THE INFLUENCE OF SOME ORGANIC ACTIVE PRODUCTS OVER THE TOMATOES TRANSPLANTS IN ORDER TO PRACTICE THE ORGANIC TECHNOLOGIES

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Abstract: *The market place of the organic agriculture is increasing in the most EU countries. This fact is motivated by the consumer's request for the food product obtained by using unpolluted, clean technologies, without toxic substances. For the increasing of the organic agriculture it is necessary the elaboration and the knowledge of alternative technologies. The aim of the research was to identify new possibilities to minimize the pollution level of the environment and to increase the viability of the vegetable sector on long term, which can be done by the conversion process to the organic vegetable yield. In order to obtain organic products, inside of the organic vegetable farms, it is needed to produce organic certified transplants. In this way, it was organized an experience concerning the improvement of the organic tomatoes transplants product technologies by using treatments with bioactive products. The bibliography shows numerous date regarding the using of plants extracts, marine algae etc., with an essential role in increasing and development of the crops. In this way, for the tomatoes obtaining process, for the organic crops from green houses or filed, there were used many methods for the stimulation of the biologic potential by applying treatments with certified organic products. The biological material used was represented by the autumn tomatoes transplants, the Cristal hybrid, produced in greenhouse and as biostimulator products there were applied the next organic certified assortment: Cropmax, Algimax and Hyppophae rhamnoide extract. The experimental model had the next six variants: V1 – untreated transplant; V2 – transplant treated with Hyppophae rhamnoides extract; V3 – transplant treated with Cropmax; V4 – transplant treated Algimax; V5 – transplant treated with a mixture of Cropmax and Hyppophae rhamnoides extract; V6 – transplant treated with Algimax and Hyppophae rhamnoides extract. By applying those products, there were obtained transplants with superior physical and chemical features compare with the untreated control. (In this way, it is increased the plant vigurosity by the enlargement of the stem with a maximum of 27,3%, the number of leaf/plant is higher with a maximum of 17,5%, and the formation of the fruits elements is earlier, the ratio of inflorescences/plant being of 30,4%-79,3%, superior compare with the control). Also, it was obtained transplants in a shorter period of time, respectively in 45 days compare with 50-55 days, reducing the number of day necessary to heat up the greenhouse, so a lower energy consumption. As originality elements, it can be considered aspects regarding the applying treatments with organic products, especially by association between Cropmax or Algimax and Hyppophae rhamnoides extract. All those determination are important and necessary, concerning the practical aspects, in order to ensure the transition of as much possible high number of farms from the conventional agriculture to the alternative and then to the durable one. Also, there will be a positive impact on the knowledge in this agriculture area, contributing on the enrichment of bibliography.*

Key words*: ecologically, quality, bioactive products*

INTRODUCTION

In the last decades, the environment's pollution, the vegetable's fertilization technologies and the modernization of the food industry by using the addition substances creates a new dimension over the rational nutrition, with direct implications on the human health. In this way, the organic agriculture promotion is one of the most certain way to preserve the environment reserve, to avoid the pollution and to obtain healthy and clean yields. The

tomatoes crops, together with other species from *Soloanaceae* botanic Group, are holding the biggest area cultivated with vegetables from Romania (more then 30%). In unfavourable crop vegetation conditions (less light, high humidity, inadequate temperature) the plants suffer some dysfunctions, according to the biochemical and physiologic resistance potential of each variety. In order to avoid this risk, it is recommended the application of stimulator substances in the main development vegetation phases of the plants. This problem constituted the main study purpose for many authors that made researches regarding the influence of some bioactive substances on the quality and yield improvement of green pepper cropped in the field (GHEORGHE POŞTA, VIOREL BERAR), on fructification of the eggs plant (N. STAN, MIHAELA-CRISTINA BERNARDIS, V. PETRESCU, ELENA LUPULEASA), on the quality of tomatoes transplants (ADRIANA DUŢĂ, BRAD I., GINA UNGUREANU) and on the tomato's yield (Florica Popescu, Rizan, D, Mariana Dinu), etc.

By continuing the researches regarding the organic bioactive substances it is brought an important contribution on the knowledge of the action on the growing and development of the plants, the needed treatments inside off organic vegetable crops from the protected spaces. By applying treatments with bioactive products it is increasing the vigour of the transplants and the resistance on the fungus and bugs attack and also on the less favourable conditions that the plants had after the tomato crop establishing, especially concerning the early ones from the field or greenhouse.

MATERIAL AND METHODS

On the Banu-Maracine R.D.S of the University of Craiova, there were organized an experience regarding the improvement of the organic technology for obtaining the tomatoes transplants by using treatments with bioactive products.

The aims of the researches concerned the next aspects:

- the influence of the leaf fertilizer and of the bioactive substances on the vigour and quality of the tomatoes transplants;
- the obtaining of transplants in a shorter period, compare with 50-55 days the period recommended by the current technology, in order to reduce the number of days to heat up the greenhouses.

The biologic material used was represented by the tomatoes transplants, the Cristal hybrid, obtained in the greenhouse, and as biostimulator products there were used the next organic assortment:

- Cropmax that contain macroelements N - P2O5 – K2O (2:5:2), microelements Fe, Mn, Zn, Cu, B, Mo, Co, Mg, Ca, Ni, vegetal stimulators, organic aminoacids, vitamins and vegetal enzymes;
- Algimax, fertilizer that can be applied on the leaf or in the irrigation water. It is a marine algae and microelements (bor 2%, sulf 9.7 %, magneziu 4.8 %, molibden 0.2%) extract. The active substances quickly penetrate the leaf stimulating the leaf and fruits increasing;
- *Hyppophae rhamnoides* extract: there used *Hyppophae rhamnoides* fruits that were macerated in 7-10 days, in a concentration of 1/10.

The experimental model had the next six variants: V_1- untreated transplant; V_2 - transplant treated with *Hyppophae rhamnoides* extract; V_3 - transplant treated with Cropmax; V_4 - transplant treated with Algimax; V_5 - transplant treated with Cropmax and *Hyppophae rhamnoides* extract; V_6 - transplant treated with Algimax and *Hyppophae rhamnoides* extract.

There were applied two leaf treatments, after transplanting, in 14 days intervals. On planting age, on transplants there were made a series of biometric measurements, in order to emphases the applied treatment effect on the morphologic characters of the tomatoes transplants: the high and the diameter of the stem, the number of leaf/plant, the number of

inflorescence/plant. The observation was made on 50 plants, after that being calculated the average.

The biologic potential of the tomatoes transplants is determined among other things, by the next biochemical compounds: total dry substance (TDS), soluble dry substance (SDS), C vitamin and the sugar from the leaf gives the young plants resistance to law temperature from open field, that determine the vegetation stagnation and even the plant's death if the law temperature is maintaining for longer period of time.

The SDS was determined with the portable refractometer, the C vitamin and the sugar was determined based on Kits, with RQ Flex equipament, by mineralization the vegetal material.

The six variants were placed after the randomized blocks method, the technical date regarding the organisation of the experiment being showed in the table 1.

Table 1

Technical date concerning the experience

Specification		2007	2008
Planting day		07 martie	09 martie
Sprout day		19 III	21 III
Transplants day		26 III	27 III
The applying treatment day:	I	15 IV	17 IV
	II	28 IV	30 IV
The field planting day		02 V	05 V
The transplant age on the planting (no. of days)		45	46
Number of variants		6	6
Number of repetitions		3	3
The area of an variant (m^2)		14	14
The planting distance (cm)		70 x 20	70 x 20
The variety		Cristal F_1	Cristal F_1

Others caring works applied to the transplants were:

- temperature during the seeds germination until the sprout was maintained on 22-24 C and on the transplants was by 18-20 C during the day, 16-18 C in the night, after that being correlated the temperature with the light intensity. In a week before planting in the field, it was made the young plants harden by using higher ventilation.
- the humidity was moderate also in the soil and in the atmosphere before planting (60%) and for the young plants harden the irrigation was stop for 5 days;
- the ventilation was periodical made, in order to ensure a moderate atmospheric humidity and also for the air freshness and to eliminate the toxic gas from the green house;
- the disease control management by applying prevention treatments with certified organic products: $CuSO_4$ 0.5 %, Champion 0.4 %, onion extract, aluminium sulphate 2%; Milbecknok 1% (insecticide- acaroids), obtained by fermenting from a specie of actinomycete bacteria (*Streptomyces hygroscopicus*);
- the weed control;
- the plant transplant was made in plastic pots with 7 cm in diameter, on 25th of February and the planting was made in the third decade of April.

RESULTS AND DISCUSSIONS

The bioactive products have favourable effects on the developed elements of the transplants by modifying the vital process of the vegetal organism and on the metabolism of

those once, determining: a higher percent adaptation of the young plants transplantation, the acceleration of the vegetation increasing development.

In order to emphases the gain effect of the applied treatments with natural organic products, on transplants were made a series of measurements, determinations and analysis before planting.

One of the saving energy possibilities in the transplants production technology is the one by obtaining transplants with optimum features in as short possible period, compare with 50-55 days the normal period fallowing the current technology. For this study, the transplant planting was made after only 45 days from the sprout, the transplants having a normal development.

The obtained date in the two years of study, shown in table 2, proves the positive effect of the treatments with bioactive products on the increasing and development.

In this way, the high of the stem was between 20.6-25.4cm on the treated variants, increased compare with the control by 5.8% (V_4 – transplant treated with Algimax) – 23.4% (V_6- transplant treated with Algimax and *Hyppophae rhamnoides* extract).

The diameter of the stem was situated between 5.5 cm on the control (untreated transplant) and 7.0 cm on the variant where was applied Cropmax and *Hyppophae rhamnoides* extract. The stem enlargement on the transplants recorded percent increasing compare with the control by 12.7-17.5% (V_5).

On planting, the tomatoes transplants had between 6.3 and 7.5 leaf/plant, value that is superior compare with the untreated variants by 12.7% (V_2) – 17.5% (V_5).

The bioactive substances increased the process of the inflorescences formation. On V1-the control, from 50 analyzed plants, on 45 plants there were observed inflorescences in forming, while on the V2 and V8 this process was in acceleration. In this way, on the treated variants it was recorded 57.1% (V_2) and 80.7% (V_5), surpassing the control with 30.4%-79.3%.

Table 2

The influence of the bioactive organic products on the growing elements on the tomatoes transplants – Cristal hybrid F_1 (Average 2007-2008)

The variant	The high's stem		The diameter		The number of leaf/plant		The number of inflorescence/plant	
	(cm)	(%)	(mm)	(%)	(no.)	(%)	(no.)	(% comparative to Ct.)
V_1- untreated transplant	20.6	100.0	5.5	100.0	6.3	100.0	45.0	100.0
V_2 - transplant treated with *Hyppophae rhamnoides* extract	22.0	106.8	6.5	118.2	7.1	112.7	57.1	130.4
V_3 - transplant treated with Cropmax	24.9	120.9	6.5	118.2	7.3	114.3	72.3	160.7
V_4 - transplant treated with Algimax	21.8	105.8	6.5	118.2	7.5	115.9	63.0	144.4
V_5 - transplant treated with Cropmax and *Hyppophae rhamnoides* extract	25.0	121.4	7.0	127.3	7.4	117.5	80.7	179.3
V_6 - transplant treated with Algimax and *Hyppophae rhamnoides* extract	25.4	123.4	6.2	112.7	7.2	114.3	77.7	172.7

The biologic potential of the tomatoes transplants is determined among other things by the next biochemical compounds: total dry substance (TDS), soluble dry substance (SDS), C

vitamin and the sugar from the leaf gives the young plants resistance to the law temperature from open field, that determine the vegetation stagnation and even the plant's death if the law temperature is maintaining for longer period of time.

Concerning the influence of the bioactive products on the biochemical composition of the transplants, there were recorded the next data: TDS from the leaf was between 6.4% (V_1 control) and 8.0% (V_6) and the SDS was between 5.7% (V_1 control) and 7.2 % (V_6).

It is significant the C vitamin contain, on V1 was by 6.6 mg/100 g d.s. and on the treated variants was by 11.8 mg/100 g f.s. – 17.4 mg/100 g d.s., the control being surpassed with 78.8% (V_2) – 163.6% (V_4).

The sugar level in the leaf was in close limit in all six variants 1,10 % (V_2) – 1,54 % (V_6) (Table 3.)

Table 3

The influence of the bioactive products on some biochemical features on tomatoes transplants – Cristal hybrid F_1

The variant	TDS		SDS		The C vitamin		The sugar from the leaf	
	(%)	(% comparative to Ct.)	(%)	(% comparative to Ct.)	(mg/100 g f.s.)	(% comparative to Ct.)	(%)	(% comparative to Ct.)
V_1- untreated transplant	6.4	100.0	5.7	100.0	6.6	100.0	1.12	100.0
V_2 - transplant treated with *Hyppophae rhamnoides* extract	6.7	104.7	6.1	107.0	11.8	178.8	1.10	98.2
V_3 - transplant treated with Cropmax	7.3	114.1	6.3	110.5	13.2	200.0	1.30	116.1
V_4 - transplant treated with Algimax	7.6	118.7	6.1	107.0	17.4	263.6	1.20	107.1
V_5 - transplant treated with Cropmax and *Hyppophae rhamnoides* extract	7.2	112.5	6.1	107.0	14.7	222.7	1.12	100.0
V_6 - transplant treated with Algimax and *Hyppophae rhamnoides* extract	8.0	125.0	7.2	126,3	16.7	253.0	1.57	140.2

This data proves the fact that by applying bioactive organic products treatments, especially by associating the Cropmax or Algimax with *Hyppophae rhamnoides* extract, are improving the morphologic and biochemical parameters of the plants, obtaining in a shorter period transplants for planting from high quality, with a high biologic potential, capable to ensure also precocity and high yields.

CONCLUSIONS

The obtained results in the two years of experimentations regarding the improvement of the organic technology for obtaining the tomatoes transplants by using treatments with organic bioactive products, allow us to conclude:

➢The application of bioactive products on tomatoes transplants, *Hyppophae rhamnoides* extract, Cropmax and Algimax, determine the obtaining of transplants with superior morphologic features compare with the untreated control:

- It is obtained planting material in a shorter period of time, by 45 days compare with 50-55 days, reducing the number of days necessary to heat up the greenhouse with conventional energy sources;

- It is increasing the plant's vigour by enlarging the stem until 27.3%;

- The number of leaf/plant is higher till 17.5%;

- The formation of the fructification elements is earlier, the proportion of the inflorescence/plant being of 30.4% - 79.3%, superior compare with the control<

➢ Considering the biochemical contain, the tomatoes transplants treated with bioactive substances presents on the most of the components, higher value compare with the control: TDS and SDS until 25.0%, respectively 26.3%, and C vitamin records increases by 78.8 % - 163.6 %.

➢ In order to expand the organic agriculture area, it is necessary the elaboration and the knowledge of alternative technologies.

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