MICROBIOLOGICAL CHARACTERISTICS OF OAK FOREST SOILS

Oneț Aurelia *

**University of Oradea-Faculty of Environmental Protection,*
e-mail: aurelia_onet@yahoo.com

Abstract
The microorganisms of soil are important biological agents for the structure of soil and represent the most active component of organic matters. The microbiological activity of the soil is affected by the changes of chemical and physical characteristics of soil.
This research focused on haplic luvisol microbial community structure which can be affected by the biological substance ″INF-LD″, utilized to control the density of Lymanthria Dispar L. The investigation concerning the biological characteristics of haplic luvisol suggests that certain populations of microorganisms were promoted.
The results presented in this paper confirm the reporting of specialty literature. These results are specifically for the experimental condition and play a part in for a good understanding of the phenomenal.

Keywords: soil, microflora, biological treatment, forest.

INTRODUCTION

The productiveness of soil and his auto purification capacity are provided, in main, by the microbiological activity. The anthropics action such as irrigation, fertilization, treatments with pesticides, and processing of soil, can affect the microorganisms of soil.

Soil microorganisms are an important soil component because it plays a key role in soil nutrient cycling. Soil microbial biomass is considered to serve both as agent of biochemical changes in soil and as a repository of plant nutrients such as nitrogen (N) and phosphorus (P). Many studies have reported the relationship between soil fertility and microbial biomass (One 2010).

The purpose of this research is to investigate the changes of biological characteristics of forestry haplic luvisol under biological treatment utilized to control the density of *Lymanthria dispar* L.

To resolve these aspects was elaborate an experimental model constituted of a series biological analysis and methods for evaluation the microbiological activity of the soil.

MATERIAL AND METHOD

The research was done in 2008. The soil samples were collected from a forest placed at 30 kilometers from Oradea at village CEFA, in Bihor County. The researches were achieved on the haplic luvisol, a representative soil for the surface where the trees (Quercus) were treated with biological substance called ″INF-LD″. The soil samples were collected from experimental plots field, were the trees were treated with ″INF-LD″. On the whole, were collected also soil samples from the surface where the trees were not treated with biological substance called ″INF-LD″.

The soil was collected from upper 40 cm of soil profile. In the laboratory plant material and soil macro fauna were removed and the soil samples were sieved (<2 mm) and mixed.

Total number of soil microorganisms, *Actinomycetes*, yeast-mold, *Azotobacter* and nitrifying bacteria was determined using the dilution method. These soil samples (10 g) were suspended in 90 ml distilled water. Dilutions (of 10^{-6}) were prepared from the soil samples using distilled water and these were dispersed with a top drive macerator for 5 min.

The soil samples taken from suitable dilution were planted in or on the solid feeding medium as required. Plate-count agar was used to estimate the total number of microorganisms, the number of *Actinomycetes* was determined on Agar with glucose and asparagines.

The number of yeast-mold was determined in Sabouraud Agar, the number of *Azotobacter* in Agar with glucose and the number of nitrobacteria in nourishing solution Ashby. The cells of microorganisms were counted with colony counter and the results were evaluated as the number of microorganisms in 1 g oven-dried soil.

The cultures were analyzed in point of morphological aspect and biochemical reaction.

All the results were presented in graphics and tables and analyzed with the ″Student″ statistics method. Student Test is used to determine significance of differences between several sequences of values.

RESULTS AND DISCUSSION

In table 1 is presented the count of microorganisms determined in untreated haplic luvisol and also the number of microorganisms counted in haplic luvisol variant which is a representative soil for the surface where the trees (Quercus) were treated with biological substance called ″INF-LD″.

To determine the influence of biological substance ″INF-LD″ on biological properties of haplic luvisol the results of counting from both soil variant were compared with statistical ″Student″ Test to establish the significant of differences between several sequences of values.

Table 1

Principal groups of micro organisms present in haplic luvisol

Vegetation period	Type of soil	Depth (cm)	Mean values (cells/1 g soil)				
			Total microflora	Actinomycets	Yeast-mold	Azotobacter	Nitrifying bacteria
Spring 2008	Untreated haplic luvisol	0-20	$34,68x10^6$	$16,38x10^6$	$1,92x10^6$	235	630
		20-40	$24,6x10^6$	$17,1x10^6$	$3,78x10^6$	189	434
		0-40	$29,64x10^6$	$16,74x10^6$	$2,85x10^6$	212	532
	Treated haplic luvisol	0-20	$11,64x10^6$	566	$3,21x10^6$	598	$170,4x10^3$
		20-40	$32,64x10^6$	343	$3,78x10^6$	48000	24000
		0-40	$22,14x10^6$	454,5	$3,49x10^6$	24299	$194,4x10^3$
	Significance labels	0-40	p<0,01**	p<0,01**	p>0,10	p>0,10	p>0,10
Autumn 2008	Untreated haplic luvisol	0-20	$36,8x10^6$	$17,38x10^6$	$1,29x10^6$	340	560
		20-40	$25,4x10^6$	$16,1x10^6$	$865x10^3$	178	425
		0-40	$31,1x10^6$	$16,4x10^6$	$1,077x10^6$	259	492,5
	Treated haplic luvisol	0-20	$2,46x10^6$	$740x10^3$	$4,12x10^6$	750	$107,4x10^3$
		20-40	$11x10^6$	$250x10^3$	$3,65x10^6$	1200	$18x10^3$
		0-40	$21,73x10^6$	$495x10^3$	$3,885x10^6$	975	$62,7x10^3$
	Significance labels	0-40	p<0,01**	p<0,01**	p>0,10	p>0,10	p>0,10

Significance labels: ** - $0.001 < p < 0.01$

Haplic luvisol representative for the surface where was applied the substance ″INF-LD″ presented a total number of microorganisms lower than that of the haplic luvisol where the trees were not treated with ″INF-LD″. The statistics interpretation of the results suggest that the haplic luvisol were the trees were treated with INF-LD has a number of *Actinomycetes* lower than that of the untreated haplic luvisol. The dates presented suggest also that in inferior profile (20-40 cm) of the haplic luvisol the *Actinomycetes* are much undeveloped. Usually in this profile of the soil the nourishing substances are reduces. The development of *Actinomycetes* depends by large conditions such as temperature, humidity and presence of plant material rests. *Actinomycetes* plays a key role in the process of hemicelluloses decomposition and these bacteria participate in the genesis of humus. *Actinomycetes* are microorganisms intensively producers of antibiotics. Also, in point of the total number of yeast-mold, Azotobacter and nitrobacteria, there were no significant differences. In both profile of the haplic luvisol, the number of yeast-mold indicate that this microorganisms are very well represented because they prefer an acid pH and the presence of plant material rests offer optimal condition for their development. *Azotobacter* was found only in inferior profile of the soil where the trees were treated with the biological substance INF-LD. In superior profile of soil the number of *Azotobacter* is much reduced. *Azotobacter* is widely distributed in soils having a pH value of 6.0 or above. The presence of aluminum salts has inhibitory effects on the development of *Azotobacter*. The nitrobacteria are micro-organism who prefers for their development optimal values of pH (7.3-8). The soil samples were collected in March and in this period the nitrification activity is much reduced. The optimal temperature for these micro-organisms is 25-30^{0}C and at 0^{0}C or 49^{0}C the nitrobacteria dies.

CONCLUSIONS

The statistics interpretation of the results suggest that the haplic luvisol were the trees were treated with INF-LD registered a reduced microbial activity compared with untreated haplic luvisol because the total number of microorganisms was lower than that of the treated luvosoil and *Actinomycetes* was inhibited. There were no significant differences between the number of yeast-mold, *Azotobacter* and nitrifying bacteria counted in haplic luvisol. Investigation of the biological characteristics of haplic luvisol were the trees were treated with the biological substances called ″INF-LD″ showed that certain microbial groups like *Actinomycetes* were inhibited while yeast-mold, *Azotobacter* and *Nitrobacteria* have not registered significant variations.

REFERENCES

1. Athalye M., Lacey J. Goodfellow,M., 1981, Selective isolation and enumeration of *actinomycetes* using rifampicin., J.Appl. Bacteriol., 51:289-297;
2. Bradshaw, J.L., 1992, Laboratory Microbiology, New York, Fourth.Saunders Colege Publishing, 436;
3. Collins, C.H., Lyne, P.M., Grange, J.M., Collins and LyneÕs., 1989, Microbiological Methods. Sixth Edition, London, Butterworths Co., Ltd., 410;
4. Digrak M., Kazanici F., 1999, Efects of some organohophorus insecticides on soil microorganism, Faculty of Arts-Science, Turkey;
5. Drăgan-Bularda, M., Kiss. S., 1986, Soil Microbiology, Univ. Babeş-Bolyai, Cluj-Napoca;
6. Dýûrak, M., Ozçelik, S., 1998, Effect of some pesticides on soil microorganisms, Bull. Environ. Contam. Toxicol., 60:916-922;
7. Dýûrak, M., Ozçelik, S., Elik, S., 1995, Degradation of ethion and methidation by some microorganisms, 35 th IUPAC Congress, Istanbul. 14-19 August, p 84;
8. Gomoryova Erika, 2004, Small-scale variation of microbial activities in a forest soil under a beech (*Fagus Sylvatica* L.)stand, Tehnical University in Zvolen, Faculty of Foresty, Slovakia;
9. Oneț Aurelia, 2010, Research on the influence of fertilizers and pesticides pollution on biological activity and other properties of soil in the plains Crisuri, PhD Thesis;
10. Wootton, M.A., Kremer, R.J., Keaster, A., 1993, Effects of carbofuran and the corn rhizosphere on growth of soil microorganisms, Bull. Environ. Contam. Toxicol., 50: 49-56.