INFLUENCE OF MOLDSTIM ON THE GROWTH AND DEVELOPMENT OF ORGANIC TOMATO CROP FROM POLYTUNNELS

INFLUENȚA MOLDSTIMULUI ASUPRA CREŞTERII ŞI DEZVOLTĂRII TOMATELOR ECOLOGICE ÎN SOLAR

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Abstract. *The Moldstim is a natural bioregulator with glycosidic structure extracted from pepper (Capsicum annum). The paper aims to assess the influence of this bioactive substances used in two concentrations (0.001% and 0.0015%) on two cultivars of tomato in polytunnel, under organic farming conditions. The biological material was represented by two hybrids obtained Hazera company (Israel), Winona F1 and Primadona F1. The results obtained were compared with the average experience. Experience distinctly revealed significant differences Moldstim version 0.0015% (58.35 t/ha) compared to the control, in which the production obtained was 44.65 t/ha.*
Keywords*:Moldstim, tomato, organic crop*

Rezumat. *Moldstimul este un bioregulator natural cu structură glicozidică extras din ardei (Capsicum annum). Lucrarea îşi propune sa evalueze influența acestei substanțe bioactive, utilizată în două concentrații (0,001% si 0,0015%), asupra a două cultivaruri de tomate, în solar, în condiții de agricultură ecologică.Materialul biologic a fost reprezentat de doi hibrizi obtinuți de firma Hazera (Israel), Winona F_1 si Primadona F_1. Rezultatele obținute au fost comparate cu media experienței.Experiența a scos în evidentă diferențe distinct semnificative ale variantei Moldstim 0,0015% (58,35 t/ha) comparativ cu varianta martor, la care producția obțnută a fost de 44,65 t/ha.*
Cuvinte cheie*:Moldstim, tomate, cultură ecologică*

INTRODUCTION

During the last decades of vegetable practice, stimulating by bioactive substances have acquired a key role due to the positive contribution they have on physiological processes and therefore the final product by increasing precocity, the quantity and quality while ensuring high economic efficiency (Stan et al., ; 1995; 1996).

The Moldstim is such a bioactive substance, with steroidal glycoside structure extracted from sweet pepper (*Capsicum annum*), an annual herbaceous plant belonging to the botanical *Solanaceae* family.

The favorable effect of Moldstim on vegetable crops is presented by Chintea P et al., 1998: tratated tomato and cucumber seeds, although they have

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been sown in an infested soil with different pathogenic fungus, generated healthy plants, the accumulation of biomass and increasing the rate of development of the vegetative organs of plants produced from the seeds from untreated (control) (Matevosyan et al., 2001).

Also, from the biochemical point of view, the treated plants showed high levels of total carbohydrates.

The Moldstim of 0,001% increases the production by 15-20%, extend the fruiting season and reduce nitrate content from fruit (Kintia et al., 1993).

MATERIAL AND METHOD

Research have been carried out in 2012 in the experimental vegetable field in "V. Adamachi" farm, belong U.A.S.V.M. Iaşi. Tomato crop was established in a polytunnel of 270 m^2, on 26/04/2012, using an assortment consisting of two hybrids from Israel origin: Primadonna F1 and Winona F1. The crop was cultivated in extended cycle through product alveolar seedling trays (without transplant).

The experience has included six variants, determined by differentiated applying in two strengths of Moldstim (0,001% and 0,0015%) on two hybrids, with untreated variants.

$V_1 = a_1b_1$ untreated x Primadona F_1;
$V_2 = a_1b_2$ Moldstim 0.001% x Primadona F_1;
$V_3 = a_1b_3$ Moldstim 0.0015% x Primadona F_1;
$V_4 = a_2b_1$ untreated x Winona F_1;
$V_5 = a_2b_2$ Moldstim 0.001% x Winona F_1;
$V_6 = a_2b_3$ Moldstim 0.0015% x Winona F_1;

The treatments were carried out with a spraying machine of 16 L (Vermorel) it through fine, uniform spray solution on the entire surface of the plants, weekly, the first treatment being carried out two weeks after planting.

The organization experiment was done in a randomized blocks device with three repetitions, each repetition parcel including 10 plants.

The effectiveness of treatments was emphasized by the observation and biometric measurements on height plants, number of flowering, flowers number and linked fruits, the average of fruit weight, as well as the production of fruit for each variant.

The results for each variant have been analyzed compared to untreated control for each hybrid.

Measurements on growth and development indices of tomato were carried out in dynamics from July until the first decade of September.

RESULTS AND DISCUSSIONS

Following the observations and performed determinations, it was noted the positive influence of treatment with Moldstim 0.0015%, so on growth and on production of the two tomato cultivars.

From the dates related in Table 1, about the effect of treatment with Moldstim the growth in height can be observed for both hybrids the difference compared to the control (Mt) ranged from 22.27 cm (Primadonna) to 32.80 cm

(Winona). The greatest increase in plant height was achieved on Winona hybrid when treated with Moldstim 0.0015%.

Table 1

The treatment effect on growth and development plants with stimulating substances

Variants	Indices for growth and development				
	Height (cm)	No. of inflorescen-ces/plant	No. of flowers /plant	No.of fruits/plant	Average fruit weight (g)
Primadona F_1 (untreated)	162,53	5,67	22,21	16,20	83,13
Primadona F_1 x Moldstim 0,001	179,87	7,27	24,31	18,01	95,22
Primadona F_1 x Moldstim 0,0015	184,80	7,89	25,40	19,26	104,56
Winona F_1 (untreated)	166,80	6,01	22,26	16,40	79,60
F_1 x Moldstim 0,001	187,30	7,37	24,86	18,13	82,70
Winona F_1 x Moldstim 0,0015	199,60	8,01	25,06	20,16	91,60

In terms of development indices obtained by applying the Moldstim substance (Table 1), we can see that in the case of both product concentrations achieved a positive effect on binding of flowers and fruit difference. At the same time, by spraying Moldstim, to produce a growth inhibition in the internode length (Table 1), calculated as the ratio of the height of plants and average number of inflorescences per plant.

Regarding on influence of glycosidic substances number of flowers per plant, it is observed that in all 4 treatment variants have been made and very significant differences compared to control.

The best results have been obtained in variants which applied Moldstim 0.0015%, respectively 7.89 inflorescences per plant on Primadonna hybrid and 8.01 inflorescences per plant at Winona.

Regarding the influence of Moldstim on number of fruits per plant is seen the best results were obtained by the application on Winona hybrid in concentration of 0.0015% respectively 20.16 fruit per plant.

Regarding the ratio of fruit number and formed flowers, the best percentage was obtained from the hybrid Winona data in which the Molstim was applied in concentration of 0.0015%, respectively 80.45%. Also, Primadona tratated with Molstim in conc. of 0.0015% was achieved the highest percentage of binding of fruit, 75.83%.

The Moldstim treatment effect can be observed where the average weight of tomato fruits. Thus, most of the weight of the obtained fruit from the Primadona hybrid, 104.56 g respectively compared with the control in which the weight was 83.13 g.

In the case of Winona F1 cultivar, by applying Moldstimulului 0.0015% fruit weight was 91.60 g (Table 1).

Table 2

Dynamics of production

Variants	Date of production evaluation					Total yield \ (kg/ha)
	June	July	August	September	October	
Primadona F_1 (untreated)	1,34	8,93	12,50	14,28	7,60	44,65
Primadona F_1 x Moldstim 0,001	1,98	9,92	13,89	15,88	7,96	49,63
Primadona F_1 x Moldstim 0,0015	2,33	11,67	16,33	18,67	9,35	58,35
Winona F_1 (untreated)	1,81	9,06	11,60	10,15	3,64	36,26
Winona F_1 x Moldstim 0,001	2,49	10,41	13,32	11,66	3,77	41,65
Winona F_1 x Moldstim 0,0015	3,59	12,83	16,41	14,36	4,11	51,30

From measurements carried out in 2012 about the influence of Moldstim treatments on two hybrids on its earliness, can be seen from Table 2, that on 31 July 2012, the best results were obtained by applying Moldstim in conc. of 0.0015%. Significant results compared to the control have been obtained by applying the product in conc. of 0.001%.

The biggest early production was achieved by Winona cultivar respectively 16.42 t / ha, about 32% of total production compared to the control in which the percentage of early production was 29.9%.

Regarding the total production and significance of differences of production, from Table 2 shows that untreated variants showed lower total production compared to treated variants.

In the case of the production of Primadona varied from 44.65 t / ha in the control to 58.35 t / ha treated with Moldstim 0.0015%, differences of production is provided statistically 99%, compared to the control, the differences was 13.70 t / ha.

In the case of Winona cultivar, total production ranged from 36.26 t / ha to 51.30 t / ha, the difference between the two variants are statistically ensured that production 99.9% relative to the control, the best results were variant was obtained Winona F1 x Moldstim 0.0015% respectively 141.5%.

Table 3

Analysis of total production

Variants	Total yield (t/ha)	Differences than control (t/ha)	Relativ ely yield (%)	Significant of difference	LSD (t/ha)
Primadona F_1 (untreated)	44,65	0	100	-	DL 5%= 4,26
Primadona F_1 x Moldstim 0,001	49,63	4,98	111,2	*	DL 1%= 9,17
Primadona F_1 x Moldstim 0,0015	58,35	13,70	130,7	**	DL 0,1%= 15,39
Winona F_1 (untreated)	36,26	0	100	-	DL 5%= 4,17
Winona F_1 x Moldstim 0,001	41,65	5,39	114,9	*	DL 1%= 8,64
Winona F_1 x Moldstim 0,0015	51,30	15,04	141,5	***	DL 0,1%= 13,85

CONCLUSIONS

1) The dynamics of height plant growth highlights the fact that it is directly proportional to the increase in the concentration of moldstim, variants of which have been applied to the highest concentration showing vigorous growth compared to untreated variants.

2) The variants treated with Moldstim showed a number of inflorescences, flowers and fruits linked higher than untreated variants denoting positive treatment effect.

3) The main measure of effectiveness of treatments proved average fruit weight, all treated variants, giving an average weight of about 8-10 g higher than untreated variants.

4) The main measure of treatment effectiveness proved to be average weight and relative to total production was higher in the Moldstim treated variants, they are superior to the untreated control. Differences from the control are statistically assured 95%, 99% and 99.9%.

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