DIVERSITY AND DISTRIBUTION OF THE ORIBATID MITES (*ACARI, ORIBATIDA*) IN SOME GRASSLAND ECOSYSTEMS FROM THE LOWER SECTION OF THE PRUT MEADOW (ROMANIA)

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This study comprises the results of researches carried on in some grassland ecosystems from the lower section of the Prut meadow, and aims to evidence the manner in which the changes of habitats due to the embankment measures are reflected at the level of the oribatid communities. The taxonomic, ecological, and zoogeographical spectrum of the fauna was analyzed, as well as the coenoses' structure, in relation with the stand conditions. The oribatid fauna which populate the grasslands under study is adapted to the habitat conditions, having an obvious meso-hygrophilous – mesophilous feature. The coenological analysis put in evidence the different structure of the oribatid communities in the floodable perimeters compared with the embanked ones, which reflects the different bio-edaphic conditions.

***Key words**: oribatid mites, communities, grassland, Prut meadow, embankment.*

Within the edaphic mesofauna the oribatids mites are distinguished not only by their weight as species and individuals number, but also by a special selectivity in relation with the life conditions, therefore the bioindicator quality regarding the soil quality or the changes due to some human practices or interventions.

Certain previous studies carried out in the middle section of the Prut riverside showed the influence of the drought phenomenon - installed in this zone after the drainage and embankment measures - on the oribatid mites' fauna and on their communities' structure. In the lower section of the Prut meadow there are no similar studies, that is why a complex research project is developed now, the present study being performed in this context.

MATERIAL AND METHOD

After the observations and field researches, 5 ecological stands located in the Prut river meadow (the lower section, on the territory of Iaşi and Vaslui counties) have been selected. Some grassland ecosystems were taken into study, as follows: 1. Gorban I; 2. Gorban II; 3. Stănileşti I; 4. Stănileşti II; 5. Cârja. The stands 1, 3 and 5 are situated in the floodable perimeter, while 2 and 4 – beyond the dyke.

Series of 100 cm^2 soil samples have been taken over from each ecological stand. Edaphic mesofauna has been extracted from samples through the Tullgren - Berlese method and then selected by systematic groups. The faunistic material has

been submitted to microscopic study, with a view to identify the species; the abundance of each species, on samples and ecological stands has been noted. The primary data obtained in this way have been processed by means of some analytic and synthetic ecological estimators: average abundance of each species (ā) and global average abundance (Ā), expressed as individuals/100cm^2 and, respectively, m^2; number of species (S) and average number of species /sample surface (S´); frequency (C) of each species; relative density (D.r.); index of ecological significance (W), expressed as classes: V and IV-edifying species, III-influential species, II and I-accompanying species; specific diversity (H(s)max, H(s), H.r.), estimated by the Shannon - Wienner equation; the adults/preadults ratio. The faunistic synopsis includes the list of recorded taxa, autecological peculiarities and world distribution; the species recorded for the first time in Romanian fauna are marked with *. Also, for each species is indicated presence in one or another stand, and the relative density, as follows: +++species with more than 5% of total effectives, ++species with 2.1-5% of effectives, +species with under 2% of effectives.

RESULTS AND DISCUSSIONS

The faunistic material collected from the above mentioned grassland ecosystems totalized 2,028 individuals of adult oribatids and 303 preadults, the last ones being registered globally. 32 species, belonging to 26 genera and 20 families of the order *Oribatida* Dugès, 1834 have been recorded (see the Faunistic synopsis below).

Faunistic synopsis of the oribatid mites

Fam. *Brachychthoniidae* Thor, 1934

Poecilochthonius Balogh, 1943

-*P. spiciger* (Berlese, 1910): 1(+++), 3(+); (mainly) sylvicolous, meso-xerophilous; Holarctic, Argentina.

Sellnickochthonius Krivolutsky, 1964

-*S. immaculatus* (Forsslund, 1942): 1(+); (mainly) sylvicolous, eurytopic; Holarctic, N Neotropical

-*S. rostratus* (Jacot, 1936): 1(+), 3(+); meso-hygrophilous, euedaphic; Holarctic

Fam. *Epilohmanniidae* Oudemans, 1923

Epilohmannia Berlese, 1910

-*E. cylindrica* (Berlese, 1904): 1(+), 3(+), 4(+); euedaphic, lawn species; cosmopolitan

Fam. *Euphthiracaridae* Jacot, 1930

Acrotritia Jacot, 1923

-*A. ardua* (Koch, 1841): 3(++); (mainly) sylvicolous, eurytopic, mesophilous; cosmopolitan

Fam. *Liacaridae* Sellnick, 1928

Liacarus (Liacarus) Michael, 1898

-*L. (L.) coracinus* (Koch, 1841): 4(+++); eurytopic, mesophilous; Palaearctic

Fam. *Tectocepheidae* Grandjean, 1954

Tectocepheus Berlese, 1896

-*T. velatus* (Michael, 1880): 1(+), 4(+++); euryplastic; cosmopolitan

Fam. *Oppiidae* Sellnick, 1937

Anomaloppia Subias, 1978
-*A. differens* Mahunka et Topercer, 1983: 2(+), 4(+); Central, S Europe
Ramusella (Insculptoppia) Subias, 1980
-*R. (I.) insculpta* (Paoli, 1908): 4(+++); euryplastic; Palaearctic (except N)
Medioppia Subias et Minguez, 1985
-*M. obsoleta* (Paoli, 1908): 1(+); euryplastic; Palaearctic, New Zealand, Hawaii
Microppia Balogh, 1983
-*M. minus* (Paoli, 1908): 1(+), 2(++), 3(+++), 4(+), 5(+++); euryplastic, euedaphic; cosmopolitan
Subiasella (Lalmoppia) Subias et Rodriguez, 1986
-*S. (L.) subiasi* (Mahunka, 1987): 1(+++), 3(+++), 5(+++); meso-hygrophilous; Central Europe

Fam. *Suctobelbidae* Jacot, 1938
Suctobelbella (Suctobelbella) Jacot, 1937
-*S. (S.) subtrigona* (Oudemans, 1900): 3(+); (mainly) sylvicolous, eurytopic; Holarctic

Fam. *Scutoverticidae* Grandjean, 1954
Scutovertex Michael, 1879
-*S. sculptus* Michael, 1879: 3(+); lawn species; Palaearctic, New Zealand

Fam. *Phenopelopidae* Petrunkevitch, 1955
Peloptulus Berlese, 1908
-*P. montanus* Hull, 1914*: 1(++), 3(+); recorded in wet lawns, in peat bogs; Palaearctic
-*Peloptulus sp.*: 4(+)

Fam. *Achipteriidae* Thor, 1929
Achipteria (Achipteria) Berlese, 1885
-*A. (A.) coleoptrata* (Linné,1758): 1(+), 3(+); eurytopic, mesophilous; Holarctic

Fam. *Oribatellidae* Jacot, 1925
Tectoribates Berlese, 1910
-*T. ornatus* (Schuster, 1958): 4(+++); eurytopic, lawn species; Palaearctic, Argentina, Uruguay

Fam. *Ceratozetidae* Jacot, 1925
Zetomimus (Protozetomimus) Perez – Iñigo, 1990
-*Z. (P.) acutirostris* (Mihelčič, 1957): 5(+++); lawn species; S Europe

Fam. *Chamobatidae* Thor, 1937
Chamobates (Chamobates) Hull, 1916
-*C. (C.) cuspidatus* (Michael, 1884): 1(+); sylvicolous; Holarctic

Fam. *Punctoribatidae* Thor, 1937
Minguezetes Subias, Kahwash et Ruiz, 1990
-*M. hexagonus* (Berlese, 1908): 1(+), 3(+); hygrophilous; Holarctic
Punctoribates Berlese, 1908
-*P. minimus* Shaldybina, 1969: 1(+), 4(+); Palaearctic

Fam. *Mochlozetidae* Grandjean, 1960
Podoribates Berlese, 1908

-*P. longipes* (Berlese, 1887): 1(+), 3(+); recorded in lawns, frequently in salted soils; Holarctic

Fam. *Oribatulidae* Thor, 1929

Oribatula (Oribatula) Berlese, 1896

-*O. (O.) amblyptera* Berlese, 1916*: 1(+), 2(+), 3(+), 4(+); Italy, Switzerland, Austria

-*O. (O.) pannonica* Willmann, 1949: 4(+++); lawn species; Palaearctic

Oribatula (Zygoribatula) Berlese, 1916

-*O. (Z.) undulata* Berlese, 1916: 1(+++), 2(+++); xerophilous, tolerant for soil's salinity; subtropical, pantropical

Fam. *Liebstadiidae* J. et P. Balogh, 1984

Liebstadia Oudemans, 1906

-*L. pannonica* (Willmann, 1951): 1(++); mesophilous, (mainly) lawn species; Holarctic

Fam. *Scheloribatidae* Grandjean, 1933

Scheloribates (Scheloribates) Berlese, 1908

-*S. (S.) fimbriatus* Thor, 1930: 1(+); recorded in lawns, in cultivated soils; cosmopolitan

-*S. (S.) labyrinthicus* Jeleva, 1962: 1(+++), 2(+), 3(+++); eurytopic lawn species; S and S-E Europe

Fam. *Protoribatidae* J. et P. Balogh, 1984

Protoribates (Protoribates) Berlese, 1908

-*P. (P.) capucinus* Berlese, 1908: 4(+++); eurytopic, mesophilous; cosmopolitan

-*P. (P.) dentatus* (Berlese, 1883)*: 5(+); Holarctic

Fam. *Galumnidae* Jacot, 1925

Galumna (Galumna) Heyden, 1826

-*G. (G.) obvia* (Berlese, 1914):1(+), 4(+); mesophilous, (mainly) lawn species; Holarctic.

On the whole fauna, the primitive oribatids represent 15.62%, the superior, picnonotic ones – 25%, and the poronotic oribatids – 59.37%, the dominance of the last major group being characteristic for the lawn communities [1, 2, 3]. In this case the poronotic oribatids are dominant both as species and as individuals number in most the investigated stands.

The zoogeographical analysis shows that the widely distributed species are the most numerous, Holarctic elements representing 34.37%, cosmopolitan and semi-cosmopolitan ones - 25%; these are followed by the Palaearctic - 21.87%, and European species – 12.5%. As regards the ecological spectrum, the lawn elements constitute the most numerous group (34.37%), followed by the euryplastic and sylvicolous species (21.87%, respectively 15.62%). If considering the species' requirements related to the humidity factor the high proportion of the mesophilous and meso-hygrophilous species can be observed [2, 3, 4].

In this context three species, namely *Peloptulus montanus* Hull, 1914, *Oribatula (O.) amblyptera* Berlese, 1914 şi *Protoribates (P.) dentatus* (Berlese, 1883), have been recorded for the first time in Romanian fauna [4].

Table 1

Structural global parameters of the oribatid communities in the investigated grasslands

Stands	Ā		S	S'	Adults/ preadults	specific diversity		
	total	adults				H(s)max	H(s)	H. r.
1. GORBAN I	18,540	16,180	20	10,6	6.85	4.3219	2.7622	63.91
2. GORBAN II	6,740	6,700	5	2,2	168.5	2.3219	0.386	16.62
3. STĂNILEŞTI I	4,480	2,900	14	5	1.83	3.8073	2.1111	55.45
4. STĂNILEŞTI II	4,980	4,940	13	6,2	123.5	3.7004	2.6087	70.49
5. CÂRJA	11,880	9,840	5	3	4.82	2.3219	0.8394	36.15

Legend: Ā - global average abundance, individuals/m^2; S - number of species; S - number of species/sample; H(s)max - maximal specific diversity; H(s) - real specific diversity; H.r. – relative diversity (%).

The analysis of the global structural parameters of the oribatid communities shows that the global average density varies between wide limits from a stand to another, being comparable with values found in other similar ecosystems (*table 1*) [2, 3, 5]. The number of species differs, too, from an ecosystem to another, and an adequacy between the abundance and the richness in species does not always exist. The specific diversity is relatively low, mostly the real and relative ones. In these wet riverside lawns, at least one ecological factor is pithy (excessive humidity, high content in salts of the soil), which favours a small number of species and limits the others.

In the investigated lawns at Gorban the oribatid mites reach relatively high values of the global average abundance; in the floodable perimeter (Gorban I) maximum values both of the density and of the number of species were found (*table 1*). In the other lawn situated beyond the dyke (Gorban II) the abundance is almost 3 times lower, and the number of species represent ¼ of those recorded in the first stand. In the both stands the species *Oribatula (Zygoribatula) undulata* is euconstant and eudominant, this fact indicating soil's high content in salts [2, 5]. In the soil of the floodable lawn the oribatid community has a balanced structure, illustrated by the relatively high values of the specific diversity. Besides the mentioned species *Scheloribates labyrinthicus*, *Poecilochthonius spiciger* and *Subiasella (Lalmoppia) subiasi* are the edifying species, which cummulate 84.54% of the total effectives.

At Gorban II the oribatid coenosis has an extremely unbalanced structure, *O. (Z.) undulata* being the only edifying element, that reunite over 94% of the effectives. Therefore, the community is characterized by structural entropy (as indicate the values of specific diversity) and consequently, by a marked instability (*table 1*). These facts indicate that the salting phenomenon is more increased beyond the dyke, and during the summer the drought represent an additional factor with negative effects on the edaphic microarthropods.

As regards the investigated grasslands at Stănileşti, the global average abundance and the richness in species are very close, but the specific composition and the communities' structure are entirely different (*table 1*). Despite of the nearby placement of these stands, only 2 species are common in the oribatid coenoses. In the floodable perimeter (Stănileşti I) the edifying species - *Scheloribates labyrinthicus, Subiasella (L.) subiasi* and *Microppia minus* – cummulate 87.58% of the individuals, while in the embanked surface (Stănileşti II) *Oribatula pannonica, Tectoribates ornatus, Liacarus coracinus, Protoribates capucinus* and *Tectocepheus velatus* form the edifying group, and hold 88.24% of the effectives.

In the lawn soil at Cârja the oribatid mites reach a relatively high value of the global average abundance, but the number of species and the specific diversity are very low. *Subiasella (L.) subiasi* and *Zetomimus (P.) acutirostris* are the edifying species and comprise 93.28% of the effectives. Due to the uneven distribution of the effectives on species, the community is characterized by a marked instability.

CONCLUSIONS

The oribatid fauna which populates the grasslands situated in the lower section of the Prut meadow is well adapted to the habitat conditions, having an obvious meso-hygrophilous – mesophilous feature; within this fauna, the typical lawn species and the euryplastic ones are well represented.

The oribatid communities have a relatively low specific diversity, and the global average density varies between wide limits from a stand to another. The coenological analysis put in evidence the different structure of the oribatid communities in the floodable perimeters compared with the embanked ones, which reflects the different bio-edaphic conditions.

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