

THE CONTRIBUTIONS TO THE KNOWLEDGE OF INVERTEBRATES (COLLEMBOLA; INSECTA: COLEOPTERA) FROM THREE DIFFERENT CROPS

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Abstract. The papers includes the comparative study of invertebrates (Collembola; Insecta: Coleoptera) from three different crops: alfalfa (*Medicago sativa* L.), corn (*Zea mays* L.) and rape (*Brassica napus oleifera* L.) from the Republic of Moldova, in comparative aspect. A total number of 168 invertebrate species belonging to 92 genera and 28 families, among which 64 Collembola and 104 Coleoptera, were identified all over the studied fields. Dominant invertebrate species and pests of each culture were also revealed.

Keywords: Collembola, Coleoptera, species diversity, crops, pests.

Rezumat. Contribuții la cunoașterea nevertebratelor (Collembola; Insecta: Coleoptera) din trei culturi agricole diferite. Lucrarea include studiul comparativ al nevertebratelor (Collembola, Insecta: Coleoptera) din trei culturi diferite: lucernă (*Medicago sativa* L.), porumb (*Zea mays* L.) și rapiță (*Brassica napus oleifera* L.) în aspect comparativ din Republica Moldova. În total în cele trei culturi au fost identificate 168 specii de colembole și coleoptere, care fac parte din 92 genuri și aparțin la 28 familii. Au fost evidențiate speciile de nevertebrate dominante și dăunătoare pentru fiecare cultură studiată.

Cuvinte cheie: Collembola, Coleoptera, diversitatea specifică, cultură, dăunători.

INTRODUCTION

The main human impact on the Republic of Moldova landscape is through agriculture. Agricultural lands cover 75.6% of the territory, of which 64.5% are intensively used. The most important crops in the country are cereals mainly wheat and corn, fruits, grapes and vegetables. Since 2003, in the Republic of Moldova new oilseed crops, such as *Brassica napus oleifera*, have been of great importance and covered considerable areas. In the agricultural landscapes species richness of animals and plants has declined drastically, due to monoculture land use. It is known that certain plant species like legumes *Medicago sativa* and *Trifolium repens* have a positive influence on invertebrate fauna and improve soil quality, while other crops attracted a great number of insect pests. However, the use of crop rotation schemes can minimize the damage, which brings great harm to agriculture.

Collembola are the most diverse, abundant and widely distributed groups of invertebrate animals, playing an important role in organic matter decomposition. They represent the vast majority of insects living in the soil of different habitats, including agricultural. Also, different vegetation communities host different species assemblages of Collembola.

The Insect from the order Coleoptera includes more species than any other order, constituting almost 25% of all known life-forms. The diversity of beetles is very wide. They are found in all major habitats, except marine and the Polar Regions. There are particular species that are adapted to practically every kind of diet (STARODUB & GHEORGHIEV, 2008). Some are non-specialist detritus feeders, breaking down animal and plant debris; some feed on waste such as dung; some feed on fungi, some on particular species of plants and others on a wide range of plants. Several Coleoptera species are predatory, usually on other invertebrates; some are parasites or parasitoids, but there are also some species which can damage crops. Many of the predatory species are important controls of agricultural pests. For example, the beetles in the family Coccinellidae consume aphids, scale insects, trips and other plant-sucking insects.

The preliminary results of the study of Collembola and Coleoptera for each particular crop were published before (BACAL *et al.*, 2010; BACAL & BUȘMACHIU, 2010; BACAL & CILIPIC, 2011; BUȘMACHIU, 2011a, 2011b; BUȘMACHIU *et al.*, 2012).

The aim of this research was to reveal the invertebrate fauna (Collembola, Insect: Coleoptera) from all three types of crops such as alfalfa (*Medicago sativa* L.), corn (*Zea mays* L.) and rape (*Brassica napus oleifera* L.) in comparative aspect. The study was performed to identify the species of invertebrates associated with studied crops, including the most important pests.

MATERIAL AND METHODS

The faunistic materials were sampled in 14 different localities of the Republic of Moldova during the 2010 – 2012. The fields varied in size and location.

The samples were collected in the following crops and localities:

- i) The fields with alfalfa (*Medicago sativa* L.): near the localities Călărași, Copanca, Ivancea, Leuntea, Lozova, Mirnoe, Rezina, Rădenii Vechi and Trebujeni;
- ii) The fields with rape (*Brassica napus oleifera* L.): near the localities Troița Nouă and Băcioi;
- iii) The fields with corn (*Zea mays* L.): near the localities Ivancea, Covurlui, Opaci and Mălăiești.

The samples of soil for Collembola identification were taken using steel quadrant, with a surfaces area of 25 cm² and 5 cm depth, put in plastic bags and transported in laboratory. Specimens were extracted using flotation method, fixed in 80% ethyl alcohol, sorted and identified.

Coleoptera were collected using Barber ground pitfalls, exhauster, some specimens were also gathered by hand from the leaves of crops or soil surfaces.

Invertebrate species were identified according to the basic keys and some modern systematic works.

RESULTS AND DISCUSSIONS

As a result of the investigation a total number of 3,546 individuals of Collembola and Coleoptera were identified all over the studied fields, which belong to 168 species, fell into 92 genera and 28 families.

Collembola were represented in all of studied fields by 1,389 individuals belonging to 64 species, 35 genera and 13 families: Entomobryidae with 5 genera and 15 species, followed by Isotomidae - 9 genera and 13 species, Tullbergiidae - 5 genera and 11 species, Hypogastruridae - 4 genera and 7 species, Neanuridae - 4 genera and 5 species, Onychiuridae - 3 genera and 4 species, Katiannidae - 1 genus and 4 species. Six families: Odontellidae, Tomoceridae, Cypperidae, Sminturidae, Neelidae and Sminthuridae were represented only by one genus and one species each (Table 1).

The highest number of individuals was registered in case of the family Entomobryidae - 588 (42.3%), followed by the families Isotomidae - 319 (23.0%), Onychiuridae - 189 (13.6%), Tullbergiidae - 135 (9.7%), Hypogastruridae - 73 (5.3%) and Katiannidae - 32 (2.3%). These six families include the majority of identified taxa (29 genera and 58 species) and individuals - 1,336 (96.2%).

The most abundant Collembola species identified in one crop was *Heteromurus major* with a total number 316 individuals (312 in alfalfa) (Table 1). Between other abundant and frequent species present in the majority of fields of all three crops, we can to emphasize *Protaphorura sakatoi* with 164 individuals (138 in alfalfa, 6 in rape and 20 in corn crops, respectively), followed by *Entomobrya marginata* with 126 individuals (34, 84 and 8, respectively) and *Parisotoma notabilis* with 98 individuals (73, 23 and 2, respectively). The species with lower abundance but also present in all types of crops were *Hemisotoma thermophila* with 69, *Isotoma viridis* - 38, *Isotomiella minor* - 23, *Pseudosinella octopunctata* - 14, *Isotomodes productus* - 6 and *Sminthurinus elegans* - 5 individuals.

The comparative study of species diversity between the three crops shows a positive relationship of Collembola with the alfalfa fields, where there was revealed the highest species diversity - 55. In the fields cultivated with rape and corn crops, the number of species was low; there were recorded only 17 and 26 species, respectively.

Coleoptera. A total number of 2,159 individuals of coleopteran were collected in all three crops. The identified insects belong to 104 species, 57 genera and 15 families: Carabidae with 12 genera and 41 species, Scarabaeidae - 7 genera and 13 species, Chrysomelidae - 7 genera and 11 species, Curculionidae - 6 genera and 10 species, Coccinellidae - 6 genera and 6 species, Silphidae - 3 genera and 6 species. Families Tenebrionidae and Staphylinidae were represented only by 4 genera and 4 species each, other two families Cerambycidae and Dermestidae by 2 species each, but 2 genera and one genus respectively. Five families: Nitidulidae, Cantharidae, Histeridae, Anthicidae and Trogidae were represented only by one genus and one species each (Table 2). The highest number of individuals revealed in all three crops were from the family Carabidae - 1,277 (59.2%), followed by the families Chrysomelidae - 270 (12.5%), Tenebrionidae - 192 (8.8%), Curculionidae - 120 (5.6%) and Scarabaeidae - 82 (3.8%). These families include the majority of identified taxa (36 genera and 79 species) and individuals - 1,941 (89.9%).

The most abundant species identified in one crop was *Harpalus rufipes* with a total number of 845 individuals (827 in corn).

The number of collected Coleoptera individuals varied in dependence of crops: in alfalfa there were revealed 206 individuals, in rape - 919 and in corn 1,034. The highest number of coleopteran taxa was identified in rape - 67 species from 39 genera. The most representative families in rape crop were Carabidae with 29 species from 9 genera, followed by the families Scarabaeidae with 10 species from 6 genera and Curculionidae - 7 species from 4 genera. Other families were represented only by 4; 3; 2 and one species.

In alfalfa crop were identified 32 species from 28 genera. The highest numbers of species were from the families Chrysomelidae with 8 species from 6 genera and Coccinellidae - 6 species from 6 genera. Other families were represented only by 4; 3; 2 and one species.

In corn crop, there were revealed 24 species of Coleoptera that belong to 15 genera. The most representative and numerically dominant family in this crop was Carabidae with 1,005 individuals of 14 species from 5 genera. Other families were represented by lower number of species, only 3, 2 and 1.

According to the trophic spectrum, the investigated coleopterans belong to 7 groups: phytophagous consists of 58%, zoophagous - 18%, necrophagous - 9%, coprophagous - 8%, saprophagous - 4%, mixophagous - 2% and mycophagous - 1% (Fig. 1). Necrophagous and coprophagous coleopterans were attracted by the smell of decomposition of small vertebrates got into Barber traps. There was also a significant number of zoophagous coleopteran species. Some phytophagous species were also collected using Barber traps. Among them are: *Opatrum sabulosum*, *Dorcadion tauricum*, *Lethrus apterus*, *Pentodon idiota*, same representatives of the genera *Amara* and *Harpalus*, which attack plants at ground level. Some pests of the alfalfa culture such as *Subcoccinella*

vigintiquatuorpunctata and *Gonioctena fornicata* were also revealed in the fields of this crop. In rape culture, 6 species of phytophagous coleopterans can be considered as potential pests of this crop, *Psylliodes chrysocephala*, *Ceutorhynchus pallidactylus*, *Phyllotreta atra*, *Opatrum sabulosum*, *Meligetis aeneus* and *Ceutorhynchus assimilis* were identified. The revealed species of coleopteran that can damage the corn culture were: *Blaps lethifera*, *Opatrum sabulosum* and *Pentodon idiota*. However, some predatory species from the families Carabidae, Coccinellidae and Staphylinidae were reported from the studied fields also. These species of insects keep under control the phytophagous insects' number.

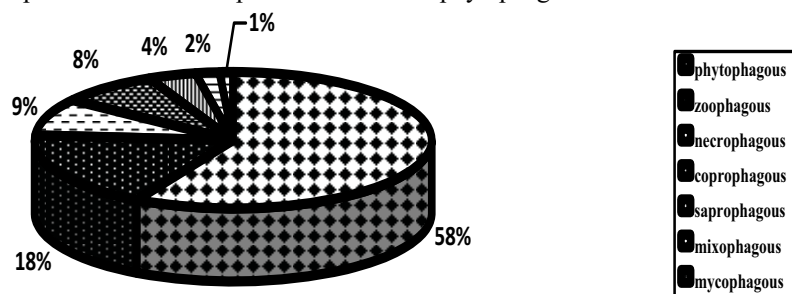


Figure 1. Trophic spectrum of revealed coleopteran species. / Figura 1. Spectrul trofic al speciilor de coleoptere identificate.

CONCLUSIONS

The investigation carried out in three different crops in the Republic of Moldova allows us revealing 168 species of Collembola and Coleoptera belonging to 92 genera and 28 families. Collembola were represented in all of the studied fields by 64 species, 35 genera and 13 families; Coleoptera by 104 species, 57 genera and 15 families. According to the trophic spectrum, the investigated coleopterans belong to 7 trophic groups: phytophagous - 58%, zoophagous - 18%, necrophagous - 9%, coprophagous - 8%, saprophagous - 4%, mixophagous - 2% and mycophagous - 1%. The coleopteran pest species for alfalfa crops, *Subcoccinella vigintiquatuorpunctata* and *Gonioctena fornicata*, and for corn crops, *Blaps lethifera*, *Opatrum sabulosum* and *Pentodon idiota*, were also revealed. Six phytophagous coleopteran pests were identified in rape. Several predatory species from the families Carabidae, Coccinellidae and Staphylinidae that keep under control the phytophagous insects' number were reported from the studied fields too.

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Table 1. List of collembolan species identified in three studied crops. / Tabel 1. Lista speciilor de colembole identificate în trei culturi studiate.

No.	Families and species	Crops			Total
		Alfalfa	Rape	Corn	
	Hypogasturidae	43	25	5	73
1	<i>Ceratophysella denticulata</i> (BAGNALL, 1941)	6	-	-	6
2	<i>C. engadinensis</i> (GISIN, 1949)	11	24	3	38
3	<i>Hypogastrura assimilis</i> (KRAUSBAUER, 1898)	-	1	-	1
4	<i>H. vernalis</i> (CARL, 1901)	16	-	-	16

5	<i>H. viatica</i> (TULLBERG, 1872)	8	-	-	8
6	<i>Schoettella unungiculata</i> (TULLBERG, 1869)	-	-	2	2
7	<i>Willemia scandinavica</i> STACH, 1949	2	-	-	2
	Neanuridae	8	3	1	12
8	<i>Anurida ellipsoides</i> STACH, 1920	-	-	1	1
9	<i>Pseudachorutes subcrassus</i> TULLBERG, 1871	3	-	-	3
10	<i>P. pratensis</i> RUSEK, 1973	4	2	-	6
11	<i>Friesea afurcata</i> (DENIS, 1926)	-	1	-	1
12	<i>Neamura muscorum</i> (TEMPLETON, 1835)	1	-	-	1
	Odontellidae	3	-	15	18
13	<i>Axenyllodes bayeri</i> (KSENNEMAN, 1935)	3	-	15	18
	Tullbergiidae	109	4	22	135
14	<i>Doutnacia xerophila</i> RUSEK, 1974	3	-	-	3
15	<i>Mesaphorura critica</i> ELLIS, 1976	46	-	12	58
16	<i>M. italica</i> (RUSEK, 1971)	1	-	-	1
17	<i>M. hylophila</i> RUSEK, 1982	6	-	-	6
18	<i>M. krausbaueri</i> BÖRNER, 1901	4	-	-	4
19	<i>M. macrochaeta</i> RUSEK, 1976	6	-	1	7
20	<i>M. yosii</i> (RUSEK, 1967)	18	-	6	24
21	<i>M. sp.</i>	2	4	-	6
22	<i>M. affinis</i> (BÖRNER, 1902)	21	-	-	21
23	<i>Marcuzziella tripartita</i> RUSEK, 1975	2	-	-	2
24	<i>S. metaparisi</i> TRASER, WEINER, 1999	-	-	3	3
	Onychiuridae	163	6	20	189
25	<i>Protaphorura sakatoi</i> (YOSII, 1966)	138	6	20	164
26	<i>P. armata</i> (TULLBERG, 1869)	1	-	-	1
27	<i>Deuteraphorura silvaria</i> (GISIN, 1952)	10	-	-	10
28	<i>Micraphorura uralica</i> (KHANISLAMOVA, 1986)	14	-	-	14
	Isotomidae	226	65	28	319
29	<i>Hemisotoma thermophilus</i> (AXELSON, 1900)	24	39	6	69
30	<i>Folsomia quadrioculata</i> (TULLBERG, 1871)	5	-	-	5
31	<i>F. candida</i> (WILLEM, 1902)	5	-	-	5
32	<i>Folsomides parvulus</i> STACH, 1922	15	-	-	15
33	<i>Isotoma anglicana</i> LUBBOCK, 1862	-	-	8	8
34	<i>I. viridis</i> BOURLET, 1839	33	1	4	38
35	<i>Isotomodes productus</i> (AXELSON, 1906)	4	1	1	6
36	<i>Isotomiella minor</i> (SCHÄFFER, 1896)	17	1	5	23
37	<i>Parisotoma notabilis</i> (SCHÄFFER, 1896)	73	23	2	98
38	<i>Proisotoma minuta</i> (TULLBERG, 1871)	2	-	-	2
39	<i>Desoria trispinata</i> (MAC GILLIVRAY, 1896)	6	-	-	6
40	<i>D. tigrina</i> NICOLET, 1842	-	-	2	2
41	<i>D. sp.</i>	42	-	-	42
	Entomobryidae	471	87	30	588
42	<i>Orchesella cincta</i> (LINNAEUS, 1758)	42	-	-	42
43	<i>O. multifasciata</i> STSCHERBAKOW, 1898	7	-	2	9
44	<i>Entomobrya marginata</i> (TULLBERG, 1871)	34	84	8	126
45	<i>E. multifasciata</i> (TULLBERG, 1871)	1	-	-	1
46	<i>Heteromurus major</i> (MONIEZ, 1889)	312	-	4	316
47	<i>Lepidocyrtus cyaneus</i> TULLBERG, 1871	22	-	-	22
48	<i>L. lamuginosus</i> (GMELIN, 1788)	1	-	-	1
49	<i>L. lignorum</i> (FABRICIUS, 1775)	1	-	-	1
50	<i>L. paradoxus</i> UZEL, 1890	27	-	-	27
51	<i>Pseudosinella alba</i> (PACKARD, 1873)	1	-	-	1
52	<i>P. moldavica</i> GAMA & BUŞMACHIU, 2002	3	-	2	5
53	<i>P. horaki</i> RUSEK, 1985	12	-	-	12
54	<i>P. imparipunctata</i> GISIN, 1953	1	-	-	1
55	<i>P. octopunctata</i> BÖRNER, 1901	7	3	4	14
56	<i>P. sexoculata</i> SCHOTT, 1902	-	-	10	10
	Cyphoderidae	2	-	-	2
57	<i>Cyphoderus albinus</i> NICOLET, 1842	2	-	-	2
	Tomoceridae	1	-	-	1
58	<i>Tomocerus vulgaris</i> (TULLBERG, 1871)	1	-	-	1
	Neelidae	2	-	2	4
59	<i>Neelus murinus</i> FOLSOM, 1896	2	-	2	4
	Sminthuridae	6	-	-	6
60	<i>Sminthurus viridis</i> (LINNAEUS, 1758)	6	-	-	6
	Katiannidae	7	8	17	32
61	<i>Sminthurinus sp.</i>	6	4	-	10
62	<i>S. aureus</i> (LUBBOCK, 1862)	-	-	16	16
63	<i>S. elegans</i> (FITCH, 1863)	1	3	1	5
64	<i>S. niger</i> (LUBBOCK, 1867)	-	1	-	1
	Sminthurididae	1	6	3	10
65	<i>Sphaeridia pumilis</i> (KRAUSBAUER, 1898)	1	6	3	10

	Number of individuals	1042	204	143	1389
	Number of species	55	17	26	65
	Number of genera	33	15	20	35
	Number of families	13	8	9	13

Table 2. List of Coleoptera species identified in three studied crops. / Tabel 2. Lista coleopterelor identificate în cele trei culturi studiate.

No.	Families and species	Crops			Total
		Afalfa	Rape	Corn	
	Carabidae	4	268	1005	1277
1	<i>Amara aenea</i> (DE GEER, 1774)	–	20	–	20
2	<i>A. eurynota</i> (PANZER, 1798)	–	3	–	3
3	<i>A. familiaris</i> (DUFTSCHMID, 1812)	–	5	–	5
4	<i>A. ingenua</i> DUFTSCHMID, 1812	1	–	–	1
5	<i>A. municipalis</i> DUFTSCHMID, 1812	–	1	–	1
6	<i>A. nitida</i> STURM, 1825	–	1	–	1
7	<i>A. similata</i> (GILLENHAL, 1810)	–	3	–	3
8	<i>A. tibialis</i> (PAYKULL, 1798)	–	2	–	2
9	<i>Anchomemus dorsale</i> (PONTOPPIDAN, 1763)	–	4	–	4
10	<i>Anisodactylus signatus</i> (PANZER, 1797)	–	9	–	9
11	<i>Brachinus crepitans</i> (LINNAEUS, 1758)	–	8	–	8
12	<i>B. ejaculans</i> FISCHER-WALDHEIM, 1825	–	1	–	1
13	<i>Calathus ambiguus</i> PAYKULL, 1790	–	–	3	3
14	<i>C. fuscipes</i> (GOEZE, 1777)	–	–	20	20
15	<i>C. melanocephalus</i> (LINNAEUS, 1758)	–	–	4	4
16	<i>C. halensis</i> (SCHALL., 1783)	–	–	93	93
17	<i>Carabus coriaceus</i> LINNAEUS, 1758	–	1	–	1
18	<i>C. nemoralis</i> MULLER, 1764	–	–	5	5
19	<i>Curtonotus</i> sp.	1	–	–	1
20	<i>Harpalus calceatus</i> (DUFTSCHMID, 1812)	–	1	–	1
21	<i>H. serripes</i> (QUENSEL, 1806)	–	2	–	2
22	<i>H. affinis</i> (SCHRANK, 1781)	–	–	2	2
23	<i>H. atratus</i> LATREILLE, 1804	1	–	4	5
24	<i>H. distinguendus</i> (DUFTSCHMID, 1812)	–	169	20	189
25	<i>H. froelichi</i> STURM, 1818	–	2	1	3
26	<i>H. fuscipalpis</i> STURM, 1818	–	1	–	1
27	<i>H. latus</i> (LINNAEUS, 1758)	–	1	–	1
28	<i>H. melancholicus</i> (DEJEAN, 1829)	–	1	–	1
29	<i>H. picipennis</i> (DUFTSCHMID, 1812)	–	2	–	2
30	<i>H. rufipes</i> DE GEER, 1774	1	17	827	845
31	<i>H. signaticornis</i> (DUFTSCHMID, 1812)	–	1	–	1
32	<i>H. smaragdinus</i> DUFTSCHMID, 1812	–	1	2	3
33	<i>Laemostenus terricola</i> (HERBST, 1784)	–	1	–	1
34	<i>Ophonus puncticollis</i> (PAYKULL, 1798)	–	1	–	1
35	<i>O. griceus</i> (PANZER, 1797)	–	–	3	3
36	<i>O. schaubergerianus</i> PUEL, 1937	–	4	–	4
37	<i>O. diffinis</i> (DEJEAN, 1829)	–	3	–	3
38	<i>O. sp.</i>	–	–	20	20
39	<i>Pterostichus melas</i> (CREUTZ, 1799)	–	–	1	1
40	<i>P. niger</i> (SCHALLER, 1783)	–	2	–	2
41	<i>Tachyta nana</i> (GYLLENHAL, 1810)	–	1	–	1
	Histeridae		5		5
42	<i>Hister bipustulatus</i> SCHRANK, 1781	–	5	–	5
	Silphidae	4	6	2	12
43	<i>Nicrophorus germanicus</i> LINNAEUS, 1758	–	–	2	2
44	<i>N. vespilloides</i> HERBST, 1783	3	–	–	3
45	<i>N. vestigator</i> HERSCHEL, 1807	–	2	–	2
46	<i>Silpha carinata</i> HERBST, 1783	1	–	–	1
47	<i>S. obscura</i> LINNAEUS, 1758	–	2	–	2
48	<i>Tanathophilus rugosus</i> (LINNAEUS, 1758)	–	2	–	2
	Staphylinidae	1	1	8	10
49	<i>Astrapaeus ulmi</i> (ROSSI, 1790)	–	–	1	1
50	<i>Atheta inquinata</i> (GRAVENHORST, 1802)	1	–	–	1
51	<i>Drusilla canaliculata</i> (FABRICIUS, 1787)	–	–	7	7
52	<i>Ocypus nitens</i> (SCHRANK, 1781)	–	1	–	1
	Trogidae	1	2		3
53	<i>Trox sabulosus</i> (LINNAEUS, 1758)	1	2	–	3
	Scarabaeidae	4	75	3	82
54	<i>Aphodius distinctus</i> (MULLER, 1776)	–	5	–	5
55	<i>A. luridus</i> (FABRICIUS, 1775)	1	–	–	1
56	<i>A. melanostictus</i> SCHMIDT, 1840	–	1	–	1
57	<i>A. sticticus</i> (PANZER, 1798)	1	–	–	1

58	<i>Epicometis hirta</i> (PODA, 1761)	–	15	–	15
59	<i>Lethrus apterus</i> (LAXMAN, 1770)	1	2	–	3
60	<i>Miltotrogus aequinoctialis</i> (HERBST, 1790)	–	1	–	1
61	<i>O. furcatus</i> (FABRICIUS, 1781)	–	12	–	12
62	<i>O. kindermanni</i> HAROLD, 1877	–	1	–	1
63	<i>O. ovatus</i> LINNAEUS, 1767	–	2	–	2
64	<i>O. vitulus</i> (FABRICIUS, 1776)	–	28	–	28
65	<i>Pentodon idiota</i> (HERBST, 1789)	1	–	3	4
66	<i>Pleurophorus caesus</i> (PANZER, 1796)	–	8	–	8
	Dermestidae	10	45	9	64
67	<i>Dermestes ater</i> DEGEER, 1774	–	2	–	2
68	<i>D. lanarius</i> ILLIGER, 1801	10	43	9	62
	Cantharidae	-	21	-	21
69	<i>Cantharis rustica</i> FALLEN, 1807	–	21	–	21
	Nitidulidae	-	32	-	32
70	<i>Miligetes aeneus</i> (FABRICIUS, 1775)	–	32	–	32
	Coccinellidae	59	8	1	68
71	<i>Coccinella septempunctata</i> (LINNAEUS, 1758)	19	3	1	23
72	<i>Coccinula quatuordecimpustulata</i> (LINNAEUS, 1758)	2	1	–	3
73	<i>Hyppodamia tredecimpunctata</i> (LINNAEUS, 1758)	1	–	–	1
74	<i>Propylea quatuordecimpunctata</i> LINNAEUS, 1758	2	–	–	2
75	<i>Psyllobora vigintiduopunctata</i> (LINNAEUS, 1758)	2	4	–	6
76	<i>Subcoccinella vigintiquatuorpunctata</i> LINNAEUS, 1758	33	–	–	33
	Anthicidae	-	1	-	1
77	<i>Formicomus pedestris</i> (ROSSI, 1790)	–	1	–	1
	Tenebrionidae	10	177	5	192
78	<i>Blaps lethifera</i> MARSHAM, 1802	–	3	3	6
79	<i>Gonocephalum pusillum</i> (FABRICIUS, 1792)	–	9	–	9
80	<i>Opatrum sabulosum</i> (LINNAEUS, 1761)	10	164	1	175
81	<i>Pedinus femoralis</i> (LINNAEUS, 1767)	–	1	1	2
	Cerambycidae	1	-	1	2
82	<i>Dorcadion tauricum</i> WALTZ, 1838	1	–	–	1
83	<i>Megopis scabricornis</i> (SCOPOLI, 1763)	–	–	1	1
	Chrysomelidae	99	171	270	270
84	<i>Altica oleracea</i> (LINNAEUS, 1758)	3	–	–	3
85	<i>Cryptocephalus moraei</i> (LINNAEUS, 1758)	7	–	–	7
86	<i>C. octacosmus</i> BEDEL, 1891	17	–	–	17
87	<i>Gastrophysa polygoni</i> (LINNAEUS, 1758)	1	–	–	1
88	<i>G. viridula</i> (DEGEER, 1775)	25	–	–	25
89	<i>Gonioctena fornicata</i> (BRÜGGEMAN, 1873)	42	–	–	42
90	<i>Oulema melanopus</i> (LINNAEUS, 1758)	3	–	–	3
91	<i>Phyllotreta atra</i> (FABRICIUS, 1775)	–	59	–	59
92	<i>P. nemorum</i> (LINNAEUS, 1758)	–	5	–	5
93	<i>Psylliodes attenuata</i> (KOCH, 1803)	1	–	–	1
94	<i>P. chrysocephala</i> (LINNAEUS, 1758)	–	107	–	107
	Curculionidae	13	107	120	120
95	<i>Ceutorhynchus assimilis</i> (PAYK, 1792)	–	35	–	35
96	<i>C. denticulatus</i> (SCHRANK, 1781)	–	1	–	1
97	<i>C. pallidactylus</i> (MARSHAM, 1802)	–	33	–	33
98	<i>Hypera variabilis</i> HERBST, 1795	7	–	–	7
99	<i>Otiorrhynchus ligustici</i> LINNAEUS, 1758	1	–	–	1
100	<i>O. velutinus</i> GERMAR, 1824	–	1	–	1
101	<i>Stenocarus ruficornis</i> (STEPH, 1831)	–	28	–	28
102	<i>Tanymecus dilaticollis</i> GILLENHAL, 1834	–	1	–	1
103	<i>T. palliatus</i> FABRICIUS, 1787	–	8	–	8
104	<i>Tychius flavus</i> BECKER, 1864	5	–	–	5
	Number of individuals	206	919	1034	2159
	Number of species	32	67	24	104
	Number of genera	28	36	15	54
	Number of families	11	14	8	15

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