

**CONTRIBUTIONS TO KNOWLEDGE OF THE STRUCTURE,
DYNAMICS AND ABUNDANCE OF THE COLEOPTER
SPECIES (ORDER COLEOPTERA)
IN APPLE ORCHARDS**

**CONTRIBUȚII LA CUNOAȘTEREA STRUCTURII, DINAMICII ȘI
ABUNDENȚEI SPECIILOR DE COLEOPTERE
(ORDINUL COLEOPTERA), DIN PLANTAȚIILE DE MĂR**

HEREA Monica¹*, TALMACIU Mihai¹, BOBOC Cristina¹, TALMACIU Nela¹

*Corresponding author e-mail: monica28is@yahoo.com

Abstract. *The biological material was collected from June to September throughout 2018. The experimental Stationar was a apple orchard belonging to the Teaching Resort Vasile Adamachi Iasi, in technology which only covers five chemical treatments. During the 4 harvest a total of 1016 samples were collected as follows: The species with the highest number of fish collected were: Opatrum sabulosum, Harpalus distinguendus, Dermestes lanarius, Pseudophonus rufipes, Pseudophonus griseus. The smallest number of specimens, one of them, had the species: Epicometis hirta, Coccinella 7-punctata, Cymindis humeralis, Cleonus piger, Coccinella 14-punctata, Opatrum sabulosum.*

Key words: Coleoptera, soil traps type Barber, useful fauna.

Rezumat. *Materialul biologic a fost colectat din luna iunie până în luna septembrie pe tot parcursul anului 2018. Staționarul experimental a fost reprezentat de o livada de măr ce aparține Stațiunii Didactice Vasile Adamachi Iași, în tehnologia căreia nu sunt încadrate decât 5 tratamente chimice. Pe parcursul celor 4 recoltări, au fost colectate în total 1016 exemplare de coleoptere, după cum urmează: Speciile cu cel mai mare număr de exemplare colectate au fost: Opatrum sabulosum, Harpalus distinguendus, Dermestes lanarius, Pseudophonus rufipes, Pseudophonus griseus. Cel mai mic număr de exemplare, câte unul, l-au avut speciile: Epicometis hirta, Coccinella 7-punctata, Cymindis humeralis, Cleonus piger, Coccinella 14-punctata, Opatrum sabulosum.*

Cuvinte cheie: Coleoptera, Capcana de tip Barber, fauna utilă

INTRODUCTION

Orchards as a type of agro-ecosystem comprise complex biocenosis, with a high degree of organization, multiple intra- and inter-specific relationships, primarily due to the perenniality of growing plants and secondly to the large volume of vegetative mass, thus approaching the natural ecosystems represented by forests. However, being artificial ecosystems, which make up unsaturated biocenosis, are susceptible to the attack of pests and phytopathogens, and the technological link of plant protection has an important role to play in achieving

¹ University of Agricultural Sciences and Veterinary Medicine from Iasi, Romania

high and constant yields. It is thus well known that the production potential of these horticultural schemes can be reduced by 20-30% or sometimes completely compromised due to the attack of diseases and pests.

Combating diseases and pests in apple and pear orchards with a view to keeping them below the economic threshold of harm requires 10-12 simple or combined treatments to be applied during a year (Baicu and Săvescu, 1978).

MATERIAL AND METHOD

The material was collected in 2018 from an apple plantation of The Teaching Resort Vasile Adamachi, Iasi. This was done by Barber-type soil traps, which were in number 6 at a time 3, also taking into account the protection distances. A 25 % concentration solution of NaCl has been put inside the traps (Tălmăciu *et al*, 2016). A number of four harvests were carried out throughout 2018, beginning in June until autumn in September at the following dates:

Harvesting I –a to 27.06.2018

Harvesting II to 30.07.2018

Harvesting III to 23.08.2018

Harvesting IV-a to 28.09.2018

Every one of the 4 harvest the fixing solution has been replaced, retaining all the captured material. It was brought to the laboratory where only the species of the coleopters were retained and then determined (Chatened du Gaetan, 1990; Panin, 1951; Reitter, 1908).

RESULTS AND DISCUSSIONS

- At the first harvest of 27.06, 9 species were caught, with a total of 192. The species collected 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* și *Cleonus piger*, each with one sample.
- In second harvest, from 30.07 a number of 15 species were collected, in total 210 specimens. The species collected were: *Harpalus distinguendus*, with 98 specimens; *Opatrum sabulosum* with 45 specimens; *Amara aenea*, with 19 specimens; *Amara familiaris*, with 12 specimens; *Dermestes lanarius* with 8 specimens; *Amara similata*, with 5 specimens; *Brachynus explodens*, with 4 specimens; *Calathus fuscipes*, *Anisodactylus signatus*, *Cantharis fusca* and *Brachynus crepitans*, each with 3 specimens; *Harpalus calceatus*, *Psylliodes attenuata* and *Halyzia 22-punctata*, with 2 samples and *Coccinella 14-punctata* with one specimen.
- In the third harvest, from date 23.08 a number of 15 species were captured, in total 142 specimens. The collected species were *Opatrum sabulosum* with 66 specimens; *Harpalus distinguendus*, with 39 specimens; *Dermestes lanarius* with 12 specimens; *Amara familiaris*, with 7 specimens; *Amara aenea*, with 4 specimens; *Pseudophonus rufipes*, with 3 specimens;

Brachynus crepitans and *Calathus fuscipes* with 2 specimens; *Carabus glabratus*, *Carabus violaceus*, *Carabus besseri*, *Brachynus explodens*, *Brosicus cephalotes*, *Zabrus tenebrioides* and *Psylliodes attenuata*, each with one samples.

- In fourth harvest a number of 12 species were captured, in total 472 specimens. The collected species were: *Pseudophonus rufipes*, with 350 specimens, *Pseudophonus griseus*, with 85 specimens, *Calathus fuscipes*, with 14 specimens, *Opatrum sabulosum*, with 5 specimens, *Carabus violaceus*, *Dermestes lanarius* and *Anisodactylus signatus*, each with 3 samples; *Carabus besseri*, *Zabrus tenebrioides*, *Dolichus halensis* and *Harpalus calceatus*, each with two specimens and one-samples for *Carabus glabratus*.

Table 1

The time of harvesting and the structure of the collected species

No	Name of species	Number of samles	Total
Harvesting I-a on 27.06.2018			
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	
Harvesting II-a on 30.07.2018			
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 fuscipes</i>	3	
9	<i>Anisodactylus signatus</i>	3	
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	
Harvesting III-a on 23.08.2018			
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	

Continued Table 1		
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
Harvesting IV-a on 28.09.2018		
1	<i>Pseudophonus rufipes</i>	350
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

472

Regarding the dynamics and abundance of collected species throughout the observation period the situation is the following (tab. 2).

Table 2

Structure, dynamics and abundance of the collected species of beetles

No.	Name of species	Harvests				Total
		27.06	30.07	23.08	28.09	
1	<i>Pseudophonus rufipes</i>	-	-	3	350	353
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

Continued Table 2						
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>Brosicus 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	472	1016

- one species, *Opatrum sabulosum*, was collected in all four harvesting dates;
- 5 species: *Harpalus distinguendus*, *Amara aenea*, *Amara familiaris*, *Dermestes lanarius*; *Calathus fuscipes* were collected on 3 of the 4 crops;
- 10 species: *Pseudophonus rufipes*, *Anisodactylus signatus*, *Brachynus explodens*, *Brachynus crepitans*, *Harpalus calceatus*, *Carabus violaceus*, *Psylliodes attenuata*, *Carabus besseri*, *Zabrus tenebrioides* and *Carabus glabratus*, were collected on 2 of the 4 harvests.
- a number of 12 species, *Pseudophonus griseus*, *Amara similata*, *Cantharis fusca*, *Panagaeus crux-major*, *Halyzia 22-punctata*, *Dolichus halensis*, *Epicometis hirta*, *Coccinella 7-punctata*, *Cymindis humeralis*, *Cleonus piger*, *Brosicus cephalotes* and *Coccinella 14 punctata* were collected at a single harvest.

Regarding the species with the highest number of specimens collected, they were (tab. 3): *Pseudophonus rufipes* with 353 specimens, *Opatrum sabulosum* with 201 specimens; *Harpalus distinguendus* with 195 specimens; *Pseudophonus griseus* with 85 specimens; *Amara aenea* with 48 specimens and *Amara familiaris* with 37 specimens.

Table 3
Structure and abundance of species with the highest number of specimens collected

No.	Name of species	Number of samples	% of total
1	<i>Pseudophonus rufipes</i>	353	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

CONCLUSIONS

1. In the period of observations, 4 harvests were carried out on the following dates:

- Harvesting I at 27.06.2018
- harvesting II at 30.07.2018
- Harvest III at 23.08.2018
- Harvest IV at 28.09.2018

2. A total of 1016 copies of beetles were collected as follows: 192 specimens were collected during on first harvesting; In harvest II, 210 specimens were collected; In the third harvest, 142 specimens were collected; In harvest IV, 472 specimens were collected.

3. A single species, *Opatrum sabulosum*, has been collected at each of the 4 harvests.

4. The species with the highest number of specimens collected were: *Pseudophonus rufipes* with 353 samples representing 57% of the total, *Opatrum sabulosum* with 201 samples representing 14% of the total; *Harpalus distinguendus* with 195 specimens, accounting for 13% of the total; *Pseudophonus griseus* with 85 specimens, accounting for 6% of the total; *Amara aenea* with 48 amples, representing 4% of total and *Amara familiaris* with 37 specimens, accounting for 3% of the total.

REFERENCES

1. Baicu T. and Săvescu A., 1978 - *Combaterea integrată în protecția plantelor*, Edit. Ceres București
2. Chatened du Gaetan, 1990 - *Guide des Coleopteres d'Europe*. Délacrois et Niestlé, Paris.
3. Panin I., 1951 - *Determinatorul Coleoptelor dăunătoare și folositoare din R.P.R.* Editura de Stat, București.
4. Reitter E., 1908 - *Fauna Germanica. Die Käfer des Deutschen Reiches Band I*, Stuttgart.
5. Rogojanu V., Perju T., 1979 - *Determinator pentru recunoașterea dăunătorilor plantelor cultivate*. Editura Ceres, București.
6. Tălmăciu M., Mocanu Ionela, Herea Monica, Tălmăciu Nela, Manole Liliana, 2016 - *Observations on Invertebrates Fauna Encountered in Some Agricultural Crops*, Full Paper Proceeding NDMRP, Istanbul, 2, p. 119-129
7. Tălmăciu Nela, Tălmăciu M., Herea Monica, 2010 - *Comparative research on the structure and abundance of beetles in some orchards*, Bulletin of University of Agricultural Sciences and veterinary medicine Cluj – Napoca, (vol 67 (1)), p.156-164.