CONTRIBUTIONS TO THE KNOWLEDGE OF THE COLEOPTERAN ENTOMOFAUNA IN THE APPLE FRUIT TREE ORCHARDS

CONTRIBUȚII LA CUNOAŞTEREA ENTOMOFAUNEI DE COLEOPTERE DIN PLANTAȚIILE POMICOLE DE MĂR

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Abstract. *The observations have been made in a fruit tree orchards owned by the Society S.C. Loturi Service SRL Deleşti,Vaslui country, Romania. The several varieties of apple are grown within this company: Golden delicious, Idared, Wagner, etc. The Barber soil traps were used to collect the biological material, and they functioned continuously from May to September or even October in 2017 six traps were used for each experimental variant. The experimental variants were set up, depending on the existing vegetal carpet . The samples were harvested at intervals of 7-14 days when we changed the fixing fluid, were filled in, or, if it was necessary it was replaced. The collected species were cleansed from all plant debris, other impurities and then separately selected coleopteran species, which by means of the determiners boocks were identified. The structure, dynamics and abundance of coleopteran species were then determined according to each experimental variant. The species of the coleopters, more frequently collected were: Dermestes laniarius Ill. Harpalus calceatus, Harpalus distinguendus, Amara eurynota, Phyllotreta nemorum, Opatrum sabulosum and Omias rotundus, etc.*
Key words: biological material, Barber traps, *Harpalus distinguendus*

Rezumat. *Observaţiile au fost făcute într-o plantaţie pomicolă de măr aparţinând Societăţii , S.C. Loturi Service Deleşti –Vaslui. În cadrul acestei societăţi sunt cultivate mai multe soiuri de măr şi anume: Golden delicious, Idared, Wagner etc. Pentru colectarea materialului s-au folosit capcanele de sol tip Barber, care au funcţionat în permanenţă, începând din luna Mai până în luna septembrie sau chiar octombrie, în anul 2017 s-au înfiinţat mai multe variante experimentale, în funcţie de covorul vegetal existent . Recoltarea probelor s-a făcut la intervale de 10-14 zile când şi lichidul de fixare, respectiv a fost completat sau, după caz a fos înlocuit. Speciile colectate au fost curăţate de toate resturile vegetale, şi determinate cu ajutorul determinatoarelor. S-a stabilit apoi structura, dinamica şi abundenţa speciilor de coleoptere, în funcţie de fiecare variantă experimentală. Speciile de coleoptere, mai frecvent colectate au fost: Dermestes laniarius, Harpalus calceatus, Harpalus distinguendus, Amara eurynota, Phyllotreta nemorum, Opatrum sabulosum şi Omias rotundus, etc.*
Cuvinte cheie: material biologic, Barber trap, *Harpalus distinguendus*

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INTRODUCTION

Among the most important insect families belonging to both the useful and harmful entomofauna belong to the order Coleoptera (Insecta Class), which includes species spread around the globe. The species of this family have a trophic regime largely entomophagic, but there are also species of mixed-phage or phytopofage (few species).

In agricultural crops, in fruit trees and even in forest areas, many of the species are particularly important ecological indicators, responding immediately to some human interventions, such as pesticides, which cause the paralysis or even the death of adult insects or larvae at shortly after treatment.

This paper presents some research results on the coleopteran population from a fruit tree plantation, where the fruits are destined for both fresh consumption and industrialization (Miller and Zubovski, 1917; Malcolm and Bell, 1997; Talmaciu *et al.*, 2016).

MATERIAL AND METHOD

Collection of entomological material was carried out using the soil traps type Barber method.

Samples of the collected biological material were labeled specifying: sample number, harvest date. Samples so labeled were shielded from sunlight and transported to the laboratory for analysis and determination.

Fig. 1. Soil trap type *Barber*

The Barber type soil trap method (fig.1) was used in the apple plant research at S.C. Farm. SERVICE lots, from Deleşti County, Vaslui county, from May to September, for establishing the structure and dynamics of the epigee entomofauna.

For this purpose, plastic cans with a volume of 500 ml were used, with a diameter of 10 cm and a height of 8-10 cm, and a salt solution in a concentration of 25% was used as the fixing liquid.

In the study station, six traps were placed on a row of trees on each of the 7 variants V-1, existing vegetal carpet from the spontaneous flora (witness), the V-2, the *Lotus corniculatus*, V-3 vegetal carpet, (*Tifolium repens*), V-4, vegetation overgrown with red clover (*Trifolium pratense*), V-5 vegetal overlay with lucerne (*Medicago sativa*), V-6, vegetal oat overlay with a mixture of 4 leguminous species and V-7 black field.

RESULTS AND DISCUSSIONS

To establish the structure and dynamics of the coleopter entomofauna, 6 traps were placed on a line of trees from the edge to the inside in a straight line, at a distance of 20 m from the edge and 6 - 7 m between traps in a row.

At Variant number 1, Existing vegetal carpet from the spontaneous flora (witness) were collected specimens of coleoptera belonging to a number of 11 species, in total, 14 specimens. A number of 3 species had two samples, these being: *Otiorrhynchus raucus* L., *Coccinella 7-punctata* and *Psylliodes chrysocephala* L. (tab. 1).

Table 1

The situation concerning the collection epigenous entomofauna V1 variant

No.	Name of species	Trap and number of samples						
		1	2	3	4	5	6	Total
1.	*Pseudophonus pubescens* Müller	1	-	-	-	-	-	1
2.	*Calathus fuscipes* G.	1	-	-	-	-	-	1
3.	*Cymindis humeralis* G.	1	-	-	-	-	-	1
4.	*Psylliodes cupreus* Koch	1	-	-	-	-	-	1
5.	*Otiorrhynchus raucus* L.	-	1	-	-	1	-	2
6.	*Coccinella 7-punctata* L.	-	2	-	-	-	-	2
7.	*Cantharis fusca* L.	-	1	-	-	-	-	1
8.	*Opatrum sabulosum* L.	-	-	1	-	-	-	1
9.	*Tachyporus abdominalis* Fabr.	-	-	1	-	-	-	1
10.	*Halyzia 22 punctata* F.	-	-	-	-	1	-	1
11.	*Psylliodes chrysocephala* L.	-	-	-	-	1	1	2
Total 11 species		4	4	2	-	3	1	14

At Variant number 2, Vegetable carpets over-sown with guides, were collected specimens of coleoptera belonging to a number of 11 species, in total, 55 specimens. The species with the most specimens collected were: *Calathus fuscipes* Goeze, *Opatrum sabulosum* L., with 9 copies, followed by the species *Psylliodes chrysocephala* Koch with 8 specimens, *Otiorrhynchus raucus* L., 6 specimens, *Coccinella 7 punctata* and *Cantharis fusca* L., with 5 copies each. The other 5 species had between 1 and 5 specimens (tab. 2).

Fig. 2. General aspects of variants

Table 2

The situation concerning the collection epigenous entomofauna V2 variant

No.	Name of species	Trap and number of samples						
		1	2	3	4	5	6	Total
1.	*Pseudophonus pubescens* Müller	1	-	-	-	-	-	1
2.	*Calathus fuscipes* Goeze	3	-	5	-	1	-	9
3.	*Cymindis humeralis* G.	1	1	-	1	-	-	3
4.	*Psylliodes chrysocephala* Koch	1	-	2	-	3	2	8
5.	*Otiorrhynchus raucus* L.	-	1	3	1	1	-	6
6.	*Coccinella 7-punctat* L.	1	2	-	1	-	1	5
7.	*Cantharis fusca* L.	-	1	3	1	-	-	5
8	*Opatrum sabulosum* L.	-	1	1	3	2	2	9
9.	*Tachyporus abdominalis* Fabr.	-	-	1	-	-	-	1
10.	*Halyzia 22 punctata* L.	1	-	-	1	1	1	4
11.	*Psylliodes chrysocephala* L.	-	1	1	-	1	1	4
Total 11 species		8	7	16	8	9	7	55

At Variant number 3, Vegetable carpets over-chopped with white clover, sample of Coleoptera belonging to a number of 14 species were collected, totaling 30 sample. The species with the most samples collected were: *Brachynus hirtus* B., with 9 samples, *Opatrum sabulosum* L., 5 samples, *Polydrosus flavipes* Sch., 4 samples and *Leistus ferrugineus*, 2 samples. The other species had one sample (tab. 3).

At Variant number 4, Vegetable carp topped with red clover, samples of Coleoptera belonging to a number of 9 species were collected, in total 109 samples. The most specimen species were: *Phyllotreta atra*, 20 samples, *Amara familiaris*, 17 samples, *Dermestes laniarius*, 15 samples, *Pterostichus cylindricus* and *Harpalus tardus*, each with 14 samples. The other species had between 1 and 11 samples (tab. 4).

Table 3

The situation concerning the collection epigenous entomofauna V3 variant

No.	Name of species	Trap and number of samples						
		1	2	3	4	5	6	Total
1.	*Harpalus tardus* Panz.	1	-	-	-	-	-	1
2.	*Leistus ferrugineus* L.	1	-	-	1	-	-	2
3.	*Mordellistena abdominalis* F.	1	-	-	-	-	-	1
4.	*Opatrum sabulosum* L.	1	-	-	3	1	-	5
5.	*Otiorrhynchus pinastri* Gyll.	1	-	-	-	-	-	1
6.	*Cymindis vaporariorum* L.	1	-	-	-	-	-	1
7.	*Cantharis fusca* L.	-	1	-	-	-	-	1
8.	*Amara eurynota* Panz.	-	-	1	-	-	-	1
9.	*Polydrosus flavipes* Sch.	-	-	1	3	-	-	4
10.	*Attagenus unicolor* Brahm.	-	-	-	1	-	-	1
11.	*Longitarsus anchusae* Boh.	-	-	-	1	-	-	1
12.	*Brachysomus hirtus* B.	-	-	-	9	-	-	9
13.	*Coccinella 7-punctata* L.	-	-	-	1	-	-	1
14.	*Harpalus calceatus* Duft.	-	-	-	-	1	-	1
Total 14 species		6	1	2	19	2	-	30

Table 4

The situation concerning the collection epigenous entomofauna V4 variant

No.	Name of species	Trap and number of samples						
		1	2	3	4	5	6	Total
1.	*Dermestes laniarius* Illiger	2	-	5	1	7	-	15
2.	*Amara familiaris* Duft.	-	1	9	4	3	-	17
3.	*Phyllotreta atra* F.	1	11	-	3	3	2	20
4.	*Pterstichus cylindricus* Hrbst.	4	1	6	-	3	-	14
5.	*Harpalus distinguendus* Duft.	-	3	1	1	2	2	9
6.	*Harpalus tardus* Panz.	5	1	1	2	2	3	14
7.	*Harpalus calceatus* Duft.	2	2	1	1	2	3	11
8	*Coccinella 7-punctata* L.	-	4	1	1	-	1	7
9.	*Pseudophonus pubescens* Müll.	1	-	-	-	-	1	2
Total 9 species		13	25	24	13	22	12	109

At Variant number 5, vegetable carpets overgrown with alfalfa, coleopteran specimens of 19 species were collected, with a total of 74 samples. Most samples collected had their species, *Opatrum sabulosum* L., with 27 samples and *Omias rotundus* L., with 17 samples. The other 17 species collected had between 1 and 5 samples.

At Variant number 6, vegetable carp topped with the 4 species of grasses and legumes were collected samples of Coleoptera belonging to a number of 18 species, in total, 214 samples. The most sampes species harvested were: *Harpalus calceatus*, 54 samples, *Dermestes laniarius*, 45 samples, *Harpalus*

tardus, 38 samples, *Opatrum sabulosum* L., 14 samples and *Harpalus aeneus*, 10 samples. The other species had between 1 and 9 samples (tab. 6).

Table5

The situation concerning the collection epigenous entomofauna V5 variant

No.	Name of species	Trap and number of samples						
		1	2	3	4	5	6	Total
1.	*Dermestes haemorrhoidalis* Kuster	1	-	-	-	-	-	1
2.	*Coccinella 7-punctata* L.	1	1	-	-	-	-	2
3.	*Omias rotundatus* Fabr.	4	7	2	-	3	1	17
4.	*Orchestes lonicerae* Olivier	1	-	-	-	-	-	1
5.	*Otiorrynchus ovatus* L.	2	-	-	-	-	-	2
6.	*Otiorrynchus pinastri* Hrbst.	4	-	-	-	-	-	4
7.	*Otiorrynchus obsidianus* Bohem	1	-	-	-	-	-	1
8.	*Acrolocha sulcula* Steph.	1	-	-	-	-	-	1
9.	*Opatrum sabulosum* L.	12	-	-	3	-	12	27
10.	*Sitona crinitus* Hrbst.	-	2	-	-	1	-	3
11.	*Meligetes maurus* Strm.	-	2	-	-	3	-	5
12.	*Tychius 5 punctatus* L.	-	1	-	-	-	-	1
13.	*Licinus cassideus* F.	-	2	-	-	1	-	3
14.	*Harpalus calceatus* Duft.	-	1	-	-	-	-	1
15.	*Harpalus tardus* Panz.	-	-	2	-	-	-	2
16.	*Otiorrhynchus fullo* Schrank	-	-	-	2	-	-	2
17.	*Mordella fasciata* Fabr.	-	-	-	-	1	-	1
18.	*Dermestes laniarius* Illiger	-	-	-	-	-	2	2
19.	*Leucoparyphus fullo* F.	-	-	-	-	-	2	2
	Total 19 specii	27	16	4	5	9	17	78

Table6

The situation concerning the collection epigenous entomofauna 6 variant

No.	Name of species	Trap and number of samples						
		1	2	3	4	5	6	Total
1.	*Curculio nucum* L.	1	-	-	-	-	-	1
2.	*Omias rotundatus* Fabr.	1	1	1	-	4	1	8
3.	*Pseudoophonus griseus* Panz.	3	-	2	1	2	1	9
4.	*Dermestes laniarius* Illiger	7	9	6	4	6	13	45
5.	*Pterostichus vulgaris* L.	2	-	-	-	-	-	2
6.	*Harpalus calceatus* Duft.	6	7	11	8	12	10	54
7.	*Calathus fuscipes* G.	1	-	2	-	1	-	4
8	*Pseudoophonus rufipes* Deg.	2	2	-	-	2	-	6
9.	*Epicometis hirta* Poda	1	1	-	2	1	1	6
10.	*Harpalus aeneus* F.	-	4	1	2	3	-	10
11.	*Harpalus tardus* Panz.	-	15	4	13	5	1	38
12.	*Otiorrhynchus raucus* Fabr.	-	-	1	-	-	1	2
13.	*Anisodactylus signatus* Panz.	-	-	3	-	-	-	3

Continued Table no 6

No.	Name of species	Trap and number of samples						
		1	2	3	4	5	6	Total
14	*Amara aenea* Djean.	-	-	-	3	-	-	3
15	*Opatrum sabulosum* L.	5	4	1	-	-	4	14
16	*Necrobia violacea* L.	-	-	-	1	-	-	1
17	*Harpalus distinguendus* Duft.	-	-	-	-	3	3	6
18	*Amara ovata* F.	-	-	-	-	-	1	1
Total 18 species		28	43	32	35	40	36	214

Table7

The situation concerning the collection epigenous entomofauna 7 variant

No.	Name of species	Trap and number of samples						
		1	2	3	4	5	6	Total
1.	*Dermestes laniarius* Illiger	1	-	-	-	-	-	1
2.	*Harpalus calceatus* Duft.	1	3	-	-	-	-	4
3.	*Omias rotundus* F.	-	1	-	-	-	-	1
4.	*Ephistemus globulus* Payk.	-	1	-	-	-	-	1
5.	*Carabus violaceus* L.	-	-	-	1	-	-	1
6.	*Pterostichus niger* Schaller	-	-	-	1	-	-	1
7.	*Harpalus tardus* Panz.	-	-	-	-	1	-	1
Total 7 species		2	5	-	2	1	-	10

At Variant number 7, Black field, specimens of Coleoptera belonging to a number of 7 species were collected, in total, 10 samples. With the exception of the species *Harpalus calceatus*, which had a number of 4 samples, the other species, *Dermestes laniarius*, *Omias rotundus*, *Ephistemus globulus*, *Carabus violaceus, Pterostichus niger*, *Harpalus tardus*, had one sample (tab. 7).

CONCLUSIONS

1. Following the six harvests that took place in May 2017, 510 specimens of coleoptera were collected in totel.
2. The situation of the collections on variants is as follows:

► V1 were collected 11 species with a total of 14 specimens.
► A total of 11 species with a total of 55 specimens were collected at V2.
► At V3 a total of 14 species were collected with a total of 30 specimens.
► A total of 9 species were collected at V4 with a total of 109 specimens.
► A total of 19 species were collected at V5 with a total of 214 specimens.
► A total of 19 species were collected at V6 with a total of 14 specimens.
► A total of 7 species with a total of 10 specimens were collected at V7.

3. The most common and common species of coleopterans were *Dermestes laniarius* Ill. *Harpalus calceatus, Harpalus distinguendus, Amara eurynota, Phyllotreta nemorum, Opatrum sabulosum* and *Omias rotundus*.

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