SUMMARY

Key words: bacteria, micromycetes, soil

The present PhD paper entitled ***Research Regarding the Saprophytic and Parasitic Microflora that Colonizes Soils from Moldavia*** is the result of a three year work that consisted of collecting soil samples, working them in the lab, interpreting the results and elaborating this paper.

Microflora is the very element that determines the fertility of a certain type of soil and its self-cleansing capacity. The act of knowing the dynamics of a certain type of soil is essential when it comes to determining the efficiency of that type of soil. The research that has been carried out until now has been extensive and has shown the biological activity of the microflora, the interaction that is settled amongst different types of soil microorganisms and their roles in the soil.

Due to the fact that the soil microflora is represented by important biological agents that contribute to the structure of the soil we have considered it essential to analyse and contrast the microbiological activity that is to be found in several types of soils that are of agricultural importance in Moldavia county.

The types of soils that are to be found in Moldavia county are not characterized by extensibility and excessive fertility, but they are the main means that is to be used in agriculture; therefore, the ensuring of a maximum fruitfulness is our specialists' main concern. The maximum potential of the soil could be achieved only if the people that are working in this field of activity know the soils thoroughly so that they could obtain large and stable harvests under any pedoclimatic circumstances.

We have carefully selected 20 types of soils from all over Moldavia in order to determine the activity and dynamics of saprophytic and parasite microflora. Our thorough research has been performed on soil samples represented by typical chernozem (2), greic chernozem, psamic chernozem, cambic chernozem, faeoziom chernozem, preluvosoil (3), albic luvosoil, psamic luvosoil, solonchak (2), solonetz (2), planosoil, molic saline aluviosoil, vertosoil and gleiosoil, all of them collected from all over Moldavia.

The research was carried out during the period 2012-2013 and, in order to determine the microflora and the genera of saprophyte and parasite micromycetes that are to be found in Moldavia, the samples were collected and analysed as it follows:

- The 20 soil samples were collected and brought to the lab in midst November 2012 in order to determine the nitrogen fixators, the Gram-positive bacteria and the Gram-negative bacteria and to identify the saprophyte and parasite micromycetes. The obtained data was introduced in a data base by using a Microsoft Excel application. The results that were obtained are to be found in the paper under the name "Autumn 2012".
- In midst May 2013 the 20 soil samples were collected from exactly the same spots as in the previous year (by using the coordinates given by GPS system) in order to determine the nitrogen fixators, the Gram-positive bacteria and the Gram-negative bacteria and to identify the saprophyte and parasite micromycetes that colonize the soils in spring. The newly obtained data was added to the already existent data base. The results that were obtained are to be found in the paper under the name "Spring 2013".
- In midst November 2013 the 20 soil samples were collected from exactly the same spots as in the previous two seasons (by using the coordinates given by GPS system) in order to determine the nitrogen fixators, the Gram-positive bacteria and the Gram-negative bacteria and to identify the saprophyte and parasite micromycetes that colonize the soils in autumn. The newly obtained data was added to the already existent data base. The results that were obtained are to be found in the paper under the name "Autumn 2013".

The results that were obtained from this part of our research are to be found in our paper under the form of statistics.

The present PhD paper is structured in two parts and eight chapters as it follows:

Part I - Previous research in the field of saprophyte and parasite microflora that colonizes the soils

- Chapter I - Research in the field of saprophyte and parasite microflora that colonizes the soils
- Chapter II - The Groups of microorganisms that constitute the soil microflora

Part II - Personal contributions to the chosen subject

- Chapter III - The aim and objectives of the PhD paper
- Chapter IV - The characterization of the natural setting of the studied area, Moldavia county
- Chapter V - The material and the research method

- Chapter VI - The determining and description of the main groups of microorganisms that have been isolated during our research
- Chapter VII - Results and discussions
- Chapter VIII - Conclusions

The references and further reading part contains 196 titles of materials that were published in our country and abroad. This work is carried out on a total of 212 pages.

Part I in our paper deals with a documentation on the saprophyte and parasite microflora of the soil by appealing to the specialized literature that was published in our country and abroad. Therefore, the first chapter of our paper offers a view over the research that was done in this field of activity concerning the bacteria that fix the molecular nitrogen, the actinomycetes, the saprophyte and parasite micromycetes and the algae that are to be found in various types of soils. The stress is on the importance of all these parts of microflora on the general condition of the soils.

The second chapter of our paper briefly presents the groups of microorganisms (bacteria, actinomycetes, micromycetes and algae) that constitute the microflora of the soil.

Part II in our paper contains our own research into this field. The third chapter states the aim and the objectives of our paper –the identification of the main molecular nitrogen fixators, the analyses of the activity and dynamics of the microflora, the determining of specific saprophyte and parasite micromycetes and the studying of the seasonal variation of the microflora that colonizes the 20 types of soils that were under our observation.

The fourth chapter of our paper deals with the natural setting of Moldavia by taking into account its geographical position, its soil characteristics, its climate conditions, its precipitations, its geomorphology, hydrography and vegetation.

The fifth chapter of our paper presents our own material and the research method that we have employed in our work. We deal here with the 20 analysed soil types, the dilution in Petri dishes method that is used to isolate and identify the microflora, the examination technique that makes use of the microscope in order to identify the Gram-positive and Gram-negative bacteria and the saprophyte and parasite micromycetes, the method that is used to detect the pH of the studied soils and the Statistics-Maths method that we used in order to contrast the results of our research.

The sixth chapter deals with:

- the determining and description of free aerobe and anaerobe nitrogen fixators, the presentation of the characteristics of the species *Azobacter chroococcum* and *Clostridium*

pasteurianum and the description of the physiological conditions and external factors that influence the development of microflora in the soil;

- the determining of Gram-positive and Gram-negative bacteria found in the analysed soil samples;
- the determining, the taxonomic framing and the description of the 29 types of saprophyte and parasite micromycetes that were isolated from the studied samples. The determining of the micromycetes was performed by making use of the specialized papers and monographies that belong to the Phytopathology Department of our university while for the taxonomic faming we made use of the classification system that is widely accepted by most mycologists. The nomenclature of the taxons and their classification match the paper published by Kirk P. M. et al. on www.speciesfungorum.org, both relying on The Dictionary of the Fungi, 10th edition.

We isolated saprophyte and parasite micromycetes belonging to the genera *Absidia*, *Mucor*, *Zygorhynchus*, *Rhizopus* and *Mortierella* from the subphylum *Zygomycotina*. We isolated even more saprophyte and parasite micromycetes belonging to the genera *Aspergillius*, *Penicillium*, *Trichoderma*, *Gliocladium*, *Mycogone*, *Fusarium*, *Cephalosporium*, *Acremonium*, *Stachybotrys*, *Chaetomium*, *Humicola*, *Doratomyces*, *Nigrospora*, *Papularia*, *Verticillium*, *Alternaria*, *Stemphylium*, *Epicoccum*, *Cladosporium*, *Hormodendrum* and *Geotrichum* from the subphylum *Ascomycotina*. The genus *Sporotrichum* was isolated from the subphylum *Basidiomycotina* while the genera *Torula* and *Chlamydomyces* were isolated from the subphylum *Deuteromycotina*. We also isolated micromycetes belonging to the group *Mycelia sterilia*.

The seventh chapter of our paper deals with the results of our research concerning the pH of the studied soils, the variations in the number of Gram-positive and Gram-negative bacteria in the studies samples, the density and spectrum of saprophyte and parasite micromycetes found in the studied soils. At the end of this chapter we present the results that were obtained after applying the test ANOVA.

The soils analyzed by us in order to develop this thesis, showed pH values between 5.6 (planosol) and 8.7 (solonceac 1).

The presence of molecular the aerobic nitrogen fixer *Azotobacter chroococcum* has been reported in 19 of the 20 soil samples and the anaerobic nitrogen fixer *Clostridium pasteurianum* was reported in 15 of the 20 soil samples.

Our study shows that the number of two types of bacteria (G + and G-) can not be clearly defined. From our studies results that analyzed soils for the preparation of this thesis, are an excellent environment for developing bacterial microflora, as shown by their number.

This paper brings real contributions on bacterial microflora variation in soil types analyzed. Seasonal variation bacteria change in a year, depending on how varying climatic factors.

The mycological analyzes performed were determined saprophytic and parasitic fungal genera in all soil types studied. Most fungal genera identified are saprophytic (21 genera) and a small number of genera are parasitic (8 genera).

The results that were obtained throughout our research not only generally confirm the information in the specialized literature and are specific to the conditions of the pedoclimatic area that was under study, but they also bring new elements to a better understanding of the phenomenon.

The last chapter of our paper presents the conclusions that certify the fact that the aim and objectives of our endeavour were fully achieved.

Some of the results obtained during the years in which the research took place were published in scientific papers indexed in international databases.