

OBSERVATIONS CONCERNING THE COLEOPTERA ENTOMOFAUNA WHERE ECOLOGICAL CONTROL MEASURES WERE APPLIED

Nela TĂLMACIU*, M. TĂLMACIU

University of Agricultural Sciences and Veterinary Medicine, Iași

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ABSTRACT – Observations concerning the epigeous coleoptera found in apple tree plantations from the Fruit-Growing Research and Development Station of Fălticeni were done in 2008 from May to October, by means of Barber-type traps. A number of 10 samplings were carried out on the following dates: 30 May, 16 June, 30 June, 22 July, 1 August, 12 August, 25 August, 5 September, 18 September and 9 October. At each sampling, coleoptera species were separated by the rest of the material, the formol solution being replaced by another solution with the same concentration. During this period of observations, they collected 901 samples of coleoptera belonging to 56 species. The species with the highest number of collected samples were *Pseudophonus rufipes* De Geer (189 samples), *Opatrum sabulosum* L. (180 samples), *Dermestes frischi* Kugel. (78 samples), *Ophonus puncticollis* Payk. (67 samples), *Cicindela germanica* L. (56 samples), *Harpalus distinguendus* Duft. (43

samples), *Otiorrhynchus raucus* F. (37 samples), *Psylliodes chrysocephala* L. (34 samples), *Pterostichus vulgaris* L. (24 samples) and *Staphylinus* spp. (21 samples).

Key words: entomofauna, coleoptera, apple tree plantations, ecological technology

REZUMAT – **Observații privind entomofauna de coleoptere pe care s-au aplicat măsuri ecologice de combatere.** Observațiile asupra coleopterelor epigee din plantațiile pomicele de măr, aparținând S.C.D.P. Fălticeni, au fost făcute în anul 2008, începând din luna mai până în luna octombrie, cu ajutorul capcanelor de sol tip Barber. Au fost efectuate un număr de 10 recoltări, la următoarele date: 30.05; 16.06; 30.06; 22.07; 1.08; 12.08; 25.08; 5.09; 18.09; 9.10. La fiecare recoltare, speciile de coleoptere au fost separate de restul materialului; soluția de formol a fost înlocuită cu altă soluție de aceeași

* E-mail: ntlmaciu@yahoo.com

concentrație. Pe toată perioada de observații au fost colectate 901 de exemplare de coleoptere, aparținând la un număr de 56 de specii. Speciile cu cel mai mare număr de exemplare colectate au fost: *Pseudophonus rufipes* De Geer (189 exemplare), *Opatrum sabulosum* L. (180 exemplare), *Dermestes frischeri* Kugel. (78 exemplare), *Ophonus puncticollis* Payk. (67 exemplare), *Cicindela germanica* L. (56 exemplare), *Harpalus distinguendus* Duft. (43 exemplare), *Otiorrhynchus raucus* F. (37 exemplare), *Psylliodes chrysocephala* L. (34 exemplare), *Pterostichus vulgaris* L. (24 exemplare) și *Staphylinus* spp. (21 exemplare).

Cuvinte cheie: entomofaună, coleoptere, plantații de măr, tehnologie ecologică

INTRODUCTION

Orchards include complex biocenoses with a high organization degree, intraspecific and interspecific relations due, first, to crop perennial character and, secondly, to the great amount of vegetative mass, thus being close to the natural ecosystems, represented by woods.

However, being artificial ecosystems available for an intensive cropping system, which include unsaturated biocenoses, they are susceptible to the attack of pests and phytopathogenic agents; the technological link of phytosanitary protection has an important role in achieving high constant yields (Diaconu et al., 2004).

The pest frequency in fruit-growing plantations during the last years has significantly increased, one of the main causes being the long-term maintenance of main fruit species in the same habitat. The pest

control requires as a first measure the knowledge of important species from the economic point of view, especially of those species that diminish qualitatively and quantitatively the fruit yield (Grozea, 2006).

In the apple tree orchards from Romania, there are almost 30 pest species that may influence fruit yields, of which only eight species are key pests (Baicu and Săvescu, 1986).

This scientific paper shows the obtained results after the observations done on epigeous coleoptera from apple tree plantations, under conditions of the Fruit-Growing Research and Development Station of Fălțiceni.

MATERIALS AND METHODS

In 2008, observations were done on a 10-year old apple tree plantation, where an ecological technology was applied (fertilizers, insecticides and fungicides allowed by organic agriculture).

For collecting coleoptera, we have used 18 Barber-type traps that were placed on the tree rows, three traps on each row, at the distance of 8 – 10 m, on six rows, every five-tree rows (Tălmăciu et al., 1996; Tălmăciu et al., 1998; Varvara et al., 1995).

Inside the traps, a 3 – 4 % concentration formol solution was applied.

The material was sampled at intervals of 10-15 days, during May-October. At each material sampling, collected coleoptera were determined in laboratory (Chatenet du Gaetan, 1990; Panin, 1951; Panin, 1952; Reitter, 1908; Rogojanu and Perju, 1979).

COLEOPTERA ENTOMOFAUNA FROM APPLE TREE PLANTATIONS

In 2008, 10 samplings were done at the following dates: the first sampling, on May 30, 2008; the second sampling, on June 16, 2008; the third sampling, on June 30, 2008; the fourth sampling, on July 22, 2008; the fifth sampling, on August 1, 2008; the sixth sampling on August 12, 2008; the seventh sampling on August 25, 2008; the eighth sampling on September 5, 2008; the ninth sampling on September 18, 2008 and the tenth sampling on October 9, 2008.

RESULTS AND DISCUSSION

At the first sampling, which was carried out on May 30, 2008, 140 coleoptera belonging to 21 species were collected in 18 traps (*Table 1*). The species with the highest number of collected samples were *Opatrum sabulosum* L. with 72 samples, *Dermestes frischi* Kugel. with 12 samples and *Psylliodes chrysocephala* L. with 14 samples. The other species had between one and six samples.

At the second sampling, carried out on June 16, 2008, 170 coleoptera samples belonging to 21 species were collected (*Table 1*). The species with the highest number of collected samples were *Opatrum sabulosum* L. with 74 samples, *Dermestes frischi* Kugel. with 26 samples, *Harpalus distinguendus* Duft. with 16 samples and *Otiorrhynchus raucus* F. with 10 samples. The other species had between one and nine samples.

At the third sampling, carried out on June 30, 2008, 90 samples belonging to 19 species were collected (*Table 1*).

The species with the highest number of collected samples were *Opatrum sabulosum* L. with 29 samples, *Cicindela germanica* L. with 10 samples and *Pseudophonus griseus* Panzer with seven samples. The other species had between one and six samples.

At the fourth sampling, carried out on July 22, 2008, 71 coleoptera samples belonging to 16 species were collected. *Cicindela germanica* L. species had the highest number of collected samples (39). The other species had between one and six samples.

At the fifth sampling, carried out on August 1, 2008, five coleoptera samples belonging to two species were collected.

At the sixth sampling, carried out on August 12, 2008, 85 coleoptera samples belonging to 17 species were collected. The species with the highest number of collected samples were *Pseudophonus rufipes* De Geer (21 samples), *Harpalus distinguendus* Duft. (16 samples), *Dermestes frischi* Kugel. (eight samples), *Harpalus aeneus* F. and *Cicindela germanica* L. (7 samples). The other species had between one and six samples.

At the seventh sampling, carried out on August 25, 2008, 116 coleoptera samples belonging to 13 species were collected. The species with the highest number of samples was *Pseudophonus rufipes* De Geer, which had 69 samples, followed by *Dermestes frischi* Kugel. with 13 samples. The other species had between one and six samples.

Table 1 – Situation of species sampling

		The first sampling on May 30, 2009																	
No.	Name of species	Number of samples/trap																	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1.	<i>Cymindis vaporariorum</i>	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.	<i>Psylliodes chrysocephala</i>	3	3	5	1	-	1	-	-	-	-	-	-	-	-	1	-	-	14
3.	<i>Ceuthorrhynchus</i> spp.	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
4.	<i>Harpalus distinguendus</i>	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
5.	<i>Dermestes frischii</i>	-	1	6	-	1	-	-	1	-	1	-	-	-	-	-	1	-	12
6.	<i>Dorcadion fulvum</i>	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
7.	<i>Opatrum sabulosum</i>	-	-	2	1	1	-	-	10	1	2	8	3	-	-	2	1	-	41
8.	<i>Amara crenata</i>	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
9.	<i>Pseudophonus rufipes</i>	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	2
10.	<i>Otiorhynchus</i> spp.	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	3
11.	<i>Tanymericus palliatus</i>	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	3
12.	<i>Polydrosus atomarius</i>	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	3
13.	<i>Ceuthorrhynchus macula-alba</i>	-	-	-	3	-	-	-	-	-	-	1	-	-	-	-	-	-	5
14.	<i>Amara aenea</i>	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	2
15.	<i>Pseudocleonus cinereus</i>	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
16.	<i>Orthochaetes setiger</i>	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
17.	<i>Cassida nobilis</i>	-	-	-	-	1	1	-	-	-	-	-	1	1	-	-	-	-	4
18.	<i>Athous niger</i>	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	2
19.	<i>Staphylinus</i> spp.	-	-	-	-	-	-	-	-	-	-	1	3	-	-	-	1	1	6
20.	<i>Tachyporus hypnorum</i>	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	2
21.	<i>Formicomus pedestris</i>	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
TOTAL		5	6	19	11	3	2	0	12	1	3	12	9	2	0	4	4	1	46
		The second sampling on June 16, 2008																	
1.	<i>Cassida nobilis</i>	2	2	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	6
2.	<i>Pseudocleonus cinereus</i>	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
3.	<i>Otiorhynchus raucus</i>	1	-	-	-	1	3	-	-	1	-	3	-	-	-	1	-	-	10
4.	<i>Amara crenata</i>	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1

COLEOPTERA ENTOMOFAUNA FROM APPLE TREE PLANTATIONS

		The first sampling on May 30, 2009																	
No.	Name of species	Number of samples/trap																	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
5.	<i>Dermestes frischi</i>	3	7	3	-	2	10	-	-	-	-	-	-	1	-	-	-	-	26
6.	<i>Opatrum sabulosum</i>	2	9	12	3	-	4	3	9	12	5	3	3	4	5	-	-	-	74
7.	<i>Harpalus distinguendus</i>	1	9	-	1	-	5	-	-	-	-	-	-	-	-	-	-	-	16
8.	<i>Psylliodes chrysocephala</i>	6	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9
9.	<i>Idiochroma dorsalis</i>	-	2	-	1	-	-	-	-	-	-	-	-	1	2	-	-	-	6
10.	<i>Ophonus puncticollis</i>	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
11.	<i>Carabus violaceus</i>	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	2
12.	<i>Dorcadion fulvum</i>	-	-	1	-	3	1	-	-	-	-	-	-	-	-	-	-	-	5
13.	<i>Sphenophorus striatopunctatus</i>	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1
14.	<i>Agriotes lineatus</i>	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1
15.	<i>Cassida nebulosa</i>	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1
16.	<i>Cleonus piger</i>	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
17.	<i>Athous sacheri</i>	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1
18.	<i>Ceuthorrhynchus macula-alba</i>	-	-	-	-	-	-	-	-	-	-	-	1	-	1	1	-	-	3
19.	<i>Staphylinus spp.</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	2
20.	<i>Amara familiaris</i>	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1
21.	<i>Ceuthorrhynchus rapae</i>	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1
TOTAL		18	32	17	6	7	27	3	10	15	6	4	7	6	10	2	0	0	170
		The third sampling on June 30, 2008																	
1.	<i>Cicindela germanica</i>	4	5	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	10
2.	<i>Pseudophonus griseus</i>	1	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7
3.	<i>Opatrum sabulosum</i>	-	6	6	1	-	-	-	4	2	1	7	-	2	-	-	-	-	29
4.	<i>Harpalus distinguendus</i>	-	5	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	6
5.	<i>Zabrus tenebrioides</i>	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
6.	<i>Otiorrhynchus raucus</i>	-	4	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	6
7.	<i>Dermestes frischi</i>	-	1	3	-	1	-	-	-	-	-	-	-	-	-	1	-	-	6
8.	<i>Cassida nebulosa</i>	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
9.	<i>Psylliodes chrysocephala</i>	-	-	3	-	-	-	-	-	-	-	-	-	2	-	-	-	-	5
10.	<i>Staphylinus spp.</i>	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	5

		The first sampling on May 30, 2009																	
No.	Name of species	Number of samples/trap																	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
11.	<i>Idiochroma dorsalis</i>	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
12.	<i>Pterostichus vulgaris</i>	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
13.	<i>Amara familiaris</i>	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
14.	<i>Sciaphobus squalidus</i>	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
15.	<i>Eusomus ovulum</i>	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
16.	<i>Ceuthorrhynchus obsoletus</i>	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
17.	<i>Longitarsus tabidus</i>	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	5
18.	<i>Rhyzotrogus aequinoctialis</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
19.	<i>Harpalus tardus</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
TOTAL		5	30	12	3	1	7	0	6	4	2	8	0	7	2	0	2	0	1
		The fourth sampling on July 22, 2008																	
1.	<i>Cicindela germanica</i>	12	1	-	7	12	7	-	-	-	-	-	-	-	-	-	-	-	39
2.	<i>Amara crenata</i>	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
3.	<i>Harpalus distinguendus</i>	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
4.	<i>Psylliodes chrysocephala</i>	1	-	-	-	-	1	-	1	-	-	-	-	-	-	1	-	-	4
5.	<i>Staphylinus spp.</i>	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	2
6.	<i>Otiorynchus raucus</i>	1	1	-	-	-	2	-	-	2	-	-	-	-	-	-	-	-	6
7.	<i>Longitarsus tabidus</i>	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
8.	<i>Phyllotreta nemorum</i>	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
9.	<i>Apion apricans</i>	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
10.	<i>Pterostichus niger</i>	-	1	-	-	-	-	-	-	-	-	-	-	-	2	2	-	-	5
11.	<i>Amara aenea</i>	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
12.	<i>Harpalus aeneus</i>	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
13.	<i>Harpalus cupreus</i>	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
14.	<i>Cassida nebulosa</i>	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	2
15.	<i>Dermestes frischii</i>	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	2
16.	<i>Opotrum sabulosum</i>	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	2
TOTAL		19	6	1	9	14	11	1	2	1	2	0	0	0	0	0	3	2	0
		71																	

COLEOPTERA ENTOMOFAUNA FROM APPLE TREE PLANTATIONS

The first sampling on May 30, 2009																				
No.	Name of species	Number of samples/trap																		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Total
The fifth sampling on August 1, 2008																				
1.	<i>Otiotryphynchus raucus</i>	-	-	-	-	-	-	-	1	-	1	-	-	-	1	-	-	-	-	3
2.	<i>Calathus fuscipes</i>	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	2
TOTAL		0	0	0	0	0	0	0	1	0	1	0	1	0	2	0	0	0	0	5
The sixth sampling on August 12, 2008																				
1.	<i>Carabus violaceus</i>	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
2.	<i>Cicindela germanica</i>	3	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	7
3.	<i>Pterostichus vulgaris</i>	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	2
4.	<i>Harpalus distinguendus</i>	13	-	-	2	-	1	-	-	-	-	-	-	-	-	-	-	-	-	16
5.	<i>Calathus fuscipes</i>	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
6.	<i>Pseudophonus rufipes</i>	1	-	-	1	6	2	1	-	-	6	2	-	1	-	1	-	1	-	21
7.	<i>Harpalus aeneus</i>	-	6	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	7
8.	<i>Ophonus azureus</i>	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
9.	<i>Ophonus puncticollis</i>	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	2
10.	<i>Abax carinatus</i>	-	1	-	-	-	-	-	-	-	1	2	2	-	-	-	-	-	-	6
11.	<i>Amara aenea</i>	-	3	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	5
12.	<i>Dermestes frischii</i>	-	-	-	-	3	4	1	-	-	-	-	-	-	-	-	-	-	-	8
13.	<i>Calathus melanocephalus</i>	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1
14.	<i>Pseudophonus griseus</i>	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1
15.	<i>Pterostichus nigrita</i>	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1
16.	<i>Otiotryphynchus raucus</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
17.	<i>Abax ater</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
TOTAL		20	14	1	3	11	11	3	0	0	2	9	5	1	1	2	0	2	0	85
The seventh sampling on August 25, 2008																				
1.	<i>Carabus violaceus</i>	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
2.	<i>Ophonus puncticollis</i>	1	3	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	6
3.	<i>Psylliodes chrysocephala</i>	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
4.	<i>Otiotryphynchus raucus</i>	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	2
5.	<i>Harpalus distinguendus</i>	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2

		The first sampling on May 30, 2009																	
No.	Name of species	Number of samples/trap																	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
6.	<i>Pseudophonus rufipes</i>	-	2	1	8	7	7	1	-	2	4	3	15	17	-	-	-	2	69
7.	<i>Pseudophonus griseus</i>	-	-	-	2	-	-	-	-	-	-	-	3	-	-	-	-	-	5
8.	<i>Dermestes frischii</i>	-	-	-	2	3	6	1	1	-	-	-	-	-	-	-	-	-	13
9.	<i>Staphylinus spp.</i>	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	2
10.	<i>Calathus fuscipes</i>	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1
11.	<i>Abax carinatus</i>	-	-	-	-	-	-	-	-	-	-	1	2	-	1	-	-	-	4
12.	<i>Pterostichus vulgaris</i>	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	4	6
13.	<i>Harpalus aeneus</i>	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	3
TOTAL		4	7	2	12	10	13	2	2	2	7	5	20	22	2	0	0	6	116
		The eighth sampling on September 5, 2008																	
1.	<i>Carabus violaceus</i>	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
2.	<i>Pseudophonus rufipes</i>	2	-	-	2	14	-	4	-	2	6	-	-	-	18	1	1	-	50
3.	<i>Ophonus puncticollis</i>	1	-	-	2	-	-	-	2	2	2	-	-	-	-	-	-	-	9
4.	<i>Abax carinatus</i>	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	2
5.	<i>Otiorynchus raucus</i>	1	-	-	-	-	-	-	-	-	1	-	1	-	1	-	-	-	4
6.	<i>Pterostichus vulgaris</i>	-	-	-	-	2	-	-	-	-	1	-	-	-	-	1	-	-	4
7.	<i>Calathus fuscipes</i>	-	-	-	-	2	-	-	-	-	1	-	-	-	-	-	-	-	3
8.	<i>Dolichus chalcensis</i>	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	2
9.	<i>Dermestes frischii</i>	-	-	-	-	6	0	4	3	4	11	0	1	1	20	2	1	0	84
TOTAL		7	0	0	4	26	0	4	3	4	11	0	1	1	20	2	1	0	84
		The ninth sampling on September 18, 2008																	
1.	<i>Carabus violaceus</i>	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2
2.	<i>Pseudophonus rufipes</i>	7	-	5	5	2	-	-	-	1	8	-	4	6	-	-	2	-	42
3.	<i>Calathus fuscipes</i>	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
4.	<i>Nebria brevicollis</i>	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
5.	<i>Ophonus puncticollis</i>	19	6	5	9	1	-	-	-	-	2	-	-	-	-	-	-	-	42
6.	<i>Dermestes frischii</i>	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	2
7.	<i>Pterostichus vulgaris</i>	-	-	1	3	-	2	-	-	-	-	-	-	-	-	-	1	-	11
8.	<i>Staphylinus spp.</i>	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	2

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		The first sampling on May 30, 2009																	
No.	Name of species	Number of samples/trap																	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
9.	<i>Opatrum sabulosum</i>	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
10.	<i>Otiorynchus raucus</i>	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
TOTAL		31	9	11	18	3	3	0	1	1	10	0	5	8	0	0	3	0	6
TOTAL		109																	
The tenth sampling on October 9, 2008																			
1.	<i>Pseudophonus rufipes</i>	1	-	-	-	-	-	-	-	-	1	2	-	-	-	-	-	1	-
2.	<i>Ophonus puncticollis</i>	2	1	1	-	-	-	-	1	-	1	-	-	-	1	-	-	-	-
3.	<i>Psylliodes chrysocephala</i>	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4.	<i>Otiorynchus raucus</i>	1	1	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-
5.	<i>Nebria brevicollis</i>	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6.	<i>Opatrum sabulosum</i>	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
7.	<i>Calathus fuscipes</i>	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-
8.	<i>Leistus ferrugineus</i>	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9.	<i>Dermestes frischii</i>	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10.	<i>Longitarsus tabidus</i>	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
11.	<i>Apion apricans</i>	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
12.	<i>Staphylinus spp.</i>	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-
13.	<i>Ceuthorrhynchus obsoletus</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
TOTAL		5	4	2	3	0	1	2	2	0	3	4	2	0	1	1	0	1	0
TOTAL SAMPLINGS		114	108	65	69	76	75	15	39	28	47	42	49	47	38	11	13	6	59
TOTAL SAMPLINGS		901																	

At the eighth sampling, carried out on September 5, 2008, 84 coleoptera samples belonging to nine species were collected. The species with the highest number of collected samples were *Pseudophonus rufipes* De Geer (50 samples), followed by *Ophonus puncticollis* Payk. (nine samples) and *Dermestes frischi* Kugel. (eight samples). The other species had between two and four samples.

At the ninth sampling, carried out on September 18, 2008, 109 coleoptera samples belonging to 10 species were collected. The species with the highest number of collected samples were *Pseudophonus rufipes* De Geer and *Ophonus puncticollis* Payk., each with 42 samples, followed by *Pterostichus vulgaris* L., with 11 samples. The other species had between one and three samples.

At the tenth sampling, carried out on October 9, 2008, 31 samples belonging to 13 species were collected. All the species had between one and seven samples.

As concerns the structure and dynamics of coleoptera species, collected during the entire period of observations, we found that 901 coleoptera, belonging to 56 species, were collected; the most frequently collected species were *Dermestes frischi* Kugel., which was collected at nine from ten samplings, *Otiorrhynchus raucus* F., which was also collected at nine from ten samplings, followed by *Staphylinus* spp., collected at seven from ten samplings, *Harpalus distinguendus* Duft., *Opatrum sabulosum* L., *Pseudophonus rufipes* De Geer, *Ophonus puncticollis* Payk. and *Calathus fuscipes* Goeze, collected at six from ten samplings (Table 2).

Table 2 – Structure, dynamics and abundance of collected coleoptera species

No.	Name of species	Sampling										Total
		1	2	3	4	5	6	7	8	9	10	
1.	<i>Cymindis vaporariorum</i>	1	-	-	-	-	-	-	-	-	-	1
2.	<i>Psylliodes chrysocephala</i>	14	9	5	4	-	-	1	-	-	1	34
3.	<i>Ceuthorrhynchus</i> spp.	1	-	-	-	-	-	-	-	-	-	1
4.	<i>Harpalus distinguendus</i>	2	16	6	1	-	16	2	-	-	-	43
5.	<i>Dermestes frischi</i>	12	26	6	2	-	8	13	8	2	1	78
6.	<i>Dorcadion fulvum</i>	2	5	-	-	-	-	-	-	-	-	7
7.	<i>Opatrum sabulosum</i>	72	74	29	2	-	-	-	-	1	2	180
8.	<i>Amara crenata</i>	1	1	-	2	-	-	-	-	-	-	4
9.	<i>Pseudophonus rufipes</i>	2	-	-	-	-	21	69	50	42	5	189
10.	<i>Otiorrhynchus</i> spp.	3	-	-	-	-	-	-	-	-	-	3
11.	<i>Tanymecus palliatus</i>	3	-	-	-	-	-	-	-	-	-	3
12.	<i>Polydrosus atomarius</i>	3	-	-	-	-	-	-	-	-	-	3
13.	<i>Ceuthorrhynchus macula-alba</i>	5	3	-	-	-	-	-	-	-	-	8
14.	<i>Amara aenea</i>	2	-	-	1	-	5	-	-	-	-	8
15.	<i>Pseudocleonus cinereus</i>	1	2	-	-	-	-	-	-	-	-	3

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No.	Name of species	Sampling										Total
		1	2	3	4	5	6	7	8	9	10	
16.	<i>Orthochaetes setiger</i>	1	-	-	-	-	-	-	-	-	-	1
17.	<i>Cassida nobilis</i>	4	6	-	-	-	-	-	-	-	-	10
18.	<i>Athous niger</i>	2	-	-	-	-	-	-	-	-	-	2
19.	<i>Staphylinus spp.</i>	6	2	5	2	-	-	2	-	2	2	21
20.	<i>Tachyporus hypnorum</i>	2	-	-	-	-	-	-	-	-	-	2
21.	<i>Formicomus pedestris</i>	1	-	-	-	-	-	-	-	-	-	1
22.	<i>Otiorrhynchus raucus</i>	-	10	6	6	3	1	2	4	1	4	37
23.	<i>Amara familiaris</i>	-	1	1	-	-	-	-	-	-	-	2
24.	<i>Idiochroma dorsalis</i>	-	6	1	-	-	-	-	-	-	-	7
25.	<i>Ophonus puncticollis</i>	-	1	-	-	-	2	6	9	42	7	67
26.	<i>Cleonus piger</i>	-	1	-	-	-	-	-	-	-	-	1
27.	<i>Athous sacheri</i>	-	1	-	-	-	-	-	-	-	-	1
28.	<i>Cicindela germanica</i>	-	-	10	39	-	7	-	-	-	-	56
29.	<i>Zabrus tenebrioides</i>	-	-	2	-	-	-	-	-	-	-	2
30.	<i>Pterostichus vulgaris</i>	-	-	1	-	-	2	6	4	11	-	24
31.	<i>Sciaphobus squalidus</i>	-	-	1	-	-	-	-	-	-	-	1
32.	<i>Eusomus ovulum</i>	-	-	1	-	-	-	-	-	-	-	1
33.	<i>Ceuthorrhynchus obsoletus</i>	-	-	1	-	-	-	-	-	-	1	2
34.	<i>Longitarsus tabidus</i>	-	-	5	1	-	-	-	-	-	1	7
35.	<i>Sphenophorus striatopunctatus</i>	-	1	-	-	-	-	-	-	-	-	1
36.	<i>Agriotes lineatus</i>	-	1	-	-	-	-	-	-	-	-	1
37.	<i>Cassida nebulosa</i>	-	1	1	2	-	-	-	-	-	-	4
38.	<i>Ceuthorrhynchus rapae</i>	-	1	-	-	-	-	-	-	-	-	1
39.	<i>Rhyzotrogus aequinoctialis</i>	-	-	1	-	-	-	-	-	-	-	1
40.	<i>Harpalus tardus</i>	-	-	1	-	-	-	-	-	-	-	1
41.	<i>Phyllotreta nemorum</i>	-	-	-	1	-	-	-	-	-	-	1
42.	<i>Apion apricans</i>	-	-	-	1	-	-	-	-	-	2	3
43.	<i>Pterostichus niger</i>	-	-	-	5	-	-	-	-	-	-	5
44.	<i>Harpalus cupreus</i>	-	-	-	1	-	-	-	-	-	-	1
45.	<i>Calathus fuscipes</i>	-	-	-	-	2	3	1	3	3	2	14
46.	<i>Carabus violaceus</i>	-	2	-	-	-	1	2	2	2	-	9
47.	<i>Harpalus aeneus</i>	-	-	-	1	-	7	3	-	-	-	11
48.	<i>Ophonus azureus</i>	-	-	-	-	-	2	-	-	-	-	2
49.	<i>Abax carinatus</i>	-	-	-	-	-	6	4	2	-	-	12
50.	<i>Pseudophonus griseus</i>	-	-	7	-	-	1	5	-	-	-	13
51.	<i>Pterostichus nigrita</i>	-	-	-	-	-	1	-	-	-	-	1
52.	<i>Dolichus chalensis</i>	-	-	-	-	-	-	-	2	-	-	2
53.	<i>Nebria brevicollis</i>	-	-	-	-	-	-	-	-	3	2	5
54.	<i>Abax ater</i>	-	-	-	-	-	1	-	-	-	-	1
55.	<i>Calathus melanocephalus</i>	-	-	-	-	-	1	-	-	-	-	1
56.	<i>Leistus ferrugineus</i>	-	-	-	-	-	-	-	-	-	1	1
Total		140	170	90	71	5	85	116	84	109	31	901

The species with the highest number of collected samples during the observation period were *Pseudophonus rufipes* De Geer (189 samples), representing 20.97% of the total, *Opatrum sabulosum* L. (180 samples), representing 19.97% of the total, *Dermestes frischii* Kugel. (78 samples), representing 8.65% of the total, *Ophonus puncticollis* Payk. (67 samples), representing 7.43% of the total, *Cicindela germanica* L. (56

samples), representing 6.21% of the total, *Harpalus distinguendus* Duft. (43 samples), representing 4.77% of the total, *Otiorrhynchus raucus* F. (37 samples), representing 4.1% of the total, *Psylliodes chrysocephala* L. (34 samples), representing 3.77% of the total, *Pterostichus vulgaris* L. (24 samples), representing 2.66% of the total and *Staphylinus* spp. (21 samples), representing 2.33% of the total (*Table 3*).

Table 3 – Structure and dynamics of the species with the highest number of collected samples

No.	Name of species	Sampling										Total	% of the total
		1	2	3	4	5	6	7	8	9	10		
1.	<i>Pseudophonus rufipes</i>	2	-	-	-	-	21	69	50	42	5	189	20.97
2.	<i>Opatrum sabulosum</i>	72	74	29	2	-	-	-	-	1	2	180	19.97
3.	<i>Dermestes frischii</i>	12	26	6	2	-	8	13	8	2	1	78	8.65
4.	<i>Ophonus puncticollis</i>	-	1	-	-	-	2	6	9	42	7	67	7.43
5.	<i>Cicindela germanica</i>	-	-	10	39	-	7	-	-	-	-	56	6.21
6.	<i>Harpalus distinguendus</i>	2	16	6	1	-	16	2	-	-	-	43	4.77
7.	<i>Otiorrhynchus raucus</i>	-	10	6	6	3	1	2	4	1	4	37	4.1
8.	<i>Psylliodes chrysocephala</i>	14	9	5	4	-	-	1	-	-	1	34	3.77
9.	<i>Pterostichus vulgaris</i>	-	-	1	-	-	2	6	4	11	-	24	2.66
10.	<i>Staphylinus</i> spp.	6	2	5	2	-	-	2	-	2	2	21	2.33
TOTAL												729	80.86

The 10 species with the highest number of collected samples had 729 samples, representing 80.86 % of the total collected samples. We have also calculated a series of more important ecological indicators of the collected species: abundance (A), constancy

(C), dominance (D) and Ecological Significance Index (W) (*Table 4*).

As concerns the abundance of the 56 collected species, we found that during the observation period, between 1 and 189 samples were collected.

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The species constancy, expressed by the number of samples from each species, reported to the total number of samples, had values comprised between 0.55 % and 25.5 % in 56 species. According to the values of this indicator, the 56 collected species are classified as it follows: 32

accidental species, having values of this indicator comprised between 1 and 25%; one species (*Pseudophonus rufipes* De Geer), belonging to adventitious species, which had the value of 25.55%.

Table 4 – Values of the most important ecological parameters of the collected coleoptera species

No.	Name of species	Ecological parameters			
		A Abundance	C Constancy	D Dominance	W Ecological Significance Index
1.	<i>Cymindis vaporariorum</i>	1	0.55	0.11	0.0006
2.	<i>Psylliodes chrysocephala</i>	34	9.44	3.77	0.3500
3.	<i>Ceuthorrhynchus</i> spp.	1	0.55	0.11	0.0006
4.	<i>Harpalus distinguendus</i>	43	6.66	4.77	0.3100
5.	<i>Dermestes frischi</i>	78	18.33	8.65	1.5800
6.	<i>Dorcadion fulvum</i>	7	2.22	0.77	0.0100
7.	<i>Opatrum sabulosum</i>	180	20.55	19.97	4.1000
8.	<i>Amara crenata</i>	4	1.66	0.44	0.0070
9.	<i>Pseudophonus rufipes</i>	189	25.55	20.97	5.3500
10.	<i>Otiorrhynchus</i> spp.	3	1.66	0.33	0.0050
11.	<i>Tanymecus palliatus</i>	3	1.66	0.33	0.0050
12.	<i>Polydrosus atomarius</i>	3	0.55	0.33	0.0018
13.	<i>Ceuthorrhynchus macula-alba</i>	8	3.33	0.88	0.0200
14.	<i>Amara aenea</i>	8	2.77	0.88	0.0200
15.	<i>Pseudocleonus cinereus</i>	3	1.11	0.33	0.0030
16.	<i>Orthochaetes setiger</i>	1	0.55	0.11	0.0006
17.	<i>Cassida nobilis</i>	10	3.88	1.10	0.0400
18.	<i>Athous niger</i>	2	1.11	0.22	0.0020
19.	<i>Staphylinus</i> spp.	21	7.77	2.33	0.1800
20.	<i>Tachyporus hypnorum</i>	2	1.11	0.22	0.0020
21.	<i>Formicomus pedestris</i>	1	0.55	0.11	0.0006
22.	<i>Otiorrhynchus raucus</i>	37	15.55	4.10	0.6300
23.	<i>Amara familiaris</i>	2	1.11	0.22	0.0020
24.	<i>Idiochroma dorsalis</i>	7	2.77	0.77	0.0200
25.	<i>Ophonus puncticollis</i>	67	12.77	7.43	0.9400
26.	<i>Cleonus piger</i>	1	0.55	0.11	0.0006
27.	<i>Athous sacheri</i>	1	0.55	0.11	0.0006
28.	<i>Cicindela germanica</i>	56	5.55	6.21	0.3400

No.	Name of species	Ecological parameters			
		A Abundance	C Constancy	D Dominance	W Ecological Significance Index
29.	<i>Zabrus tenebrioides</i>	2	0.55	0.22	0.0010
30.	<i>Pterostichus vulgaris</i>	24	7.22	2.66	0.1900
31.	<i>Sciaphobus squalidus</i>	1	0.55	0.11	0.0006
32.	<i>Eusomus ovulum</i>	1	0.55	0.11	0.0006
33.	<i>Ceuthorrhynchus obsoletus</i>	2	1.11	0.22	0.0020
34.	<i>Longitarsus tabidus</i>	7	1.66	0.77	0.0100
35.	<i>Sphenophorus striatopunctatus</i>	1	0.55	0.11	0.0006
36.	<i>Agriotes lineatus</i>	1	0.55	0.11	0.0006
37.	<i>Cassida nebulosa</i>	4	1.11	0.44	0.0040
38.	<i>Ceuthorrhynchus rapae</i>	1	0.55	0.11	0.0006
39.	<i>Rhyzotrogus aequinoctialis</i>	1	0.55	0.11	0.0006
40.	<i>Harpalus tardus</i>	1	0.55	0.11	0.0006
41.	<i>Phyllotreta nemorum</i>	1	0.55	0.11	0.0006
42.	<i>Apion apricans</i>	3	1.11	0.33	0.0030
43.	<i>Pterostichus niger</i>	5	1.66	0.55	0.0090
44.	<i>Harpalus cupreus</i>	1	0.55	0.11	0.0006
45.	<i>Calathus fuscipes</i>	14	6.11	1.55	0.0900
46.	<i>Carabus violaceus</i>	9	4.44	0.99	0.0400
47.	<i>Harpalus aeneus</i>	11	2.22	1.22	0.0200
48.	<i>Ophonus azureus</i>	2	0.55	0.22	0.0010
49.	<i>Abax carinatus</i>	12	5	1.33	0.0600
50.	<i>Pseudophonus griseus</i>	13	2.77	1.44	0.0300
51.	<i>Pterostichus nigrita</i>	1	0.55	0.11	0.0006
52.	<i>Dolichus chalcensis</i>	2	0.55	0.22	0.0010
53.	<i>Nebria brevicollis</i>	5	1.66	0.55	0.0090
54.	<i>Abax ater</i>	1	0.55	0.11	0.0006
55.	<i>Calathus melanocephalus</i>	1	0.55	0.11	0.0006
56.	<i>Leistus ferrugineus</i>	1	0.55	0.11	0.0006

The dominance (D) of collected species, representing the number of samples from one species, reported to the total number of collected samples, had values comprised between 0.12% and 22%. According to these values, the collected species (51) are classified in subrecedent species (41), with values below 1.1%; recedent species (5), with values comprised

between 1.1 and 2%; subdominant species (5), with values comprised between 2.1 and 5%; dominant species (3), with values comprised between 5.1% and 10%; eudominant species (*Pseudophonus rufipes* De Geer and *Opatrum sabulosum* L.), with values over 10%.

COLEOPTERA ENTOMOFAUNA FROM APPLE TREE PLANTATIONS

Ecological Significance Index (W), representing the product between constancy and dominance, divided by 10,000, expressed in percents, had values comprised between 0.0006% and 5.35%. The highest values of this indicator (over 1%) were found in *Pseudophonus rufipes* De Geer (5.35%), *Opatrum sabulosum* L. (4.1%) and *Dermestes frischii* Kugel. (1.58%). According to the values of this indicator, 53 species are accidental and none is edifying (over 10%).

CONCLUSIONS

In 2008, in the fruit-growing plantations belonging to the Fruit-Growing Research and Development Station of Fălticeni, Barber-type traps were installed for collecting species of epigeous coleoptera. These traps functioned from May until October.

A number of 10 samplings of the collected material were carried out on the following dates: May 30, June 16, June 30, July 22, August 1, August 12, August 25, September 5, September 18 and October 9.

The collected coleoptera (901 samples) belong to 56 species.

The species with the highest number of collected samples were *Pseudophonus rufipes* De Geer (189 samples), *Opatrum sabulosum* L. (180 samples), *Dermestes frischii* Kugel. (78 samples), *Ophonus puncticollis* Payk. (67 samples), *Cicindela germanica* L. (56 samples), *Harpalus distinguendus* Duft. (43 samples), *Otiorrhynchus raucus* F. (37

samples), *Psylliodes chrysocephala* L. (34 samples), *Pterostichus vulgaris* L. (24 samples) and *Staphylinus* spp. (21 samples).

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