

CONTRIBUTION TO THE KNOWLEDGE OF THE STRUCTURE
OF BEETLE CENOSES (INSECTA: COLEOPTERA)
FROM THE "COSAUTI" LANDSCAPE RESERVE

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Summary: This work presents data on the fauna and beetle's species diversity in some forest ecosystems in northern Moldova. As a result of collections during the year 2017, there were identified in the investigated forest ecosystems 48 species belonging to 31 genera and 7 families (Carabidae, Cantharidae, Silphidae, Geotrupidae, Scarabaeidae, Lucanidae and Cerambycidae), of which 4 ones are rare and extinction endangered species, included in the third edition of the Red Book of Moldova. After trophic preferences, most identified species of beetles belong to the phytophagous group – 43%, followed by the zoofagous group – 41%. Coprophagous represent 5%, xylophagous – 5%, mixophytophagous – 4%, and necrophagous – 2%. According to the distribution area, the European (17) and Trans-Palaearctic (15) species dominate.

Keywords: beetles, diversity, trophic spectrum, ecological indexes.

Rezumat. Această lucrare prezintă date despre fauna și diversitatea coleopterelor din 2 ecosisteme forestiere din rezervația peisagistică "Cosăuți". În rezultatul cercetărilor efectuate în anul 2017, în ecosistemele forestiere investigate au fost identificate 48 de specii aparținând a 31 de genuri și 7 familii (Carabidae, Cantharidae, Silphidae, Geotrupidae, Scarabaeidae, Lucanidae și Cerambycidae), dintre care 4 sunt rare și pe cale de dispariție, incluse în a treia ediție a Cărții Roșii a Moldovei. După preferințele trofice, majoritatea speciilor de coleoptere identificate aparțin grupului fitofagilor – 43%, urmat de grupul zoofagilor – 41%. Coprofagii reprezintă 5%, xilofagii – 5%, mixofitofagii – 4% și necrofagii – 2%. După aria de răspândire, predomină speciile europene (17) și transpalaearctice (15).

Cuvinte cheie: coleoptere, diversitate, spectru trofic, indici ecologici.

Introduction

The Republic of Moldova is the country with the lowest forestation grade from Europe. The forested surfaces from the country constitute only 8-9% of the whole territory, and the most important old forest missives that are 150-200 years old, are situated in the Centre, North and South of the Republic. The forest vegetation is constituted of deciduous forests – the Central European type (oak, durmast, fagus, tilia, ash, hornbeam, ulmus, aspen, salix, maple, etc.). These old forests are important as inherited resources, as well as examples of self-regulated ecosystems.

Material and methods

The studies were performed in vegetation period of 2017 in 2 wood types from the "Cosauti" landscape reserve (Soroca district): oak forest (*Quercus robur* L.) and ash forest (*Fraxinus excelsior* L.) (Postolache, 1995; Postolache, Lazu, 2018).

The land beetles were collected using traditional entomological methods: Barber traps (30 traps were placed in two lines), and manual collection from various species of plants (trees, shrubs, grasses), from litter and soil. In total, there were collected and analyzed by the mentioned methods over 700 samples.

The identification of coleopterans was realized based on the works of Kryjanovskij (1965), Neculiseanu (2021), Freude et al. (1976).

In the synecological analysis various ecological indexes were calculated (Shannon diversity index, Simpson, equitability) (Simionescu V. 1992; Stan Gh. 1995; Andreev A. 2001).

Results and discussions

In the research conducted, data were obtained on fauna, diversity and distribution of some groups of beetles of the components of ecological networks in the "Cosauti" landscape reserve. It was found that beetle's complexes in the stations investigated represent different numbers and taxa. The beetle's fauna collected in forest ecosystems investigated consists of 48 species belonging to 31 genera and 7 families (tab. 1). Four species of rare and endangered coleopterans were found in the investigated resorts: *Carabus ullrichi* Ill. (Carabidae), *Oryctes nasicornis* L. (Scarabaeidae); *Lucanus cervus* L. (Lucanidae), *Morimus asper funereus* (Muls.) (Cerambycidae), these being included in the Red Book of the Republic of Moldova (3rd edition) (Cartea Roșie a R. Moldova 2015).

Table 1

**Specific components of beetles in forest ecosystems investigated
("Cosauti" landscape reserve)**

No	Taxon	Type of forest		Feeding type	Type of area
		Ash forest	Oak forest		
Family Carabidae					
1	<i>Calosoma inquisitor</i> (L., 1758)	+		Z	E
2	<i>Carabus ullrichi</i> Germ., 1824	+	+	Z	E
3	<i>C. cancellatus</i> Ill., 1798	+	+	Z	Esb
4	<i>C. excellens</i> , Kr., 1887	+		Z	E
5	<i>C. convexus</i> F., 1775		+	Z	Esb
6	<i>C. coriaceus</i> Krtz., 1877		+	Z	E
7	<i>Cychrus caraboides</i> (L., 1758)	+		Z	E
8	<i>C. semigranosus</i> Pall., 1825		+	Z	E
9	<i>Poecilus sericeus</i> (L., 1758)	+		Z	PSt.
10	<i>Pterostichus niger</i> (Schall., 1783)	+	+	MFit	TP
11	<i>Pt. melanarius</i> (Ill., 1798)		+	Z	Esb
12	<i>Pt. melas</i> (Crtz., 1799)	+	+	MFit	EMd
13	<i>Abax parallelopipedus</i> (Pill., Mitterp., 1783)	+	+	Z	E
14	<i>A. carinatus</i> (Duft., 1812)	+	+	Z	E
15	<i>A. parallelus</i> (Duft., 1812)	+	+	Z	E
16	<i>Molops piceus</i> (Pz., 1793)	+	+	Z	E
17	<i>Anisodactylus binotatus</i> (Duft., 1812)		+	F	VP
18	<i>Platynus assimile</i> (Payk., 1790)		+	Z	TP
19	<i>Platyderus rufus</i> (Duft., 1812)	+		Z	E
20	<i>Amara familiaris</i> (Duft., 1812)	+		F	TP
21	<i>A. aenea</i> (F., 1792)	+		F	TP
22	<i>A. apricaria</i> (Gyll., 1810)	+		F	TP
23	<i>Harpalus rufipes</i> (De Geer, 1774)	+		F	TP
24	<i>H. griseus</i> Dej., 1829		+	F	TP
25	<i>H. atratus</i> Latr., 1804	+		F	ECauc.
26	<i>H. latus</i> (L., 1758)	+		F	TP
27	<i>Ophonus rufibarbis</i> (F., 1792)		+	F	TP
28	<i>Lebia crux-minor</i> (Payk., 1790)		+	Z	TP
29	<i>L. humeralis</i> (F., 1792)	+		Z	EMd
30	<i>Aptinus bombardarda</i> (Ill., 1800)	+		Z	E
Family Cantharidae					
31	<i>Cantharis annularis</i> (L., 1758)	+	+	F	TP
32	<i>C. oculata</i> (Gyll., 1817)		+	F	TP
Family Silphidae					
33	<i>Silpha carinata</i> Hbst., 1783	+	+	N	C
Family Geotrupidae					
34	<i>Anoplotrupes stercorosus</i> Hartm, 1791	+	+	C	Esb
Family Scarabaeidae					
35	<i>Aphodius luridus</i> F., 1775	+		C	TP
36	<i>A. rufipes</i> Poda, 1761		+	C	TP
37	<i>Melolontha melolontha</i> L., 1758		+	F	E
38	<i>Oxythyrea funesta</i> (Poda, 1761)	+		F	E
39	<i>Cetonia aurata</i> (L., 1761)	+	+	F	TP
40	<i>Protaetia aeruginosa</i> Dr., 1770	+		F	E
Family Lucanidae					

41	<i>Lucanus cervus</i> L., 1758	+		Xil.	EMd
42	<i>Dorcus parallelipedus</i> L., 1758	+	+	Xil.	ECauc
Family Cerambycidae					
43	<i>Morimus funereus</i> Muls., 1862	+		Xil.	E
44	<i>Stenocorus meridianus</i> F., 1792		+	F	Esb
45	<i>S. quercus</i> Scopoli, 1792	+		F	Eas.
46	<i>Cerambyx scopolii</i> Fuss., 1775	+	+	F	E
47	<i>Mesosa curculionoides</i> (L., 1758)	+		F	Esb
48	<i>Dorcadion pedestre</i> Poda, 1761		+	F	E
Total		34	28		

During the research period, more representative from the point of view of quality proved to be the families Carabidae (33 species from 15 genera), Scarabaeidae (6 species from 5 genera) and Cerambycidae (6 species from 5 genera). The Lucanidae, Cantharidae, Geotrupidae and Silphidae families were represented by 1-2 species.

Also, it was found that in terms of quality and quantity, the highest number of species and specimens are recorded in the ash forest (34 species and 437 specimens), followed by oak forest (28 species and 362 samples).

For all four studied biotopes 5 species were common: *Pterostichus niger*, *Pt. melas*, *Abax parallelus*, *Anoplotrupes stercorosus* and *Cetonia aurata*.

Examining the composition of beetles in forest types investigated, it was found that after the trophic spectrum, the beetles' fauna of the forest ecosystems of the north of Moldova is divided into 6 trophic groups: zoophagous, phytophagous, mixophytophagous, necrophagous, coprophagous and xylophagous. Phytophagous are the majority group with 20 species (43%), followed by zoophagous with 19 species (41%). In descending order, it follows coprophagous (3 species; 5%), xylophagous (3 species; 5%), mixophytophagous (2 species; 4%) and necrophagous (1 species; 2%) (Fig. 1).

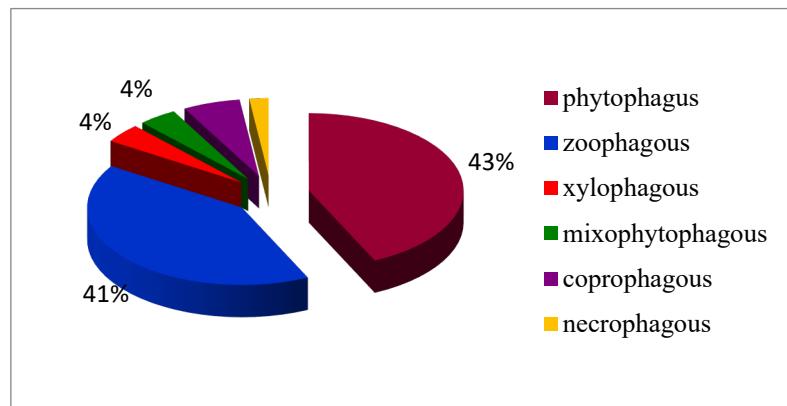


Fig. 1. The coleopteran trophic spectrum revealed in the studied stations.

Coleopteran species collected from the "Cosauti" landscape reserve, according to the distribution area belong to 9 zoogeographic elements (Drugescu, 1990), with the dominance of the European ones (17 species) and Trans-Palaearctic (15 species), which constitute more than 50% of all collected species. With a lower species number were recorded the elements from Euro-Siberian (6 species), Euro-Mediterranean (3), Euro-Caucasian (7 species) and West-Palaearctic, Cosmopolite, Euro-Asiatic, Steppicola-pontica – each with one species (Fig. 2.).

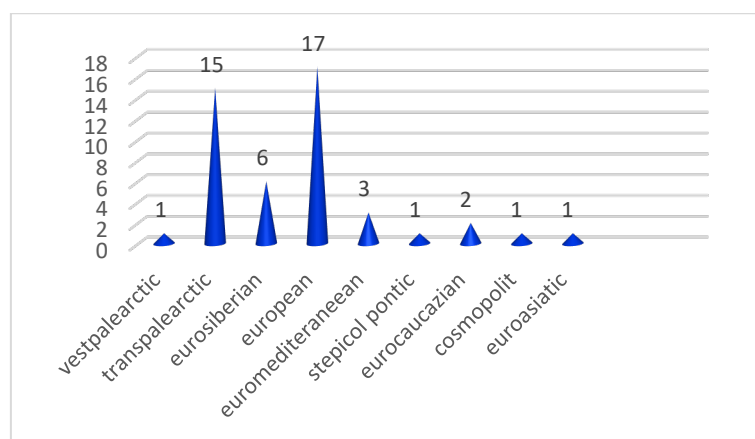


Fig. 2. The geographic distribution of the detected coleopterans in the forest ecosystems studied.

The obtained data confirms that the forest ecosystem, being a self-regulating system, has a rich fauna of beetles. The number and variation of species in this ecosystem are conditioned not only by the variety and periodic or spatial changes of main abiotic elements of the ecological support, but also by their optimal presence, especially of heat, humidity and salinity, and the favorable proportion of them. At the same time, the diversity is positively or negatively influenced by various biotic factors such as the position of the species in the trophic chains and food net of the ecosystem, number and density of species of parasites and predators, and the specific relations between the species in the ecosystem.

Conclusions

The Coleoptera Fauna (Insecta, Coleoptera), identified in forest ecosystems in the "Cosauti" landscape reserve consists of 48 species belonging to 31 genera and 7 families. The most representative in terms of quality proved to be the families Carabidae (33 species), Scarabaeidae (6 species) and Cerambycidae (6 species). The Lucanidae, Cantharidae, Geotrupidae and Silphidae families were represented by 1-2 species.

Of the species identified, 4 have been found to be rare and threatened with extinction: *Carabus ullrichi* (Carabidae), *Oryctes nasicornis* (Scarabaeidae); *Lucanus cervus* (Lucanidae) and *Morimus asper funereus* (Cerambycidae), these being included in the Red Book of the Republic of Moldova (3rd edition).

The most stable ecosystem in terms of diversity proved to be the ash, and the poorest diversity was recorded in the oak forest.

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