
ORIGINAL ARTICLE

**RESEARCHES RELATED TO THE CHEMICAL FIGHT OF THE COLORADO BUG
LEPTINOTARSA DECEMLINEATA SAY
CERCETĂRI PRIVIND COMBATERICA CHIMICĂ A GÂNDACULUI DIN
COLORADO *LEPTINOTARSA DECEMLINEATA* SAY****OLTEAN I.*, PORCA M. M.****ABSTRACT**

Between 1999-2002, Colorado bug fight experiences were annually organized in Cîmpenești. Experimental fields were organized on the land of certain cultivators of the area. The best results in fighting the Colorado bug were obtained with the following products: 290 FS Prestige – 0.8 l/ton; 480 SC Calypso – 80 ml/ha; SC 200 Confidor – 160 ml/ha; EC 10 Rimon – 0.25 l/ha; SC 150 Nomolt – 0.15 l/ha; D 50/500 Nurelle – 0.5 l/ha; SP 20 Mospilan – 0.06 l/ha.

KEYWORDS: *Leptinotarsa decemlineata*, chemical fight**REZUMAT**

Intrucât pentru combaterea gândacului din Colorado s-au folosit un timp foarte îndelungat piretroizii de sinteză, adesea se semnalează apariția fenomenului de rezistență. Din acest considerent se impune stabilirea unei strategii de combatere care să evite acest fenomen. Pentru aceasta este necesară alternanța insecticidelor utilizate în acțiuni de combatere. Pe piața de produse fitofarmaceutice fiecare firmă producătoare de pesticide, lansează an de an, o gamă bogată de produse care trebuie verificate în condițiile specifice fiecărei zone de cultură a cartofului (1,2,3,4).

În perioada 1999-2002 în localitatea Cîmpenești au fost amplasate anual experiențe de combatere a gândacului din Colorado. Câmpurile experimentale au fost organizate în parcelele unor cultivatori de cartofi din zonă. În cei patru ani experimentali au fost utilizate 18 produse pentru combaterea gândacului din Colorado, respectându-se dozele recomandate de producător, iar eficacitatea tratamentului a fost verificată după 48 ore. În ceea ce privește efectul larvicid și ovicid precum și remanența produsului a fost verificată prin efectuarea a încă 4 observații pe un interval de aproximativ 60 zile.

În anul 1999 în toate cele 5 variante în care s-au aplicat tratamente chimice, numărul mediu de larve pe 5 plante analizate a scăzut vertiginos, fiind și variante în care nu s-a mai semnalat atac. Eficacitatea tratamentului în funcție de termenul la care s-au făcut observațiile a fost cuprinsă între 56,05% și 100%.

În anul 2000 trei produse au dat rezultate excepționale. Prestige 290 FS, Nomolt 150 SC și Nurelle D 50/500.

În anul 2001, trei produse au dat rezultate foarte bune în combaterea gândacului din Colorado. Cel mai bun produs a fost Calypso 480 SC în doză de 80 ml / ha, urmat de Mospilan 20 SP și Regent 200 SC.

În anul 2002, trei produse au dat rezultate foarte bune în combaterea gândacului din Colorado. Cel mai bun produs a fost din nou Calypso 480 SC în doză de 80 ml / ha urmat de Confidor 200 SC și Rimon 10 EC.

CUVINTE CHEIE: *Leptinotarsa decemlineata*, combatere chimică

DETAILED ABSTRACT

Between 1999-2002, Colorado bug fight experiences were annually organized in Cimpenesti. During the four experimental years, 18 products were used to fight the Colorado bug, observing the dosage recommended by the producer and checking the effectiveness of the treatment after 48 hours.

In 1999 with the untreated witness the greatest number of grubs per plant was registered at the first observation which was carried out on the 5th of June when 560 grubs were found on 5 plants, i.e. 112 larvae on a plant. In all the 5 variants in which chemical treatment was applied, the average number of grubs on 5 analyzed plants decreased rapidly and there were variants where no attack was noticed. The effectiveness of the treatment according to the moment of observation ranged between 56.05% and 100%.

In 2000, the 290 FS Prestige product used in treating tubers before plantation had a 100 % effectiveness during the entire vegetation period. In this variant no grubs were noticed. The product had a special effect also for the fight of affids.

In 2001 the pest population was more reduced as compared to the preceding year but it still went much beyond the damaging economic level. This year we witnessed an increase of the population starting from June until July, thus, at the observation of July 5 we met 720 grubs/5 plants (an average of 145 grubs/plant). This year, three products gave very good results in the fight against the Colorado bug. The best product was 480 SC Calypso at a dose of 80 ml/ha, 20 SP Mospilan and 200 SC Regent.

INTRODUCTION

The Colorado bug is the most spread and at the same time the most damaging pest of the potato, egg-plant and tomatoes. The grubs' attack on the plant may have as result the foliage complete destruction, followed by the drastic cut in the crop to harvest, reaching to the total crop wreck. As the bug presents 1-3 generations every year (according to the climatic conditions of the area) to fight it, considerable financial efforts are necessary from those wishing to cultivate potatoes.

Because to fight this pest synthetic pyrethroids were used for a very long time, the resistance phenomenon occurs quite often. This is why a fight strategy which may avoid this phenomenon is strictly necessary. For this, it is necessary the alternation of the insecticides used in fight actions. On the phyto-pharmaceutical market, every year, every pesticides producer introduces a rich range of products which need to be verified under the specific conditions of every potato crop zone (1,2,3,4).

MATERIAL AND METHOD

Between 1999-2002, Colorado bug fight experiences were annually organized in Cimpenesti. Experimental fields were organized on the land of certain cultivators of the area. Every year, the surface of each variant was of 100-200 sq.m. The untreated witness variant was generally considered to be 20 plants which, immediately subsequent to the execution of observations in order to establish the biological effectiveness of the tested products, was also treated as we risked that the production be totally compromised on that surface and a danger for the neighbouring surfaces. At the other observation deadlines, the untreated plants of the neighbouring surfaces were taken as witnesses. During the four experimental years, 18 products were used to fight the Colorado bug, observing the dosage recommended by the producer and checking the effectiveness of the treatment after 48 hours. In what concerns the grub and eggs killing effect as well as the product remanence, this was checked by performing another 4 observations in an interval of 60 days.

RESULTS AND DISCUSSION

The results of the tests carried out in order to establish the biological effectiveness of certain

zoocides between 1999-2002 are shown by tables 1-4.

In 1999 (table1) with the untreated witness the greatest number of grubs per plant was registered at the first observation which was carried out on the 5th of June when 560 larvae were found on 5 plants, i.e. 112 larvae on a plant. The population decreased at the other observation moments such as 176 larvae on June 23, 256 larvae on July 7, 315 on July 20 and 213 on August 2 (larvae on 5 analyzed plants)

In all the 5 variants in which chemical treatment was applied, the average number of larvae on 5 analyzed plants decreased rapidly and there were variants where no attack was noticed. The effectiveness of the treatment according to the moment of observation ranged between 56.05% and 100%.

The best results were obtained with the product Bulldock 25 EC at a dose of 0.3 l/ha. Subsequent to the treatment, the biological effectiveness was of 100%. At the third moment of observation there were still 11.8 larvae/plant noticed, meaning an effectiveness of 95.39%. Though it is included into the pyrethroid group, being a new formula (a betacyflutrin isomer) the shock effect is special but also the product remanence is considerable.

The 50 WP Vicienon product at a dosage of 0.5 kg/ha though it has been in use for a long time now in fighting the Colorado bug, it still preserves its good action. It is to be noticed the fact that larvae death comes only in 24 hours subsequent to the treatment application. During the observation period, the product effectiveness was ranged between 89.4 % and 100 %.

The Karate product at a dosage of 0.2 l/ha, at high population densities, gives relatively good results. After the treatment, at the first observation, the effectiveness was of 98.9 % being noticed 5.6 larvae/5 plants. In a month from the treatment the population started to restore and 64.6 larvae/5 plants were met, a density which may become alarming and, above all, it may provide a considerable biological reserve for next year. Reported to the witness variant, this population represents an effectiveness of just 79.49 %, and, at the beginning of August, the effectiveness was just 56.05 %.

The mixture of Decis 2.5 and 50 WP Vicienon is recommended for private producers. They wait from all the products the shock effect with which they were used to during previous years, an effect which we so well notice with synthesis pyrethroids. As they have a lower effectiveness and a reduced remanence, in a mixture with organo-phosphoric products (such

as the Vichtenon) they give good results, presenting a cumulated effect of the two chemical formulas. In this combination, the population density was diminished by 97.33% and 99.93% during the two months of monitoring.

The weakest results were obtained with the 10 EC Fastac product at a dosage of 0.1 l/ha. Right from the first observation, the density of larvae met on 5 plants was of 69.2 larvae, i.e. a biological effectiveness of 87.64%.

The results of year 2000 are shown by table 2. This year was especially favourable for the Colorado bug development. With the untreated witness, at the first observation dated June 2, 720 larvae/5 plants were noticed, reaching a maximum of 842 grubs at the next observation of July 2. With this variant, even at the beginning of August, the population was very numerous reaching 480 larvae/5 plants.

The 290 FS Prestige product used in treating tubers before plantation had a 100 % effectiveness during the entire vegetation period. In this variant no grubs were noticed. The product had a special effect also for the fight of affids.

In the variant in which the 150 SC Nomolt product was applied at a dose of 0.15%, the pest population was decreased by 99.46% up to 100%. This product has also outstanding results in the destruction of the pest as it is a great chityne inhibitor. The product effect was preserved even after two months after the treatment, at that date only an average of 2.6 larvae being noticed.

The D 50/500 Nurelle product at a dose of 0.5 l/ha has results similar to those of Nomolt but at a lower price. The mixture between of synthesis pyrethroid and a systemic organo-phosphoric confers on it special qualities, having both shock effect as well as a good remanence. After 45 days from the treatment, 14.4 larvae/5 plants were noticed and this population does not represent a danger for the crop anymore.

The 20 WP Evisect product has an average effectiveness at the dose of 0.3 kg/ha. After the treatment the population was diminished by 99.36% but in 14 days the population started to restore and 33.2 larvae/5 plants were noticed. In 40 days after the treatment the effectiveness stays at values of 83.94% and 86.75%.

The 10 EC Fury product, just all the synthesis pyrethroids, has a good shock effect taking the pest population down by 99.5 %. The population is

restoring though relatively fast due to the fact that it does not have a very good ovicidal and adult killing effect. In a month from the treatment approximately 20 larvae/plant can be met, such a number being over the damaging economic level. The product effectiveness stays at values of 81.14% and 75.25% in July and at the beginning of August, due to the fact that in the untreated witness variant the pest density is extremely high.

In 2001 (table 3) the pest population was more reduced as compared to the preceding year but it still went much beyond the damaging economic level. This year we witnessed an increase of the population starting from June until July, thus, at the observation of July 5 we met 720 larvae/5 plants (an average of 145 larvae/plant).

This year, three products gave very good results in the fight against the Colorado bug. The best product was 480 SC Calypso at a dose of 80 ml/ha. At the first three observations, the product effectiveness was of 100%. In 45 days after the treatment its effectiveness was kept at 99.18%, with 3.2 larvae/5 plant, and in two months the effectiveness was of 95.15%.

The 20 SP Mospilan product also had a 100% effectiveness at the first two observations, the effect staying for at least 40 days. In two months after the application the population in this variant is by 89.15% smaller than in the untreated witness variant. The 200 SC Regent product has very good results in the first part, the pest population being diminished by 94.16%. As of the second decade of July the population begins to restore going beyond the damaging economic level. At the beginning of August, in this variant, the population was smaller by 79.11% as compared to the untreated witness variant. The EC 200 Polytrin may be compared to SC 200 Regent. Also in this variant, the shock effect was terrible at the first observation, the effectiveness being of 99.83%, but, as the product does not have ovicidal effect and a long remanence, the population restores so that, two months after, in this variant we met 56.4 larvae/5 plants (over 11 larvae/plant).

In 2002 (table 4) the pest population was relatively the same as the preceding year but it went way over beyond the damaging economic level. This year we found an increase of the population density starting from June until July, so that, at the observation of July 7, we met 649 larvae/5 plants (an average of 129.8 larvae/plant).

Table 1: The effectiveness of certain insecticides in the fight against the Colorado bug (*Leptinotarsa decemlineata* Say) (Câmpenești 1999)

Var	The tested insecticides	Dose l,kg/ha	Date of observation									
			5.06		23.06		7.07		20.07		2.08	
			Larvas / 5 pl.	E %	Larvas / 5 pl.	E %	Larvas / 5 pl.	E %	Larvas / 5 pl.	E %	Larvas / 5 pl.	E %
1	Bulldock EC	25 0,30	0	100	2,2	98,75	11,8	95,39	0	100	2,6	98,78
2	Victenon WP	50 0,50	2,6	99,54	4,0	97,73	6,4	97,50	0	100	22,4	89,48
3	Karate ZEON	0,20	5,8	98,96	21,4	87,84	38,2	85,08	64,6	79,49	93,6	56,05
4	Decis2,5 EC + Victenon 50 WP	0,20 + 0,50	0,4	99,93	2,2	98,75	4,2	98,36	8,4	97,33	5,2	97,56
5	Fastac 10 EC	0,10	69,2	87,64	57,4	67,38	76,6	70,07	91,4	70,98	85,2	60,00
6	Untreated witness	-	560,0	-	176,0	-	256,0	-	315,0	-	213,0	-

Table 2: The effectiveness of certain insecticides in the fight against the Colorado bug (*Leptinotarsa decemlineata* Say) (Câmpenești 2000)

Var	The tested insecticides	Dose l,kg/ha,to	Date of observation									
			2.06		18.06		2.07		15.07		1.08	
			Larvas / 5 pl.	E %	Larvas / 5 pl.	E %	Larvas / 5 pl.	E %	Larvas / 5 pl.	E %	Larvas / 5 pl.	E %
1	Evisect 200 WP	0,30	4,6	99,36	33,2	92,60	75,2	91,06	83,2	83,94	63,6	86,75
2	Nurelle D 50/500	0,50	0	100	0,6	99,87	0	100	14,4	97,22	0	100
3	Nomolt 150 SC	0,15	0	100	0,8	99,82	1,6	99,81	0	100	2,6	99,46
4	Prestige 290 FS	0,80	0	100	0	100	0	100	0	100	0	100
5	Fury 10 EC	0,10	3,6	99,50	69,4	84,55	03,2	88,87	97,4	81,14	118,8	75,25
6	Untreated witness	-	720,0	-	449,0	-	842,0	-	518,0	-	480,0	-

Table 3: The effectiveness of certain insecticides in the fight against the Colorado bug (*Leptinotarsa decemlineata* Say) (Câmpenești 2001)

Var	The tested insecticides	Dose l,kg/ha,to	Date of observation									
			4.06		19.06		5.07		22.07		4.08	
			Larvas / 5 pl.	E %	Larvas / 5 pl.	E %	Larvas / 5 pl.	E %	Larvas / 5 pl.	E %	Larvas / 5 pl.	E %
1	Regent 200 SC	0,30	2,4	99,26	2,6	99,46	42,0	94,16	48,4	87,65	41,6	78,11
2	Polytrin 200 EC	0,15	3,8	98,83	12,4	97,43	40,0	94,44	39,2	90,0	56,4	70,31
3	Decis 2,5 EC	0,30	49,6	84,74	128,8	73,28	169,8	76,41	97,4	75,15	81,4	57,16
4	Calypso 480 SP	0,08	0	100	0	100	0	100	3,2	99,18	9,2	95,15
5	Mospilan 20 SP	0,06	0,4	99,87	0	100	10,8	98,50	21,2	94,59	20,6	89,15
6	Untreated witness	-	325,0	-	482,0	-	720,0	-	392,0	-	190,0	-

Table 4: The effectiveness of certain insecticides in the fight against the Colorado bug (*Leptinotarsa decemlineata* Say) (Câmpenești 2002)

Var	The tested insecticides	Dose l,kg/ha,to	Date of observation									
			9.06		23.06		2.07		19.07		1.08	
			Larv/5pl.	E %	Larv/5pl.	E %	Larv/5pl.	E %	Larv/5pl.	E %	Larv/5pl.	E %
1	Confidor 200 SL	0,16	0	100	0	100	12,0	98,15	19,4	95,27	19,9	85,15
2	Mavrik 2 F	0,20	12,4	96,80	26,8	94,15	48,8	92,48	81,6	80,05	78,2	41,64
3	Ultracid 20 EC	2,50	18,8	95,14	32,4	92,93	57,8	91,09	93,5	77,14	89,8	32,99
4	Rimon 10 EC	0,25	0,4	99,90	1,6	99,65	23,2	96,42	41,8	89,78	38,6	71,19
5	Calypso 480 SP	0,08	0	100	0	100	9,8	98,49	15,3	96,26	13,5	90,00
6	Untreated witness	-	387,0	-	458,0	-	649,0	-	409,0	-	134,0	-

This year too, three products gave very good results in the fight against the Colorado bug. The best product was again SC 480 Calypso at a dose of 80 ml/ha. At the first two observations the product effectiveness was at 100%. In 45 days from the treatment, the effectiveness was kept at 96.26%, i.e. 15.3 larvae/5 plants, and in two months the effectiveness was at 90.00%.

The 200 SC Confidor product had also a 100% effectiveness at the first two observations and it kept its effect for at least 40 days. In 2 months subsequent to application, in this variant the population is by 85.15% lower than in the untreated witness variant.

The 10 EC Rimon product also had strong results in the first part, the pest population being diminished by over 96.42%. As of the second decade of the month of July, the population restoration begins, going beyond the economic damaging level. In this variant, at the beginning of August the population was lower by 71.19% as compared to the untreated witness variant.

The 2 Mavrik product is comparable to 200 SC Regent. Also in this variant, the shock effect was strong at the first observation, the effectiveness being of 96.80%, but, as the product does not have an ovicidal effect and it has a long remanence, the population restores, so that, in this variant, in two months we met 78.2 larvae/5 plants (over 15 larvae/plant), the population being reduced by 41.69% as compared to the untreated witness variant.

This year, the 20 EC Ultracid product at a dose of 2.5 l/ha gave the weakest results of all the products used. Immediately after the treatment, the effectiveness was at 95.14%, staying at 92.85% after 14 days and at 91.01% after 22 days. Then the population restores but it does not reach the values of the untreated witness variant. In a month from the treatment 92.5 larvae/5 plant were seen, i.e. 18.5 larvae/plant, as compared to 81.8 larvae/plant with the untreated witness variant.

CONCLUSION

- Chemical treatments are obligatory to fight this pest, the products being chosen according to the size of the population and the financial possibilities of the cultivator.

- The best results in fighting the Colorado bug were obtained with the following products: 290 FS Prestige – 0.8 l/ton; 480 SC Calypso – 80 ml/ha; SC 200 Confidor – 160 ml/ha; EC 10 Rimon – 0.25 l/ha; SC 150 Nomolt – 0.15 l/ha; D 50/500 Nurelle – 0.5 l/ha; SP 20 Mospilan – 0.06 l/ha.

- The synthesis pyretroids present a good shock effect, the results being good immediately after the treatment, but the population restores in approximately 10-14 days and a new treatment is necessary.

- The mixture synthesis pyretroid with another product from the organo-phosphoric group gives good results. D Nurelle may be applied or 2.5 EC Decis + 50 WP Victenon.

REFERENCES

- [1.] MORAR G., V.FLORIAN, I. OLTEAN, 1998, Protecția culturilor agricole pe înțelesul tuturor - Protecția cartofului împotriva buruienilor, bolilor și dăunătorilor, 11 p., Tipo Poliam Cluj-Napoca.
- [2.] MORAR G., V. FLORIAN, I. OLTEAN, LIVIA ȘTEF, 2000, Calendarul acțiunilor fitosanitare în perioada martie-iunie 2000, la cultura: cartof, Rev Protecția Plantelor, X / 37, p. 18-22
- [3.] OLTEAN I., T. PERJU, ASEA TIMUȘ, 2001, Insecte fitofage dăunătoare ale plantelor cultivate, Editura Poliam, Cluj-Napoca, p 147-149.
- [4.] OLTEAN I., 2002, Cercetări privind combaterea chimică a gândacului din Colorado, *Leptinotarsa decemlineata* Say, Rev. Protecția Plantelor, XII / 46, p.. 63-72.

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