PROTECTION AGAINST THE PROLIFERATION OF THE COLORADO BEETLE (LEPTINOTARSA DECEMLINEATA SAY) IN THE CONCEPT OF ORGANIC CULTURE AT THE POTATO

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Abstract: *In intensive agricultural production application of pesticides is inevitable.Within the rules of sustainable agriculture and good agricultural practice, targhet application of pesticides are necessary.Modern Plant Protection is bazed on the balance between the pest threat for crops and intensification of chemical treatment.The present paper intends to approach the efficiency of two bio-insect powders Lazer and NeemAzal on the viability of the pest in the conditions from Suceava, the experiments were carried out at A.R.D.S. Suceava in the year 2008 in field and laboratory. If we compare with the untreated witness, the egg hatching was in the ratio of 70-80% in 2-days period, on the treated lots with the two products, the hatching in the ratio of 60-70% was registered only after a few days, the "inhibitory" action of the hatching process maintaining even after the end of this process on the untreated lots.*
The civilized countries under the pressure of the people retired a lot of organophosphoric insecticides and carbamates from the production system, being replaced by alternatives. The reject of the pesticides is a chance for adopting biological products of fighting having as effect the result of some organic, healthy products which don't endanger the human's health. Approximately 5% from the surface cultivated with plants is occupied by the organic agriculture.

Keywords: *bio-insect powders, eggs, treatment, organic production*

1. Introduction

In recent years, scientists have focused on increasing of food production to be need of the world population expanding rapidly. Unfortunately, crop loss is still keep on due to plant diseases, caused by insects, plant pathogen fungi, bacteria and viruses.The Colorado potato beetle (*Leptinotarsa decemlineata* Say) is the most destructive pest of potatoes, eggplants and tomatoes in the world [1].
In today, Colorado potato beetle is still a destructive pest of potatoes, eggplants and tomatoes and causes an important loss in the yield of crop.
The toxicities of several sesquiterpenes against Colorado potato beetle has been recently reported [2-3].
A great shortcoming of the long use of insecticides is the emergence of the pests' resistance to these substances. We have observed that this resistance is present at the insects after the continuous treatment with the same compound for 15-20 generations, against the same pest species [4].
After the intense use of synthetic insecticides, appeared a series of negative aspects like: the environment's contamination, the toxicity on the non-target species, human being's health, all these got everybody's interest for the

"natural" ways of control, including those for researching new sources of vegetal insecticides [5].
One possible way to reduce the high consumption of synthetic insecticides is through the application of botanical insecticides (BI), generally considered to be environmentally and medically safe [6], [7].
At present, the majority of commercially produced BIs utilize the effects of plant metabolites which show acute or chronic toxicity to insects [8], [9].
Their great advantage is their selective action against parasites and pest predators, as well as pollinators. Plant substances acting as antifeedants are found in all the compound groups of secondary plant metabolism. However, the most effective insect feeding inhibitors come from terpenoids, alkaloids, saponins and polyphenols [10].

2. Experimental

The experiences were made at the Agricultural Research Development Station Suceava in 2008. It was cultivated the Sante variety, the surface of an experimental lot being of 16.8 m^2. For the blight were applied two treatments with Curzate and Antracol. The bio insecticides were applied with manual pumps of 0.5 l with delicate atomization, for an uniform dispersion of the product. The Laser 0.033% and NeemAzal 0.33% and 0.41% and 0.5% treatments were done on the 9th of June when the process of hatching is practically inexistent. The observations regarding the hatching and an eventual larva development were made on a period of 10 days. All the places for the egg laying were counted before the treatment and after the treatment they tried to observe their effects on the eggs and of the larvae which hatched.

3. Results and Discussion

In comparison with the non treated witness, where the hatching of the eggs in proportion of 80% happened in two days, in the treated lots with Laser and NeemAzal bio chemicals, the hatching in proportion of 60-70% was registered only after a few days (table 1).
The inhibitory action of the hatching process maintained even after 12-13 June, when this ended at the non treated lots. As a result, at the NeemAzal treatment, the frequency of the non hatched eggs was registered between 8 and 32% even after 7-8 days from the end of the hatching process on the witness lots (table 2). An extension of the hatching stage registered also after the use of Laser product 0.033%. The duration of the non hatched eggs was more reduced with 1-2 days.

If we analyze the dynamic of the eggs hatching not taking into consideration the non treated lots, then it results, according to the data written in the first table, that the hatching rhythms in the first stage (9-16 June) doesn't differ significantly according to the used product. Therefore, in the interval 09.06-16.06, the frequencies of the places with hatched eggs are between 25-60% for the Laser product, 4-64% for NeemAzal 0.33%, 12-68% NeemAzal 0.41% and between 0-75% for NeemAzal bio insecticide 0.5%. Even if the differences between the three concentrations of NeemAzal product on the frequency of the hatched eggs don't have certain significance, we can still admit the fact that a certain growth of the concentration was associated with the rise of the hatched eggs frequency.

Table 1
The influence of the treatments on the eggs viability

Bio insecticide	Date	Eggs					
		non hatched		hatched		dried	
		%	differences	%	differences	%	differences
0	1	2	3	4	5	6	7
Untreated	9.06	92	mt	8	mt		
	11.06	20	-72 ^{ooo}	80	72^{xxx}		
	16.06	0	-92^{ooo}	100	92^{xxx}		
	19.06	0		-	-		
	Dl 5%		27		17		
	Dl 1%		35		24		
	Dl 0,1%		51		35		
Laser 0,033%	9.06	75	mt	25	mt	0	mt
	11.06	64	-11	29	4	7	7
	16.06	29	-46 ^{oo}	60	35^{xxx}	11	11^{x}
	19.06	0	-75^{ooo}	61	36^{xxx}	39	39^{x}
	Dl 5%		23		16		8
	Dl 1%		38		23		14
	Dl 0,1%		56		34		25
NeemAzal 0,33%	9.06	96	mt	4	mt		
	11.06	77	-19	23	19		
	16.06	36	-60 ^{ooo}	64	60^{xxx}		
	19.06	32	-64 ^{ooo}	68	64^{xxx}		
	Dl 5%		20		20		
	Dl 1%		27		28		
	Dl 0,1%		41		42		
NeemAzal 0,41%	9.06	88	mt	12	mt		
	11.06	65	-23	35	23		
	16.06	32	-56^{ooo}	68	56^{xx}		
	19.06	8	-80 ^{ooo}	92	80^{xxx}		
	Dl 5%		23		30		
	Dl 1%		34		43		
	Dl 0,1%		46		64		
NeemAzal 0,5%	9.06	100	Mt	0	mt	0	mt
	11.06	71	-29 ^{o}	29	29	0	
	16.06	25	-75 ^{ooo}	75	75^{xxx}	0	
	19.06	14	-86 ^{ooo}	82	82^{xxx}	4	4
	Dl 5%		21		22		
	Dl 1%		31		32		
	Dl 0,1%		44		47		

Between the two types of bio insecticides, the Laser product 0.033% has a remarkable capacity of reducing the adult's population which is in the copulation period, by estimating a mortality of 80-85%.

The data written in table 3 shows that Laser product has a real ovicidial action, underlined even since the 11th of June, very rapid from the treatment's execution, when the frequency of the eggs which dried was of 7%.

Table 2

The evolutions of the efficiency of the tested products in 2008 (%)

Date	Used products	Eggs					
		non hatched		hatched		dried	
		%	differences	%	differences	%	differences
0	1	2	3	4	5	6	7
9.06	Untreated	92	mt	8	mt		
	Laser 0,033%	75	-17	25	17	0	
	NeemAzal 0,33%	96	4	4	-4		
	NeemAzal 0,41%	88	-4	12	4		
	NeemAzal 0,5%	100	8	0	-		
	Dl 5%		34		21		
	Dl 1%		49		30		
	Dl 0,1%		69		43		
11.06	Untreated	20	mt	80	mt		mt
	Laser 0,033%	64	44^{xx}	29	-51^{ooo}	7	7
	NeemAzal 0,33%	77	57^{xxx}	23	-57^{ooo}		
	NeemAzal 0,41%	65	45^{xx}	35	-45^{oo}		
	NeemAzal 0,5%	71	51^{xxx}	29	-51^{ooo}		
	Dl 5%		24		23		
	Dl 1%		33		32		
	Dl 0,1%		47		45		
16.06	Untreated	0	mt	100	mt		mt
	Laser 0,033%	29	29	60	-40^{oo}	11	11^{x}
	NeemAzal 0,33%	36	36^{x}	64	-36^{oo}		
	NeemAzal 0,41%	32	32	68	-32^{o}		
	NeemAzal 0,5%	25	25	75	-25^{o}		
	Dl 5%		33		24		
	Dl 1%		44		34		
	Dl 0,1%		56		48		
19.06	Untreated	0	mt	100	mt		mt
	Laser 0,033%	-	-	61	-39^{o}	39	39^{xxx}
	NeemAzal 0,33%	32	32	68	-32	-	
	NeemAzal 0,41%	8	8	92	-8	-	
	NeemAzal 0,5%	14	14	82	-18	4	4
	Dl 5%		37		34		8
	Dl 1%		54		48		14
	Dl 0,1%		78		68		25

In the eight days that followed (19.06), the ovicidal action increased by 5.5 times (table 3), what represented 39%. The same diminution effect of the larval population was also observed at NeemAzal 0.5% but in a smaller proportion (4%) and also pretty late (19.06) (table 3).

The Laser product also remarks itself regarding the anti larval action (table 3) and also by its volume and short time when happened the decimation of the larvae's population.

Table 3

Synthesis regarding the protection capacity of the tested products against the proliferation of the Colorado beetle

Date	Ovicidal action (pu*)		Anti larval action (lm*)		Cumulated (pu +lm)	
	%	differences	%	differences	%	differences
Laser 0,033%						
9.06	0	mt	0	mt	0	mt
11.06	7	7	25	25^{x}	32	32^{x}
16.06	11	11^{x}	61	61^{xxx}	72	72^{xxx}
19.06	39	39^{xxx}	61	61^{xxx}	100	100^{xxx}
Dl 5%		8		17		27
Dl 1%		14		26		40
Dl 0,1%		25		42		65
NeemAzal 0,33%						
19.06	0	-	-	-	-	-
NeemAzal 0,41%						
9.06	0	-	0	mt	-	-
11.06	0	-	8	8	-	-
16.06	0	-	12	12	-	-
19.06	0		42	42^{xx}	-	-
Dl 5%				20		
Dl 1%				32		
Dl 0,1%				54		
NeemAzal 0,5%						
9.06	0	mt	0	mt	0	mt
11.06	0	-	3	3	3	3
16.06	0	-	15	15	15	15
19.06	4	4	83	83^{xxx}	87	87^{xxx}
Dl 5%				24		26
Dl 1%				37		39
Dl 0,1%				60		63

So in order to register the same level of larvae eradication (25%) existent on that date (11.06) on the lots treated with Laser 0.033% were necessary another 6-7 days when it was used NeemAzal product in doses of 0.41% and 0.5%.

Also in order to show the very alert rhythm of the anti larval action we can also observe the fact that in the case of using the Laser product 0.033%, the total eradication registered after 4 days (from the treatment until 13.06). It is possible that the same result to be registered after 10 days (from the treatment until 20.06) in the case of the use of the bio chemical, NeemAzal 0.5%.

The observations made also underline the fact that the emergence of the second age larvae took place on 16^{th} of June on the non treated lots and on the 19^{th} of June on those treated with NeemAzal 0.3%, while in the cases of using Laser 0.033% and NeemAzal 0.5% bio chemicals didn't signal their presence.

4. Conclusion

The Laser product has a real ovicidal action, underlined even at 2 days from the treatment, when the frequency of the eggs that dried was of 7% and after 8 days they increased 5.5 times. This also has a remarkable capacity of reducing the adults'

population, by estimating a mortality of 80-85%

For the NeemAzal treatment the frequency of the non hatched eggs was between 8 and 32% even after 7-8 days from the end of the hatching on the witness lots. An extension of the hatching stage also registered after the use of Laser product 0.033%. The duration of the presence of the non hatched eggs was firstly reduced with 1-2 days.

5. References

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