

RESEARCH ON THE RELATIONSHIP BETWEEN SPECIES DIVERSITY IN DECIDUOUS FOREST AND LUMBRICIDE COMMUNITY EXISTS IN ITS GROUND

CERCETĂRI PRIVIND RELAȚIA DINTRE DIVERSITATEA SPECIILOR ARBORICOLE DIN PĂDUREA DE FOIOASE ȘI COMUNITATEA DE LUMBRICIDE EXISTENTĂ ÎN SOLUL ACESTEIA

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Abstract. *The present study presents results of the influence of tree species diversity on the earthworm community in a Eastern Carpathian deciduous mixed forest. Earthworms were taken from soil, from May to November, sorted manually and identified. The tree diversity is correlated with earthworm densities, indicating the importance of diverse food qualities for the decomposer fauna, especially in springtime. The forest is dominated by beech (*Fagus sylvatica*), ash (*Fraxinus excelsior*), hornbeam (*Carpinus betulus*), but locally a mosaic of up to 8-12 tree species occurs with varying composition. The present earthworm species are *Dendrobaena octaedra* var. *typica*, *Lumbricus terrestris*, *Eisenia submontana*, *Octolassium lissaense*, *Eiseniella tetraedra typica*, *Lumbricus rubellus*, *Lumbricus castaneus*.*

Key words: lumbricidae; earthworm diversity; tree diversity; deciduous mixed forest.

Rezumat. *Acest studiu prezintă efectul diversității speciilor arboricole asupra comunității de lumbricide, în solul unei păduri mixte de foioase localizată în Carpații orientali. Râmele au fost colectate din sol din luna mai și până în noiembrie, sortate manual apoi determinate. Diversitatea speciilor de foioase determină densitatea lumbricidelor din sol, arătând importanța calității hranei pentru fauna de descompunători ai materiei organice, mai ales primăvara. Specia dominantă din pădure este fagul- *Fagus sylvatica*, alături de care se află frasinul (*Fraxinus excelsior*) și carpenul (*Carpinus betulus*), der se formează local un amestec de până la 10 specii de arbori diferiți care măresc indicele de diversitate. Speciile de lumbricide determinate în solul acestui areal sunt: *Dendrobaena octaedra* var. *typica*, *Lumbricus terrestris*, *Eisenia submontana*, *Octolassium lissaense*, *Eiseniella tetraedra typica*, *Lumbricus rubellus*, *Lumbricus castaneus*.*

Cuvinte cheie: lumbricide, diversitatea rămelor, diversitate arboricolă, pădure mixtă de foioase.

INTRODUCTION

Forest ecosystems in our country are changing both, the surface and the age and species composition. And these elements act of the soil characteristics and elements in the soil fauna and vegetation of the upper floors.

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Recording as changes in the structure and density of fauna elements land, air and soil, and mobility of fauna elements (species) that are either forced to restrict their living area or migrate to other locations or expand their occupied areas (K. Chapman et al., 1988).

Regarding the influence of tree species on soil structure and earthworms fauna relatively little known, fact is that both, trees and earthworms be considered ecosystem engineers, and always change their environment (J.P. Curry, 2004).

The structure of earthworm fauna is extremely varied, being determined by the depth to which they are active, and by the feeding type.

There are other group of earthworms with various functions, but equally important in forest soil.

MATERIAL AND METHOD

The location of the study is a forest of deciduous trees on the forest range Rasca, Suceava county, where the dominant species is beech (*Fagus sylvatica*), with ash (*Fraxinus excelsior*) and hornbeam (*Carpinus betulus*), but locally form up to 8-12 species mixtures, which increases the diversity index.

Regions annual average temperature is 8,8° with large variations in summer, and annual rainfall exceeds is 600 l/ sq.

For the collection of biological samples have been previously established four location (marked synthetic L1, L2, L3 and L4), spaced on a circular area of 1 km in diameter, preferred over mixed tree species and soil surface covered by dense herbaceous vegetation (A. Gunn, 1992).

Each of the four location its own structure of trees and herbaceous plants species. The characteristics of the location are presented in table 1.

Table 1

The structure of tree species on the research area

Nr. crt.	Trees species	L1/ specimens	L2 specimens	L3/ specimens	L4/ specimens
1	<i>Fagus sylvatica</i>	2	1	-	2
2	<i>Fraxinus excelsior</i>	1	-	-	1
3	<i>Carpinus betulus</i>	1	1	-	1
4	<i>Quercus robur</i>	-	1	-	-
5	<i>Robinia sp.</i>	-	-	-	1
6	<i>Prunus serotina</i>	-	1	-	-
7	<i>Tilia sp.</i>	-	1	-	-
8	<i>Salix.sp.</i>	-	-	3	-
9	<i>Populus sp.</i>	1	-	1	-
10	<i>Acer sp.</i>	1	-	1	-
	Total species/ location	5	5	3	4
	Total trees / location	6	5	5	5

Each location selected for biological sampling was a circle with 5 m radius, and from each location were taken at 5 soil samples (centre and four directions, as opposed two by two). For biological sampling pits were dug to the size of 40 cm/ 25 cm depth/ width. Sampling of biological material was carried out in four stages, each

to a season (november 2009, april, june and august 2010). Samples were manually sorted, into categories of species (epigeal, endogeal and anecic species), anecic species being extracted from the pit with a 0,33% solution of mustard.

After collecting, species have been identified in the laboratory. After removal of biological material, and to determine existing species, have centralizing the informations, to follow the structure of earthworms in each location and in each season, numerical density evolution of each species depending the season and the changes of climate factors, and the results were compared by season, location and function of the trees species composition in the area.

RESULTS AND DISCUSSIONS

Following the determinations made in the four location (L1, L2, L3, L4) have been identified 12 species of earthworms, 1077 individuals. Of these, six species are present in all locations, and the rest were present, as the case, in at least on.

The structure of the earthworm species determinate in all four area, throughout the entire year of study, is in the table 2.

Table 2

The structure of the earthworm species determinate in all four area

Nr. crt.	Earthworm species	L1/ Total number collected	L2/ Total number collected	L3/ Total number collected	L4/ Total number collected	Total number collected / year	% by Total number collected
1.	<i>Allolobophora caliginosa</i>	28	14	-	-	42	3,80
2.	<i>Allolobophora rosea</i>	23	6	-	12	41	3,70
3.	<i>Octolasion lissaeense</i>	-	4	-	-	4	0,30
4.	<i>Eisenia foetida</i>	50	47	49	47	193	17,50
5.	<i>Eisenia submontana</i>	43	32	50	24	129	11,50
6.	<i>Lumbricus terrestris</i>	18	8	4	-	30	2,50
7.	<i>Lumbricus castaneus</i>	45	56	40	36	177	16,00
8.	<i>Lumbricus rubellus</i>	51	47	58	57	213	19,70
9.	<i>Dendrobaena typica</i>	15	1	-	2	18	1,60
10.	<i>Dendrobaena octaedra</i>	5	-	1	-	6	0,50
11.	<i>Dendrobaena rubida</i>	21	21	29	36	107	9,90
12.	<i>Eiseniella tetraedra f. typica</i>	46	60	25	27	158	13,00
	Total number	345	296	256	244	1077	100

The earthworms species collected in each area, during the year were *Eisenia foetida* - 193 individuals; *Eisenia submontana* - 129 individuals; *Lumbricus castaneus f. Typica* - 177 individuals; *Lumbricus rubellus* - 213 individuals; *Dendrobaena rubida*- 107 individuals and *Eiseniella tetraedra typica* - 158 individuals.

The total number of earthworm collected of these species, was 977 individuals, representing 90,71% about total earthworms collected.

Of the four species of earthworms, which recorded a 100% consistency at every location, the dominant species is *Lumbricus rubellus* with 213 individuals, 19,7 of all individuals collected, the second place is *Eisenia foetida* with 193 individuals, 7,5% of all species.

The species with the lowest number of individuals collected, recording accidentally in a single location, was *Octolasion lissae* with 4 individuals, 0,3% from total collected.

CONCLUSIONS

1. Of the 12 species collected in the research area, only 6 are present in all location , representing over 90% of total, other species are accidental occurrence.

2. By analyzing the density of each species, was seen that the species with high density and present in each location was *Lumbricus rubellus* (19,90 % individuals), followed by *Eisenia foetida* (17,5%).

3. The presence of two species reinforce an area occupied by deciduous trees and herbaceous vegetation, confirmed their preference for rich soil, which is completed by the high numerical density of earthworms of both species.

4. However, both species diversity and density are varied in each location, this phenomenon been explained to varying environmental factors during the year, but also because the composition of trees and herbaceous vegetation.

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