OBSERVATIONS REGARDING THE BIODIVERSITY OF ENTOMOFAUNA IN SOME COLZA CULTURES

OBSERVAȚII PRIVIND BIODIVERSITATEA ENTOMOFAUNEI DIN UNELE CULTURE DE RAPIȚĂ

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Abstract: *Collection of material was made with entomological fillet on colza crops research institute belonging to the cultivation of potatoes and sugar beet for Brasov and its surroundings kidnapped "rapeseed cultivation". Were made a number of five scythes to the two variants, in June the following date: 2.06, 6.06, 16.06, 26.06 and 30.06.2008. The material thus collected was then cleaned of scrap plant then was kept in a solution in alcohol concentration of about 20%, where they were kept for a period of time. Following determination of material was present in material collected of species of insects helpful and harmful. In some situations, especially if coleopterelor determination was made to species level, in other cases the determination was made to family or genus, less to species. Finally there was a greater presence as a species are harmful to the order Coleoptera species Meligethes aeneus, Phyllotreta nemorum and Ceuthorrynchus assimilis. Fauna is especially useful order Hymenoptera with several families: Braconidae, Calcididae, Ichneumonidae and Formicidae. Fauna density useful, harmful and total / m², had different values depending on the variant and the time of collection. The variant trated rape cultivated percentage of useful fauna was 5.36% while the spontaneous variant kidnapped, the percentage of useful fauna was 16.98%.*

Rezumat: *Colectarea materialului s-a făcut cu ajutorul fileului entomologic din culturile de rapiță aparținând Institutului de Cercetări pentru cultura cartofului şi sfeclei pentru zahăr Braşov şi din împrejurimile acesteia din "rapiță spontană". Au fost efectuate un număr de 5 cosiri la cele două variante, în luna iunie la următoarele date: 2.06; 6.06; 16.06; 26.06 şi 30.06.2008. Materialul astfel colectat a fost apoi curățat de resturile vegetale apoi a fost pastrat într-o soluție de alcool în concentrație de cca 20%, unde au fost păstrate o perioadă de timp. În urma determinării materialului s-a constatat prezența în materialul colectat a speciilor de insecte utile şi dăunătoare. În unele situații, mai ales în cazul coleopterelor determinarea s-a făcut până la nivel de specie, în alte situații detrminarea s-a făcut până la familie sau gen, mai rar până la specie. În final s-a constatat că o prezență mai mare ca şi specii dăunătoare o are ordinul Coleoptera cu speciile: Meligethes aeneus, Phyllotreta atra, Phyllotreta nemorum şi Ceuthorrhynchus assimilis. Fauna utilă aparține mai ales ordinului Hymenoptera cu mai multe familii : Braconidae, Calcididae, Ichneumonidae şi Formicidae. Densitatea faunei utile, dăunătoare şi totale/m^2, a avut valori diferite în funcție de variantă, dar şi de momentul colectării. La varianta martor, rapiță cultivată procentul de faună utilă a fost de 5,36% în timp ce la varianta rapiță spontană, procentul de faună utilă a fost de 16,98%*

Key words*: treatment, pests, fauna useful*
Cuvinte cheie*: tratamente, dăunători, fauna utilă*

INTRODUCTION

In Romania, the total losses following the attack of the pathogen agents, pests and weeds reach annually 2.5-3 billion dollars, namely a few times more than the sum necessary to purchase phytosanitary products, including the costs of works for the application of treatments.

As well as other cultures, the rape culture is attacked by a series of pests producing important damages.

The autumn rape culture occupies large surfaces, especially in the areas with lower temperatures where it replaces sunflower (Poland, Germany, England, the Scandinavian countries etc. (Arion, 1957; Balachowschi, Mesnil, 1935-1936, Knechtel, 1951; Manolache et al., 1946-1957, 1969). In our country, though having a long tradition and being cultivated since the first decades of the past century, this culture has registered in recent years a strong reversal so that at present the cultivated surfaces exceed sometimes 100,000 ha annually (BAICU, 1982, PANIN, 1951; BĂRBULESCU et al., 1993, 2002; BOGULEANU, 1980; HULEA et al. 1975; RĂDULESCU et al., 1973; SĂVULESCU et al., 1982; SIN, 2000; ŞANDRU, 1996). Following the progress achieved in the improvement process by obtaining breeds whose oil content reaches 40% and the protein reaches 40% in the defatted groats with a low content of erucic acid, the rape has turned from an industrial-fodder plant into an important food plant. Both for its multiple industrial uses and numerous economic advantages, the rape is considered a valuable culture, easy to cultivate and trade but with some protection problems, especially related to pests (MANOLACHE, BOGULEANU, 1978; PAULIAN, ILIESCU, 1973; PAULIAN et al., 1974; PERJU et al., 1976; POPOV, 2003).

MATERIAL AND METHODES

The observations were made in 2008 on some rape cultures from Brasov area, at the Institute for research and development of potatoes and sugar beet, in two variants: spontaneous rape (untreated) and cultivated rape (treated).

The material was collected by means of the entomologic netting effectuating several "cuts", each time a sample being obtained from the insects collected on a surface of about 10 m^2.

We effectuated five cuts on the following dates: 1st cut, on 02.06.2008; 2nd cut, on 06.06.2008; 3rd cut, on 16.06.2008; 4th cut, on 25.06.2008; 5th cut, on 03.07.2008.

The material collected in this way was cleaned from the vegetal remains, and then it was put in an alcohol solution with 20% concentration where it was left for a certain period of time.

Afterwards, the material was selected by orders, then by families and sometimes even by species. For the establishing of the material we used different catalogues for determining breeds (Reitter, Bobârnac and Stănoiu, etc) or other materials: Romanian Hymenoptera guide, entomophagous insects and their use in the integrated protection of agricultural ecosystems; entomophagous insects and their use in the integrated protection of horticultural ecosystems. The material determined in this manner constituted the topic of this paper.

RESULTS AND DISCUSSION

In 2008, for the two variants (spontaneous rape and cultivated rape) the situation regarding the useful and damaging entomofauna collected is as follows:

a. for the 1st variant, spontaneous rape (untreated)

As for the cut no. 1 (table 1), effectuated on 02.06.2008, the damaging fauna collected belongs to a single order, the Coleoptera order and two species: *Meligethes aeneus* F. and *Cantharius obscurus* L., with a number of eight exemplars whereas the useful fauna also belongs to a single order, the Hymenoptera order, Ichneumonidae family, with two exemplars. The percentage of useful fauna from the total fauna collected is 20%.

- density of damaging fauna/m^2 - 0.8 exemplars
- density of useful fauna /m^2 – 0.2 exemplars
- density of useful and damaging fauna /m^2 – 1.0 exemplars

As for the cut no. 2 (table 1), effectuated on 6.06.2008, we totally collected 52 exemplars, the damaging fauna comprising a number of 52 exemplars belonging to 4 orders:

Coleoptera, *Diptera*, *Lepidoptera* and *Homoptera*, and the useful fauna belongs to two orders: *Diptera* and *Hymenoptera*. For this collecting, the percentage of damaging fauna was 11.86%.

Table 1

Situation on the fauna collected from the "spontaneous rape" (untreated) cultures, at the Institute for research and development of potatoes and sugar beet of Brasov

No. crt.	Fauna type	Systematic classification		No. of exemplars	Total
		Order	Suborder/family/species		
02.06.2008					
1	Damaging	Coleoptera	1.Meligethes aeneus F. 2.Cantharis obscurus L.	7 1	8
2	Useful	Hymenoptera	1.Ichneumonidae	2	2
% of useful fauna from total fauna				10	20
06.06.2008					
1	Damaging	Coleoptera	1.Meligethes aeneus F. 2.Phyllotreta atra F. 3.Eusomus ovulum Germ.	30 1 1	52
		Diptera	1.Agromyzidae 2.Anthomyidae 3.Chloropidae	8 4 2	
		Lepidoptera	1.Tortricidae	3	
		Homoptera	1.Cicadelidae 2. Cimiidae	2 1	
2	Useful	Diptera	1.Asilidae	5	7
		Hymenoptera	1. Ichneumonidae	2	
% of useful fauna from total fauna				59	11.86
16.06.2008					
1	Damaging	Diptera	1.Chloropidae 2.Agronyzidae 3.Anthomyidae	6 5 2	16
		Coleoptera	1.Oxythyrea funesta Poda 2.Ceuthorrhynchus asimilis Payk.	2 1	
2	Useful	Diptera	1.Tachynidae	5	5
% of useful fauna from total fauna				21	23.81
25.06.2008					
1	Damaging	Coleoptera	1. Phyllotreta nemorum L. 2. Meligethes aeneus F.	15 14	45
		Orthoptera	1.Acridiidae 2.Canthaidae	3 2	
		Diptera	1.Agromyzidae 2.Chloropidae	2 3	
		Homoptera	1.Cicadelidae	3	
		Heteroptera	1.Mihidae	3	
2	Useful	Diptera	1.Asilidae 2.Tachynidae	3 2	9
		Hymenoptera	1. Ichneumonidae	4	
% of useful fauna from total fauna collected				54	16.17
03.07.2008					
1	Damaging	Coleoptera	1.Phyllotreta nemorum L. 2.Phyllotreta atra F.	5 4	11
		Homoptera	1.Cicadelidae 2.Cimiidae	1 1	
2	Useful	Homoptera	1.Ichneumonidae 2.Braconidae	2 1	4
		Diptera	1.Asilidae	1	
% of useful fauna from total fauna				15	26.67

- density of damaging fauna/m^2 - 5.2 exemplars
- density of useful fauna/m^2 – 0.7 exemplars
- density of useful and damaging fauna/m^2 – 5.9 exemplars

As for cut no. 3 (table 1), effectuated on 16.06.2008, the collected fauna comprises a number of 21 exemplars. The damaging fauna belongs to two orders: *Diptera* and *Coleoptera*, whereas the useful fauna belongs to a single order, *Diptera*. The percentage of useful fauna from the total fauna collected is 23.81%.

- density of damaging fauna/m^2 - 1.6 exemplars
- density of useful fauna /m^2 – 0.5 exemplars
- density of useful and damaging fauna /m^2 – 2.1 exemplars

As for cut no. 4 (table 1), effectuated on 25.06.2008 we collected in total 54 exemplars of insects, the damaging fauna belonging to 5 orders: *Coleoptera, Orthoptera, Diptera, Homoptera* and *Heteroptera*, whereas the useful fauna belongs to two orders: *Diptera* and *Hymenoptera*. The percentage of useful entomofauna from the total entomofauna collected was 16.17%.

- density of damaging fauna /m^2 - 4.5 exemplars
- density of useful fauna /m^2 – 0.9 exemplars
- density of useful and damaging fauna /m^2 – 5.4 exemplars

As for cut no. 5 (table 1), effectuated on 03.07.2008, we collected 15 insect exemplars. The damaging fauna belongs to two orders, *Coleoptera* and *Homoptera*. The useful fauna also belongs to two orders, *Hymenoptera* and *Diptera*. The percentage of useful fauna from the total fauna collected was 26.67%.

- density of damaging fauna /m^2 - 1.1 exemplars
- density of useful fauna /m^2 – 0.4 exemplars
- density of useful and damaging fauna /m^2 – 1.5 exemplars

For each of the 5 "cuts" we also calculated density/m^2 for damaging fauna, useful fauna and damaging and useful entomofauna. So, we may notice that the damaging fauna had values ranging between 0.8 exemplars at first cut and 5.2 exemplars at the second cut.

The useful fauna registered values between 0.2 exemplars at first cut and 0.9 exemplars.

b. for the variant cultivated rape (treated), the situation is as follows:

As for the 1st cut (table 2) we collected 30 insect exemplars, the damaging fauna comprising 28 exemplars belonging to two orders: *Diptera* and *Coleoptera*, whereas the useful fauna comprises two exemplars and belongs to a single order, *Hymenoptera* order. The percentage of useful fauna from the total fauna collected is 0.6.

- density of damaging fauna /m^2 - 2.8 exemplars
- density of useful fauna /m^2 – 0.2 exemplars
- density of useful and damaging fauna /m^2 – 3.0 exemplars

As for the 2nd cut (table 2), we collected 6 insect exemplars, all belonging to the damaging fauna from two insect orders: *Diptera* and *Coleoptera*.

- density of damaging fauna /m^2 - 6 exemplars

As for the 3rd cut (table 2), we collected 4 insect exemplars, all belonging to the damaging fauna from three insect orders: *Diptera, Coleoptera* and *Homoptera*.

- density of damaging fauna /m^2 - 4 exemplars

As for the 4th cut (Table 2) we collected 13 insect exemplars, a number of 12 exemplars belonging to the damaging fauna from the *Coleoptera* order and an exemplar belonging to the useful fauna from the *Diptera* order. The percentage of useful fauna from the total fauna collected is 7.69.

- density of damaging fauna /m^2 - 1.2 exemplars
- density of useful fauna /m^2 - 0.1 exemplars
- density of useful and damaging fauna /m^2 – 1.3 exemplars

As for the 5th cut (table 2), we collected 6 insect exemplars, all belonging to the damaging fauna from two orders: *Coleoptera* and *Hymenoptera*.

- density of damaging fauna /m^2 - 6 exemplars

As for the density of damaging fauna, useful fauna and total fauna, at the 5 cuts of the variant "cultivated rape" (treated), the situation is as follows:

- the damaging fauna had values between 0.4 exemplars at "cut" no. 4 and 2,8 exemplars at cut no. 1.

- the useful fauna had the highest density value per surface unit (m^2) of 0.2 exemplars at „cut" no. 1.

- the total fauna collected, as compared to the surface unit (m^2), registered values between 0.4 exemplars at cut from 16.06.2008 and 3 exemplars at cut from 2.06.2008.

Table 2

Situation on the fauna collected from the "cultivated rape" (treated) cultures, at the Institute for research and development of potatoes and sugar beet of Brasov

No. crt.	Fauna type	Systematic classification		No. of exemplars	Total
		Order	Suborder/family/species		
02.06.2008					
1	Damaging	Diptera	1. Agromyzidae 2. Chloropidae 3.Anthomyidae	10 8 6	28
		Coleoptera	1.Meligethes aeneus F.	4	
2	Useful	Hymenoptera	1.Aphidiidae 2.Formicidae	1 1	2
% of useful fauna from total fauna				30	0.6
06.06.2008					
1	Damaging	Diptera	1.Chloropidae 2.Agromyzidae	3 2	6
		Coleoptera	1.Meligethes aeneus F.	1	
2	Useful	-	-	-	-
% of useful fauna from total fauna collected				-	-
16.06.2008					
1	Damaging	Diptera	1. Agromyzidae	2	4
		Coleoptera	1.Ceuthorrynchus sulcicolis Payk	1	
		Hymenoptera	1.Aphidiidae	1	
2	Useful	-	-	-	-
% of useful fauna from total fauna collected				-	-
25.06.2008					
1	Damaging	Coleoptera	1.Meligethes aeneus F. 2.Phyllotreta atra F. 3.Sitona hispidulus F.	8 2 2	12
2	Useful	Diptera	1.Asilida	1	1
% of useful fauna from total fauna collected				13	7.69
03.07.2008					
1	Damaging	Coleoptera	1.Chrysomelidae 2.Cerambycidae	2 2	6
		Hymenoptera	1.Eurytomidae	2	
2	Useful	-	-	-	-
% of useful fauna from total fauna collected				-	-

Referring to the entomofauna collected for the two variants, "spontaneous rape" (untreated), table 11 and cultivated rape (treated), table 12, in the period of observations, the situation is the following:

- ***for the spontaneous rape*** (untreated), in the period of observations, we collected at the 5 cuts 132 exemplars of damaging insects and 27 exemplars of useful insects. The percentage of useful fauna from the total fauna collected was 16.98. The density of damaging fauna /m^2 was 13.2 exemplars, of useful fauna was 2.7 exemplars and of useful and damaging fauna was 15.9 exemplars.

- density of damaging fauna /m^2 - 13.2 exemplars
- density of useful fauna /m^2 -2.7 exemplars
- density of useful and damaging fauna /m^2 – 15.9 exemplars

- ***for the cultivated rape*** (treated), we collected 56 insect exemplars belonging to the damaging fauna and only 3 exemplars belonging to the useful entomofauna. The percentage of useful fauna from the total fauna collected was only 5.36%.

- density of damaging fauna /m^2 - 5.6 exemplars
- density of useful fauna /m^2 -0.3 exemplars
- density of useful and damaging fauna /m^2 – 5.9 exemplars

CONCLUSIONS

1. In 2008, from the rape cultures belonging to the Institute for research and development of potatoes and sugar beet of Brasov, we collected the damaging and useful entomofauna for two variants: V_1 – spontaneous rape (untreated) and V_2 – cultivated rape (treated)

2. We made in the period of observations (June – July 2008) a number of 10 "cuts" to collect the material, as follows:

- 5 "cuts" for the variant "spontaneous rape" (untreated): 2.06; 6.06; 16.06; 25.06 and 3.07.2008.
- 5 "cuts" for the variant "cultivated rape" (treated): 2.06; 6.06; 16.06; 25.06 and 3.07.2008

3. For the spontaneous variant (untreated) we collected 132 damaging exemplars and 27 useful insect exemplars representing 16.98%, whereas for the cultivated variant (treated) we collected 56 damaging insect exemplars and 3 useful insects, the useful fauna representing only 5.36% from the total fauna collected.

4. The damaging fauna from the rape cultures belongs to the Coleoptera orders with the species *Meligethes aeneus* F., *Phyllotreta atra* L. and *Phyllotreta nemorum* F., Diptera order, Anthomyidae and Agromizidae families.

5. The useful fauna belongs to Hymenoptera and Diptera orders and Ichneumonidae, Braconidae, Asilidae and Tachynidae families.

REFERENCES

1. GAËTAN DU CHATENET, 1990 – Guide des Coléopterés d'Europe. Délacrois et Niestlé, Paris.
2. PANIN I., 1951 - Determinatorul Coleopterelor dăunătoare şi folositoare din R.P.R. Editura de Stat, Bucureşti.
3. POPOV CONSTANTIN, 2004- Tablou sinoptic cu insectele dăunătoare din culturile de rapiță întâlnite în România. Rev. Probleme de protecția plantelor, Vol XXXII, nr 1, pg. 113-118.
4. REITTER E., 1908 - Fauna Germanica. Die Käfer des Deutschen Reiches Band I, Stuttgart.
5. VILĂU FLORICA, 1991 - Influiența tratamentului chimic asupra atacului dăunătorilor rapiței pentru sămânță la diferite epoci şi densități. Rev. Probleme de protecția plantelor, Vol XIX, nr 3-4, pg. 195-204.