RESULTS OBTAINED IN THE FIGHTING OF THE MAIN PESTS OF PEA AND BEAN CROPS

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Abstract

The study presents some results regarding the prevention and fighting of the Bruchus pisorum and Laspeyresia nigricana species in pea crops, whereas with beans the results refer to the fighting of the Acanthoscelides obsoletus weevil in field conditions. During the years which are favorable to the attack, these species can destroy peas in values that range from 31.9 to 71.5% and beans from 0.0 to 5.1%. It is essential to choose the optimal moment for applying the treatment and to respect all the other technological links, which are meant to prevent the attack by creating the favorable conditions for the plants' growth, making them more resilient and unwelcoming for the development of pests.

Key words: pest, pea, beans, efficiency, results.

INTRODUCTION

Annual leguminous plants for seed (peas, beans and soybean) represent a source of nourishment for humans due to their high protein content on one hand and, on the other hand, because they are good as previous crops, due to the nitrogen they leave in the soil. This study intends to create a substantiation of the main elements that constitute the basis of an adequate protection against the pests of pea and bean crops. It is well known that the beans of these plants are consumed first and it is these very beans that are attacked by weevils, such as the pea weevil (*Bruchus pisorum* and *Tychius quinquepunctatus*) and the bean weevil (*Acanthoscelides obsoletus*). The production losses resulted from the attack of these species can reach 10-15%, sometimes even higher, as in the case of Fundulea – 29%, Podul Iloaiei – 14.5%, Săcuieni - 28.2%, Lovrin – 34.1% and Oradea – 43.4% (Bărbulescu et al., 2000).

The purpose of the study is to emphasize the economical importance of the *Bruchus pisorum* and *Acanthoscelides obsoletus* species for pea and bean crops and especially the fact that, if proper fighting measures are not taken in due time, the crops can be compromised, particularly since these species begin their attack in the field (during the formation of the pods) and continue it in storage, on the harvested beans. And while the pea weevil has one generation a year, the bean weevil has three or four, causing major damages to stored beans (Popov C., 2002).

Although the results presented in the study were obtained by using a chemical method of fighting, it is fair to assume that this method is and will continue to be a basic component in the concept of integrated pest management.

MATERIAL AND METHODS

The experiments were placed in the field according to the method of the Latin rectangle in four repetitions, having a harvested area of 10 m² for peas and 25 m² for beans, whereas the number of variants was between 8 and 12.

Two treatments were performed for peas; the first one was at the beginning of the blooming period, while the second one was performed 10 days later or at the end of blooming. Only one treatment was applied to beans, when 90% of the pods were formed, as the weevil lays its eggs on the seam of the pods.

In order to establish the efficiency of the products, pods from each lot were harvested (one average sample) and analyzed in the laboratory with a binocular microscope to detect the peas with visible signs of attack as well as those with hidden infestations.

Efficiency was established according to the formula E%= C-T/C x 100, where C = infestation in the untreated reference lot, while T = infestation after treatment in the variants. Production was calculated per area unit depending on STAS humidity of the peas.

RESULTS AND DISCUSSION

The products used in fighting the pea weevil showed a high and very high efficiency compared to the reference lot. The frequency of attack was reduced and the production of peas was superior to the one obtained in the reference lot.

The processing of the results was performed according to the variance analysis method, the Decis 2.5 CE product being considered the standard. Moreover, reference was made to the attack of the pea moth *Laspeyresia nigricana*, which in our region causes major damage to garden pea crops (Bucurean E., 2008).

The analysis of the results presented in table 1 reveals that the attack was reduced from 31.9% in the reference lot to 4.2-12.6% in the variants, while the attack of the moth was reduced from 71.5% in the reference lot to 10.8-26.2% in the variants.

Although the frequency of the attack in the variants treated with Nomolt (12.6%) and Runner (10.9%) is higher than in the case of chemical products, these products are considered an efficient means of protection for peas, as they are biological products which belong to the 4^{th} group of toxicity and do not pollute the plant, the bees or the environment (Tălmaciu M., 2003). If this fighting method had not been applied, the percentage of un-attacked peas would have been of only 28.5% for the moth and 68.6% for the pea weevil, as we can see from the table.

Table 1

The frequency of attack in pea crops for the *Bruchus pisorum* and *Laspeyresia nigricana* species – Oradea 2008

Nr. crt.	Variant	Dosage ml/ha	Frequency of attack		% of saved peas	
			Bruchus pisorum	Laspeyresia nigricana	Bruchus pisorum	Laspeyresia nigricana
1	Decis 2.5 CE	300	11.3^{-}	21.7^{-}	88.7	78.3
2	Decis Forte 2.5 CE	60	8.6**	19.8	91.4	80.2
3	Fastac 10 CE	150	6.2***	16.9**	93.8	83.1
4	Bulldock 0.25 CE	300	7.1***	15.3***	92.9	84.7
5	Pollytrin 200 CE	100	9.3*	17.2**	90.7	82.8
6	Sumialpha 2.5 CE	400	12.1°	18.5**	87.9	81.5
7	Fury 10 EC	100	5.9***	14.9***	94.1	85.1
8	Regent 200 SC	100	4.2***	10.8***	95.8	89.2
9	Cypermetrin 10 CE	200	6.7***	12.6***	93.3	87.4
10	Nomolt 15 SC	250	12.6°	24.5°	87.4	75.5
11	Runner 2 F	100	10.9°°	26.2°°	89.1	73.8
12	Reference Lot	-	31.9	71.5	68.6	28.5

*LSD 5%	1.3	2.1
1%	2.4	3.2
0.1%	4.1	5.4

Another experiment was organized for the prevention and fighting of the pea weevil, having 8 variants of products with different active substances; two treatments were applied, at the beginning of blooming (15% flowers in bloom) and at the end of blooming (75% shed petals, 90% formed pods).

The efficiency of the products was between 80.1% and 95% after the two treatments, the efficiency of synthesis pyrethroids being noticed, as they reduced the attack from 67% to 6.8-14% after the first treatment and from 32% to 2.9-5.2% after the second treatment (table 2).

Table 2

The influence of chemical treatments on the attack of the pea weevil *Bruchus Pisorum* – Oradea 2008

Nr. crt.	Variant	Dosage ml/ha	F% attacked peas		Efficiency %		Production			Signi-ficance
			T1	T2	T1	T2	Kg/ha	%	Diff.	
1	**Gold 50 CS**	0.75	$6.\ 8^{-}$	3.4^{-}	84.6	91.6	2012	130.9	475	***
2	**Decis 2.5 CE**	0.300	8.0^{-}	3.1^{-}	93.4	98.8	2005	130.5	468	***
3	**Fastac 10 CE**	0.100	7.9^{-}	3.1^{-}	94.1	99.0	1997	129.9	460	***
4	**Regent 200 SC**	0.100	$10.2^{\circ\circ}$	2.9^{-}	90.0	94.3	1930	125.6	393	**
5	**Karate 2.5 CE**	0.150	9.1^{-}	3.1^{-}	85.0	89.1	1925	125.4	388	**
6	**Pollytrin 200 CE**	0.150	$14.0^{\circ\circ\circ}$	4.3°	81.9	85.0	1887	122.8	350	**
7	**Nurelle D**	0.150	$13.5^{\circ\circ\circ}$	$5.2^{\circ\circ}$	80.1	82.4	1950	126.9	413	***
8	**Reference Lot**	-	67	32	-	-	1537	100.0	-	-

*LSD 5% 1.5 0.8 LSD 5% 296 kg/ha
1% 2.5 1.3 1% 340 kg/ha
0.1% 3.4 2.1 0.1% 410 kg/ha

Following the statistical processing of the production data, it is fair to state that the obtained differences are statistically ensured as very significantly positive and distinctly significant compared to the production obtained in the reference lot, which once more confirms the hypothesis that the adequate protection of pea crops is a necessity. Of course, the choice of products is entirely subjective, but it would be preferable that biological products or chitin inhibitors be used, as they are non-toxic, especially for pollinators.

Furthermore, in order to prevent the attacks of various pest insects, seeding must be performed in early spring so that the pods are already developed when pests appear (because the eggs are laid on very young pods), the used peas must not be infected by weevils, and the planted varieties must have a short period of vegetation. After harvesting, some works like deep ploughings must be performed in order to bury the vegetable remains that contain weevils, but also the moth larvae that go into hibernation in the soil, and furthermore, any possible second growth must be destroyed (Borcean I., A. Borcean, 2004).

Due to the fact that peas have shiny leaves, in order for the chemical treatments to work, it is absolutely necessary that 0.2% of adhesive be added in the solution, because it sets the product on the plant, increasing its efficiency.

Although beans are cultivated in rows, it creates during its period of maximum growth a certain microclimate that favors the development of pests, and the weeds found in the crop accentuate these favorable conditions, contributing along with the other factors to the decline of production.

The attack of weevils in bean crops starts in the field and continues in storage facilities, the population's evolution depending on environmental conditions. Hot, dry summers strengthen the attack in the field, whereas in storage, a humidity of the seeds that exceeds 14% and temperatures above 2° C in the storage location can lead to a massive destruction of beans during winter. It has been observed that in storage conditions, beans can be destroyed even up to 100% if proper fighting measures are not taken during the vegetation period.

By applying a single treatment on vegetation when 70-90% of the pods are formed (because the eggs are laid on the seams of the pod), the attack can be reduced from 4-5% to 0.0-0.06%, pyrethroids ensuring a mortality rate of 88-100% (table 3).

Moreover, the production obtained in the treated variants ensured distinctly and very significantly positive differences compared to the reference lot.

Table 3

Results obtained in the fighting of the bean weevil (*Acanthoscelides obsoletus*)

Nr. crt.	Variant	Dosage ml/ha	Attacked beans		Non attacked beans %	Production		Signi-ficance
			F%	E%		Kg/ha	Diff.	
1	**Fastac 10 CE**	150	0.0	100	100	1900	170	***
2	**Decis 2.5 CE**	300	0.5	90	95	1850	120	**
3	**Decis Forte 12.5 CE**	60	0.3	94	97	1900	170	***
4	**Bulldock 25 CE**	300	0.0	100	100	1890	190	**
5	**Pollytrin 200 CE**	100	0.4	92	96	1925	195	**
6	**Sumialpha 5 CE**	400	0.5	90	95	1910	180	**
7	**Alphaguard 10 EC**	150	0.6	88	94	1900	170	***
8	**Cypermetrin 10 CE**	150	0.4	92	96	1865	135	**
9	**Nomolt 15 SC**	250	0.5	90	95	1920	190	***
10	**Sinoratox plus**	2000	0.2	96	98	1910	180	***
11	**Fury 10 EC**	100	0.7	86	93	1840	110	**
12	**Reference Lot**	-	5.0	-	-	1730	-	-

*LSD 5% 2.6 LSD 5% 68 kg/ha
1% 3.4 1% 110 kg/ha
0.1% 4.7 0.1% 165 kg/ha

Table 4 presents some comparative data regarding the results obtained in fighting weevils in field bean crops. The data reveals that the attack varies from one year to the next, that is, if in 2007 the attack reached 27.1% in the reference lot and 0.9-5.1% in the variants, in 2008 it was greatly reduced, from 9.7% in the reference lot to 0.1-1.6% in the variants.

The obtained production recorded significant and distinctly significant differences compared to the production obtained in the reference lot.

Table 4

Frequency of attack of the bean weevil (*Acanthoscelides obsoletus*) during 2007-2008

Nr. crt.	Variant	Dosage ml/ha	Attacked beans %		Production kg/ha		Diff. compared to ref. lot	
			2007	2008	2007	2008	2007	2008
1	**Gold 50 CS**	75	4.3	1.6	2010	1500	80*	140**
2	**Fastac 10 EC**	150	3.2	0.8	2035	1440	105**	80*
3	**Regent 200 CS**	100	0.9	0.1	2040	1465	110**	105**
4	**Karate 2.5 EC**	150	1.8	1.0	1995	1430	65*	70*
5	**Pollytrin 200 CE**	150	4.1	1.0	1985	1425	55*	65*
6	**Alphacypermetrin 10 EC**	250	5.1	1.3	2000	1475	70**	115**
7	**Decis 2.5 CE**	300	2.6	1.2	2010	1480	80*	120**
8	**Reference Lot**	-	27.1	9.7	1930	1360	-	-

*LSD 5% 2.6 LSD 5% 68 kg/ha
1% 3.4 1% 110 kg/ha
0.1% 4.7 0.1% 165 kg/ha

CONCLUSIONS

1. In order to ensure an efficient and safe protection of leguminous plants, it is advisable that the first treatment of peas be applied at the beginning of the blooming period, while the second one is to be applied at the end of the blooming period; in the case of beans, the treatment applied in the field is most efficient if applied when 90% of pods are already formed.

2. RegarLSDess of the variant of treatment applied, the attack of the *Bruchus pisorum* was reduced from an average 33% to 2.4%, whereas the attack of *Acanthoscelides obsoletus* decreased from 27.1% to 0.9%.

3. Some good results in fighting these pests were obtained by using products such as Bulldock, Fastac and Regent, but also after applying metamorphosis inhibitors like Gold or Nomolt.

4. In the case of these species, it is very important that annual leguminous plants for beans be stored in places cleared of insects, that they have an optimal humidity upon harvesting, because both pea weevils and bean weevils attach especially during winter inside storage environments.

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