SEASONAL DYNAMIC OF EARTHWORMS OF *EISENIA FOETIDA* (SAVIGNY-1826) (*OLIGHOCHAETA-LUMBRICIDAE*), IN A MANURE HEAP, IN THE FIELD

DINAMICA SEZONIERĂ A POPULAŢIILOR DE RÂME DIN SPECIA *EISENIA FOETIDA* (SAVIGNY-1826) (*OLIGHOCHAETA - LUMBRICIDAE*) ÎNTR-O PLATFORMĂ DE GUNOI DE GRAJD

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Abstract. *This paper analyzes the population dynamic of Eisenia foetida (Oligochaeta, Lumbricidae) from a manure platform over a year, to find the epigeal earthworm respose, to season changes. The earthworms are collected from the same manure platform, in all four season, October 2009 for the autumn, March 2010 for the winter, May 2010 for the spring and August 2010 for the summer. The biological material are collected and sorted manually from each sample of wastes in part, was determined, studied and classified into three biological categories: adults, juveniles and cocoons. It was found that the transition from a season to another, can strongly influence the density of individuals, reproductive activity and biomass. All the biological parameters studied was recorded maximum efficiency in spring, the number of cocoon by the number of mature individuals has remaining constant.*

Key words: earthworm, the dynamic of species, manure heap, season

Rezumat. *Lucrarea analizează dinamica populaţiei de Eisenia foetida (Oligochaeta, Lumbricidae) dintr-o platformă de gunoi de grajd, pe parcursul unui an, pentru a afla care este reacţia lumbricidelor epigee la schimbările de anotimp. Ca urmare, au fost colectate râme din aceeaşi platformă de gunoi de grajd în cele patru anotimpuri şi anume în octombrie 2009 pentru perioada de toamnă, în martie 2010 pentru perioada de iarnă, în mai 2010 pentru anotimpul de primăvară şi în august 2010 pentru anotimpul de vară. Materialul biologic colectat a fost sortat manual, din fiecare probă de gunoi în parte, apoi a fost determinat ,studiat şi clasificat în trei categorii biologice: adulţi, juvenili şi coconi. S-a constatat astfel că trecerea de la un anotimp la altul poate influenţa puternic densitatea indivizilor, activitatea reproductivă şi biomasa. Randamentul maxim la toţi parametrii studiaţi a fost înregistrat în perioada de primăvară, numărul de coconi raportat la numărul de indivizi maturi a rămas constant pe parcursul întregului an.*

Cuvinte cheie: râme, dinamica populaţiei, gunoi de grajd; anotimp.

INTRODUCTION

Soil fauna is influenced by the environmental factors, by the physical and chemical properties of soil, been affected the abundance, density and species

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diversity. Some of these factors such as seasonal changes can affect animal live cycle and annual dynamics of population (Rozen A., 1988).

Earthworms are major component of soil fauna, and seasonal changes have a great influence on the biomass of their populations (Edwards C.A., P.J. Bohlen, 2004).

Since earthworms species have different ecological requirements, the influence of environmental factors on population dynamics varies from one species to another.

The activity of earthworms is often influenced by temperature and humidity, epigeal species is most affected by the transition from on season to another (Neuhauser E.F., R. Hartenstein, D.L. Kaplan, 1980).

If changes in temperature or humidity, individual of different species carried in the vertical movement in soil, but low temperatures can cause biological functions reducing the minimum size of individuals, but also affects heir prolificacy.

Eisenia foetida (Savigny, 1826) (*Oligochaeta - Lumbricidae*) is an epigeic species, preferring soil rich in manure and individuals living in high density communities.

MATERIAL AND METHOD

The specimens of *Eisenia foetida* were collected in a manure platform located in the area of Popricani, Iaşi. Average annual rainfall in the region is 530-550 mm, and the thermic average is 9,3-9,6 °C, with highest values in summer.

The biological samples were collected and monitored in a manure platform. The individuals were collected and sorted manually, from five samples of wastes (equally). The collection was made in October 2009, from autumn, March 2010 from winter, May 2010 from spring and August 2010 from summer.

The earthworms collected in each samples were separated in three biological categories: adults, juveniles and cocoons. Cocoons were counted per 1 kg. soil (manure) (Elvira C., J. Dominguez, M.J.I. Briones, 1996).

RESULTS AND DISCUSSIONS

The population density in the manure, over an entire year was 1-8 individuals/ kg soil (manure).

The most of biological parameters analyzed varied throughout year (table 1) the number of individuals increased significantly to spring, when the maximum density was recorded.

In summer the population density had the low value. The density and weight cocoons was highest in the spring, and they are completely absent in autumn and winter.

The age structure of population also changed during the year. The ratio of adults and juveniles averaged 4,5/ 3,25 over the year, and at the season was 4/0 in autumn, 1/0 in winter, 5/3 in spring and ¾ in summer.

The total number of individuals vary widely from on season to another, the smallest number of individuals per kg soil was recorded in winter (1 ind.), and the

largest number of individuals was recorded in spring (8). The total number of cocoons by the number of adults has remained constant.

Table 1

The effect of transition from one season to another on the density and reproductive activity in the populations of *Eisenia foetida* (*Oligochaeta - Lumbricidae*)

Biological category	Autumn	Winter	Spring	Summer	Total year	Annual average
Total individuals (nr./kg.)	4	1	8	5	18	4,5
Adults	4	1	5	3	13	3,25
Juveniles	-	-	3	2	5	1,25
Cocoons	-	-	5	3	12	4

It was also found that ecological factors changes from one season to another, affects not only individuals but the numerical density (table 2) or the size and weight of cocoons.

Table 2

The changes of morphological parameters of *Eisenia foetida* each season

Morphological parameters / Season	lenght mm	Diameter Ø mm	Clitel position	Total number of segments
Autumn (4 ind.)	130	2,5	27-32	143
	127	3,0	24-31	87
	132	3,0	24-31	89
	110	2,5	24-30	91
Winter (1 ind.)	85	2,0	24-30	87
Spring (5 ind.)	110	2,5	24-31	122
	110	2,5	24-31	100
	125	3,0	27-32	132
	122	2,5	27-32	117
	132	3,0	24-31	133
Summer (3 ind.)	100	3,0	24-31	110
	85	3,0	24-30	91
	88	3,0	24-30	99

We can see that the size of the largest individuals were collected during the autumn and spring, in these season we are collected individuals with 110-132 mm, and 2,5-3,0 mm diameter, explained by the rich source of food at the collection site.

By comparison, the small individuals were recorded in the winter, were length is 85 mm, located at the lower limit for this species.

In this case, the absence of individuals in the area or small parameters is correlated with lower temperature, determining the withdrawal in depth.

Another factor affected by the seasonal transition is the prolificacy of individuals, reflected in the number of cocoons taken from the samples.

A lack of cocoons can be seen in autumn and winter season, explained by the low temperature in the external environment, that reduce all vital functions.

CONCLUSIONS

1. The transition to one season to another influencing the growth and reproduction of earthworm from *Eisenia foetida* (*Oligochaeta- Lumbricidae*), and acts equally on the age structure of population (Tsukamoto J., H. Watanabe, 1977).

2. The high density of individuals is typical of *Eisenia foetida* population, especially when it has plenty of organic matter.

3. This species living in environments were food sources and living environment is identical, favouring reproduction and a large number of individual.

4. The small number of adults recorded during the summer is another characteristic of *Eisenia foetida* population, been the consequence of the cumulative action of the high temperature and low humidity, but also results in a reduction of food resources.

5. The changes in density of cocoons can be recorded to the variation in adult density.

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