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EARTHWORMS (*LUMBRICIDAE*) OF MOIST MEADOWS ON THE
MAZOVIAN LOWLAND

ABSTRACT

Species composition, density and structure of *Lumbricidae* communities on moist meadows of Mazovia were analysed. The occurrence of five species of earthworms was recorded. Differences in the structure of earthworm communities were observed depending on soil type and acidity.

INTRODUCTION

Lumbricidae are a group of animals showing great environmental amplitude. This group is represented by a small number of species. Earthworms form communities varying in structure depending on the soil type and its acidity.

The aim of this study was a comparative analysis of *Lumbricidae* fauna of selected moist meadows (*Arrhenatheretum medioeuropaeum*) on the Mazovian Lowland. It contains data on species composition, community structure and density of animals studied.

In the period 1980-1983 five meadows on linden-oak-hornbeam forest sites were studied. A detailed description of the study sites and premises can be found in the introductory paper (Bańkowska 1987a, b, Kotowska, Okołowicz 1987). Also some of the data published before (Pilipiuk 1981a) for moist meadows on linden-oak-hornbeam and ash-alder carr sites (meadows C and D, respectively, in Białołęka Dworska) have been used. Particular meadows varied as to their mechanical composition, fertility, humidity and soil acidity: the meadow at Klembów — a fertile mown and grazed meadow on a moist linden-oak-hornbeam forest site, with brown soil leached from the top, sandy with a broad reaction range (from acid to neutral and slightly alkaline); meadows in Białołęka Dworska: A — several years old fallow with typical brown soil of a neutral reaction and high humus content, B — several years old mown meadow with typical brown

soil of a low humus content and weak acid reaction; Chylice — moist mown-grazed meadow, in the surface layer medium sands at $pH = 7$ with high humus content.

The material was obtained using the formalin method (Satchell 1955) in which the surface area examined was splashed with 0.3% formalin solution. From each meadow 3 samples of a joint 1 m² area were taken simultaneously. Samples were taken 4–5 times in each investigation season.

ANALYSIS OF MATERIAL

In soils of moist meadows examined 5 species of earthworms were found, i.e. 42% of species known from natural Mazovian environments (Pilipiuk 1981b). These were: *Lumbricus terrestris*, *Lumbricus rubellus*, *Allolobophora caliginosa*, *Allolobophora rosea*, *Dendrobaena octaedra*. Four earthworm species were found on Klembów meadow and on Białoleka Dworska meadows C and D. Three species occurred on meadow A at Białoleka Dworska and in Chylice. The least abundant in species was meadow B at Białoleka Dworska — 2 species (Tab. 1). The constant species on all meadows examined were: *A. caliginosa* and *L. terrestris*. *D. octaedra* occurred on three meadows, *A. rosea* and *L. rubellus* on two. Of the five species occurring on meadows examined four (*L. terrestris*, *L. rubellus*, *A. caliginosa* and *A. rosea*) are known to occur frequently and to form abundant populations on meadows, whereas *D. octaedra* occurs mainly in forest habitats (Plisko 1965, 1973).

L. terrestris, *A. caliginosa*, and *A. rosea*, eurytopic species with wide ecological amplitudes prevailed in soils of the meadows studied. Other two species — *L. rubellus* and *D. octaedra* (oligotrophic) preferred sites of a pH 4.5 — 7.0.

The mean density of earthworms on meadows examined ranged between 2 and 51 ind./m². The highest earthworm density (51 ind./m²) was recorded at Białoleka Dworska on meadow C (Tab. 1). High earthworm density (44 ind./m²) was also recorded on meadow D at Białoleka Dworska. *D. octaedra* dominated there, which together with juvenile forms of *Dendrobaena* sp. (Sav.) accounted for 88.5% of all earthworms. This species prefers sites with a low soil reaction. A much smaller density of earthworms (22 ind./m²) was recorded on meadow A at Białoleka Dworska. Two species dominated there: *L. terrestris* and *A. caliginosa*. On the whole, however, earthworms of the genus *Allolobophora* (Sav.) (64.4%) prevailed over those of the genus *Lumbricus* L. (35.6%). A similarly low density of earthworms was recorded on Klembów and Chylice meadows (14 ind./m² and 13 ind./m²), respectively. *A. caliginosa* dominated at Klembów. The genus *Allolobophora* accounted for 50.5%, *Lumbricus* — 28.3% and *Dendrobaena* — 21.2%. *L. rubellus* dominated on the Chylice meadow. Earthworms of the genus *Lumbricus* (74%) prevailed there over the genus *Allolobophora* (26%). The lowest

Table 1. Species composition, density (d) and percentage of *Lumbricidae* in moist meadow soils of Mazovian Lowland (d — ind./m²)

No.	Species	Białoleka Dworska								Klembów		Chylice	
		A		B		C		D		d	%	d	%
		d	%	d	%	d	%	d	%				
1	<i>Lumbricus terrestris</i> L.	6.6	30.1	0.1	4.5	7.0	13.8	0.3	0.8	1.6	11.1	0.3	2.4
2	<i>Lumbricus rubellus</i> (Hoffm.)	—	—	—	—	—	—	0.3	0.8	0.7	5.1	4.8	37.8
—	<i>Lumbricus</i> sp.	1.2	5.5	—	—	12.7	25.0	4.0	9.1	1.7	12.1	4.3	33.8
3	<i>Allolobophora caliginosa</i> (Sav.)	6.3	28.8	0.9	41.0	15.3	30.3	0.3	0.8	5.0	35.4	1.8	14.2
4	<i>Allolobophora rosea</i> (Sav.)	0.6	2.7	—	—	5.7	11.2	—	—	—	—	—	—
—	<i>Allolobophora</i> sp.	7.2	32.9	1.2	54.5	9.7	19.1	—	—	2.1	15.1	1.5	11.8
5	<i>Dendrobaena octaedra</i> (Sav.)	—	—	—	—	0.3	0.6	6.3	14.5	1.3	9.1	—	—
—	<i>Dendrobaena</i> sp.	—	—	—	—	—	—	32.3	74.0	1.7	12.1	—	—
Total		21.9	100	2.2	100	50.7	100	43.5	100	14.1	100	12.7	100

density of earthworms (2 ind./m²) was recorded on the meadow B at Białołęka Dworska. *A. caliginosa* was a dominant there. The genus *Allolobophora* accounted for 95.5% of all earthworms.

CONCLUSIONS

On moist meadows of the Mazovian Lowland no relation was observed between the soil type and earthworm community parameters: number of species and density. On four meadows on brown soil with pH approximately neutral (Białołęka Dworska A, B, C and Klembów) density ranged between 2 and 51 ind./m². For comparison, on Białołęka Dworska meadow on black earth of a low pH 4 species of earthworms were found and the density was 44 ind./m². On Chylice meadow on medium sand of a pH = 7, there were 3 species of earthworms and their density was 13 ind./m². The number of species and density of earthworms per 1 m² on moist meadows examined were similar to those on other *Arrhenatheretum medioeuropaeum* meadows (Nowak 1975, 1976). However, differences were observed in earthworm community structure depending on soil type and its acidity. On moist meadows with brown soil the species *A. caliginosa* dominated. The community structure on each of these meadows was different, probably due to differences in humus content and small fluctuations in acidity. *L. rubellus* dominated on the moist meadow with medium sand. *D. octaedra* dominated on moist meadow with black earth.

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DŹDŹOWNICE (*LUMBRICIDAE*) ŁĄK ŚWIEŻYCH NIZINY MAZOWIECKIEJ

STRESZCZENIE

Badano skład gatunkowy, zagęszczenie i strukturę zgrupowań *Lumbricidae* na sześciu łąkach świeżych Mazowsza. Stwierdzono występowanie 5 gatunków dżdżownic. Na jednym stanowisku występowało od 2 do 4 gatunków dżdżownic. Zagęszczenie *Lumbricidae* wahało się od 2 do 51 osob./m². Na czterech łąkach dominował gatunek *A. caliginosa*, na pozostałych stanowiskach *L. rubellus* i *D. octaedra*. Zaobserwowano różnice w strukturze zgrupowań dżdżownic w zależności od rodzaju gleby i jej kwasowości.

ДОЖДЕВЫЕ ЧЕРВИ ((*Lumbricidae*)) СВЕЖИХ ЛУГОВ МАЗОВЕЦКОЙ НИЗМЕННОСТИ

РЕЗЮМЕ

Исследован видовой состав, плотность и структура сообществ *Lumbricidae* из свежих лугов на Мазовии. Констатировано 5 видов. Наблюдались различия структуры сообществ дождевых червей в зависимости от рода почвы и ее рН.