

NEW CONTRIBUTIONS TO THE KNOWLEDGE OF THE BEETLES FAUNA OF PLUM ORCHARDS

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Abstract

Observations were made in 2015 in a plum fruit tree orchards of Pietrărie stationary from Bârnova belonging Iasi County. For the collection were used the soil traps Barber, the wet type. Six traps have been used in which was placed a solution of formalin concentrate 3-4%. They were made a total of seven harvests of traps on the following dates: 28.05; 30.05; 15.06; 12.07; 26.07; 10.08 and 23.08. For each collection were selected and then identified species of beetles collected. The determination was made by using manuals for the determination wrote by Panin S and Ritter E. or the Internet sources. Biggest species abundance were: *Dermestes lanarius* L., *Cyaninis cyanea* L., *Polydrosus sericeus* Schall., *Coccinella septempunctata* L. and *Amara aenea* Dejean.

Keywords: beetles fauna, ecological parameters, plum, traps.

1. 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 fruitgrowing plantations during the last years has significantly increased, one of the main causes being the longterm 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, Tălmăciu, 2011).

In the plum 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 plum tree plantations, under conditions of the Pietrărie stationary.

2. MATERIALS AND METHODS

In 2015, observations were done on a 15-year old plum tree plantation, where a chemical technology was applied (fertilizers, insecticides and fungicides allowed by intensive agriculture).

For Coleoptera harvesting, we have used 6 Barber-type traps that were placed on the tree rows, at the distance of 8 – 10 m, on one rows (Varvara et al., 1995; Tălmăciu et al., 1996; Tălmăciu et al., 1998; Butnariu et al 2015). Inside the traps, we use a solution with 3 – 4 % concentration formol. The material was sampled at intervals of 10-15 days, during May- August. At each material sampling, collected coleoptera were determined in laboratory (Reitter, 1908; Panin, 1951; Panin, 1952; Rogojanu and Perju, 1979; Chatenet du Gaetan, 1990).

3. RESULTS AND DISCUSSIONS

The structure of coleopteran fauna collected in the plum orchard in the Pietrari stationary represents in total of six traps that were located and harvested in August 2015.

This aims study at identifying and centralizing useful and harmful coleopteran species in the studied area and, last but not least, their involvement in balancing the ecosystem.

The structure, dynamics and abundance of the collected species in 2015, from the Pietrari stationary, to the Rivers timpuriu variety it was presented in table 1.

At the first trap following the seven harvests, a number of 27 invertebrates belonging to seven insect species were collected as follows: *Polydrosus amoenus*, *Coccinella septempunctata*, *Dermestes lanarius*, *Polydrosus sericeus*, *Tomoxia biguttata*, *Anisodactylus binotatus*, *Chilopoda longitarsis*.

Table 1. Structure and abundance of coleopteran species collected at trap no.1

No	Name of species	Harvest							Total
		1	2	3	4	5	6	7	
		28.05	30.05	15.06	12.07	26.07	10.08	23.08	
1.	<i>Polydrosus amoenus</i> Schall	-	-	-	-	9	-	-	9
2.	<i>Coccinella septempunctata</i> L.	5	-	-	-	-	-	-	5
3.	<i>Dermestes lanarius</i> Illig	-	-	-	3	-	-	-	3
4.	<i>Polydrosus sericeus</i> Schall	3	-	-	-	-	-	-	3
5.	<i>Tomoxia biguttata</i> Gyll.	-	-	-	-	3	-	-	3
6.	<i>Anisodactylus binotatus</i> F.	-	-	-	2	-	-	-	2
7.	<i>Chilopoda longitarsis</i> Verhoeff	-	-	-	-	2	-	-	2
TOTAL 7 species		8	-	-	5	14	-	-	27

Table 2. Structure and abundance of coleopteran species collected at trap no.2

No	Name of species	Harvest							Total
		1	2	3	4	5	6	7	
		28.05	30.05.	15.06.	12.07.	26.07.	10.08.	23.08.	
1.	<i>Cyaninis cyanea</i> F.	-	-	-	-	-	15	-	15
2.	<i>Dermestes lanarius</i> Illig.	-	-	-	-	6	3	-	9
3.	<i>Balanimis glandium</i> Schr.	-	2	-	5	-	-	-	7
4.	<i>Chilopoda longitarsis</i> Verhoeff	-	-	-	-	-	-	5	5
5.	<i>Coccinella septempunctata</i> L.	-	-	-	4	-	-	-	4
6.	<i>Amara aenea</i> De Geer.	-	-	-	-	3	-	-	3
7.	<i>Necrophorus vespillo</i> L.	-	-	-	-	-	3	-	3
8.	<i>Tomoxia biguttata</i> Illig	-	-	-	-	-	-	2	2
9.	<i>Polydrosus sericeus</i> Schall	-	-	-	-	-	-	1	1
TOTAL 9 species		-	2	-	9	9	21	8	49

For a good presentation of the results obtained from the researches regarding the entomofauna collected in the six traps, a graphical representation of the collections of the total number of specimens from the period studied in the Pietrarie stationary was made (Figure 1).

At the second trap (Table 2), the total number of specimens was 49 after harvesting from the six traps, and these belong to a number of nine species of coleoptera, as follows: *Cyaninis cyanea*, *Dermestes lanarius*, *Balanitis glandium*, *Chilopoda longitarsis*, *Coccinella septempunctata*, *Amara aenea*, *Necrophorus vespillo*, *Tomoxia biguttata*, *Polydrosus sericeus*.

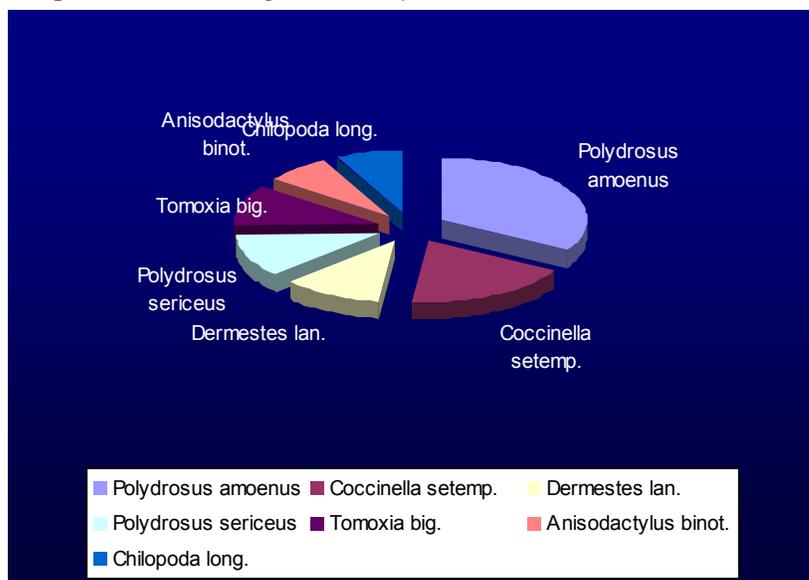


Figure 1. Graphic representation of the species collector collected in 2015

In the third trap (Table 3) there were collected 7 species of coleoptera, which totalized 28 specimens at the end of the seven harvesting period, and among them were the following: *Polydrosus sericeus*, *Amara aenea*, *Coccinella septempunctata*, *Harpalus calceatus*, *Silpha obscura*, *Cymindis vaporariorum*, *Podonta nigrita*.

As a result of the harvests of the vegetation period, the number four (Table 4) trapped a total of 8 species with 39 specimens, and these were: *Harpalus distinguendus*, *Dermestes lanarius*, *Polydrosus sericeus*, *Tomoxia biguttata*, *Ophonus azureus*, *Cymindis vaporariorum*, *Galeruca pomonae*, *Coccinella septempunctata*.

Table 3. Structure and abundance of coleopteran species collected at trap no.3

No	Name of species	Harvest							Total
		1	2	3	4	5	6	7	
1.	<i>Polydrosus sericeus</i> Schall	9	-	-	-	-	-	3	12
2.	<i>Amara aenea</i> De Geer	-	4	-	-	-	-	-	4
3.	<i>Coccinella septempunctata</i> L.	-	-	-	3	-	-	-	3
4.	<i>Harpalus calceatus</i> Duft	-	-	3	-	-	-	-	3
5.	<i>Silpha obscura</i> L	-	-	-	-	-	-	2	2
6.	<i>Cymindis vaporariorum</i> L.	-	-	-	-	-	-	2	2
7.	<i>Podonta nigrita</i> F.	-	-	2	-	-	-	-	2
TOTAL 7 species		9	4	5	3	-	-	7	28

Table 4. Structure and abundance of coleopteran species collected at trap no.4

No	Name of species	Harvest							Total
		1	2	3	4	5	6	7	
		28.05	30.05.	15.06.	12.07.	26.07.	10.08.	23.08.	
1.	<i>Harpalus distinguendus</i> Duft.	-	12	-	-	-	-	-	12
2.	<i>Dermestes lanarius</i> Illig.	-	-	-	-	-	-	-	12
3.	<i>Polydrosus sericeus</i> Schall	9	-	-	-	-	-	-	9
4.	<i>Tomoxia biguttata</i> Illig	-	2	-	-	-	-	3	5
5.	<i>Ophonus azureus</i> Dejean	-	-	-	-	5	-	-	5
6.	<i>Cymindis vaporariorum</i> L.	-	-	-	-	-	4	-	4
7.	<i>Galeruca pomonae</i> Scopoli	-	-	2	-	-	-	-	2
8.	<i>Coccinella septempunctata</i> L.	-	-	-	-	-	2	-	2
TOTAL 8 species		9	14	2	-	5	6	3	39

Trap number five did not record any coleopteran species throughout the seven harvests.

The trap number six (Table 5) recorded a number of three species, totaling 41 specimens represented by: *Cyaniris cyanea*, *Dermestes lanarius* si *Polydrosus sericeus*.

Table 5. Structure and abundance of coleopteran species collected at trap no.6

No	Name of species	Harvest							Total
		1	2	3	4	5	6	7	
		28.05	30.05.	15.06.	12.07.	26.07.	10.08.	23.08.	
1.	<i>Cyaniris cyanea</i> F.	-	-	-	-	-	-	19	19
2.	<i>Dermestes lanarius</i> Illig.	-	-	-	-	-	-	18	18
3.	<i>Polydrosus sericeus</i> Schall	-	-	4	-	-	-	-	4
TOTAL 3 species		-	-	4	-	-	-	37	41

After the centralization of the seven harvests from the six traps of Pietrarie station, we recorded a total of 184 specimens of coleoptera (Table 6).

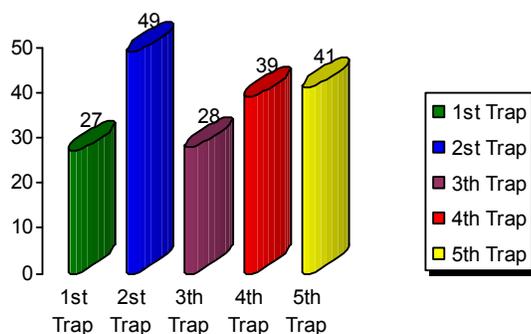
The graphical representation (figure 2) shows the distribution of the number of specimens belonging to the species collected during the year 2015 in the Pietrarie stationary as follows: in the trap number 2 recorded 49 copies, in the trap number 5 were recorded 41 copies, At trap 9 were 39 copies, and traps 1 and 2 were balanced, with 27 or 28 copies being recorded.

Table 6. Structure and abundance of coleopteran species collected at the 5 traps

No	Name of species	Harvest							Total
		1	2	3	4	5	6	7	
		28.05	30.05.	15.06.	12.07.	26.07.	10.08.	23.08.	
1.	Trap1	8	-	-	5	14	-	-	27
2.	Trap 2	-	2	-	9	9	21	8	49
3.	Trap 3	9	4	5	3	-	-	7	28
4.	Trap 4	9	14	2	-	5	6	3	39
5.	Trap 5	-	-	-	-	-	-	-	0
6.	Trap 6	-	-	4	-	-	-	37	41
TOTAL 34 species		26	20	11	17	28	27	55	184

Table 7. Values ecological indices of species (taxons) in 2015, from Pietrarie stationary, the Rivers early variety

No.	Species or taxa	ECOLOGICAL INDICES			
		A	C	D	W
1.	<i>Dermestes lanarius</i> Illig	42	17.86	22.83	4.07
2.	<i>Cyaniris cyanea</i> F	34	7.14	18.48	1.32
3.	<i>Polydrosus sericeus</i> Schall	26	17.86	14.13	2.52
4.	<i>Coccinella septempunctata</i> L	14	14.29	7.61	1.09
5.	<i>Harpalus distinguendus</i> Duft.	12	3.57	6.52	0.23
6.	<i>Polydrosus amoenus</i> Schall	9	3.57	4.89	0.17
7.	<i>Tomoxia biguttata</i> Illig	8	10.71	4.35	0.47
8.	<i>Chilopoda longitarsis</i> Verhoeff	7	7.14	3.80	0.27
9.	<i>Amara aenea</i> De Geer.	7	7.14	3.80	0.27
10.	<i>Cymindis vaporariorum</i> L.	6	7.14	3.26	0.23
11.	<i>Ophonus azureus</i> Dejean.	5	3.57	2.72	0.10
12.	<i>Necrophorus vespillo</i> L.	3	3.57	1.63	0.06
13.	<i>Harpalus calceatus</i> Duft	3	3.57	1.63	0.06
14.	<i>Anisodactylus binotatus</i> F.	2	3.57	1.09	0.04
15.	<i>Balaninus glandium</i> L.	2	3.57	1.09	0.04
16.	<i>Silpha obscura</i> L	2	3.57	1.09	0.04
17.	<i>Podonta nigrita</i> F.	2	3.57	1.09	0.04
18.	<i>Galeruca pomonae</i> Scopoli.	2	3.57	1.09	0.04
Total 18 species		184 collected specimens			

**Figure 2. Structure and abundance of coleopteran species collected at the 5 traps**

The 10 species with the highest number of collected samples had 184 specimens, 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 7). As concerns the abundance of the 18 collected species, we found that during the observation period, between 1 and 184 specimens were collected.

4. CONCLUSIONS

In 2015, in the fruit-growing plantations belonging to the Pietrarie stationary, Barber-type traps were installed for collecting species of epigeous coleoptera. These traps functioned from May until August.

A number of 7 gatherings of the collected material were carried out on the following dates: May 28, May 30, June 15, July 12, July 26, August 10, August 23. The collected coleoptera (184 specimens) belong to 18 species.

The species with the highest number of collected specimens were: *Dermestes lanarius* (42 specimens), *Cyaniris cyanea* (34 samples), *Polydrosus sericeus* (26 samples), *Coccinella septempunctata* (14 samples), *Harpalus distinguendus* (12 samples), *Polydrosus amoenus* (9 samples), *Tomoxia biguttata* (8 samples), *Chilopoda longitarsis* (7 samples), *Amara aenea*, *Cymindis vaporariorum* (6 samples).

6. REFERENCES

- Baicu, T., Săvescu, A. (1986). Sisteme de combatere integrată a bolilor și dăunătorilor pe culturi [Systems of disease and pest integrated control in crops], *Edit. Ceres*, p.226 – 233, București.
- Butnariu, G., Tălmăciu, M., Tălmăciu, N., Herea, M. (2015). Observation on the structure and ecological parameters of the population of invertebrates in plum orchards, *Lucrări Științifice, seria Horticultură*, U.S.A.M.V. 58(1), 221-226.
- Gaetan, C. (1990). Guide des Coléoptères d'Europe. *Delacrois et Niestlé*, Paris.
- Diaconu, A. et al. (2004). Rezerva hibernantă a unor dăunători ai mărului în condițiile diferite de protecție fitosanitară [Hibernating stock of apple tree pests under different conditions of phytosanitary protection]. *Lucrări științifice, seria Horticultură* U.S.A.M.V., I/47, 1187 – 1192.
- Panin, I. (1951). Determinatorul Coleoptelilor dăunătoare și folositoare din Republica Populară Română [Determinator of damaging and useful coleoptera from Romania]. *Edit. de Stat*, București.
- Reitter, E. (1908). Fauna Germanica. *Die Käfer des Deutschen Reiches. Band I*, Stuttgart.
- Rogojanu, V., Perju, T. (1979). Determinator pentru recunoașterea dăunătorilor plantelor cultivate [Determinator for knowing the crop pests]. *Edit. Ceres*, București.
- Tălmăciu, M., Georgescu, T., Filipescu, C., Bădeanu, M. (1996). Studii asupra structurii și abundenței speciilor de carabide din cultura viței de vie [Studies on the structure and abundance of Carabidae species in vine]. *Rev. Cercetări Agronomice în Moldova*, p 98-103, Iași.
- Tălmăciu, M., Georgescu, T., (1998). Fauna de Carabide (Coleoptera – Carabidae) din plantațiile de viță de vie din Moldova [Carabide fauna (Coleoptera – Carabidae) from vine plantations in Moldavia]. *Edit "Ion Ionescu de la Brad"*, Iași.
- Tălmăciu, M., Tălmăciu, N., Herea, M. (2011). Research on the Population Structure, Dynamics, and Abundance of Coleoptera Species in Sweet Cherry and Sour Cherry Plantations. *International symposium on plant protection Book Series: Acta Horticulturae*, 917, 119-124, International horticultural congress on science and horticulture for people (IHC2010).
- Varvara, M., Tălmăciu, M., Georgescu, T. (1995). Diversitatea carabidelor (ord. Coleoptera – Carabidae) în cultura viței de vie din Moldova [Diversity of Carabidae (ord. Coleoptera – Carabidae) in vines from Moldavia]. *Rev. Cercetări Agronomice în Moldova*, I- II, 111-116.