

CONTRIBUTION ON KNOWING THE STRUCTURE, DYNAMICS AND ABUNDANCE OF COLEOPTERS (COLEOPTERA) SPECIES IN APPLE-TREES PLANTATIONS

M. TĂLMACIU^{1*}, Nela TĂLMACIU¹, A. DIACONU², Ar. IRIMIA³

¹University of Agricultural Sciences and Veterinary Medicine of Iași

²Institute of Biological Research of Iași,

³Agricultural School Group of Huși

ABSTRACT - Investigations were conducted during April-August 2005 on the plantation of apple-trees from Huși, Vaslui District. 1516 samples of coleopters, belonging to 28 species were collected. The most abundant species were: *Pseudophonus rufipes* (853 samples), *Opatrum sabulosum* (201 samples), *Harpalus distinguendus* (195 samples), *Pseudophonus griseus* (85 samples), *Amara aenea* (48 samples) and *Amara familiaris* (37 samples). One species was collected during the entire period (*Opatrum sabulosum*) and five species were collected for three months. These species were *Harpalus distinguendus*, *Amara aenea*, *Amara familiaris*, *Dermestes lanarius* and *Calathus fuscipes*.

Key words: fruit-bearing, ecosystem, pests, Carabidae, Coleoptera

REZUMAT – Contribuții la cunoașterea structurii, dinamicii și abundenței speciilor de coleoptere (Coleoptera) din plantațiile de măr. Observațiile au fost efectuate în perioada aprilie-august 2005, într-o plantație de măr de la Huși, jud. Vaslui. Au fost colectate 1516 exemplare de coleoptere, ce aparțin la 28 specii. Speciile cele mai abundente au fost : *Pseudophonus rufipes* (853 exemplare), *Opatrum sabulosum* (201 exemplare), *Harpalus distinguendus* (195 exemplare), *Pseudophonus griseus* (85 exemplare), *Amara aenea* (48 exemplare) și *Amara familiaris* (37 exemplare). O singură specie (*Opatrum sabulosum*) a fost colectată în toată perioada și cinci specii (*Harpalus distinguendus*, *Amara aenea*, *Amara familiaris*, *Dermestes lanarius* și *Calathus fuscipes*) au fost colectate pe durata a trei luni.

Cuvinte cheie: ecosistem pomicol, prădători, Carabidae, Coleoptera

* E-mail: mtalmaciu@yahoo.fr

INTRODUCTION

The biological control, that is the diminution of pest populations as influenced by agro-biocoenosis, is due, on the one hand, to unfavourable environment factors and, on the other hand, to biotic factors. A series of internal factors of the population, entomophagues, predators and parasites, and entomopathogenic agents belong to the category of biotic factors.

Carabids are essential components within the epigesis fauna inside biocoenosis and farming ecosystems, some of them being predators (*Cicindela germanica* L., *Calosoma auropunctatum* Herbst., *Pterostichus cupreus* L., *Calathus fuscipes* Goeze., etc.), others are phytophagues (*Harpalus aeneus* Fab., *Harpalus distinguendus* Duft., *Harpalus tardus* Panz., *Amara* spp., etc.) and others are panthophagues (*Anisodactylus signatus* Panz., *Ophonus azureus* Fab., *Pseudophonus rufipes* De Geer., etc.) (Panin, 1951; Rogojanu, Perju, 1979).

Generally, carabids represented the subject of many investigations, especially on predators and the carabids from farming agro-ecosystems (Tălmăciu et al., 1997; Varvara, 1995). Within this context, we have determined the structure of useful fauna, of coleopters and carabids from apple-tree plantations.

MATERIALS AND METHODS

The material was collected in 2005 from an apple-tree plantation belonging to the Agricultural School Group of Huși, Vaslui District. We have used six Barber-type soil traps. A formol solution with a concentration of 5-6% was spread inside the traps. Four samplings were carried out during 2005: first sampling on 27.04.2005; second sampling on 30.05.2005; third sampling on 23.06.2005 and fourth sampling on 28.08.2005.

For each of the four samplings, the formol solution was replaced, being kept all the captured material. The material was brought in the laboratory, where only the coleopters species were kept and then, they have been determined.

RESULTS AND DISCUSSION

At first sampling, nine species have been captured, representing 192 samples. The collected species were *Opatrum sabulosum* with 85 samples; *Harpalus distinguendus*, with 58 samples; *Amara aenea*, with 25 samples; *Amara familiaris*, with 18 samples; *Panagaeus crux-major*, with 2 samples; *Epicometis hirta*, *Coccinella 7-punctata*, *Cymindis humeralis* and *Cleonus piger*, each of them with one sample (Chatened du Gaetan, 1990).

At the second sampling, 15 species have been captured, representing 210 samples. The collected species were *Harpalus distinguendus*, with 98 samples;

COLEOPTERS SPECIES IN APPLE-TREES

Opatrum sabulosum with 45 samples; *Amara aenea*, with 19 samples; *Amara familiaris*, with 12 samples; *Dermestes lanarius* with 8 samples; *Amara similata*, with 5 samples; *Brachynus explodens*, with 4 samples; *Calathus fuscipes*, *Anisodactylus signatus*, *Cantharis fusca* and *Brachynus crepitans*, each with 3 samples; *Harpalus calceatus*, *Psylliodes attenuata* and *Halyzia 22-punctata*, each with 2 samples and *Coccinella 14-punctata* with one sample (Panin, 1951).

At the third sampling, 15 species have been captured, representing 142 samples. The collected samples were *Opatrum sabulosum* with 66 samples; *Harpalus distinguendus*, with 39 samples; *Dermestes lanarius* with 12 samples; *Amara familiaris*, with 7 samples; *Amara aenea*, with 4 samples; *Pseudophonus rufipes*, with 3 samples; *Brachynus crepitans* and *Calathus fuscipes* with 2 samples; *Carabus glabratus*, *Carabus violaceus*, *Carabus besseri*, *Brachynus explodens*, *Broscus cephalotes*, *Zabrus tenebrioides* and *Psylliodes attenuata*, each with one sample (Reitter, 1908; Rogojanu, Perju, 1979).

At the fourth sampling, 12 species have been captured, representing 972 samples. The collected species were *Pseudophonus rufipes*, with 850 samples, *Pseudophonus griseus*, with 85 samples, *Calathus fusipes*, with 14 samples, *Opatrum sabulosum* with 5 samples, *Carabus violaceus*, *Dermestes lanarius* and *Anisodactylus signatus*, each of them with 3 samples; *Carabus besseri*, *Zabrus tenebrioides*, *Dolichus halensis* and *Harpalus calceatus*, each with 2 samples and *Carabus glabratus* with one sample (Table 1).

Table 1

Time of sampling and structure of collected species

No.	Name of the species	No. of collected samples	Total
First sampling, 27.04.2005			
1.	<i>Opatrum sabulosum</i>	85	192
2.	<i>Harpalus distinguendus</i>	58	
3.	<i>Amara aenea</i>	25	
4.	<i>Amara familiaris</i>	18	
5.	<i>Panagaeus crux-major</i>	2	
6.	<i>Epicometis hirta</i>	1	
7.	<i>Coccinella 7-punctata</i>	1	
8.	<i>Cymindis humeralis</i>	1	
9.	<i>Cleonus piger</i>	1	
Second sampling, 30.05.2005			
1	<i>Harpalus distinguendus</i>	98	210
2	<i>Opatrum sabulosum</i>	45	
3	<i>Amara aenea</i>	19	
4	<i>Amara familiaris</i>	12	
5	<i>Dermestes lanarius</i>	8	
6	<i>Amara similata</i>	5	
7	<i>Brachynus explodens</i>	4	
8	<i>Calathus fusipes</i>	3	
9	<i>Anisodactylus signatus</i>	3	

M. TĂLMACIU ET AL.

No.	Name of the species	No. of collected samples	Total
10	<i>Cantharis fusca</i>	3	
11	<i>Brachynus crepitans</i>	3	
12	<i>Harpalus calceatus</i>	2	
13	<i>Psylliodes attenuata</i>	2	
14	<i>Halyzia 22-punctata</i>	2	
15	<i>Coccinella 7-punctata</i>	1	
Third sampling, 23.06.2005			
1	<i>Opatrum sabulosum</i>	66	142
2	<i>Harpalus distinguendus</i>	39	
3	<i>Dermestes lanarius</i>	12	
4	<i>Amara familiaris</i>	7	
5	<i>Amara aenea</i>	4	
6	<i>Pseudophonus rufipes</i>	3	
7	<i>Brachynus crepitans</i>	2	
8	<i>Calathus fuscipes</i>	2	
9	<i>Carabus glabratus</i>	1	
10	<i>Carabus violaceus</i>	1	
11	<i>Carabus besseri</i>	1	
12	<i>Brachynus explodens</i>	1	
13	<i>Broscus cephalotes</i>	1	
14	<i>Zabrus tenebrioides</i>	1	
15	<i>Psylliodes attenuata</i>	1	
Fourth sampling, 28.08.2005			
1	<i>Pseudophonus rufipes</i>	850	972
2	<i>Pseudophonus griseus</i>	85	
3	<i>Calathus fuscipes</i>	14	
4	<i>Opatrum sabulosum</i>	5	
5	<i>Carabus violaceus</i>	3	
6	<i>Dermestes lanarius</i>	3	
7	<i>Anisodactylus signatus</i>	3	
8	<i>Carabus beseri</i>	2	
9	<i>Zabrus tenebrioides</i>	2	
10	<i>Dolichus halensis</i>	2	
11	<i>Harpalus calceatus</i>	2	
12	<i>Carabus glabratus</i>	1	

As concerns the dynamics and abundance of collected species in the entire period of observations, we have found that one species, *Opatrum sabulosum*, was collected at all the four samplings; 5 species, *Harpalus distinguendus*, *Amara aenea*, *Amara familiaris*, *Dermestes lanarius*; *Calathus fuscipes* have been collected at 3 of the 4 samplings; 10 species, *Pseudophonus rufipes*, *Anisodactylus signatus*, *Brachynus explodens*, *Brachynus crepitans*, *Harpalus calceatus*, *Carabus violaceus*, *Psylliodes attenuata*, *Carabus besseri*, *Zabrus tenebrioides* and *Carabus glabratus* have been collected at 2 of the 4 samplings; 12 species, *Pseudophonus griseus*, *Amara similata*, *Cantharis fusca*, *Panagaeus crux-major*, *Halyzia 22-punctata*, *Dolichus halensis*,

COLEOPTERS SPECIES IN APPLE-TREES

Epicometis hirta, *Coccinella 7-punctata*, *Cymindis humeralis*, *Cleonus piger*, *Broscus cephalotes* and *Coccinella 14-punctata* have been collected at one sampling (Table 2).

Table 2
Structure, dynamics and abundance of collected species

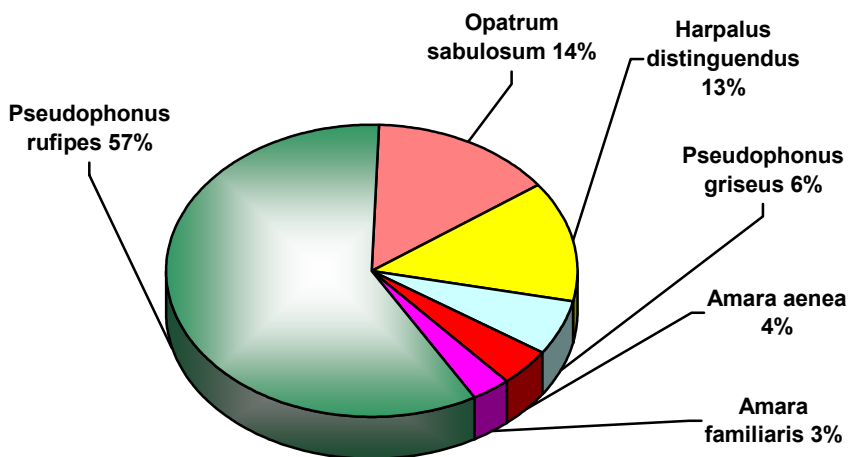
No.	Name of the species	Sampling				Total
		27.04	30.05.	23.06	28.08	
1	<i>Pseudophonus rufipes</i>	-	-	3	850	853
2	<i>Harpalus distinguendus</i>	58	98	39	-	195
3	<i>Pseudophonus griseus</i>	-	-	-	85	85
4	<i>Amara aenea</i>	25	19	4	-	48
5	<i>Amara familiaris</i>	18	12	7	-	37
6	<i>Dermestes lanarius</i>	-	8	12	3	23
7	<i>Calathus fuscipes</i>	-	3	2	14	19
8	<i>Anisodactylus signatus</i>	-	3	-	3	6
9	<i>Brachynus explodens</i>	-	4	1	-	5
10	<i>Brachynus crepitans</i>	-	3	2	-	5
11	<i>Amara similata</i>	-	5	-	-	5
12	<i>Harpalus calceatus</i>	-	2	-	2	4
13	<i>Carabus violaceus</i>	-	-	1	3	4
14	<i>Cantharis fusca</i>	-	3	-	-	3
15	<i>Psylliodes attenuata</i>	-	2	1	-	3
16	<i>Carabus besseri</i>	-	-	1	2	3
17	<i>Zabrus tenebrioides</i>	-	-	1	2	3
18	<i>Panagaeus crux-major</i>	2	-	-	-	2
19	<i>Halyzia 22-punctata</i>	-	2	-	-	2
20	<i>Carabus glabratus</i>	-	-	1	1	2
21	<i>Dolichus halensis</i>	-	-	-	2	2
22	<i>Epicometis hirta</i>	1	-	-	-	1
23	<i>Coccinella 7-punctata</i>	1	-	-	-	1
24	<i>Cymindis humeralis</i>	1	-	-	-	1
25	<i>Cleonus piger</i>	1	-	-	-	1
26	<i>Broscus cephalotes</i>	-	-	7	-	1
27	<i>Coccinella 14-punctata</i>	-	1	-	-	1
28	<i>Opatrum sabulosum</i>	85	45	66	5	201
TOTAL		192	210	142	972	1516

The species with the highest number of collected samples were *Pseudophonus rufipes* with 853 samples; *Opatrum sabulosum* with 201 samples; *Harpalus distinguendus* with 195 samples; *Pseudophonus griseus* with 85 samples; *Amara aenea* with 48 samples and *Amara familiaris* with 37 samples (Table 3, Figure 1).

Table 3

**Structure and abundance of species with the highest number
of collected samples**

No.	Name of species	No. of samples	% of the total
1	<i>Pseudophonus rufipes</i>	853	57
2	<i>Opatrum sabulosum</i>	201	14
3	<i>Harpalus distinguendus</i>	195	13
4	<i>Pseudophonus griseus</i>	85	6
5	<i>Amara aenea</i>	48	4
6	<i>Amara familiaris</i>	37	3



**Figure 1 – Structure and abundance of species with the highest number
of collected samples**

CONCLUSIONS

During the observation period, four samplings have been carried out at the following dates: first sampling on 27.04.2005; second sampling on 30.05.2005; third sampling on 23.06.2005 and fourth sampling on 28.08.2005.

A total of 1516 coleopters have been sampled. At first sampling, 192 samples have been collected; at second sampling, 210 samples have been

COLEOPTERS SPECIES IN APPLE-TREES

collected; at third sampling, 142 samples have been collected and at fourth sampling, 972 samples have been collected.

One species, *Opatrum sabulosum*, was collected at each of the four samplings. The species with the highest number of collected samples were *Pseudophonus rufipes* with 853 samples, representing 57% of the total; *Opatrum sabulosum* with 201 samples, representing 14% of the total; *Harpalus distinguendus* with 195 samples, representing 13% of the total; *Pseudophonus griseus* with 85 samples, representing 6% of the total; *Amara aenea* with 48 samples, representing 4% of the total and *Amara familiaris* with 37 samples, representing 3% of the total.

REFERENCES

- Chatened du Gaetan, 1990** - *Guide des Coléoptères d'Europe*. Délaçrois et Niestlé, Paris.
- Panin I., 1951** – *Guide of useful and harmful Coleoptera from Romania*. State Publishing House, Bucharest
- Reitter E., 1908** - *Fauna Germanica. Die Käfer des Deutschen Reiches Band I*, Stuttgart.
- Rogojanu V., Perju T., 1979** – *Guide for the knowledge of grown plant pests*. Ceres, Bucharest
- Tălmăciu M., Georgescu T., Mitrea I., Filipescu C., Bădeanu Marinela, Radu C., 1997** - *Comparative research in structure, dynamycs and certain ecological parameters of carabides species collected from Huși and Iași vineyards during 1992 - 1994*. Scientific Works vol. 40, Series Horticulture, University of Agricultural Sciences and Veterinary Medicine, Iași.
- Varvara M., Tălmăciu M., Georgescu T., 1995** – *Structure of carabides (Coleoptera - Carabidae) species in vine plantations from Moldavia*. Cercetări Agronomice în Moldova, Iași