RESEARCH INTO THE USE OF BIOFERTILIZERS FOR GROWTH AND FRUCTIFICATION IN THE STRAWBERRIES CULTURE

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Abstract. *The strawberry is the species of economic interest and great potential food production that adapts to the wide variety of climatic conditions due to the diversity of varieties created. The strawberry crop was founded in spring of 2013 as a multi-cultural open country classic variety Albion with extra baking semi-early variety with good resistance to white leaf blotch, powdery mildew and gray mold. For each pathogen were used two fungicides. Treatments were two in number of 0.05 ha surface, leaving the control surface, untreated. To combat staining of leaves of strawberry (Mycosphaerella fragariae), were used Score 250 EC products (0.03%) and Ortiva Top (0.1%) to yield better results in the second embodiment. Strawberry powdery mildew has been combated with Topas 100 EC variant 1 (0.025%) and version 2 was used Kumulus DF (0.3%). Results were better in the first embodiment. From the results obtained it is apparent that the production of the best results have been obtained in embodiments where the strawberries were used Switch 62.5 WG products, Ortiva top and Topas 100 EC, the comlexare with stimulators. When preparing the land for the establishment of the crop in 2013, it was fertilized with NPK complex fertilizers using a norm of 700 kg / ha. The surface of the plot being 0.35 ha. The maintenance works were applied according to the technology recommended for this crop. The fruits were harvested at intervals of 2-3 days, staggered as they ripened, when the pulp was still hard, and the fruits were colored over 90% of the surface or in its entirety. The variety used was Albion is a Californian variety, which is suitable for both field cultivation and forced cultivation in greenhouses. The plant has medium vigor, directed port. It is among the most productive varieties of strawberry, obtaining yields exceeding 50 t / ha.*

Key words: *strawbery, treatment, pesticides, effectiveness*

INTRODUCTION

In order to be as competitive as possible, a strawberry variety must produce large yields (500 - 800 g / plant), produce medium or large fruits (for fresh consumption or industrialization), uniformly colored, regular shape, balanced taste, resistant to transport and handling, shorter harvest time (up to 1 8 - 2 4 days), the average weight of the fruit should not decrease too much at the last stages of harvest [DRĂGĂNESCU E., MIHUŢ E 2005].

In addition, a variety must be resistant to stressors (frost, drought) and to diseases and pests. For multiannual crops, a valuable variety must keep its production level for at least 2 years. Normally the strawberry fruit is harvested in 5-6 installments. [SIMERIA ȘI col. 2011].

More valuable is considered a variety, in which, in the first 3-4 rounds, 80% of the harvest is harvested. For the consumption of fresh fruits, large fruits are preferred and for industrialization, medium fruits, with a high dry matter content. [TEODORESCU AL., COMAN M., 1988]

The shape of the fruit must be conical, spherical - conical, uniform, without pronounced ribs. A valuable variety, grown in proper conditions, retains the shape of the fruit [HUMMER K. E 2000].

There are areas where elongated shafts are preferred, as well as areas where the cordiform shape is preferred. The bright red color is preferable to the dark red, gloss-free.

Light-colored strawberries are commercially free and commercially free. [BRENNAN R. M, 1996]

The position of the achenes is important in the appreciation of a variety, because they impress, together with the consistency of the pulp, resistance to storage and transport. Strawberries with achenes buried in the pulp are very sensitive to handling and transport.

MATERIAL AND METHOD

The experiment was located in a linear settlement on a total area of 0.35 ha of Albion strawberries. For each pathogen (*Mycoshaerella fragariae, Botrytis cinerea, Sphaerotheca macularis)*, two fungicides were applied. Each variant of treatment was carried out on an area of 0.05 ha, leaving a control area of 0.05 ha, where no fungicide treatments were applied.

The culture is established in a system of double rows, a system still used in some countries of the European Union.

When preparing the land for establishment in 2013, it was fertilized with organic fertilizers 30 to / ha and complex chemical fertilizers NPK 15:15:15 in a dose of 500 kg / ha.

The strawberries were planted on agrotextile, this being a material woven from strips of foil (raffia) pigmented and UV stabilized. The fixing of the foil can be done with earth filling or by means of "U" -shaped fixing elements, made of galvanized wire or spikes. Fixing the foil with these fasteners at a distance of 1-1.2 m, ensures a good fixation even in case of strong winds. The agrotextile fixed in this way can be easily tightened later, as well as the fasteners and can be reused.

The strawberry crop was established in the spring of 2012 with stolons, being a classic multiannual crop in the open field, the Albion variety, being one of the newest strawberry varieties, European patent no. 2162/2010.

It is a suggested variety for all types of crops: tunnel, solarium, open field, garden, hydroculture, Grodan, etc. Good storage after harvest, high resistance to transport, conical fruit, uniform, perfect. ALBION is widespread and appreciated in the USA, comes from the cross between Diamonds and a selection CAL94.16-1 made in 1997 at the University of California.

Biofertilizers Score 250 EC, Ortiva Top, Cropmax were applied in combination with the products used to control the main diseases and pests.

The experiment was placed according to the method of randomized blocks with 4 repetitions:

The effectiveness of the treatments (E%) was determined according to the Abbot formula (1925) in which:

$$E\% = \left(1 - \frac{a_2}{N - M_2}\right):$$

a= number of fruits attacked in the treated version; N = total number of fruits analyzed; M2 = total number of unattacked fruit on control (degree of attack on control).

The effectiveness of the products was followed by establishing the frequency of the attacked fruits in each variant by harvesting 100 fruits each.

In order to determine the frequency, intensity and degree of attack produced by the larvae of the plum worm, the observations were made in conditions of non-application of control treatments. On the untreated control variant, observations were made on a number of 10 trees, at which we analyzed a number of 100 fruits / tree.

The frequency and intensity of the attack has been passed down from generation to generation.

The frequency of the attack was calculated according to the formula:

$$F\% = \frac{n}{N} x100$$

where:n = number of fruits attacked; N = number of fruits analyzed.

RESULTS AND DISCUSSIONS

Results obtained in combating the white spot of strawberry leaves (*Mycosphaerella fragariae*)

Regarding the attack of diseases, especially those caused by the pathogens *Mycosphaerella fragariae* (white spot of strawberry leaves) to the observations made at the beginning of flowering, the results presented in the table were obtained.

Table1

Results obtained from treatments for attacks caused by *Mycosphaerella fragariae* using Score 250 EC and Ortiva Top

Alternative	Pesticides used		Conc. (%)	Frequency of leaf attacks caused by *Mycosphaerella Fragariae* (%)
V1 Score 250 EC	T1	Score 250 EC	0,03	2,6
		Fastac 10 EC	0,01	
		Cropmax	0,1	
	T2	Score 250 EC	0,03	
		Cropmax	0,1	
V2 Ortiva Top	T1	Ortiva Top	0,1	2,1
		Fastac 10 EC	0,01	
		Cropmax	0,15	
	T2	Ortiva Top	0,1	
		Cropmax	0,15	
V3 Mt. (untreated)	T1	Cropmax	0,15	10,6
		Fastac 10 EC	0,01	
	T2	Cropmax	0,1	

These data show that the best efficacies were recorded in variant 2 (V2 - Ortiva Top in a dose of 0.1%) with the frequency of attack produced by *Mycosphaerella fragariae* of only 2.1% compared to 2.6% in variant 1 and 10.6% in variant 3.

Results obtained in combating gray strawberry rot *(Bothrytis cinerea*).

Table 2.

Results obtained from treatments for attacks caused by *Bothrytis cinerea* using Score 250 EC and Switch 62.5 WG

Alternative	Pesticides used		Conc. (%)	Frequency of leaf attacks caused by *Bothrytis cinerea* (%)
V1 Score 250 EC	T1	Score 250 EC	0,05	2,9
		Fastac 10 EC	0,01	
		Cropmax	0,1	
	T2	Score 250 EC	0,05	
		Cropmax	0,1	
V2		Switch 62.5 WG	0,1	

Switch 62.5 WG	T1	Fastac 10 EC	0,01	1,9
		Cropmax	0,15	
	T2	Switch 62,5 WG	0,1	
		Cropmax	0,15	
V3 Mt. (untreated)	T1	Cropmax	0,1	12,5
		Fastac 10 EC	0,01	
	T2	Cropmax	0,1	

These data show that the best efficacies were recorded in variant 2 (V2 - Switch 62.5 WG in a dose of 0.1%) with the frequency of attack produced by *Bothrytis cinerea* of only 1.9% compared to 2.9%. in variant 1 and 8.7% in variant 3.

In the case of gray rot (*Bothrytis cinerea*), the plants treated with the fungicide Switch 62.5 WG showed increased resistance to this disease (in percentage of 1.9%), compared to those treated with Score 250 EC (2.9%) and compared to the untreated ones that showed a frequency of 12.5%.

Results obtained in combating strawberry powdery mildew (*Sphaerotheca macularis*)

Table 3

Results obtained from treatments for attacks caused by *Sphaerotheca macularis* using Kumulus DF şi Topas 100 EC

Alternative	Pesticides used		Conc. (%)	Frequency of leaf attacks caused by *Sphaerotheca Macularis* (%)
V1 Kumulus DF	T1	Kumulus DF	0,3	3,3
		Fastac 10 EC	0,01	
		Cropmax	0,1	
	T2	Kumulus DF	0,3	
		Cropmax	0,1	
V2 Topas 100 EC	T1	Topas 100 EC	0,025	2,2
		Fastac 10 EC	0,01	
		Cropmax	0,15	
	T2	Topas 100 EC	0,025	
		Cropmax	0,15	
V3 Mt. (untreated)	T1	Cropmax	0,1	11,9
		Fastac 10 EC	0,01	
	T2	Cropmax	0,1	

The data presented in Table 4 show that the frequency of leaves attacked by *Sphaerotheca macularis* (strawberry powder) was reduced in the variant treated with Kumulus DF from 11.9% to 3.3% in variant 1, and from 11.9% to 2.2% in variant 2 where the fungicide Topas 100 EC was used. The difference between variant 1 and variant 2 shows that the fungicide Topas 100 EC offers the plants a better resistance to strawberry powdering compared to Kumulus DF.

Table 4

Results obtained from treatments for disease attacks

Pathogenic	Pesticides used	Strength	Frequency %
Pătarea albă (*Mycosphaerella Fragariae*)	V1 –Score 250 EC	0.03%	2.6
	V2 – Ortiva Top	0.1%	2.1
	V3 – Netratat (martor)		10.6
Putregaiul cenușiu (*Bothrytis cinerea*)	V1 – Score 250 EC	0.05%	2.9
	V2 – Switch 62.5 WG	0.1%	1.9

	V3 – Netratat (martor)		12.5
Făinarea (*Sphaerotheca Macularis*)	V1 – Kumulus DF	0.3%	3.3
	V2 – Topas 100 EC	0.025%	2.2
	V3 – Netratat (martor)		11.9

CONCLUSIONS

The best efficacies were registered in variant 2 (V2 - Ortiva Top in a dose of 0.1%) with the frequency of attack produced by *Mycosphaerella fragariae* of only 2.1% compared to 2.6%

In the case of gray rot (*Bothrytis cinerea*), the plants treated with the fungicide Switch 62.5 WG showed increased resistance to this disease (in percentage of 1.9%), compared to those treated with Score 250 EC (2.9%).

The frequency of leaves attacked by *Sphaerotheca macularis* (strawberry powdery mildew) was reduced in the variant treated with Kumulus DF from 11.9% to 3.3% in variant 1, and from 11.9% to 2.2% in variant 2 where Topas 100 EC fungicide was used.

The Cropmax foliar fertilizer in complexation with pesticides, with a concentration of 0.1% achieved an average production of 10000 kg / ha, and in variant 3, without biofertilizers the treatments were performed only with pesticides, the average production was 8000 kg /ha.

Average productions obtained using Terra Sorb fertilizer, conc. 0.25% were 9,800 kg / ha, in variant 2, and in the variant treated with Terra Sorb conc. 0.2% production was 9500 kg / ha.

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