

INVESTIGATION OF COLLEMBOLA IN ARENOSOLS OF EAST LITHUANIA

NEDA GRENDIENĖ

Institute of Ecology of Nature Research Centre, Akademijos 2, LT-08412 Vilnius, Lithuania
E- mail: nedagr@gmail.com

Abstract

The investigation was carried out on Collembola species in the low productivity Arenosols (sand soils) of Vilnius and Šalčininkai districts. Data on 19 species of Collembola belonging to 9 families identified in agricultural fields are presented. In total, 1022 individuals of Collembola were found. The material was collected in July-September in 2008 using a cenometer, five times in each territory. The structure of Collembola communities in the cultivated fields was found to be of a monodominant character. *Parisotoma notabilis* (Schaeffer, 1896) and *Hypogastrura assimilis* (Krausbauer, 1898) are eudominant species. *Ceratophysella denticulata* (Bagnal, 1941) and *Desoria hiemalis* (Schoett, 1893) are rare species. *Podura aquatica* (Linnaeus, 1758) was identified for the first time in Lithuania.

Key words: Arenosols, Collembola, species composition, cultivated fields

Introduction

Collembola are currently considered to be a monophyletic class of the phylum Arthropoda although their exact taxonomic position is still a subject of discussion. Many authors treat Collembola as insects (Hopkin, 2002). Worldwide, about 7000 Collembola species have been described; about 2400 are known from Europe (Sterzynka, 2007). At present, the list of Lithuanian invertebrates includes 146 species of Collembola from 12 families. The subject of the work was the Collembola community in cultivated fields of poor Arenosols.

Material and Methods

The material was collected in July and September 2008. Agricultural fields were investigated. Soil samples were taken with a cenometer (5 x 5 x 5 cm) from the top soil layer (0–5 cm) repeatedly ten times in each of the study territories.

Collembolans were isolated from soil with a modified Tullgren-Berlese extractor following standard methods (Ghiliarov & Striganova, 1987). The samples were kept in the extractor for five days until the collembolans gained access to glass containers filled with 70% ethanol and 2% glycerol solution. The waste material and soil particles were removed by filtration through a white filter paper. Collembolans were picked out with a sharp needle and placed into a glycerin drop on the microscopic slide. Species were identified using identification keys: Bei-Bienko *et. al.* (1964) and Fjellberg (2007). The diversity of species was calculated according to the index of Shannon

(Brower & Zar, 1984). The dominance of species was determined according to H. Engelmann (Engelmann, 1978): eudominant species accounted in the sample for 40% to 100%, dominant species for 12.5% to 39.9%, subdominant species for 4.0% to 12.4%, recedent species from 1.3% to 3.9%, and subrecedent species less than 1.3%.

List of localities

Vilnius district	Gulbinai	54°47'54"N, 25°17'27" E
	Pakenė	54°39'00"N, 25°35'53" E
Šalčininkai district	Šalčininkėliai	54°22'35"N, 25°23'24" E
	Turgeliai	54°26'59"N, 25°30'51" E

Results

Table 1. Collembola species and the number of individuals sampled. In parentheses – dominance in percentage

Family, species	Number of individuals			
	Pakenė	Gulbinai	Turgeliai	Šalčininkėliai
Isotomidae				
<i>Desoria hiemalis</i> (Schoett, 1893)	1 (0.9%)	-	-	-
<i>Desoria violacea</i> (Tullberg, 1876)	3 (2.6%)	-	-	-
<i>Folsomia quadrioculata</i> (Tullberg, 1871)	-	86 (15.2%)	-	15 (19.2%)
<i>Isotoma viridis</i> Bourlet, 1839	-	71 (12.5%)	3 (1.1%)	2 (2.6%)
<i>Isotomiella minor</i> (Schaeffer, 1896)	32 (27.4%)	30 (5.3%)	40 (15.3%)	5 (6.4%)
<i>Proisotoma minima</i> (Absolon, 1901)	-	8 (1.4%)	-	9 (11.5%)
<i>Parisotoma notabilis</i> (Schaeffer, 1896)	63 (53.8%)	137 (24.2%)	22 (8.4%)	7 (9%)
Tullbergiidae				
<i>Mesaphorura krausbaueri</i> (Boerner, 1901)	9 (7.7%)	65 (11.5%)	6 (2.3%)	1 (1.3%)
<i>Stenaphorurella quadrispina</i> (Boerner, 1901)	-	-	-	2 (2.6%)
Hypogastruridae				
<i>Ceratophysella armata</i> (Nicolet, 1841)	-	55 (9.7%)	3 (1.1%)	10 (12.8%)
<i>Ceratophysella denticulata</i> (Bagnal, 1941)	-	-	-	1 (1.3%)
<i>Hypogastrura assimilis</i> (Krausbauer, 1898)	4 (3.4%)	113 (20%)	187 (71.6%)	16 (20.5%)
Entomobryidae				
<i>Lepidocyrtus cyaneus</i> (Tullberg, 1871)	3 (2.6%)	-	-	-
Poduridae				
<i>Podura aquatica</i> (Linnaeus, 1758)	1 (0.9%)	-	-	-
Brachystomellidae				
<i>Brachystomella parvula</i> (Schaeffer, 1896)	1 (0.9%)	-	-	2 (2.6%)
Katiannidae				
<i>Sminthurinus aureus</i> (Lubbock, 1862)	-	-	-	2 (2.6%)
Sminthurididae				
<i>Sminthurus viridis</i> (Linnaeus, 1758)	-	-	-	2 (2.6%)
Odontellidae				
<i>Protaphorura armata</i> (Tullberg, 1869)	-	-	-	2 (2.6%)

A total of 1022 Collembola individuals was found; 19 Collembola species belonging

to 9 families identified in agricultural fields of the East Lithuania are presented.

Nine species of six Collembola families – Isotomidae, Tullbergiidae, Entomobryidae, Hypogastruridae, Poduridae, Brachystomellidae were identified in Pakenė (Shannon-Weiner species diversity index = 0.57). In total, 117 individuals of Collembola were found. *Parisotoma notabilis* was identified as an eudominant species (Table 1).

Nine Collembola species of three families (Isotomidae, Tullbergiidae, Hypogastruridae) were identified in a field near Gulbinai (Shannon-Weiner species diversity index = 0.83). In total, 566 Collembola individuals were found. *Hypogastrura assimilis*, *Parisotoma notabilis*, *Isotoma viridis*, *Folsomia quadrioculata* were the dominant species (Table 1).

The *Hypogastrura assimilis* species of the family Hypogastruridae clearly predominated in Turgeliai (Table 1). In total six species of three families (Isotomidae, Tullbergiidae, Hypogastruridae) were identified in Turgeliai (Shannon-Weiner species diversity index = 0.40). In total, 261 individuals of Collembola were found.

The highest species diversity was detected in Šalčininkėliai: 15 species from families Isotomidae, Tullbergiidae, Hypogastruridae, Brachystomellidae, Katiannidae, Sminthurididae, Odontellidae were identified among 78 individuals (Shannon-Weiner species diversity index = 1.01). *Hypogastrura assimilis*, *Ceratophysella armata* and *Folsomia quadrioculata* were the dominant species, while eudominant species were absent in these samples (Table 1).

Discussion

The results have shown that the structure of Collembola communities in the cultivated fields bears a monodominant character. *Parisotoma notabilis* (Schaeffer, 1896) and *Hypogastrura assimilis* (Krausbauer, 1898) are eudominant species. *Desoria hiemalis* (Schoett, 1893) and *Ceratophysella denticulata* (Bagnal, 1941) are rare species. Although *Podura aquatica* (Linnaeus, 1758) has earlier been described as being extremely common and widespread on the surface of water or water plants (Bei-Bienko, 1964), it was identified for the first time in Lithuania. We think that the reason why this species has been found in Pakenė is because the Kena river flows near the study field.

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Collembola tyrimai Rytų Lietuvos smėlžemio dirvožemiuose

N. GRENDIENĖ

Santrauka

Tyrimai atlikti Rytų Lietuvos skurdžiuose smėlžemio dirvožemiuose Vilniaus raj. (Gulbinai) ir Šalčininkų raj. (Turgeliai, Šalčininkėliai, Pakenė). Pateikiami duomenys apie 19 Collembola rūšių priklausančių 9 šeimoms, rastų tiriant agrokultūrinius laukus. Viso rasti 1022 Collembola individai. Medžiaga surinkta 2008 metų birželio, rugsėjo mėnesiais 5 pakartojimais kiekvienoje teritorijoje. Nustatyta, kad dirbamų laukų Collembola bendrijų struktūra yra monodominantinė. Eudominuoja *Parisotoma notabilis* (Schaeffer, 1896) ir *Hypogastrura assimilis* (Krausbauer, 1898). *Ceratophysella denticulata* (Bagnal, 1941) ir *Desoria hiemalis* (Schoett, 1893) yra retos rūšys dirbamuose laukuose. *Podura aquatica* (Linnaeus, 1758) pirmą kartą nurodoma Lietuvos faunai.

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