



Microbiological profile of selected mucks

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INTRODUCTION

Matyka-Sarzynska and Sokolowska (2000) emphasize that peats and peat soils comprise large areas of Poland. The creation of soil begins when the formation of swamp has ended. Gawlik (2000) states that the degree of influence of the mucky process of organic soils on the differentiations of the conditions of growth and development of plants is mainly connected with the changes of moisture-retentive properties of mucks which constitute the material for these soils, and the loss of their wetting capacities. The above-mentioned changes, which usually occur gradually and show a clear connection with the extent of dehydration and, at times, with its duration, intensify significantly when the soils are under cultivation.

The mucky process of peat soils leads to transformations of their physical, chemical and biological properties. The main ingredient of peat soils is organic substance. The substance is maintained inside them by the protective activity of water. The process of land improvement reduces the humidity of the environment, and that intensifies the pace of the activity of soil microorganisms which cause the decay of organic substance. The decay takes place in the direction of two parallel processes: mineralization and humification. All groups of chemical substances constituting peat undergo mineralization. Special attention should be called to the mineralization of carbon and nitrogen compounds, which constitute a large percentage of the organic substance of the peat organic mass. Okruszko (1976) has examined scientific bases of the classification of peat soils depending on the intensity of the muck process.

The aim of this publication was to conduct a microbiological characteristic of selected mucky material.

METHODS AND MATERIALS

Soil samples used in the experiments were acquired from the Leczynsko-Wlodawski Lake Region, a large area of which constitutes a part of the Poleski National Park, which is covered to a large extent with high peat bogs. It was a mucky-peat soil with different degrees of muck process, described by Gawlik (2000) as MtI – first step of muck process, and MtII – second step of muck process. The numbers of selected groups of microorganisms were established using the cultivation method. The total number of microorganisms, zymogenic, aerobic and anaerobic microorganisms (Fred, Waksman 1928), oligotrophic microorganisms, the number of fungi (Parkinson 1982), ammonifiers (Parkinson et al 1971), nitrogen reducers and amolytic microorganisms (Pochon and Tardieux 1962), were determined.

RESULTS

The interpretation of the obtained results should take into consideration not only the characteristics of the studied objects, but also the characteristics of the methods used and of the examined microorganisms. As a result of the experiments that were carried out, significant differences of the numbers of the examined groups of microorganisms, depending on the degree of the muck process, have been observed. The number of the examined groups was significantly higher in the soil at the first step muck process than the second step of muck process. Amyolytic bacteria were an exception. Probably, during the muck process, ammonification, nitrification and nitrogen reduction process take place at the same time, which is indicated by the number of individual groups of examined microorganisms.

CONCLUSIONS

During the muck process, the number of microorganisms in the soil decreases. It can be presupposed that during the muck process, the basic process realized by microorganisms is the degradation of organic substance, using nitrates as oxidizers.

- Dąbek-Szreniawska M.: 1992 Results of microbiological analysis related to soil physical properties. Zesz. Probl. Post. Nauk Roln., 398, 1-6.
- Fred E.B., Waksman S.A.: 1928 Laboratory manual of general microbiology. Mc Graw-Hill Book Company, New York - London pp. 145.
- Gawlik J.: 2000 Division of differently silted peat formations into classes according to their state of secondary transformations. Acta Agrophysica, 26, 17-24.
- Maciak F.: 1985 Materiał y do ćwiczeń z rekultywacji terenów zdegradowanych. SGGW-AR (ed.), Warszawa pp. 127
- Martin J.P.: 1950 Use of acid, rose bengal and streptomycin in the plate method for estimating soil fungi. Soil Sci 69, 215.
- Matyka-Sarzyńska D., Sokołowska Z.: 2000 Determination of soil organic matter susceptibility to oxidation for peaty-moorsh soils of different state of secondary transformation, Acta Agrophysica, , 38, 149-156.
- Okruszko H.: 1976 The principles of identifications and division of hydrogenic soils from point of view of amelioration purposes. (in Polish) Bibl. Wiad. IMUZ, 52, 7-54.
- Parkinson D., Gray T.R.G., Williams S.T.: 1971 Methods for studying the ecology of soil micro-organisms. Blackwell Scientific Publication, Oxford, Edinburgh pp. 116
- Pochon J., Tradieux P.: 1962 Techniques d'analyse en microbiologie du sol. Edition de la Tourelle, St. Mondé pp. 111