CONTROL OF THE CEREAL LEAF BEETLE (*OULEMA MELANOPUS*) THROUGH TREATMENT APPLIED DURING THE VEGETATION PERIOD IN WHEAT CROPS

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Abstract

The following paper presents some results obtained in fighting the larvae of the cereal leaf beetle (Oulema melanopus) in wheat crops by applying treatment during the vegetation period. The efficiency of the products was monitored at different time intervals after the treatment, in order to establish the way in which the insecticides work and the number of live larvae remained after treatment. Furthermore, the paper also presents some results regarding the resistance of 10 wheat varieties to the attack of this pest. Production results are not included in the study, because, given the long period of drought, they would be inconclusive. Research will certainly continue, as the cereal leaf beetle remains an important pest.

Key words: pest, efficiency, resistance, insecticide.

INTRODUCTION

Cereal crops are attacked by approximately 40 pests during the vegetation period. Some species cause significant damage every year, while others are only sporadically present in crops, thus not being considered of economical importance.

One of the noteworthy pests is the cereal leaf beetle (*Oulema melanopus L., ord. Coleoptera, Fam. Crysomelidae*), which has been mentioned beginning with the year 1890, later research then proving that since the year 1987 (Barbulescu and collaborators, 1988) the population of this pest has increased significantly, expanding its area of damage beyond oat crops, where it had first been spotted, to crops such as wheat, barley, triticale, fodder plants, gramineous plants, and corn (Popov C., 1994; Bucurean E., 1996; Sapunaru T., 1992). Moreover, this pest can be found both in plains as well as in areas with altitudes of up to 2000 m (Perju T., 1984).

The following paper presents data regarding the control of this pest through treatment applied during the vegetation period in wheat crops, the influence of the used products on the larvae depending on the number of

days since treatment and, finally, the resistance of some varieties to the pest's attack.

MATERIAL AND METHOD

The research regarding the control of the cereal leaf beetle was performed at ARDS Oradea, in the wheat improvement field, in comparative crops, the surface of the lot being of 10 m² (1x10). A single treatment was applied during full eclosion, larvae of different ages being present on the leaves.

The experiment was placed in the field according to the method of the Latin rectangle, having 12 variants in 4 repetitions. The notes for the efficiency test were taken 24, 48 hours and 5 days after treatment. The metric frame was employed, performing 5 surveys in each lot, then calculating their average.

Efficiency was calculated in percentages by making a rapport between the pest's density in treated variants and its density in the untreated reference lot and was statistically processed through the method of variance analysis, the obtained results being presented in the paper as tables.

RESULTS AND DISSCUSIONS

In order to prevent the attack of this pest, all the technological steps of wheat planting must be respected, although over the years, it has been noticed that crop rotation and soil workings do not reduce the biological reserve, because the pest does not hibernate in the soil where the attack took place but rather in nearby forests, dry plant remains or spontaneous plants found on unused plots. Therefore chemical fighting continues to be a solution for stopping damages, but it must be applied according to the economical threshold of damage, prognosis and warning, in order to comply with the principles of ecological agriculture.

In 2011 the intensity of the cereal leaf beetle's attack in wheat crops was low to medium, because this plant's leaves, especially those of pubescent varieties, are not preferred by the larvae, as they are harder to consume, having a certain mechanical resistance.

Treatment was performed in the second decade of June, the quantity of solution being calculated according to the surface of the lot and the norm of water per hectare (250 l). The employed wheat variety was Ardeal.

Table 1 shows that 24 hours after applying the treatment, mortality differed depending on the used product, its concentration and active substance, ranging between 92% in the case of the Vantex 60 EC product and 97.5% for Fury 10 EC and Calypso 480 SC. The number of live larvae after treatment decreased from 275 larvae/m² in the reference lot to 7-22

larvae/m² in the treated variants. It is important to mention that the notes taken 24 hours after treatment show that the live larvae remained do not feed, but only move on the leaves. The variant Fastac 10 EC was considered the standard product in this experiment, as it is widely used in the fighting of the pest.

Table 1

Efficiency of the products used in fighting the cereal leaf beetle. Oradea 2011

Variant	Dosage l/t	Live larvae/m²	Efficiency %	Significance
Fury 10 EC	0.1	7	97.5	xxx
Fastac 10 EC	0.1	12	95.6	standard
Faster 10 EC	0.1	17	93.8	00
Reldan 40 EC	1.25	9	96.7	xx
Decis Mega 50 EW	0.150	11	96.0	-
Vantex 60 EC	0.07	22	92.0	000
Nuprid 200 SC	0.275	19	93.1	000
Calypso 480 SC	0.08	7	97.5	xxx
Actara 25 WG	0.06	10	96.4	x
Sumialpha 5 EC	0.2	15	94.5	00
Efcymethrin 10 EC	0.1	10	96.4	x
Reference lot	-	275	-	-
		DL 5% - 0.4	DL1% - 0.86	DL 0,1% - 1.88

The statistical processing of efficiency data reveals that differences were very significantly positive (Fury 10 EC, Calypso 480 SC), distinctly significant (Reldan 40 EC), significant (Actara 25 WG, Efcymethrin 10 EC), insignificant (Decis Mega), but also very significantly negative (Vantex 60 EC, Nuprid 200 SC) and distinctly significant and negative (Faster 10 EC and Sumialpha 5 EC).

The observations made 48 hours and 5 days after treatment showed that the mortality of the larvae increased, thus after 5 days practically no live larvae were found on the leaves in the treated variants compared to the reference lot. The obtained results are presented in table 2.

Table 2

Results obtained in fighting the cereal leaf beetle (*Oulema melanopus*) in wheat crops

Variant	Dosage l/ha	48 hours		5 days	
		Larvae/m²	Eff. %	Larvae/m²	Eff. %
Fury 10 EC	0.1	1	99.6 **	0	100
Fastac 10 EC	0.1	4	98.3 ¯	0	100
Faster 10 EC	0.1	2	99.2 *	0	100
Reldan 40 EC	1.25	3	98.7 ¯	0	100
Decis Mega 50 EW	0.150	5	97.9 °	0	100
Vante x 60 EC	0.07	7	97.0 °°	0	100
Nuprid 200 SC	0.275	6	97.5 °	0	100
Calypso 480 SC	0.08	2	99.2 *	0	100
Actara 25 WG	0.06	3	98.7 ¯	0	100
Sumialpha 5 EC	0.2	6	97.5 °	0	100
Efcymethirin 10 EC	0.1	3	98.7 ¯	0	100
Reference lot	-	237	-	142	-

DL 5%-0.51 DL 1%-0.97 DL 0,1 %-1.99

The table shows that 48 hours after treatment, efficiency ranged between 97% and 99.6%, while 5 days later it reached 100%. The density of larvae per surface unit in the reference lot decreased due to the fact that many larvae moved to the last evolution stage, retreating in the soil for pupa phase. It can be concluded that all the products used in fighting the larvae of the cereal leaf beetle were very efficient, which could also be explained by the fact that larvae are very sensitive and can no longer feed after the applied treatment.

Regarding the resistance of some wheat varieties to this pest's attack, an experiment was set up using 10 wheat varieties. The results are presented in table 3 in average figures, obtained by tallies performed from April, when adults start to appear until the end of June, when the first new adults appear.

Table 3

The resistance of wheat varieties to the attack of the cereal leaf beetle

Variety	No. of larvae/ plant	Hatched larvae	Degree of resistance	Grade	No. of grains/ear	MMB
Ardeal	32.4	20.1	4.5	S	29	48.4
Izvor	7.7	6.7	4.6	S	28	47.5
Ciprian	6.7	3.3	4.0	S	28	49.5
Trivale	6.2	3.5	3.9	MS	35	43.0
Crisana	1.5	1.0	1.1	R	34	55.4
Ariesan	18.0	12.0	4.8	S	27	52.0
Fundulea 4	7.6	4.4	3.8	MS	33	52.0
Appullum	2.7	2.7	3.8	MS	28	47.2
Delia	20.5	10.0	4.8	S	27	52.0
Aflux	1.5	1.1	1.0	R	27	47.6

Specialty writers like Maria Csősz and collaborators (1993), state that resistance to the attack of the cereal leaf beetle mainly depends on the pubescence of the leaves and the number of eggs laid by the pest depends on how green the leaves are.

Our observations revealed that the cereal leaf beetle chooses the plants it attacks based on their morphological structure and less based on the bio-chemical structure of the plants.

Both adults and larvae disfavor cereal varieties with very dense veins and many trichomes, because it makes feeding slower and eggs are laid farther from the surface of the leaf because of the hairs, so they dry more easily.

In order to grade damage caused to wheat leaves, a scale of 1 to 5 was used (after Guslits, 1987) and the number of eggs laid on the plant and the number of hatched larvae was estimated. Based on their degree of resistance to *Oulema melanopus*, varieties were classified as follows: from 1 to 2 resistant varieties, 2-3 moderately resistant varieties, 3-4 moderately susceptible varieties and 4-5 susceptible varieties.

Due to the reduced pubescence of the leaves, the studied varieties recorded sensitivity to the attack (Ardeal, Izvor, Ciprian, Ariesan, Delia), resistant varieties also existing (Crisana, Aflux).

These results confirm once more the hypothesis of pubescent wheat's resistance to the pest's attack, as well as the necessity of using resistant lines and varieties as genitors in the improvement process.

Webster J.A., 1982, states that the varieties' resistance to the attack of *Oulema melanopus* is attributed to the high number of hairs on the leaves on which larval density and attack are decreased compared to varieties with reduced pubescence, which are sensitive to attacks. Moreover, Barbulescu Al., 1984, shows that the resistance of plants to pest attacks is a phenomenon that depends on the plant-pest interaction and can sometimes be relative.

CONCLUSIONS

In order to fight the cereal leaf beetle's larvae with chemical products in wheat crops, the density of the pest must be monitored and the treatment must be applied when eclosion is maximal.

The products used in the experiment were very efficient and can be recommended to cereal producers.

Fighting can be performed through a single treatment, provided that it be applied before the appearance of white spots in crops; otherwise production is diminished due to both the reduction of leaf surface and the destruction of the top leaf, which is preferred for feeding.

The most efficient products were Fury, Calypso, Fastac, Actara. Crisana and Aflux were the resistant wheat varieties this year.

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