RESULTS OBTAINED IN CONTROL OF *DIABROTICA VIRGIFERA VIRGIFERA* LARVAE

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Abstract: *To determine the efficacy of the product against the western corn root worm, since the spring of 2007 was organised an experimental field in the area Tărtăria, Alba County (Romania). The experiments were made according to the experimental technique. It should be noted that it was located in an area where the pest has been reported since 2002, under monoculture. Sowing date varied from year to year depending on climatic factors and weather conditions. In 2008 sowing took place on April 21, May 1 in 2009, and April 30 in 2010. As a result of research carried out in 2008-2010 can be seen that among the four products used in preventing and fighting Diabrotica virgifera virgifera species larvae, we obtained best results with products applied to the seed. In the experimental period, the larvae attack symptoms were manifested by the appearance of "goose neck", in control plot, the attack frequency being about 15.46% in 2008, 25.33% in 2009 and 26,88% in 2010. Biobit bioproduct applied only to the seed reduced the incidence of attack to 5.76% in 2008 (about 63% less compared to the control, 8.12% in 2009 (about 68% less compared to the control) and 6.23% in 2010. Of the four products used in preventing and fighting Diabrotica virgifera virgifera larvae species, we obtained best results with products applied to the seed. The best results in the fight against larvae and adults were obtained with the bioproduct Biobit applied to seed and vegetation. The research was supported by the Research Program PD-PN II, Contract no. 186/2010.*

Keywords: *pest, western corn root worm, biological control, bioproduct, corn*

INTRODUCTION

The pest *Diabrotica virgifera virgifera* Le Conte was accidentally introduced in Europe (1992) in Yugoslavia (Serbia) [8].The Western corn root worm (*Diabrotica virgifera virgifera* Le Conte) has in his origin country, U.S.A., 1-2 generations per year and in Europe, the investigations of Camprag (1993 to 1994 in Yugoslavia) and GROZEA IOANA (1998-2002 in Timis District - Romania) has established a generation per year [2,3,5].Researches on the biology, morphology and ecology of insects, in the ecological conditions of our country, have concluded that the species is monovoltine, wintering on egg stage [6].

The use of pathogenic organisms (viruses, bacteria, fungi) that cause illness and death of the insect is one of biological control methods. To control the maize pest *Diabrotica virgifera virgifera* Le Conte, was used bacterium *Bacillus thuringiensis* [4]. Of the 350 species of entomopathogenic fungi, *Beauveria bassiana* is the most important, parasitizing over 100 species of pests [6].

MATERIAL AND METHODS

To determine the efficacy of the product against the western corn root worm, since the spring of 2007 was organised an experimental field in the area Tărtăria, Alba County (Romania). The experiments were made according to the experimental technique. It should be noted that it was located in an area where the pest has been reported since 2002, under monoculture.A variant has an area of 10.5 square meters, and within it, the plants are arranged

in three rows of 5 meters long each. Sowing date varied from year to year depending on climatic factors and weather conditions. In 2008 sowing took place on April 21, May 1 in 2009, and April 30 in 2010.

RESULTS AND DISCUSSIONS

From the data presented in the table 1, it can be observed, in 2008, that in control variant, symptoms produced by the larvae attack, "goose neck", there was a frequency of attack of 15.46%. In other variants, the frequency of attacks was significantly reduced, it being between 1.89% and 7.64%. We see therefore that the application of chemical treatments can reduce the frequency of attacks at a rate of between 50.6% and 87.8%.

In 2008 the best results were achieved with products that have been applied to the seed.

Force M product applied to the seed, decreased the attack frequency by 72.5% (4.7% attacked plants). The application of Force 1,5 at ground, also reduced the attack frequency to 4.53%, when was applied at doses of 15 kg / ha.

Poncho product, applied at a dose of 10 l / t seed, obtained very good results. In this variant frequency of attacked plant was 1.98%, which means a reduction of 87.8% compared to the control.

In 2008, using Biobit product applies only to the seed reduced the incidence of attack by 63% compared to the control, and the number of plants being attacked by 5.76%. In the variant where the bioproduct was applied in two stages, to the seed and on vegetation, the percentage of attacked plants was reduced by 4.49%, with an efficacy of 71% (Table 1).

Table 1

The efficacy of products used in the prevention and control of *Diabrotica virgifera virgifera* larvae (Tărtăria – 2008)

Variant	Attack frequency %	% of control	Difference to control	The significance of difference
Control	15.46	100.0	0.00	Control
Force M	3,42	22,1	-12,03	ooo
Force 1,5 G	4,53	29,3	-10,93	ooo
Biobit (seed)	5.76	37.3	-9.70	ooo
Biobit (vegetation)	7.62	49.3	-7.84	oo
Biobit (seed + vegetation)	4.49	29.0	-10.97	ooo
Poncho	1,89	12,2	-13,56	ooo

LSD (p 5%) = 4.68; LSD (p 1%) = 6.23; LSD (p 0.1%) = 8.07

Table 2

The efficacy of products used in the prevention and control of *Diabrotica virgifera virgifera* larvae (Tărtăria – 2009)

Variant	Attack frequency %	% of control	Difference to control	The significance of difference
Control	25.33	100.0	0.00	Control
Force M	5,03	19,8	-20,30	ooo
Force 1,5 G	7,06	27,9	-18,26	ooo
Biobit (seed)	8.12	32.1	-17.20	ooo
Biobit (vegetation)	13.47	53.2	-11.86	ooo
Biobit (seed + vegetation)	5.62	22.2	-19.71	ooo
Poncho	2,68	10,6	-22,65	ooo

LSD (p 5%) = 4.68; LSD (p 1%) = 6.23; LSD (p 0.1%) = 8.07

In 2009, control variant, symptoms produced by the larvae attack, "goose neck", there was a 25.33% frequency of attack (the attack frequency was greater than last year with a plus

of 9.87%)., attack frequency, the other variants with values, ranging between 2.68% and 13.47%.

Very good results were obtained with Poncho product, applied at a dose of 10 l / t of seed. In this variant frequency of plants attacked was 2.98%, which means a reduction of 89.8% compared to the control.

Force M product applied to seed, decreased attack frequency by 80.2% (5.03% attacked plants), soil application of Force 1.5 G product, also reduced the frequency of attack, this was 7.06 if was applied in doses of 15 kg / ha.

In 2009, using Biobit product applied only to the seed, there was reduced the incidence of attack at 8.12%. In the variant where the bioproduct was applied in two stages, to the seed and on vegetation, the percentage of attacked plants was reduced by 5.62%, with an efficacy of 77.8% (Table 2).

From the data we find that the larvae attack frequency on variant control, attack symptoms manifested by the appearance of "goose neck", was 26.88%. In other variants, the frequency of attacks was significantly reduced, it being between 2.41% and 12.79%. We see therefore that the application of chemical treatments can reduce the frequency of attacks at a rate of between 53.3% and 91.0%.

The best results were achieved with products that have been applied to the seed. Thus, the product Force M applied to the seed decreased attack frequency to 78.3% (5.83% frequency of attack). Apply this product to the ground, also reduced the frequency of attack, which was 6.35%.

Very good results presented product Poncho, plant frequency of attacked plants was 2.41%, which means a reduction of 91.0% compared to the control.

In 2010, the use of the product Biobit significantly reduced the attack frequency. Applied only to the seed reduced the incidence of attack by 76.8% compared to the control. In this variant the number of plants being attacked was 6.23%. In the variant where the bioproduct was applied in two stages, to the seed and on vegetation, the percentage of attacked plants was reduced up to 4.28%, with an efficacy of 84.1%. This version has increased the efficacy by 7.3% compare to applying only to the seed (Table 3).

Table 3

The efficacy of products used in the prevention and control of *Diabrotica virgifera virgifera* larvae (Tărtăria – 2010)

Variant	Attack frequency %	% of control	Difference to control	The significance of difference
Control	26.88	100.0	0.00	Control
Force M	5.83	21.7	-21.05	ooo
Force 1,5 G	6.35	23.6	-20.53	ooo
Biobit (seed)	6.23	23.2	-20.65	ooo
Biobit (vegetation)	12.79	46.7	-14.09	ooo
Biobit (seed + vegetation)	4.28	15.9	-22.60	ooo
Poncho	2.41	9.0	-24.47	ooo

LSD (p 5%) = 4.68; LSD (p 1%) = 6.23; LSD (p 0.1%) = 8.07

As a result of research carried out in 2008-2010 can be seen (Table 4) that among the four products used in preventing and fighting *Diabrotica virgifera virgifera* species larvae, we obtained best results with products applied to the seed.

Among them was observed Force M product (with attack frequency of 4.76% using dose of 15 l / t seed).

Best product to which the attack frequency was 2.33% and "goose neck" symptom was reduced, was the product Poncho with an efficacy of 88.7%.

Table 4

The efficacy of products used in the prevention and control of *Diabrotica virgifera virgifera* larvae (Tărtăria – 2008-2010)

Variant	Attack frequency %	% of control	Difference to control	The significance of difference
Control	22.56	100.0	0.00	Control
Force M	4.76	21.1	-17,80	ooo
Force 1,5 G	5.98	26.5	-16.58	ooo
Biobit (seed)	6.70	29.7	-15.86	ooo
Biobit (vegetation)	11.29	50.0	-11.27	ooo
Biobit (seed + vegetation)	4.80	21.3	-17.76	ooo
Poncho	2.33	10.3	-20.23	ooo

LSD (p 5%) = 4.68; LSD (p 1%) = 6.23; LSD (p 0.1%) = 8.07

The application of Force 1.5 product at ground, reduced attack frequency by 16.6%

Using the product Biobit, the average frequency of attacks in the three years of experimentation, was lower than control, which is between 6.70% (applied to seed) and 11.29% (applied to vegetation) (Table 4). Best efficacy was recorded when the product was applied in two stages, to the seed and on vegetation, this being 78.7%.

Compared to the average experimental field (8.77%) had higher values only product Bobit aplied only on vegetation.

CONCLUSIONS

1. Of the four products used in preventing and fighting *Diabrotica virgifera virgifera* larvae species, we obtained best results with products applied to the seed.
2. The best results in the fight against larvae and adults were obtained with the bioproduct Biobit applied to seed and vegetation.
3. At the variant with the bioproduct applied in two rounds to sow and growing, percentage of plants attacked by larvae was reduced to 4.49% in 2008 (an efficacy of 71%), at 5.62% in 2009 (an efficacy of 78%) and 4.28% in 2010 (84% efficacy).

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