# MICROBIOLOGICAL CHARACTERIZATION OF SOME TYPES OF SOIL FROM THE WESTERN PLAIN

# CARACTERIZAREA MICROBIOLOGICĂ A UNOR SOLURI DIN CÂMPIA DE VEST

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***Abstract**: The microbiological study he materialized in the estimation of the groups of microorganisms: eubacteria, actinomycetes, micromicetes, and the evaluation of the biologic activity of the soils through the determination of potential respiration. The soils taken into consideration having as characteristic feature the gleyic horizon. The determinations were made in the summer and in the autumn, in climatic condition afferent of the year 2006.*

***Rezumat**: Studiul microbiologic s-a materializat în estimarea grupelor de microorganisme: bacterii, actinomicete şi micromicete şi evaliarea avtivităţii biologice a solului prin determinarea potenţialului de respiraţie. Solurile analizate au ca şi caracteristică comună prezenta orizontului gleic. Determinările au fost efectuate în vară şi toamnă, în condiţiile climatice aferente anului 2006.*

***Key words*: soil microflora, plating method, soil respiration capacity**
***Cuvinte cheie*: *microflora solului,metoda cultivării pe placi, capacitatea de respiratie a solului***

## INTRODUCTION

The live soil part comprises, depending on the size of the edaphic organisms, macroorganisms, mezo, and microorganisms, which represent soil's macro, mezo, and micropopulation. Each soil type is characterized by a specific load of organisms, whose activity occurs under the influence exerted by the variation of the non-live phases included within soil content (GARBEVA P., 2004). In this paperwork, we present the results of our study concerning the microbial load and the biological activity occurring in three soil types, in terms of texture, but which have as common feature the existence of the G-gley superior horizon. The influence exerted by the different mineral formations from soil upon microflora depends upon their total content in different elements and on their accessibility to physical-chemical, and especially biological degeneration (FLOREA N., BUZA M., 2003).

The researches performed have led to the conclusion that the clayey minerals exert the most intense influence upon microorganisms, due to the adsorption properties specific to these mineral fractions (MARTINA S., 2003). In its adsorbed form, the organic matter becomes more accessible to the microbial attack. We have also remarked a seasonal variation of the activity performed by the microflora specific to each soil type, determined by the fluctuation of the climatic factors along seasons (GROFFMAN P. M., 1996).

## MATERIAL AND METHOD

The soils, located in the West Plain, were identified as having the following textures: sandy-loamy, taken from the pastures near the village Pesac, loamy-clayey, taken from the surroundings of the village Graniceri and clayey-loamy, taken from the neighbourhood of the village Cheglevici-Dudesti. The physical-chemical properties of these types of soil are

presented in Table 1. We have carried the determinations in two moments: in summer (August) and autumn (November) and we have considered only non-cultivated areas, respectively pastures. Soil samples were taken with a hole, at the depth of 10-20 cm in the superior horizon, and then we have constituted a mean sample for each location. A part of this sample was used to make dilutions in order to establish the number of microorganisms per categories, and the other part was used in the determination of soil's respiration potential.

*Table 1*

The physical-chemical characteristics of soils studies

| Location | Soil types | Textures | Gleyzation level | Level of salinization-alcalinization | Store of humic substances t/ha | pH | humidity % | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | summer | autumn |
| Pesac | fluvisoil gleyic | Loamy-sand/ Loamy-sand | gleyied low | - | 61-120 | 6,4 | 5 | 11 |
| Grăniceri | solonetz gleyic | Medium loam/ Clayey-loamy medium | gleyied medium | salinyed, medium sodyied | 61-120 | 9,08 | 5,5 | 19 |
| Cheglevici-Dudesti | gleyosol mollic | Loamy-clayey/ Clayey-loamy | gleyied strong | - | 301-400 | 7,23 | 17 | 26 |

We have worked in two repetitions. In order to determine the number of microorganisms, we have applied the indirect method of cultivating on plates the medium Topping for bacteria (PAPACOSTEA P., 1976), Martin for fungi and Gause for actinomycetes (ANA HULEA, 1969). To determine soil's respiration potential, we have applied the incubation method with permanent covering of the oxygen requirements (STEFANIC GH., 1988).

## RESULTS AND DISCUSSIONS

The data presented in Table 2 lead to the conclusion that the gleysoil has the biggest bacterial load, respectively $3281.85x10^6$ bacteria/g dry soil in the case of the analysis from summer.

*Table 2*

The number of microorganisms, summer and autumn determination

| Soil types | Bacteria (ufc/gr dry soil) | | Micromycetes (ufc/gr dry soil) | | Actinomycetes (ufc/gr dry soil) | |
|---|---|---|---|---|---|---|
| | summer | autumn | summer | autumn | summer | autumn |
| Fluvisoil gleyic | 76 125 x $10^3$ | 8328 x $10^3$ | 98 x $10^3$ | 13 431x $10^3$ | 5 748,75 x$10^3$ | 804,75 x $10^3$ |
| Solonetz Gleyic | 1837,5 x $10^3$ | 8925 x $10^3$ | 5 x $10^3$ | 11 424 x $10^3$ | 6300 x $10^3$ | 2112,25 x $10^3$ |
| Gleyosol Mollic | 3281,85 x $10^3$ | 6300 x $10^3$ | 204,75 x $10^3$ | 13 324 x $10^3$ | 20 738 x $10^3$ | 2047,5 x $10^3$ |

The amount represented by these microorganism categories / g dry soil is 93-99% of total microflora. This observation is identical for the three types of soil (Fig. 1).

The reduced soil's humidity in summer has caused a structural variability about the bacterial microflora. We have remarked the increased frequency of the xerophil or xerotolerant endospore-forming species of *Bacillus cereus, B. megaterium, and B. mycoides.* In addition, we have observed on the gleyosol mollic species of *Bacillus subtillis* and *Arthrobacter globiformis.* The structural variety of the species isolated on mollic gleysoil and their presence in a big number are due to the high clay content of these soils. Clayey soils, under a dry hydric regime, provide protection for the edaphic microorganisms.

In autumn, the bacterial number decreases for about 50 times. This decrease may be observed in all soils studied. These general results are mainly caused by the low temperatures, almost 0°C, which has characterized the beginning of November. We have also remarked the

increase of the micromycete number, proving that high temperatures and the lack of humidity impede the differentiation of mycelia and of the fructification formations. During our quantitative determinations performed during autumn, w have observed that micromycetes represent the biggest amount within soil microflora, in the case of all types of soil analyzed (Fig. 2).

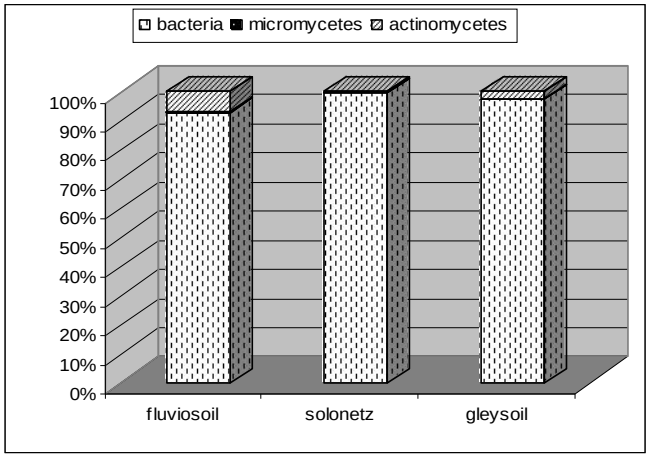


Fig. 1 The weight of microorganism's categories in summer determination

Actinomycetes were found in a big number on the gleysoil in summer, with a load of $20.7x10^6$ UFC/g dry soil. The resistance of the edaphic actynomycetes to high temperatures and their tolerance to dryness represent defining features for them.

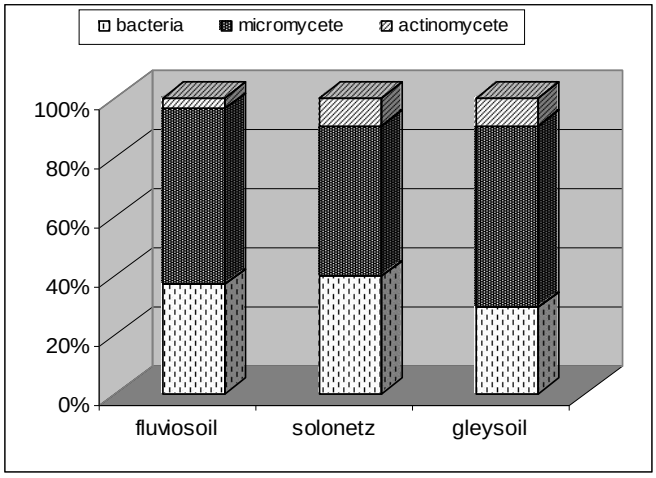


Fig. 2 The weight of microorganism's categories in autumn determination

Due to their low competitively within microflora, especially in the case of abundant real bacteria, we may assist at low levels of actinomycetes per total microflora. However, because they are termophil and thermal-tolerant bacteria, they may be observed in higher amounts during summer (see fig. 1). In autumn, we have observed a decrease in their number

due to their sensibility to low temperatures. About soil's respiration potential, the results achieved and presented in figure 3 prove a high biological activity within fluvisol and gleyosol.

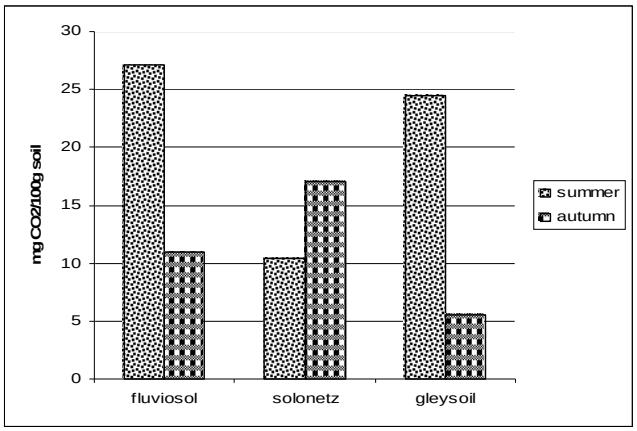


Fig. 3 The respiration potential of soils

This fact is caused especially by the bacterial activity, micromycetes representing a reduced amount. In the case of the gleyic solonetz, we have noticed a low potential for biological activities during our summer determinations, a higher potential during autumn.

## CONCLUSIONS

The researches and results concerning the numeric microflora determination and its activity determine us to characterize the gleyed soils as having a moderate biological activity, which occurs under the incidence of the abiotic factors specific to that region or of the season in which the determination was performed. Overall, microflora is represented by endospore forming bacterial species with a great capacity of survival; their number is in direct relationship with soil's humus and water reserve.

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