	184.00	***
V_3 - C2	10.80	4.55	172.80	***
V_4 - C3	21.20	14.95	339.20	***
	DL5% = 1.700	DL5% in % =		27.2000
	DL1% = 2.580	DL1% in % =		41.2800
	DL01% = 4.110	DL01% in %=		65.7600

The medium growth rhythm of the seedlings was higher for the treated variants (see table 8).

Table 8. The medium growth rhythm of the seedlings

Variant	From 3 to 5 days mm/day	From 5 to 10 days mm/day	Medium growth rhythm mm/day
V_1 Ctrl	1.37	0.31	0.69
V_2 - C1	2.44	0.45	1.28
V_3 - C2	1.33	0.69	1.20
V_4 - C3	1.44	2.12	2.36

All of the treated variants presented cotyledonous leaves bigger than the ones from V1, of 22,5 mm for V4 and 5,85 mm for V2 (see table 9, fig. 2).

Table 9. Size of cotyledon leaves - mm

Variant	**Length of the cotyledon leaves - mm**	
	After 8 days	**After 10 days**
V1 Ctrl	3.25	5.85
V2 - C1	5.00	12.00
V3 - C2	4.87	12.5
V4 - C3	5.00	22.5

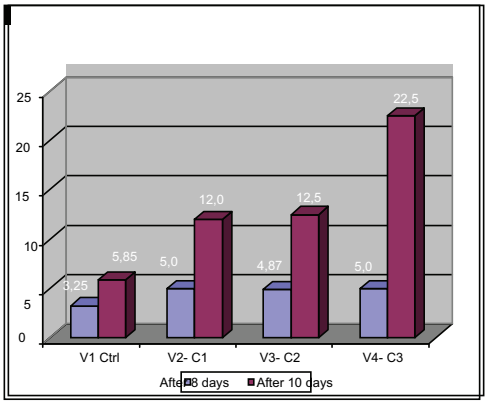

Fig. 2. Length of the cotyledonous leaves – mm

From tables 9 and 10 we notice that the root of the sapling was bigger for all the treated

variants: between 2 mm for V2 and 5 mm for V3 (after 6 days).

Table 10. Size of cotyledon leaves for bell pepper seedlings after 8 days from sowing

Variant	Size of cotyledonous leaves	Difference		Significance
	mm	(mm)	(%)	
V1 Ctrl	3.25	0.00	100.00	Ctrl
V2 - C1	6.33	3.08	194.77	***
V3 - C2	4.87	1.62	149.85	**
V4 - C3	5.00	1.75	153.85	**
	DL5% = 0,440 DL5% in % = 13,5385 DL1% = 0,820 DL1% in % = 25,2308 DL01% = 1,820 DL01% in %= 56,0000			

After 10 days for V3 and V4 the length was 32,5 mm and 36,8 mm respectively, table 11.

Table 11. Length of the root

Variant	**Length of the root - mm**		
	After 5 days	**After 8 days**	**After 10 days**
V1 Ctrl	1	12.66	24.33
V2 - C1	2	24.7	28.11
V3 - C2	5.0	25.6	32.5
V4 - C3	2.1	26.5	36.8

The control (V1) presented the lowest growth in height, the differences between the variants as opposed to the control group being very significantly (for V3 and V4) and significantly (for V2) - table 12.

Table 12. The summary of results regarding the length of the root on bell pepper seedlings

VARIANT	LENGTH OF THE ROOT (mm)	DIFFERENCE (mm)	(%)	SIGNIF
V(0) average	30.51	5.88	123.86	***
V(1)	24.63	0.00	100.00	Ctrl
V(2)	28.11	3.48	114.11	**
V(3)	32.50	7.87	131.94	***
V(4)	36.80	12.17	149.39	***
DL5% =	1.500	DL5% in % =	6.0893	
DL 1% =	2.270	DL 1% in % =	9.2152	
DL 01% =	3.620	DL 01% in %=	14.6955	

CONCLUSIONS

The percent of seeds germinated was 22% (V2) comparatively with control (V1) which only germinated 15%.

After 8 days the germination percentage for the treated variants was very close to the maximum germination percentage of the seeds after 10 days. The control group V1 was almost 50% smaller compared to the rest of the variants.

Early seed germination is preferred in order to obtain seedling in a shorter timeframe. Economically speaking, obtaining a seedling earlier also reduces costs.

Based on the obtained results the following data was extracted:

- Treated seeds presented a higher germination percentage in a shorter time period compared to the control group one – without any treatment.
- All the variants on which the treatment with Bioseed was applied to for 60 minutes had a superior seedling height than that of the control but the best results were obtained by V2 on which we applied the solution with a C1 concentration;
- Although remarkable differences can be observed for all the treated variants, we can appreciate that for pepper only using the V2 variant is practical.

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