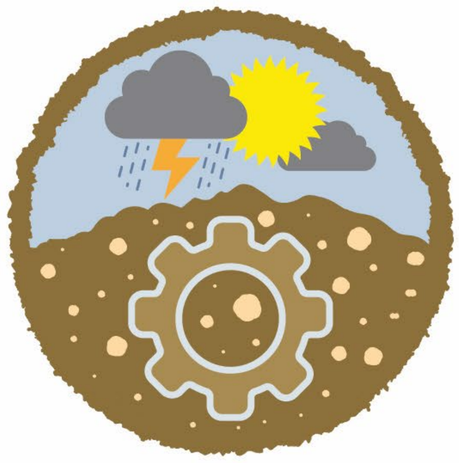

Theme 3
Impacts of soil nutrient management on the environment and climate change

The Influence of climate change on the functioning of soil microbiocenosis

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INTRODUCTION

In the aspect of global environmental problems, climate change and its impact on the functioning of the soil microbiocenoses problems has considerable researchers' attention. Given the high sensitivity of microorganisms to various environmental and anthropogenic factors and uncertainty about the impact of hydrothermal conditions on the taxonomic and functional structure of soil microbial groups, in global climate change, it is important to determine changes in the structure of the microbial complex with changes in hydrothermal regime.

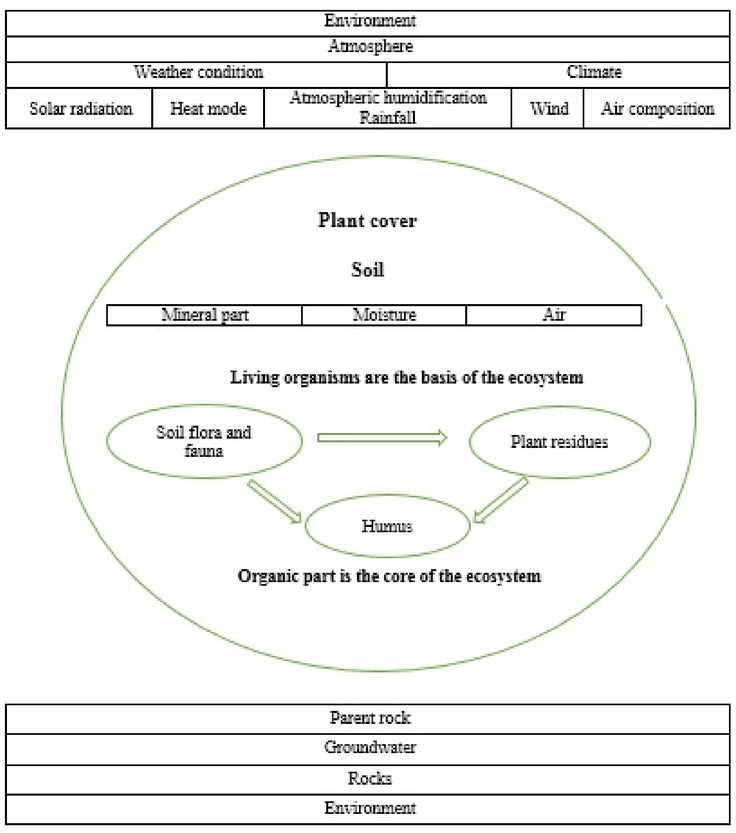


Fig. 1: Soil ecosystem

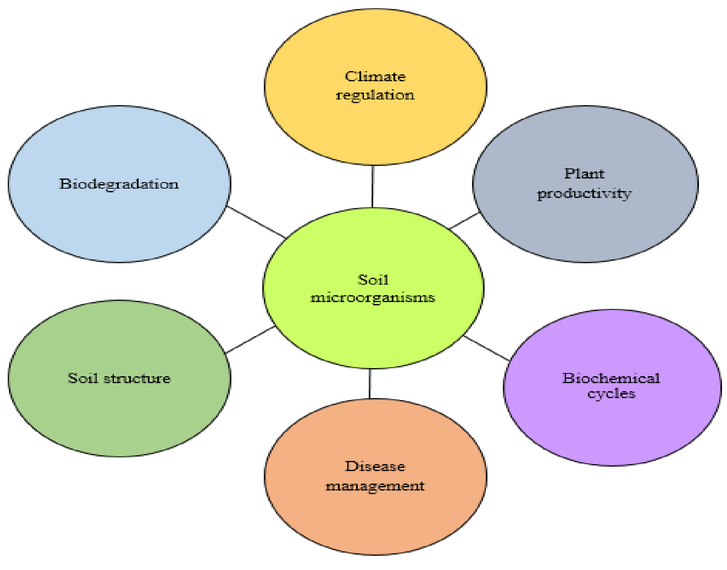


Fig. 2: Soil microbial impact

METHODOLOGY

The number of major ecological-trophic groups of microorganisms is determined by the methods of sowing of consecutive dilutions of soil suspension on standard nutrient media generally accepted in soil microbiology. During the experiment, microbiological and biochemical parameters in the soil are defined.

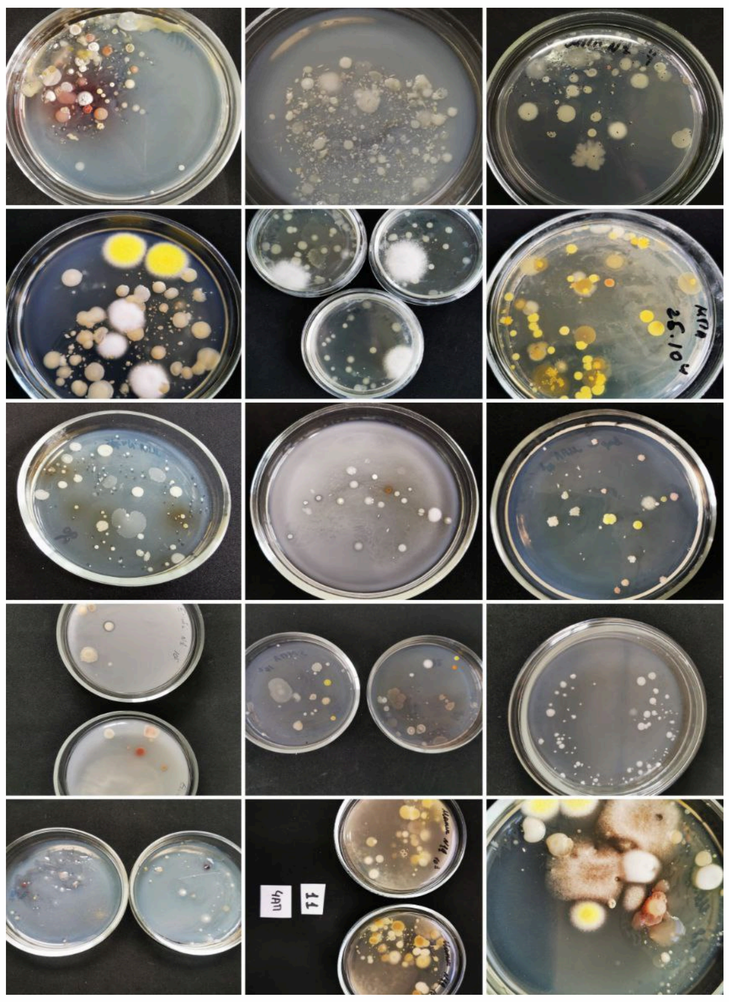


Fig. 3: Determination of major ecological-trophic microbial groups

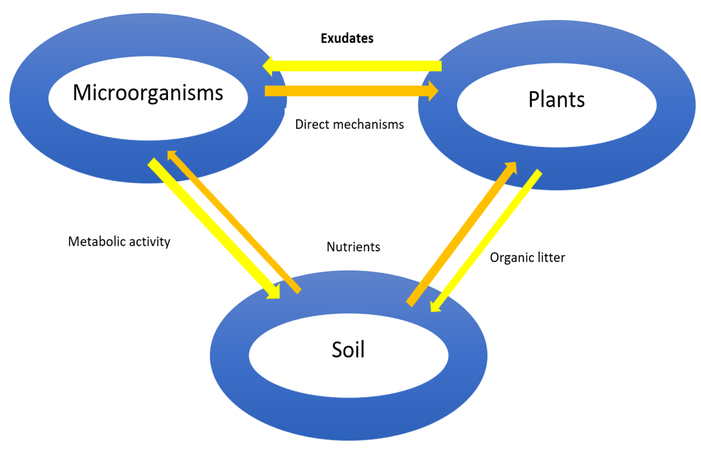


Fig. 4: Relationship in soil system

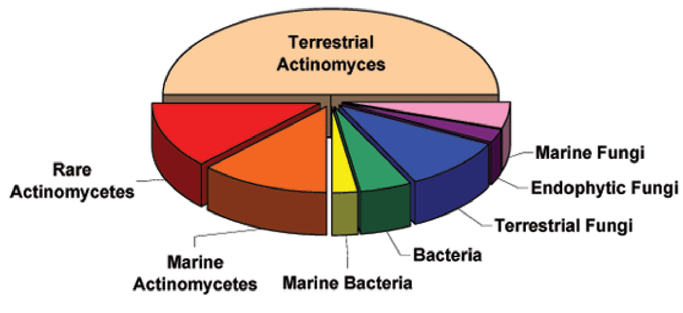
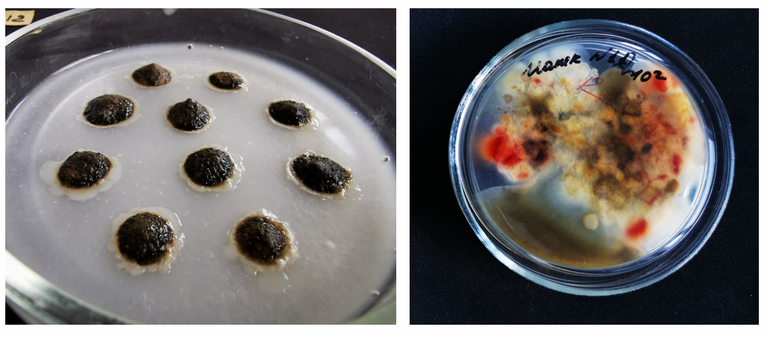


Fig. 5: Microbial diversity

RESULTS AND DISCUSSION

On the example of chernozem soil of the natural ecosystem as a reference system, in the simulated conditions, the influence of hydrothermal factors on microbial productivity and accumulation of microbial biomass due to climate change in global warming will be determined. In the course of our research, it was shown that the increase in temperature has a greater negative impact on microbial productivity in the agroecosystem, and the presence of moisture has a positive effect on the development of microorganisms. The obtained experimental data contribute to the assessment of hydrothermal factors on the soil microbiocenosis and show that the dynamic changes in the content of microbial biomass in the soil are associated primarily with changes in such environmental factors (Nannipieri, 2012). Our research has shown that the rate of CO_2 production is more dependent on temperature than humidity. The results of the model experiment showed that the temperature range 5-25°C had different effects on the ecological-physiological diversity of microorganisms. The best conditions for the development of soil microorganisms were formed at the temperature of 15°C, the least favorable – at 5°C and 25°C (Bradford, 2013). In our studies, the enzymatic activity was significantly positively correlated with the number of *Azotobacter* and micromycetes, for which the best conditions for proliferation were in soils at 15°C. Determining the influence of such a factor as the level of soil moisture on microbial and biochemical activity in the soil showed that the optimal moisture content in the soil is about 20% (Chen, 2007).



a b

Fig. 6: Soil microorganisms: a – *Azotobacter* spp. (Ashbys` medium); b – Micromycetes (Czapek`s medium)

CONCLUSIONS

It was found, that increasing the temperature has a greater negative impact on microbial productivity in the soil, and the presence of moisture has a positive effect on the development of microorganisms. Due to the correlation-regression analysis of the studies, a reliable relationship was established between the content of microbial biomass and hydrothermal conditions.