

CONSIDERATIONS REGARDING THE TERRESTRIAL TRUE BUGS OF THE STREI RIVER BASIN (TRANSYLVANIA, ROMANIA)

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Preliminary studies on the heteroptera terrestrial fauna of habitats located in catchment Strei have identified a number of 37 species belonging to 8 families. Although investigated habitats provide a trophic source for much more terrestrial heteroptera species, fewer identified species are explained mainly by the sampling period of biological material. The presence in the investigated areas of some rare species in Romania (*Rhopalus distinctus*, *Stictopleurus subtomentosus*) and also the trophic availability of these habitats require further research.

Key words: Heteroptera, terrestrial true bugs, faunistic list, diversity indices, Transylvania, Strei River Basin, Romania.

INTRODUCTION

Heteroptera includes about 40,000 species of large six infraorders and 50 families, of which over 1000 are found in Romania. They are common species known as plant bugs, stink bugs, damsel bugs, bedbugs, widespread in terrestrial and aquatic habitats. The need to know them as accurate both in terms of fauna and from the point of view of biological species and their preferences green is very important because many of land heteroptera are either harmful to crops, or entomophag insects with special role in economy and combating biological nature.

Important contributions to knowledge of the heteroptera fauna land of Transylvania were made by Perju and Schneider (1972) through studies of leguminous crops in the North-western part of Transylvania. Following collections made in 1966 and 1967 crops of alfalfa, clover, trefoil and sainfoin there were identified 3732 specimens belonging to 72 species classified in 14 families (Perju & Schneider, 1972).

No studies have been conducted on heteroptera terrestrial fauna of Strei River riparian ecosystems, our data representing a preliminary study will be supplemented by further studies.

MATERIAL AND METHODS

Biological material was sampled on a single campaign in August 2014 from seven sampling sites situated in “Hațeg Country” (Transylvania), which is drained by the Strei River. Sites were encoded T1 to T7, according to the order of sampling.

T1 (Fig. 1): 45° 31' 09.5" northern latitude; 023° 04' 02.4" eastern longitude; 388 m altitude. It is a mesophilic meadow, with *Daucus carota*, *Holcus lanatus*, *Sanguisorba officinalis*, productive, but below average quality. It was a fallow, but now it is a mowed meadow.



Fig. 1. Sampling station T1.

T2 (Fig. 2): 45° 31.945' 56.7" northern latitude; 023° 01.983' 59.0" eastern longitude; 357 m altitude. It is situated near Rușor locality. There is Strei meadow, invaded by weeds (especially *Daucus carota*, *Tanacetum vulgare*, *Erigeron annuus*, *Carex sp.*, *Artemisia vulgaris* etc.). There was identified vegetal association Tanaceto-Artemisieto vulgaris.

T3 (Fig. 3): 45° 28.857' 51.4" northern latitude; 023° 08.586' 35.1" eastern longitude; 462 m altitude.

It is situated at about 1 km from Livadia locality. There is a meadow of *Agrostis stolonifera* with *Achillea millefolium*, *Galium molugo*, *Hypericum perforatum*, invaded by weeds (e.g. *Tanacetum vulgare*). There are some cereal crops in the neighborhood.



Fig. 2. Sampling station T2.



Fig. 3. Sampling station T3.

T4 (Fig. 4): 45° 32.266' 16.0" northern latitude; 022° 58.694' 41.6" eastern longitude; 374 m altitude.

Sampling was carried out on a fallow covered with grass, where dominates *Setaria glauca*, together with *Daucus carota* and *Agrostis stolonifera*. The sampling station is situated on the territory of Ohaba de sub Piatră.



Fig. 4. Sampling station T4.

T5 (Fig.5): 45° 31.961' 57.6" northern latitude; 023° 01.016' 01.0" eastern longitude; 365 m altitude.

We performed samplings on the territory of Băiești locality; we chose there a fallow with evolutionary tendency toward mesophilic meadow, with the dominant species *Daucus carota*, growing with *Dipsacus laciniatus*, *Rumex crispus*, etc.

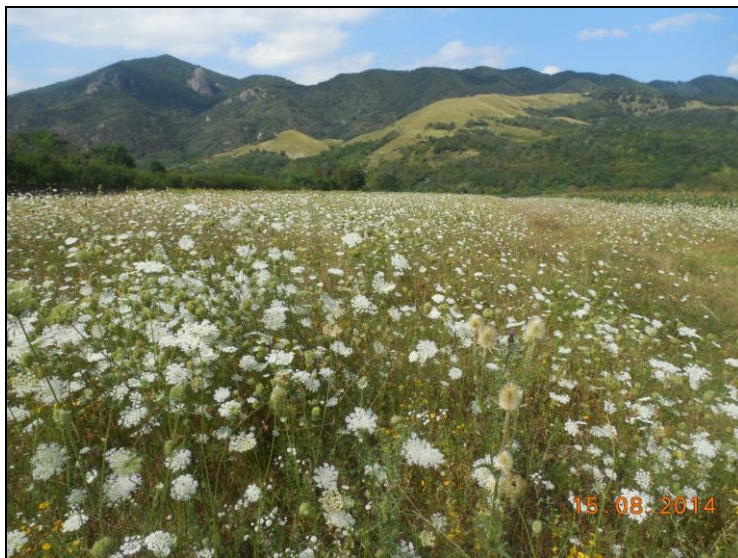


Fig. 5. Sampling station T5.

T6 (Fig. 6): 45° 35.639' 38.3" N, 022° 59.589' 35.3"E, altitude 303 m

It is a meadow of *Agrostis stolonifera*, sometimes invaded by weeds and bushes. There were also identified *Erigeron annuus* and *Tanacetum* sp. The meadow has mesohygrophilous character in patches, reed growing in such places.



Fig. 6. Sampling station T6.

T7 (Fig. 7): 45° 37.507' 30.4" N, 022° 59.404' 24.3"E, altitude 286 m.

It is a mesophilic to meso-hygrophilic meadow, with *Agrostis stolonifera*, more or less invaded by *Tanacetum vulgare*, *Erigeron annuus* and bushes.



Fig. 7. Sampling station T7.

Insects were evenly sampled by performing 50 sweeps through the grassy vegetation from each habitat. The samples were afterwards preserved in 70% ethyl alcohol before their identification. Determinations were performed in the laboratory using a stereomicroscope with the help of different key for determination: Wagner (1966), Kis (1984, 2001), Moulet (1995), Derjanschi & Pericart (2005) and Rabitsch (2005). The nomenclature, systematics and information on the general distribution of the species are presented after Aukema & Rieger (1995, 1996, 1998, 2001, 2006), with respect to later changes.

Field data was processed using hierarchical clustering (Lance & Williams, 1966) with Systat 10.2, on relative abundance (AR%) data. Diversity index values were used in the analysis of the sampled species, namely Species Richness (Hill, 1973), and community heterogeneity, expressed by Gini-Simpson Index (Jost, 2006).

RESULTS AND DISCUSSION

As a result of the present study a total of 35 terrestrial Heteroptera species were found in this area (Table I). The species belong to the following families: Miridae, Nabidae, Pentatomidae, Rhopalidae, Alydidae, Coreidae, Scutelleridae and Cydnidae, seven samples being collected with 189 specimens.

Table 1

Terrestrial heteroptera fauna identified of the Strei River Basin and the values of diversity indices

Nr. crt.	Taxon	Sampling station						
		T1	T2	T3	T4	T5	T6	T7
	Family Miridae							
1	<i>Adelphocoris lineolatus</i> (Goeze, 1778)	1	8	9	43	20	2	4
2	<i>Adelphocoris seticornis</i> (Fabricius, 1775)	-	-	2	3	-	-	-
3	<i>Adelphocoris quadripunctatus</i> (Fabricius, 1794)	-	-	1	-	7	-	-
4	<i>Adelphocoris ticinensis</i> (Meyer-Dür, 1843)	-	-	-	-	1	-	1
5	<i>Deraeocoris (Deraeocoris) ruber</i> (Linnaeus, 1758)	-	-	-	-	2	-	-
6	<i>Lygus maritimus</i> Wagner, 1949	-	-	2	-	-	-	-
7	<i>Lygus pratensis</i> (Linnaeus, 1758)	-	-	2	-	-	-	-
8	<i>Liocoris tripustulatus</i> (Fabricius, 1781)	2	-	-	-	-	-	-
9	<i>Trigonorylus caelestialium</i> (Kirkaldy, 1902)	-	-	-	-	-	12	-
10	<i>Halticus apterus</i> (Linnaeus, 1758)	2	2	3	2	-	3	1
11	<i>Apolygus lucorum</i> (Meyer-Dür, 1843)	-	-	-	2	-	-	-
12	<i>Chlamydatus (Euattus) pulicarius</i> (Fallen, 1807)	-	1	-	-	-	-	-
13	<i>Polymerus (Poeciloscytus) unifasciatus</i> (Fabricius, 1794)	-	-	-	1	-	-	-

Table 1 (continued)

14	<i>Notostira elongata</i> (Geoffroy 1785)	-	-	-	2	-	-	-
15	<i>Stenodema</i> (<i>Stenodema</i>) <i>laevigata</i> (Linnaeus, 1758)	-	-	5	-	-	-	1
16	<i>Strongylocoris leucocephalus</i> (Linnaeus, 1758)	-	2	-	-	-	-	-
Family Pentatomidae								
17	<i>Aelia acuminata</i> (Linnaeus, 1758)	-	-	-	-	1	-	1
18	<i>Aelia rostrata</i> Boheman, 1852	-	-	-	2	-	-	-
19	<i>Carpocoris</i> (<i>Carpocoris</i>) <i>fuscispinus</i> (Boheman, 1850)	1	-	-	-	-	-	-
20	<i>Eurydema</i> (<i>Eurydema</i>) <i>oleracea</i> (Linnaeus, 1758)	-	-	-	-	1	-	-
21	<i>Neottiglossa leporine</i> (Herrich-Schäffer, 1830)	-	-	-	-	3	-	-
22	<i>Piezodorus lituratus</i> (Fabricius, 1794)	-	-	1	-	-	-	-
23	<i>Stagonomus</i> (<i>Dalleria</i>) <i>bipunctatus</i> (Linnaeus, 1758)	-	-	-	1	-	-	-
24	<i>Vilpianus galii</i> (Wolff, 1802)	-	-	1	1	-	-	-
Family Alydidae								
25	<i>Camptopus lateralis</i> (Germar, 1817)	-	-	2	1	2	-	-
Family Coreidae								
26	<i>Coreus marginatus</i> (Linnaeus, 1758)	-	-	-	1	-	-	-
Family Scutelleridae								
27	<i>Eurygaster testudinaria</i> (Geoffroy, 1785)	-	-	-	3	1	-	-
Family Cydnidae								
28	<i>Legnotus picipes</i> (Fallen, 1807)	-	-	-	1	-	-	-
Family Nabidae								
29	<i>Nabis</i> (<i>Nabacula</i>) <i>flavomarginatus</i> Scholtz, 1847	2	-	-	2	-	-	-
30	<i>Nabis</i> (<i>Nabis</i>) <i>ferus</i> (Linnaeus, 1758)	-	-	-	-	-	3	-
31	<i>Nabis</i> (<i>Nabis</i>) <i>rugosus</i> (Linnaeus, 1758)	-	1	1	2	-	-	-
Family Rhopalidae								
32	<i>Rhopalus</i> (<i>Rhopalus</i>) <i>parumpunctatus</i> Schilling, 1829	-	-	-	-	1	-	-
33	<i>Rhopalus</i> (<i>Rhopalus</i>) <i>rufus</i> Schilling, 1829	-	-	-	-	1	-	-
34	<i>Rhopalus</i> (<i>Rhopalus</i>) <i>distinctus</i> (Signoret, 1859)	-	-	-	-	-	1	1
35	<i>Stictopleurus subtomentosus</i> (Rey, 1888)	-	-	-	-	-	1	-
Total specimens		8	14	29	67	40	22	9
Species richness		5	5	11	15	11	6	6
Heterogeneity		0.893	0.67	0.869	0.586	0.737	0.684	0.833

Considering there are 695 species of Heteroptera already found in Romania (Roșca, 1984) and 72 species found in Transylvania (Perju & Schneider, 1972), the number of identified species in this study is very low comparing with sampling area size but this fact can be linked to the discontinuous collecting program. Moreover, the main research objective had in view a preliminary study regarding the incidence of different terrestrial heteroptera in the Strei catchment area and future works will approach the spatial and temporal distribution as well as the structure of this group from the targeted area.

Among the rare species identified in our study, we mention: *Rhopalus distinctus* (Fig. 8) and *Stictopleurus subtomentosus* (Fig. 9).



Fig. 8. *Rhopalus distinctus* - habitus (orig.).

Rhopalus distinctus occurs sporadically in Romania, is a thermophilic species – sandy specific biotope, while *Stictopleurus subtomentosus* is xero-thermophilic identified in southern Oltenia (Kis, 2001), National Park Măcin Mountains area and the lower basin of the Siret River (Șerban, 2012).

About 100 specimens in the larval stage were not identified. The sampling period of Heteroptera can explain the large number of larvae in collected samples, knowing that terrestrial heteroptera present generally to a single generation per year, mostly wintering adults, larvae of the new generation appearing in June-August.



Fig. 9. *Stictopleurus subtomentosus* – habitus (orig.).

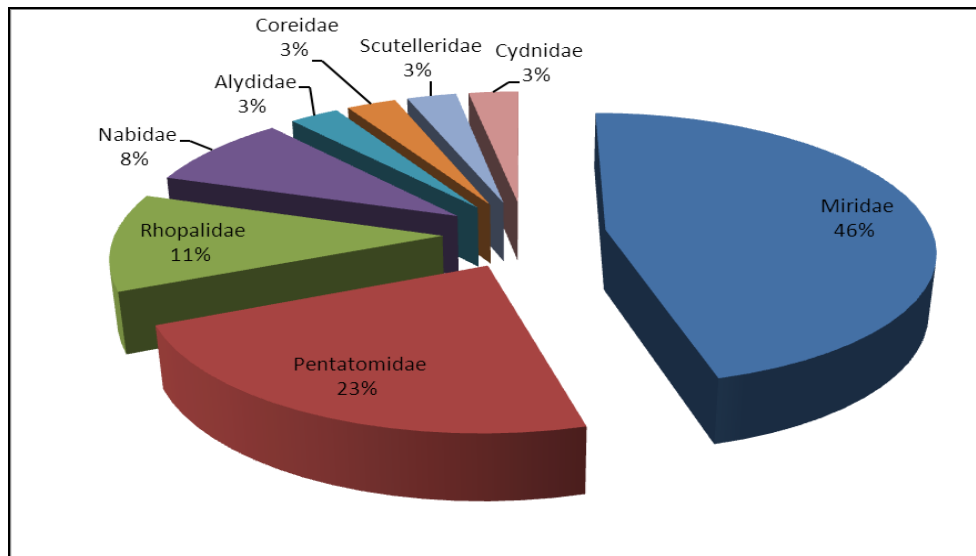


Fig. 10. Families percentage based on the number of species identified in the area.

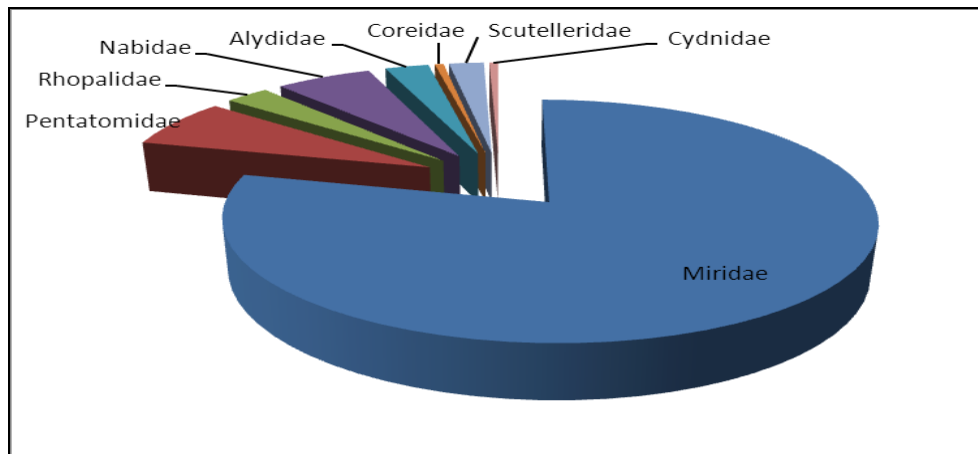


Fig. 11. Families percentage based on the number of individuals collected.

If we take into consideration the number of identified species we can see that the best represented families are: Miridae (46%), Pentatomidae (23%) and Rhopalidae (11%) (Fig. 10).

The situation is similar when we take into account the number of individuals, Miridae, Pentatomidae and Nabidae being the dominant families (Fig. 11).

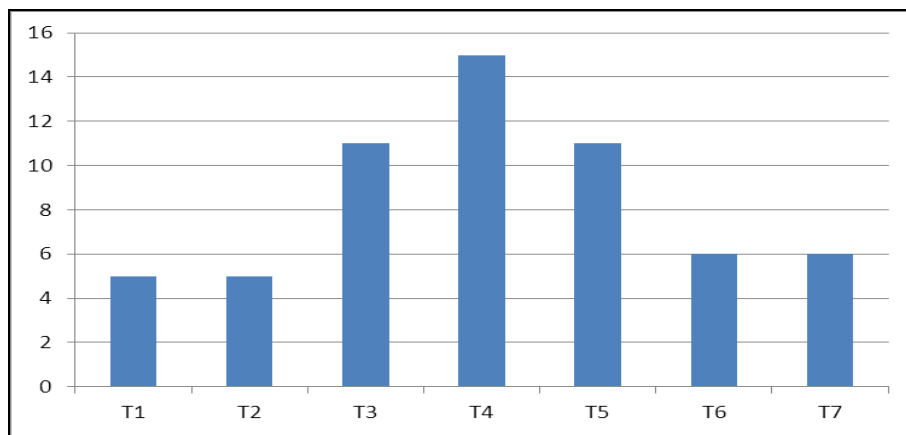


Fig. 12. Graphical representation of the Species Richness Index values, for the seven sampling stations.

As expected, species richness values were very low (Fig. 12). The heterogeneity of the community was surprisingly high in four of the six stations where terrestrial Heteroptera were found – T1, T3, T5, respectively T7 (Table 1). The communities of true bugs from our sampling stations are relatively equilibrated, considering the high values of Gini-Simpson Index.

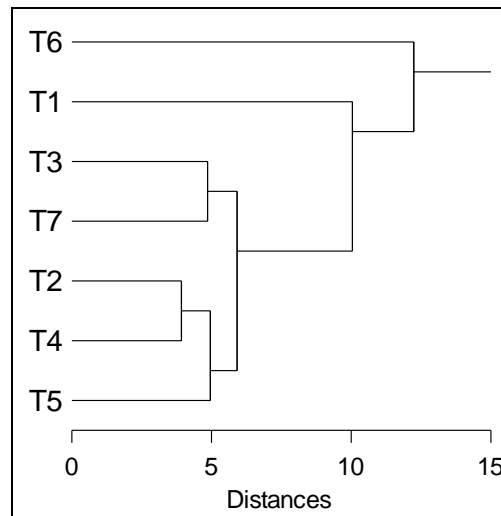


Fig. 13. Cluster analysis for AR% data (Euclidean distances, average linkage).

The cluster analysis of the sampling stations performed on the Euclidean distances between the relative abundances of the true bugs species (Fig. 13) reveals two different groups.

The first group is formed by T2, T4 and T5; these sampling stations are fallows covered with grass, with the dominant species *Daucus carota* (T4 and T5), respectively Strei meadow, invaded by weeds, especially *D. carota* (T2). Each of these stations is dominated by *Adelphocoris lineolatus* and, also, have at least two species represented by one specimen each.

The second group is formed by T3 and T7, two meadows of *Agrostis stolonifera*, more or less invaded by weeds (e. g. *Tanacetum vulgare*).

The remaining two stations are independent. T6 has a particular true bugs community structure being dominated to a great degree by *Trigonotilus caelestialum*; it is a meadow with reed growing in patches. T1 has the most equilibrated true bugs community structure; it is a mowed meadow.

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