CONTRIBUTIONS TO THE STUDY OF EASTERN CARPATHIANS EARTHWORMS (*OLIGOCHAETA-LUMBRICIDAE*) - BIODIVERSITY RESEARCH TO EARTHWORMS IN SOIL FOR VEGETABLE CULTURE SIHLA NEAMT MONASTERY

CONTRIBUȚII LA STUDIUL LUMBRICIDELOR DIN CARPAȚII ORIENTALI - CERCETĂRI PRIVIND BIODIVERSITATEA LUMBRICIDELOR DIN SOLUL DESTINAT CULTURII DE LEGUME DE LA SCHITUL SIHLA-NEAMȚ

BĂDEANU Marinela[1], FILIPOV F.[1], ŞUTEU Daniela[2], SANDU Tatiana[1]
e-mail: badeanumarinela@yahoo.com

Abstract. *Cultivated soil biodiversity study of Sihla Neamt county is part of a complex program of study amd monitor the role of earthworms species in the soil, the diversity of existing species, correlated with plant elements from different levels and types of existing soil, with the final goal to establish a fauna of soil type and soil biological diagnosis. In this diagnosis are study the earthworms species from the mountains Neamt, in cultivated soils with vegetables in unsafe conditions by monks hermitage Sihla. Earthworms were collected with soil and vegetation studies. Monastery Sihla is located in Subcarpathians Great Eastern, 1000 m altitude, in a remote area, rich in fauna and flora elements, but with poor soils, difficult to cultivate. Little land available for cultivation has proved rich in species of earthworms, whose development was certainly favored by the species richnes of plants and trees in the area that provided organic material for food and the excess moisture.*
Key words*:* biodiversity, soil, vegetation, lumbricidae, fauna.

Rezumat*.* *Studiul biodiversității lumbricidelor din solul cultivat al Schitului Sihla din județul Neamț face parte dintr-un program mai complex de studii şi urmăreşte rolul acestor specii în sol, diversitatea speciilor existente corelată cu diversitatea elementelor vegetale din diferite etaje şi cu tipurile de sol existente, având drept scop final stabilirea faunei specifice unui anumit tip de sol şi o diagnoză biologică a solurilor. În această diagnoză sunt prezentate speciile de lumbricide din zona montană Neamț, din solurile cultivate cu zarzavaturi şi legume, în condiții neprotejate, de către călugării schitului Sihla. Lumbricidele au fost colectate odată cu cercetările pedologice şi concomitent cu studiile de vegetație din zona limitrofă. Schitul Sihla este situat pe Dealul Mare din Subcarpații Orientali (Obcinile Bucovinei), la altitudinea de 1000 m, într-o zonă izolată, bogată în elemente de faună şi floră specifice, dar cu soluri sărace, greu de cultivat. Puținul sol disponibil pentru cultură s-a dovedit bogat în specii de lumbricide, a căror dezvoltare a fost cu siguranță favorizată şi de*

[1] University of Agricultural Sciences and Veterinary Medicine of Iaşi, Romania
[2] "Gheorghe Asachi" Technical University of Iaşi, Romania

bogăția speciilor de plante şi arbori din zonă, care au furnizat materia organică pentru hrană cât şi de excesul de umiditate, preferat de lumbricide.
Cuvinte cheie: biodiversitate, sol, vegetație; lumbricide; faună.

INTRODUCTION

Earthworms are as group of invertebrate animals with the largest biomass in the temperate zone, and as having a decisive role in processes of pedogenesis.

Information earthworms community as well as high mountain regions of mixed forests of beech Carpathian spruce tree we find only the work of Pop (1933-1949) and Pop (1972-2007). These include the Earthworms structure, the Earthworms communities and the Earthworms –vegetation- soil relationships.

Due to their age and mobility, earthworms spread on all surfaces globe, regardless of soil type and its fertility.

MATERIAL AND METHOD

Biological research material as represented by earthworms collected from the land for vegetable cultivation Sihla Monastery, Neamt County.

It is located 28 km from the town of Neamt, at an altitude of 1000 m in the Mountains Stânişoara. Vegetation consists of large trees that pine and deciduous trees of varying sizes and several grass species. The plant species existing in site are: *Pinus sylvestris*, *Picea abies, Abies alba, Pinus nugo, Fagus sylvatica, Alnus sp., Sorbus sp., Crataegus sp., Coryllus avellana, Cornus sp., Viburnum sp., Latyrus sp., Centaurea sp., Linum sp., Hypericum sp.*

Elements of vegetation structure indicate a large amount of organic matter, therefore a rich source of food for earthworms.

The soil type determined predominate in the area are brown acid with moderate mull, podzolic brown soils, but there are humic-calcareous soils.

The Earthworms are collected and sorting manually. They are collected from topsoil (0-50 cm depth) and under rocks and fallen trunks. After collecting individuals were switched immediately into ethyl alcohol 70%, during which death occurred instantly.

Analysis and classification by the earthworms are active after: body pigmentation, by size etc. The basic classifications on earthworm made the link between individuals and work that out in the ground and show the effects of this activity on land.

Starting from the depth to which they are active, they can be active in soil (endogee), active at the soil surface (epigee) and anecic. Epigeic earthworms live at the soil surface is variable groups are as abundant, live in areas rich in food and is a source for predators and another part is exposed to occasional adverse conditions at this level. Endogeic earthworms live permanently in the soil and feed on organic matter. They live and feed on soil poor in organic matter; in soil rich medium which ingest organic particles.

Anecic earthworms are large worms with vertical galleries and that are involved in soil organic waste and feed the manure.

When body size are two categories: large species and small species. Each category stated above is particularly important in soil to which it inhabits. It should be noted that as soil characteristics and influence it, especially organic matter content influences the size of earthworms. Thus individuals of the same species will be lower in soils poor in organic matter and will be larger in rich soils.

The area analyzed was a single collection, the first summer (the end of May).

Were collected 39 individuals of 6 species namely *Eisenia submontana* Veijd., *Lumbricus rubellus* Hoff., *Eiseniella tetraedra typica* Sav., *Lumbricus terestris* L. *Eisenia foetida* Sav., *Octolasium lissaense* Orley, (table 1).

Table 1

Earthworm species collected in Sihla Monastery

Nr. crt.	The species	No. Individual collected	Coloration	Life environment
1	*Eisenia submontana* Veijd.	11	Dorsal and lateral stripes Purple Red	Under rotten wood waste
2	*Lumbricus rubellus* Hoff.	4	Iridescent purple brown	Land under logs
3	*Eiseniella tetraedra typica* Sav.	11	Reddish brown, intense dorsal	Amphibious,
4	*Lumbricus terestris* L.	2	Purple red	Land
5	*Eisenia foetida* Sav.	4	Dorsal and lateral stripes Purple Red	Manure
6	*Octolasium lissaense* Orley	7	without pigment	Land

RESULTS AND DISCUSSIONS

Collected individuals belonging to 6 species, 5 with red pigment and one without pigment. Tree species are large and constantly active in soil layer 90-120 cm: *Lumbricus terestris* L., *Lumbricus tubellus* Hoff and *Octolasium lisaense* Orley.

A species is amphibious: *Eiseniella tetraedra typica* Sav. Two species are epigee, loving big banks under stones are long present: *Eisenia submontana* Veijd. and *Eisenia foetida* Sav. (table 2).

Table 2

The main morphological features of individuals collected

Nr. crt.	Species	No. Ind.	Length variations (mm)	Diameter variation (mm)	Clitelum position (segm)	No. body segments
1	*Eisenia submontana* Veijd.	11	130-180	5-6	24- 33	115-130
2	*Lumbricus rubellus* Hoff.	4	130-150	5-6	24-33	134-145
3	*Eiseniella tetraedra typica* Sav.	11	50-100	2-4	23-36	70-90
4	*Octolasium lissaense* Orley	7	50-170	3-7	30-36	97- 170
5	*Eisenia foetida* Sav.	4	30-130	3-4	24-33	87-120
6	*Lumbricus terestris* L.	2	90-300	5-7	27-36	110-180

The comparative analysis of the size of individuals collected was found that body length varied (overall levels) very large (30 -300 mm), the predominant individuals of 120-150 mm in size, that of medium to large, determined the abundance and quality of food.

CONCLUSIONS

1. After collecting and analyzing biological material Sihla Neamt Monastery site have revealed the presence of a number of six earthworm species namely : *Eisenia submontana* Veijd., *Lumbricus rubellus* Hoff., *Eiseniella tetraedra typica* Sav., *Lumbricus terestris* L. *Eisenia foetida* Sav., *Octolasium lissaense* Orley.

2. In the acid brown soil was reported *Octolasium lissaense* Orley species, which is active in this type of soil. The entire forest area is *Eisenia submontana* Veijd species, which is the pilgrim species with greater mobility and increased capacity for dissemination.

3. Were also reported species *Lumbricus terrestris* L, *Lumbricus rubellus* Hoff. and *Eisenia foetida* Sav. specific care especially soils grazed by cattle, rich in manure. Their role is to recycle these materials and incorporate them in to the ground.

4. Species *Eiseniella tetraedra typica* Sav. is a common amphibious soils on the mountain streams.

REFERENCES

1. **Pop V., 1948** - *Lumbricidele din Romania*. Analele Acad. Republicii Populare Romane, Sect. Stiinte Geologice, Geografice, Biologice. Ser. A, Mem. 9, 1, p. 383-506.
2. **Pop V., 1964** - *New faunistic and systematic data on the Romanian Lumbricids (Oligochaeta)*. Studia Univ. Babes-Bolyai Cluj, Ser.Biol. 2, p.106-116.
3. **Pop V. V., 1978** - *Modificari in compozitia faunei de lumbricide in urma taierii jnepenisurilor din Muntii Maramuresului*. Publ. Acad. R.S.Romania, Fil.Cluj Napoca, Subcomisia Om si Biosfera, p. 120-125.
4. **Pop V. V., 1985** - *Relatii intre sinuziile de lumbricide si tipurile de ecosistem in Muntii Apuseni.* in: *Actualitate si perspectiva in biologie. Structuri si functii in ecosisteme terestre si acvatice*. Tipo Agronomia, Cluj Napoca, p. 79-86.