

OBSERVATIONS REGARDING ON EXISTING ENTOMOFAUNA FROM WALNUT ORCHARDS

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Abstract

The observations were made during the two years, 2019 and 2020 in a plantation belonging walnut fruit from Iasi County in the chemical treated stationary, in both years. The material collection was done with traps type Barber from May until August at intervals between 10 and 20 days. Collection of 2019 was made on the following dates: 20.05, 30.05, 15.06, 5.07, 25.07, 10.08 and 23.08. In total 2019 were collected 265 samples belonging to 22 species (taxa). Species (taxa) with the largest number of samples collected were *Dermestes lanarius* L. 42 samples Heteroptera (bedbugs) with 38 samples, and *Polydrosus sericeus* Schall. 26 samples. In 2020 collection of the biological material was made on the following dates: 10.05, 22.05, 18.06, 06.07, 29.07, 15.08, 05.09. In total in 2020 were collected 744 samples belonging to 41 species (taxa) with the highest number of samples were collected: Hymenoptera (bees) with 92 samples, Orthoptera (locusts) with 87 samples, Lepidoptera (larvae) with 37 samples, Araneida (spiders) with 33 samples and Homoptera (cycads) with 31 samples.

Keywords: Barber traps, entomofauna, walnut orchard.

1. INTRODUCTION

In the complex of control measures to ensure the health of trees, an important role has recently returned to chemical control.

Control must be applied in accordance with the new ecological concept of integrated control, which consists of a system for regulating pest populations, taking into account the specific flight and dynamics of pest and zoophagous species, using harmoniously all methods of pest control. control (agro-phytotechnical, physical-mechanical, biological and chemical), in order to maintain the density of pests or their attack at a level that does not produce crop losses.

This integrated control system is a set of methods, means, products that are applied according to various criteria in crop technology to reduce losses.

It is necessary to take into account taxonomic studies (determination of host and parasite species), biological studies (food source, mode of attack and feeding, stages of development, duration of each stage, mode of multiplication, the number of generations), ecology studies (influence of climatic factors, establishing the relations between the attacked and harmful species, between pests and parasitic species, the importance of parasites in limiting the pest population).

These studies offer the possibility of directed human intervention, in order to reduce damage and restore biocenotic balances in ecosystems and they will be the basis for the judicious preparation of biological and integrated pest control schemes.

2. MATERIALS AND METHODS

In 2019 and 2020 there were collected the entomofauna of invertebrates existing in walnut orchards. To establish biodiversity, ecological dynamics and calculation of indices such as (Talmaciu, 2005) abundance (A), constance (C) dominance (D), the index of ecological significance (W) etc. In a walnut plantation were placed the soil traps type Barber for our research for all type of arthropods. There were a number of 6 traps installed in a walnut plantation from Iasi (Butnariu, 2020). These pots consisted of approximately 800 ml capacity which was placed a solution of salt in a 20% concentration (Herea, 2019). The traps were installed in April- May and worked until August to September, over two years.

The material who was collected were removed from plant debris, soil particles and other material, whichever is only arthropods fauna.

To follow the dynamics of species of invertebrates collected, there have been periodic harvests of traps, samples each time tagging, labeling specifying the number and date of collection trap.

In both years of observations have been made by 7 harvests of the collected material, covering in this way almost the entire growing season of trees.

3. RESULTS AND DISCUSSIONS

In 2019 in total, 1-6 traps were collected 255 specimens belonging to more groups of species (taxa) (Ritter,1908) (Rogojanu and Perju, 1979). Most specimens were collected from the harvest VII, 71, followed by harvesting the fifth, sixth 51 specimens and 41 specimens of the sixth harvest. The few specimens were collected from harvesting II-IV, between 17 and 26 samples.

In the 6 traps at 7 harvests there were collected the specimens belonging to a number of 22 species, the species with the highest number of specimens collected are: *Dermestes lanarius* 42 specimens, *Heteroptera* (bedbugs), with 38 specimens, *Cyaniris cinerea* with 29 specimens and 26 specimens *Polydrosus sericeus*. The lowest number of specimens, they had two species: *Anisodactylus binotatus* F., *Balanitis glandium* L., other species (taxa) that *Podonta nigra* F. and *Silpha obscura* had between 3 and 14 pieces (Tab. 1)

Referring to the number of traps that each species was collected in 2019 from the walnut plantations shows the following in table 1. The most frequently collected species were *Heteroptera* in 10 traps, followed by species *Dermestes lanarius* L. *Polydrosus sericeus*, collected by 5 traps, *Coccinella septempunctata* into 4 traps species of *Homoptera* (cycads) and *Tomoxia biguttata* in by 3 traps, the other species were collected only in one or two traps.

For a deeper analysis of how the results were calculated a number of leading ecological indexes such as abundance (A), consistency (C) dominance (D) and the ecological significance index (W).

These indicators were calculated with the results centralized in 2019 (tab. 2) for the all collected species of arthropods.

- The Abundance largest had a species: (42 specimens), species *Heteroptera* (38 specimens), *Cyanis cinerea* (34 specimens), *Polydrosus sericeus* Schall (26 specimens), *Coccinella septempunctata* L (14 specimens), *Homoptera* (cycads) and *Harpalus distinguendus* Duft (12 specimens). The other species had between 2 and 9 specimens.

Table 1. The species (taxons) and the number of specimens collected in 2019, from walnut orchards in Iași

Nr.	Name of species (taxa)	28.05.	30.05	15.06	12.07	26.07.	10.08.	23.08.	Total
1.	<i>Dermestes lanarius</i>	-	-	-	3	6	3	12+18	42
2.	<i>Anisodactylus binotatus</i> F.	-	-	-	2	-	-	-	2
3.	<i>Polydrosus sericeus</i> Schall	9+3+9	-	4	-	-	-	1	26
4.	<i>Coccinella septempunctata</i>	5	-	7	4+3	-	2	-	14
5.	<i>Polydrosus amoenus</i> Schall	-	-	-	-	9	-	-	9
6.	<i>Tomoxia biguttata</i>	-	2	-	-	3	-	3	8
7.	<i>Chilopoda longitarsis</i>	-	-	-	-	2	-	-	7
8.	<i>Heteroptere</i> (bedbugs)	2	-	3+5	-	3+2+4	12+3+3	1	38
9.	<i>Balanitis glandium</i> L.	-	2	-	-	-	-	-	2
10.	<i>Amara aenea</i>	-	4	-	-	3	-	-	7
11.	<i>Necrophorus vespillo</i> L.	-	-	-	-	-	3	-	3
12.	<i>Cyaninis cyanea</i> F	-	-	-	-	-	10	19	34
13.	<i>Homoptere</i> (cycads)	-	-	-	-	6	-	3+3	12
14.	<i>Silpha obscura</i>	-	-	-	-	-	-	2	2
15.	<i>Hymenoptera</i> (wasp)	-	3	-	-	-	-	2	5
16.	<i>Cymindis vaporariorum</i> L.	-	-	-	-	-	4	2	6
17.	<i>Harpalus calceatus</i> Duft	-	-	3	-	-	-	-	3
18.	<i>Podonta nigrita</i> F.	-	-	2	-	-	-	-	2
19.	<i>Galeruca pomonae</i>	-	-	2	-	-	-	-	2
20.	<i>Armadillidium vulgare</i>	-	3	-	-	-	-	-	3
21.	<i>Harpalus distinguendus</i>	-	12	-	-	-	-	-	12
22.	<i>Ophonus azureus</i>	-	-	-	-	5	-	-	5
Total 22 species		28	26	19	17	51	41	71	255

- Constancy of collected species ranged between 3.7 and 35.71. The species with the highest values of constancy were *Heteroptera* (35.71) *Polydrosus sericeus* Schall and *Dermestes lanarius* L. (17.85), *Coccinella septempunctata* (14.28), *Homoptera* (cycads) and *Tomoxia biguttata* (10.71). The lowest values of constancy (3.57) have had a total of 10 species, namely: *Polydrosus amoenus* Schall., *Ophonus azureus* F., *Necrophorus vespillo* L., *Harpalus calceatus* Duft, *Armadillidium vulgare* L., *Anisodactylus binotatus* F., *Balaninus glandium* L., *Podonta nigra* F. and *Galeruca pomonae* F.

- Dominance (D) had the highest values species: *Dermestes lanarius* (17.23), *Heteroptera* (15.57), *Cyaniris cyanea* (13.93), *Polydrosus sericeus* (10.65) and *Coccinella septempunctata* (5.73). The other species had values less than 5.00 dominance;

- Ecological significance of the index (W) had values greater than 1.00 at a number of 3 species. These were: *Heteroptera* - bedbugs (5.56) *Dermestes lanarius* L. (3.07) and *Polydrosus sericeus* (1.90).

The large groups of taxa species collected the situation is as follows (tab. 3 fig. 1):

-The *Coleoptera* species are the most numerous, accounting for 76.25% of the total followed by *Heteroptera* with 15.51% of the total;

-The lowest share, 5% have had *Homoptera* (4.03%), *Hymenoptera* (2.96%) and *Isopoda* (1.25%).

Table 2. Values of ecological indices of species (taxons) in 2019, in the walnut orchards from Iași

No.	Name of species (taxa)	ECOLOGICAL INDEX			
		A	C	D	W
1.	<i>Dermestes lanarius</i>	42	17.85	17.23	3.07
2.	<i>Heteroptera (bedbugs)</i>	38	35.71	15.57	5.56
3.	<i>Cyaninis cyanea</i> F.	34	7.14	13.93	0.99
4.	<i>Polydrosus sericeus</i> Schall	21	17.85	10.65	1.90
5.	<i>Coccinella septempunctata</i>	14	14.28	5.73	0.81
6.	<i>Homoptera (cycade)</i>	12	10.71	4.91	0.52
7.	<i>Polydrosus amoenus</i> Schall	9	3.57	3.68	0.13
8.	<i>Tomoxia biguttata</i>	8	10.71	3.28	0.35
9.	<i>Chilopoda longitarsis</i>	7	7.14	2.86	0.20
10.	<i>Amara aenea</i>	7	7.14	2.86	0.23
11.	<i>Harpalus distinguendus</i>	12	3.57	4.96	0.18
12.	<i>Cymindis vaporariorum</i> L.	6	7.14	2.46	0.18
13.	<i>Hymenoptera(wasp)</i>	5	7.14	2.05	0.15
14.	<i>Ophonus azureus</i>	5	3.57	2.04	0.07
15.	<i>Necrophorus vespillo</i> L.	3	3.57	1.23	0.04
16.	<i>Harpalus calceatus</i> Duft	3	3.57	1.23	0.04
17.	<i>Armadillidium vulgare</i>	3	3.57	1.23	0.03
18.	<i>Anisodactylus binotatus</i> F.	2	3.57	0.82	0.03
19.	<i>Balaninus glandium</i> L.	2	3.57	0.82	0.03
20.	<i>Harpalus distinguendus</i>	3	3.57	1.23	0.04
21.	<i>Podonta nigrita</i> F.	2	3.57	0.82	0.03
22.	<i>Galeruca pomonae</i>	2	3.57	0.82	0.03
Total 22 species		255 collected samples			

Table 3. The structure of the collected entomofauna of walnut plantations, in 2019, groups of taxons

No.	Taxa	No. of collected samples	% total (255)
1.	Coleoptera	186	76.25
2.	Heteroptera	38	15.51
3.	Homoptera	12	4.03
4.	Hymenoptera	5	2.96
5.	Isopoda	3	1.25
TOTAL	5 taxa	255	100

In 2020 in total, of 6 traps were collected 756 specimens belonging to several groups of species (taxa) (Ritter 1908) (Rogojanu and Perju 1979). The most specimens were collected from the harvest III, 218, followed by harvesting fourth, 99 specimens and VII of the harvest to 97 specimens. The few specimens were collected from 72 specimens fifth harvesting.

At the 6 traps at 7 harvests were collected specimens belonging to a number of 41 species, the species with the highest number of specimens collected are: Hymenoptera 92 specimens, Orthoptera (grasshoppers) with 87 specimens, Lepidoptera (larvae) 42 specimens, Araneide, Hymenoptera (ants) with 33 specimens, Homoptera (cycads) 31 specimens, Hymenoptera (wasps) with 30 specimens Diptera (larvae) with 29 specimens, Galeruca tanacetii 25 specimens, Opatrum sabulosum 24 specimens, Diptera (adults) with 23 specimens, Coccinella conglobata 21 specimens Ontophagus ovatus and Hymenoptera (ants) with 20 specimens, Dermestes lanarius 18 specimens Ceutorhinchus crucifer and Ontophagus taurus 17 specimens, Polydrosus sericeus 16 specimens

Gastropoda 13 specimens *Tomoxia biguttata* , *Polydrosus amoeus* and *Harpalus calceatus* 12 specimens and 11 specimens *Amara aenea* (tab. 4)

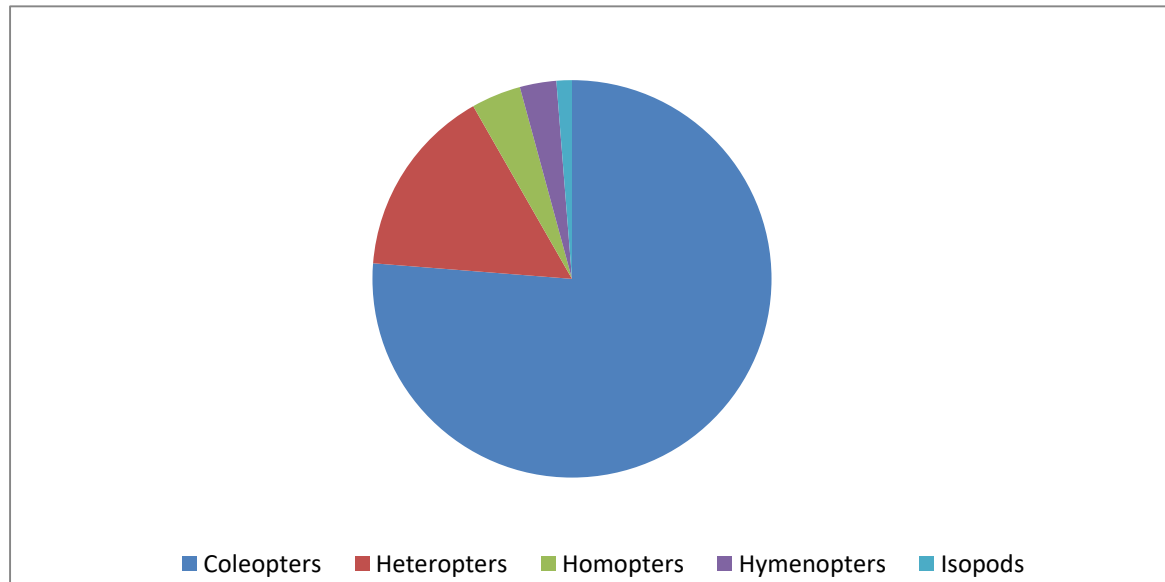


Figure 1. The structure of collected taxons from walnut plantations in 2019

Other species recorded a number equal to or less than 10 specimens.

For a deeper analysis of how the results were calculated a number of leading ecological indexes such as abundance (A), constancy (C) dominance (D) and ecological significance index (W).

These indicators was calculated in 2020 for all species or taxa collected in walnut orchards and that is as follows (tab. 5)

The Abundance most had a species: *Hymenoptera* (bees) (92 specimens), *Orthoptera* (locusts) (87 specimens), *Lepidoptera* (larvae) (37 specimens), *Hymenoptera* (wasps) (36 specimens), *Araneide*, *Hymenoptera* (ants) (33 specimens), *Homoptera* (cycads) (31 specimens), *Opatrum sabulosum* (26 specimens), *Galeruca tanacetii* (25 specimens), *Coccinella conglobata* (21 specimens), *Ontophagus ovatus* (20 specimens), *Dermestes laniarius* (18 specimens), *Diptera* (larvae) and *Ontophagus taurus* (17 specimens), *Polydrosus sericeus* (16 specimens), *Harpalus distinguendus* and *Gastropoda* (13 specimens) *Polydrosus amoeus* and *Tomoxia biguttata* and *Harpalus calceatus* (12 specimens), *Amara aenea* (11 specimens) *Hister purpurascens* and *Heteroptera* (bugs)(1 specimens). The other species had between 2 and 9 specimens;

- The Constancy collected species ranged between 2.70 and 37.83. The species with the highest values of constancy were *Orthoptera* (grasshoppers (37.83), *Lepidoptera* (larvae) (29.73), *Hymenoptera* (wasps) and *Araneide* (27.02), *Hymenoptera* (bees) (24.32), adults *Diptera* (21.62), *Galeruca tanacetii* (16.22), *Opatrum sabulosum* and *Hymenoptera* (ants) (10,81). the lowest values of constancy under (8.12) have had a number of 7 species of which: *Harpalus distinguendus* Duft., *Gastropoda*, *Dermestes laniarius*, *Diptera* (larvae) and *Homoptera* (cycads).

- Dominance (D) had the highest values species: *Hymenoptera* (bees) (12.36), *Orthoptera* (11.39), *Lepidoptera* (adults) (11.21), and other species showed values between 0-14 and 4.43.

- Index of ecological significance (W) had higher values of 1.00 to a total of five species. These were: *Orthoptera* (locusts) (4.42), *Hymenoptera* (bees) (3), *Lepidoptera* (larvae) (1.48) *Araneide* (1.19), *Hymenoptera* (wasps) (1.08)

Table 4. The species (taxons) and the number of samples collected in 2020

No	Name of species (taxa)	07.05	21.05	07.07	04.08	04.09	12.09	27.09	Total
1.	<i>Pterostichus niger Sch</i>	3	-	-	-	-	-	-	3
2.	<i>Araneida</i>	2+8	-	3+5+2+2	3	-	3+2	3	33
3.	<i>Diptera (adults)</i>	1+6+1	2+2	5	3	-	-	3	23
4.	<i>Opatrum sabulosum</i>	8+6	-	-	-	-	-	6+6	26
5.	<i>Hymenoptera (wasp)</i>	6+2	-	1	6+3+6	3	-	3	30
6.	<i>Harpalus distinguendus</i>	8	-	-	-	-	-	-	8
7.	<i>Gastropoda</i>	-	2	-	-	6	-	5	13
8.	<i>Tomoxia biguttata</i>	-	6	6	-	-	-	-	12
9.	<i>Hister purpurascens</i>	-	-	5	-	5	-	-	10
10.	<i>Hymenoptera (bees)</i>	2	5	20+10+21+8+9	-	6+3+10	-	-	92
11.	<i>Galeruca tanacetii</i>	3	-	4	6	3	3+3	6	25
12.	<i>Harpalus calceatus</i>	-	-	6+6	-	-	-	-	12
13.	<i>Lepidoptera (larva)</i>	1+5	4+8+3	5	1+3+2+2	-	-	3	37
14.	<i>Dermestes lanarius</i>	-	-	-	3	6	-	9	18
15.	<i>Hymenoptera (ants)</i>	-	20	8	5	-	-	-	33
16.	<i>Armadillidium vulgare</i>	-	-	-	3	-	-	-	3
17.	<i>Orthoptera (locust)</i>	-	9+6	2+2	-	3+3+12	9+26	6+6+3	87
18.	<i>Harpalus distinguendus</i>	-	-	-	-	5	-	-	5
19.	<i>Diptera (larva)</i>	1+2	-	4	12	-	-	10	29
20.	<i>Ceutorhynchus crucifer</i>	2	4	6+5	-	-	-	-	17
21.	<i>Blaps lethifera</i>	-	-	3	-	-	-	-	3
22.	<i>Orthoptera (Gryllus)</i>	3	-	-	-	3	-	-	6
23.	<i>Onthophagus taurus</i>	-	-	-	-	-	15+2	-	17
24.	<i>Cantharis fusca.</i>	3	-	5	-	-	-	-	3
25.	<i>Polydrosus sericeus</i>	3	-	-	9	-	4	-	16
26.	<i>Homoptera (cycads)</i>	-	6	13	-	-	12	-	31
27.	<i>Carabus scabriusculus</i>	-	5	-	-	-	-	-	5
28.	<i>Leipidoptere (adults)</i>	-	-	3+3	-	-	3	-	9
29.	<i>Amara aenea</i>	-	2	9	-	-	-	-	11
30.	<i>Pseudophonus griseus</i>	-	-	8	-	-	-	-	8
31.	<i>Coccinella conglobata</i>	-	-	-	12+9	-	-	-	21
32.	<i>Anisodactylus binotatus</i>	-	-	-	-	5	-	4	4
33.	<i>Calathus fuscipes Gaeze</i>	4	-	-	-	-	-	-	4
34.	<i>Hymenoptera (ants)</i>	-	20	-	-	-	-	-	20
35.	<i>Polydrosus amoeus</i>	-	-	5	6+6	-	-	-	12
36.	<i>Carabus coriaceus</i>	-	-	-	-	-	3+3	-	6
37.	<i>Onthophagus ovatus</i>	-	-	5	-	-	-	6+9	20
38.	<i>Homoptera (aphids)</i>	8	-	-	-	-	-	-	8
39.	<i>Collembola</i>	2	-	-	-	-	-	-	2
40.	<i>Adalia bipunctata</i>	-	-	-	3	-	-	-	3
41.	<i>Heteroptera (bedbug)</i>	-	-	10	-	-	-	-	10
Total 41 species		90	90	218	99	72	90	97	756

The large groups of taxa species collected the situation is as follows (tab. 6, fig. 2):

- Beetles are the most numerous, accounting for 38.70% of the total followed by Hymenoptera with 23.52% of the total;
- The lowest share, 5% have had *Araneide* (4.43%), *Gastropoda* (1.74%) and *Collembola* (0.27%).

Table 5. The values of ecological indices for species (taxons) in 2020, in the walnut orchard

NO.	Name of species (taxa)	ECOLOGIC INDEX			
		A	C	D	W
1.	<i>Pterostichus niger</i> Schall	3	2.70	0.40	0.01
2.	<i>Araneida</i>	33	27.02	4.43	1.19
3.	<i>Diptera (adults)</i>	23	21.62	3.09	0.67
4.	<i>Opatrum sabulosum</i>	26	10.81	3.49	0.38
5.	<i>Hymenoptera (wasp)</i>	36	27.02	4.03	1.08
6.	<i>Harpalus distinguendus</i>	13	8.11	1.75	0.14
7.	<i>Gastropoda</i>	13	8.11	1.75	0.14
8.	<i>Tomoxia biguttata</i>	12	5.41	1.61	0.09
9.	<i>Hister purpurascens</i>	10	5.41	1.34	0.07
10.	<i>Hymenoptera (beens)</i>	92	24.32	12.36	3.00
11.	<i>Galeruca tanaceti</i>	25	16.22	3.36	0.54
12.	<i>Harpalus calceatus</i>	12	5.41	1.61	0.09
13.	<i>Lepidoptera (larva)</i>	37	29.73	4.97	1.48
14.	<i>Dermestes lanarius</i>	18	8.11	2.41	0.20
15.	<i>Hymenoptera (ants)</i>	33	10.81	4.43	0.48
16.	<i>Armadillidium vulgare</i>	3	2.70	0.40	0.01
17.	<i>Orthoptera (locust)</i>	87	37.83	11.69	4.42
18.	<i>Diptera (larva)</i>	17	8.11	2.28	0.18
19.	<i>Ceutorhynchus crucifer</i>	3	2.70	0.40	0.01
20.	<i>Blaps lethifera</i>	6	5.40	0.80	0.04
21.	<i>Orthoptera (Gryllus)</i>	3	2.70	0.40	0.01
22.	<i>Onthophagus taurus</i>	17	5.40	2.28	0.121
23.	<i>Polydrosus sericeus</i> Schall	16	8.11	2.15	0.17
24.	<i>Homoptera (cycads)</i>	31	8.11	4.17	0.34
25.	<i>Carabus scabriusculus</i>	5	2.70	0.67	0.02
26.	<i>Leipidoptere (adults)</i>	9	8.1	11.21	0.09
27.	<i>Amara aenea</i>	11	5.40	1.48	0.08
28.	<i>Pseudophonus griseus</i>	8	2.70	1.08	0.03
29.	<i>Coccinella conglobata</i>	21	5.40	2.82	0.15
30.	<i>Anisodactylus binotatus</i> F	7	5.40	0.14	0.05
31.	<i>Calathus fuscipes</i> Gaeze	4	2.70	0.54	0.01
32.	<i>Polydrosus amoeus</i>	12	5.40	1.61	0.08
33.	<i>Carabus coriaceus</i> L	6	5.40	0.81	0.04
34.	<i>Onthophagus ovatus.</i>	20	8.11	2.68	0.22
35.	<i>Homoptera (aphyds)</i>	8	2.70	1.08	0.03
36.	<i>Collembola</i>	2	2.70	0.40	0.01
37.	<i>Adalia bipunctata</i>	3	2.70	0.40	0.01
38.	<i>Heteroptera (bedbugs)</i>	10	2.70	1.34	0.04
Total 38 species			756 samples collected		

Table 6. The structure entomofauna collected of walnut plantations, in 2020

No..	Name of species (taxa)	No. of specimens	% total (744)
1.	Araneida	33	4.3
2.	Diptera	52	6.98
3.	Hymenoptera	175	23.52
4.	Lepidoptera	46	6.18
5.	Izopode	3	0.40
6.	Gastropoda	13	1.74
7.	Orthoptera	93	12.50
8.	Homoptera	39	5.24
9.	Collembole	2	0.27
10.	Coleoptere	288	38.70

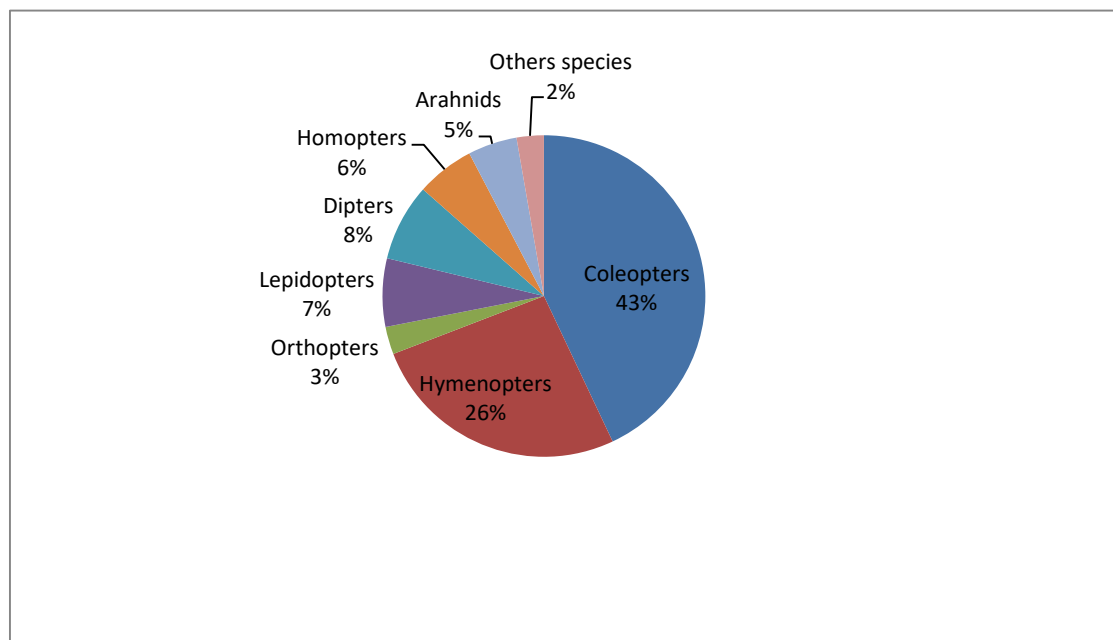


Figure 2. The structure of collected taxa from walnut plantations in 2020

4. CONCLUSIONS

1. 2019 was collected in the orchards of walnut specimens belonging to more and different groups of taxa as follows:

- Beetles (Coleoptera), 186 specimens representing 76.25% of the total (255 copies);
- Heteroptera, 38 specimens representing 15.51% of the total;
- Homoptera 12 specimens representând 4.03% of the total;
- Hymenoptera 5specimens, representing 2.96% of the total;
- Isopoda, 3 specimens, representing 1.25% of the total.

2. In 2020, were collected from orchards of walnut samples of taxa belonging to the following groups:

- Beetles (Coleoptera), representing 38 288 specimens, 70% of the total (756 specimens);

- Hymenoptera 175 specimens, representing 23.52% of the total;
- Orthoptera, 93 specimens representing 12.50% of the total
- Diptera, 52 specimens representing 6.98% of the total;
- Lepidoptera, 46 specimens representing 6.18% of the total;
- Homoptera, 39specimens reprezentâmnd 5.24% of the total;
- Araneide, 33 specimens representing 4.43% of the total;
- Gastropoda, 13 specimens representing 1.74% of the total;
- Isopoda, 3 specimens, representing 0.40% of the total.
- Collembola, 2 specimens, representing 0.27% of the total.

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