

FAUNISTIC AND SYNECOLOGICAL RESEARCHES OF GRASSHOPPERS (INSECTA, ORTHOPTERA) FROM THE SCIENTIFIC RESERVES OF THE REPUBLIC OF MOLDOVA

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Abstract. In the present paper are used the entomologic materials from five natural scientific reserves of the Republic of Moldova: "Codrii", „Plaiul Fagului”, „Stepa Bugeacului”, „Prutul-de-Jos” and „Pădurea Domnească”. The faunistic researches are frame in actual orientations of biological variety and conservation from different zones from our republic which are a few studied. The faunistic dates of order Orthoptera are very poorly known (NICOLAESCU, DERJANSCHI, 2001, STAHI, 2005).

Key words: Orthoptera, natural scientific reserve, Republic of Moldova

Rezumat: Cercetarea sinecologică și faunistică a ortopterelor (Insecta: Orthoptera) din rezervațiile științifice ale Republicii Moldova. În lucrarea de față este folosit materialul entomologic colectat din cinci rezervații științifice ale Republicii Moldova: Codrii, Plaiul Fagului, Stepa Bugeacului, Prutul-de-Jos, Pădurea Domnească. Cercetările faunistice se încadrează în orientările actuale de cunoaștere a biodiversității și conservării genofondului din diferite zone din țara noastră mai puțin studiate. În ceea ce privește ordinul Orthoptera, datele faunistice cunoscute sunt foarte puține (NICOLAESCU, DERJANSCHI, 2001, STAHI, 2005).

Cuvinte cheie: Orthoptera, rezervație științifică, Republica Moldova

INTRODUCTION

The Orthoptera order is a large group of insects which includes the Grasshoppers, Locusts, Groundhoppers, Crickets, Bush-crickets, Mole-crickets and Camel-crickets as well as some lesser groups. The grasshoppers represent one of the most important insects, because they cause big damages either in agriculture or forests.

In this paper we present entomologic materials which were collected from the following natural scientific reserves of the Republic of Moldova: "Codrii", „Plaiul Fagului”, „Stepa Bugeacului”, „Prutul-de-Jos” and „Pădurea Domnească”.

MATERIAL AND METHODS

The investigations were done in 2005 and 2006, especially in August and September. Sampling was made with a sweep-net, collecting in grass and individual search. In plane with pure grasses there were the geo-philous species (they have a small size and the same colour like earth) which are predominant; the collection was carefully effectuated with hand.

The identification of the species was made according to: UVAROV (1927), KNECHTEL (1959), BEI-BIENCO (1964), AVAKEAN (1968, 1981).

The synecological calculations were carried out in accordance with ecology and analitic coefficients and Cekanovski-Sorensen ecological indexes of similarity.

DESCRIPTION OF THE SITES

The „Codrii” Scientific Reserve is situated in the centre of the Republic of Moldova, at 49 km away from the city of Kishinev, and contains 12300 ha including the following zones: the protective zone and the buffer and transit zone. The central headquarters of the “Codrii” Scientific Reserve is situated near the Lozova village, Straseni district.

The Vegetation of „Codrii” is composed of the genera: *Fraxinus* L., *Carpinus* L., *Sorbus* L., *Quercus* L., *Carex* L., *Aegopodium* L., *Stellaria* L. etc. (POSTOLACHE, 1995).

The “Plaiul Fagului” Scientific Reserve is situated on N-W of the “altitude of the Central of Moldova” near the Radenii-Vechi village, Ungheni district. The vegetation of this reserve is represented by: the families: Asteraceae, Poaceae, Fabaceae, Lamiaceae, Rosaceae, Scrophulariaceae, Ranunculaceae, Brassicaceae, Cyperaceae, and the genera: *Fraxinus* L., *Carpinus* L., *Fagus* L., *Corylus* L., *Swida* Opiz., *Rubus* L., *Euonymus* L. etc.

The „Pădurea Domnească” Scientific Reserve comprises the Balatina and Călinești forests and is situated on the meadowlands of the middle Prut River (185 km north of Chisinau). The total area is 6039 ha. The area of natural woods is 3054 ha and it includes the oak tree zones (*Quercus robur* L.), the poplar zones (*Populus alba* L., *P. nigra* L.), silky willow zones (*Salix alba* L.) and osier plots (*S. triandra* L., *S. viminalis* L.). The flora includes 633 genera of vascular plants, 58 species and 2 varieties of lichens. The collection was effectuated only from planes which often are under water and the vegetation is formed of *Phragmites australis* Cav. and *Calamagrostis epigeios* L.

The „Stepa Bugeacului” Scientific Reserve is situated between Bugeac and Cicur-Mingir villages, Cimislia district and the vegetation is represented by *Festuca valesiacea* Gaudin, *Poa angustifolia* L. etc.

The „Prutul-de-Jos” Scientific Reserve has a surface of 626 ha and 2/3 of the reserve's surface is occupied by Belevu lake waters. The rest - 1/3 of the territory has got reed thickets, salces (*Salix alba* L., *S. fragilis*, *S. viminalis* L., *S. triandra* L.) and holm meadow herbs. In the north and north - east of the lake the high tide and the low tide is big and there is taking place the accumulation of aluvial deposits, creating favourable conditions for the development of the *Phragmites australis* Cav., *Typha angustifolia* L., *Scirpus lacustris* L., *Bolboschoenus maritimus* L. etc.

REZULTS AND DISCUSSIONS

As a result of determining the entomological materials collected from different reserves of the Republic of Moldova (Codrii, Plaiul Fagului, Stepa Bugeacului, Prutul-de-Jos, Pădurea Domnească) were identified 55 species of grasshoppers. A richer fauna of Orthoptera was found out in the “Codrii” Scientific Reserve, with 29 species, and a poor fauna was found out in „Pădurea Domnească”, with only 3 species (but fauna of grasshoppers of this reserve wasn't studied so well so this dates aren't definitive).

Gryllus campestris (LINNE 1758) was collected in all those five reserves, but *Metrioptera bicolor* (PHILIPPI 1830), *Oechanthus peluscens* (SERVILLE 1831), *Chorthippus biguttulus* (LINNE 1761) and *Ch. brunneus* (THUNBERG 1815) were found in four reserves. The species *Poecilimon affinis* (FRIVALDSKY 1868), *Omocestus minutus* (BRULLE 1832) and *Chorthippus mollis* (CHARPENTIER 1825) were found in three reserves respectively.

The *Mecostethus* genus with the large Marsh Grasshopper *Mecostethus grossus* (Linnaeus, 1766) collected from „Plaiul Fagului” are new genus and species for the fauna of the Republic of Moldova. This species is distributed in European and Asiatic parts of the former U.R.S.S. and in Europe. *Mecostethus grossus* (L.) preferred meadows, which are periodically flooded each winter.

The results of the indexes of dominance in those five reserves are given in Tab. 1.

Table 1. The index of dominance of the grasshopper's species from scientific reserves of the Republic of Moldova: Codrii (C), Plaiul Fagului (PF), Stepa Bugeacului (SB), Prutul-de-Jos (PJ) and Pădurea Domnească (PD).

Table 1. Indicele de dominanță a speciilor de ortoptere din rezervațiile științifice ale Republicii Moldova: Codrii (C), Plaiul Fagului (PF), Stepa Bugeacului (SB), Prutul-de-Jos (PJ) și Pădurea Domnească (PD).

Family	Species	Scientific reserves				
		C	PF	SB	PJ	PD
BRADYPORIDAE	<i>Ephippiger ephippiger</i> LATREILLE 1825	0.9	0.3	-	-	-
TETTIGONIIDAE	<i>Pholidoptera aptera</i> FABRICIUS, 1793	-	0.5	-	-	-
	<i>Phaneroptera falcata</i> SCOPOLI 1763	4.4	1.2	-	-	-
	<i>Phaneroptera spinosa</i> BEI-BIENKO, 1954	0.9	-	-	-	-
	<i>Leptophyes punctatissima</i> Bosc 1792	3.9	1.2	-	-	-
	<i>Leptophyes bosci</i> FIEBER 1853	10.2	9.2	-	-	-
	<i>Leptophyes albobittata</i> KOLLAR 1833	4.4	1.6	-	-	-
	<i>Pholidoptera griseptera</i> DE GEER 1773	6.3	20.8	-	-	-
	<i>Isophia gracilis</i> Brunner v. WATTENWYL 1882	0.9	-	-	-	-
	<i>Isophia costata</i> BRUNNER v. WATTENWYL 1878	-	0.7	-	-	-
	<i>Barbistis sericaudus</i> FABRICIUS 1793	3.3	-	-	-	-
	<i>Poecilimon ukrainicus</i> BEY-BIENKO, 1951	0.9	-	-	-	-
	<i>Poecilimon affinis</i> FRIVALDSKY 1868	0.9	0.1	-	1.2	-
	<i>Meconema thalassima</i> FABRICIUS 1793	1.9	-	-	-	-
	<i>Conocephalus fuscus</i> FABRICIUS 1793	1.5	2.2	-	-	-
	<i>Conocephalus discolor</i> THUNBERG, 1815	0.9	-	-	-	-
	<i>Tettigonia viridisima</i> LINNAEUS 1758	-	0.1	-	-	-
	<i>Metrioptera brachiptera</i> LINNAEUS 1745	-	-	2.5	-	-
	<i>Metrioptera roeselii</i> HAGENBACH 1822	1.5	-	-	-	-
	<i>Metrioptera bicolor</i> PHILIPPI 1830	0.9	0.8	0.8	0.4	-
	<i>Platycleis vittata</i> CHARPENTIER, 1825	-	-	3.3	0.7	-
<i>Platycleis tessellata</i> CHOPARD. 1922	-	-	0.8	0.4	-	
<i>Platycleis intermedia</i> SERVILLE 1839	-	-	3.3	0.4	-	
<i>Rhacocleis germanica</i> HERRICH-SCHAEFFER, 1840	0.5	-	-	-	-	
OECANTHIDAE	<i>Oecanthus peluscens</i> SCOPOLI 163	1.9	1.4	7.4	3.8	-
GRYLLIDAE	<i>Gryllus campestris</i> LINNAEUS 1758	2.9	0.9	3.3	5.3	4.6
TETRIGIDAE	<i>Tetrix tenuicornis</i> SAHLBERG, 1891	-	-	-	0.7	40.9
	<i>Tetrix bipunctata</i> LINNAEUS 1758	-	0.3	-	-	-
	<i>Tetrix subulata</i> LINNAEUS 1761	0.5	-	-	-	-
	<i>Tetrix depressa</i> BRISOUT 1848	0.9	-	-	-	-
ACRIDIDAE	<i>Acrida hungarica</i> HERBST 1786	-	-	-	9.1	-
	<i>Myrmeleotetix maculatus</i> THUNBERG 1815	-	-	1.7	1.2	-

<i>Omocestus viridulus</i> LINNAEUS 1761	0.9	-	2.5	1.2	-
<i>Omocestus minutus</i> BRULLE 1832	0.48	-	-	-	-
<i>Omocestus rufipes</i> ZETTERSTEDT, 1821	-	1.9	2.5	-	-
<i>Stenobothrus lineatus</i> PANZER 1796	-	-	-	3.1	-
<i>Pezotetrix giornai</i> ROSSI 1794	-	-	-	1.2	-
<i>Podismopsis poppuisi</i> MIRAM, 1908	0.5	-	-	-	-
<i>Parapleurus alliaceus</i> GERMAR 1817	-	-	-	-	54.5
<i>Paracryptera microptera</i> FISCHER WALDHEIM, 1833	-	-	-	0.4	-
* <i>Mecostethus grossus</i> LINNAEUS, 1766	-	0.1	-	-	-
<i>Euthystira brachyptera</i> OCSKAY, 1826	1.5	-	-	-	-
<i>Oedipoda caerulescens</i> LINNAEUS 1758	0.9	-	-	1.9	-
<i>Paracinema tricolor bisignata</i> THUNBERG 1815	-	0.3	-	3.1	-
<i>Dociostaurus maroccanus</i> THUNBERG 1815	-	-	-	0.7	-
<i>Chortippus loratus</i> FISCHER de WALDHEIM 1846	-	-	-	4.2	-
<i>Chortippus biguttulus</i> LINNAEUS 1761	22.7	27.1	13.3	6.8	-
<i>Chortippus dorsatus</i> ZETTERSTEDT 1821	-	0.2	-	3.1	-
<i>Chortippus brunneus</i> THUNBERG 1815	15.5	18.1	10.7	43.1	-
<i>Chortippus pullus</i> PHILPPI 1830	-	0.9	22.3	-	-
<i>Chorthippus vagans</i> EVERSMANN 1848	-	-	-	0.7	-
<i>Chortippus longicornis</i> LATREILLE 1804	-	5.9	-	1.8	-
<i>Chorthippus mollis</i> CHARPENTIER 1825	6.3	5	-	3.8	-
<i>Euchorthippus pulvinatus</i> FISCHER de WALDHEIM 1846	-	-	25.6	-	-
<i>Calliptamus italicus</i> LINNAEUS 1758	-	-	-	2.3	-

Legendă: C – Codrii; PF – Plaiul Fagului; SB – Stepa Buceacului; PJ – Prutul de Jos; PD – Pădurea Domneasca;

* - specie nouă pentru Republica Moldova

Note: C – Codrii; PF – Plaiul Fagului; SB – Stepa Buceacului; J – Prutul de Jos; PD – Pădurea Domneasca; * - a new species for Republic of Moldova

The structure of dominance is presented in Table 2. As is known there are five groups of dominance: eudominant species (with percentages over 10 %), dominant species (5.1 - 10 %), subdominant species (2.1 - 5 %), recedent (sporadical) species (1.1 – 2 %), subrecedent (subsporadical) species below 1 %. Within these groups of dominance the number of species, of course is variable.

Thus, the number of eudominant species varied between one species (*Chortippus brunneus* THNB.) in “Prutul de Jos” Reserve with 4.0% and four species in “Stepa Buceacului” Reserve (*Chortippus biguttulus* L., *Chortippus brunneus* THNB., *Chortippus longicornis* LATR., *Euchorthippus pulvinatus* F.-W.) with 28.57% (Tab.1. and Tab. 2).

The number of dominant species varied between one species (*Oecanthus pelucens* Scop.) in “Stepa Buceacului” Reserve) with 7.14%, and three species in “Prutul de Jos” Reserve (*Chortippus biguttulus* L., *Chortippus brunneus* THNB., *Chortippus pullus* PHIL.) respectively with 12.0% (Tab.1. and Tab. 2).

The number of subdominant species varied between one species (*Gryllus campestris* L.) in “Pădurea Domneasca” Reserve with 33,33%, and 7 species in “Prutul de Jos” Reserve (*Oecanthus pelucens* SCOP., *Stenobothrus lineatus* PANZ., *Paracinema tricolor bisignata* THNB., *Chortippus loratus* F.-W., *Chortippus dorsatus* ZETT., *Chorthippus mollis* CH., *Calliptamus italicus* L. with 28. 0 %.(Tab.1. and Tab. 2).

Recedent and subrecedent species have importance in the coenosis, because they contribute to the increase of diversity, but their number of individuals is small. It is known that in every ecosystem the number of the recedent and subrecedent species is big. The cumulative number of recedent and subrecedent species varied between 3 (“Stepa Buceacului” Reserve) and 19 (“Codrii” Reserve) (Tab.1. and Tab. 2).

Table 2. The structure of dominance and procentual representation of the material, collected in those five natural reserves.

Tabelul 2. Structura dominanței și reprezentarea procentuală a materialului colectat în cele cinci rezervații.

Name of reserves	Ed	D	SD	R	SR	T sp and %
Codrii	3	2	5	5	14	29
%	10.34	6.89	17.24	17.24	48.27	99.98
Plaiul Fagului	3	2	2	5	12	24
%	12.5	8.33	8.33	20.83	50.00	99.99
Stepa Buceacului	4	1	6	1	2	14
%	28.57	7.14	42.85	7.14	14.24	99.94
Prutul de Jos	1	3	7	6	8	25
%	4.0	12.0	28.0	24.0	32.0	100.0
Pădurea Domneasca	2	0	1	0	0	3
%	66.66	0	33.33	0	0	99.99

Legendă: ED = eudominant; D = dominant; SD= subdominant; R= recedent (sporadic); SR= subrecedent
 Note: ED = eudominant; D = dominant; SD= subdominant; R= recedent; SR= subrecedent

The Cekanovski-Sörensen ecological indexes of similarity of grasshoppers from scientific reserves of the Republic of Moldova are represented in Tab. 3. The Cekanovski-Sörensen indexes are smaller in „Codrii” – „Pădurea Domnească” – 0.06, and bigger in „Stepa Bugeacului” – „Prutul-de-Jos” – 0.37.

Table 3. The Cekanovski-Sorensen ecological indexes of similarity of grasshoppers from scientific reservations of the Republic of Moldova.

Tabelul 3. Indicele lui Cekanovski-Sorensen de similitudine ecologică a speciilor de ortoptere din rezervațiile științifice ale Republicii Moldova.

Rezerves	Codrii	Plaiul Fagului	Stepa Bugeac	Prutul de Jos	Pădurea Domnească
Codrii	-	0.35	0.22	0.26	0.06
Plaiul Fagului	0.35	-	0.27	0.29	0.07
Stepa Bugeac	0.22	0.27	-	0.37	0.11
Prutul de Jos	0.26	0.29	0.37	-	0.14
Pădurea Domnească	0.06	0.07	0.11	0.14	-

CONCLUSIONS

1. In the scientific reserves of the Republic of Moldova „Codrii”, „Plaiul Fagului”, „Stepa Bugeacului”, „Prutul-de-Jos” and „Pădurea Domnească” were collected 55 species of grasshoppers which belong to 6 families and 34 genera. On the whole, family Acrididae is richer in genera with 16 genera, and family Tettigoniidae with 13 genera.

2. The *Mecostethus* genus with *Mecostethus grossus* (LINNAEUS, 1766) collected from „Plaiul Fagului” are new genus and species for the fauna of the Republic of Moldova.

3. There was established that *Chortippus brunneus* THNB. and *Chortippus biguttulus* L. are the eudominant species in four reserves, but the species *Leptophies bosci* FIEB. and *Pholidoptera griseptera* DE GEER were eudominant only in Codrii and Plaiul Fagului reserves.

4. The Cekanovski-Sörensen ecological indexes of similarity of grasshoppers from scientific reserves of the Republic of Moldova is smaller in „Codrii” – „Pădurea Domnească” – 0.06, and bigger in „Stepa Bugeacului” – „Prutul-de-Jos” – 0.37.

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