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The effect of long-term fertilizer treatments on nitrogen cycle microorganisms

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Statement of the Problem: A feature of modern crop production is the intensive exploitation of agricultural land using mineral fertilizers. This often leads to negative consequences. Possible negative consequences can be corrected by tracking changes in the structure and number of different microbial groups. The purpose of this study is to assess the change in the microorganisms participating in the nitrogen cycle number and the soil nitrogen available due amount to the many years of fertilizer use.

Methodology & Theoretical Orientation: We used agricultural soils involved in long-term experience (74 years). Three sites were investigated: 1) Control, soil without fertilizers; 2) NPK, soil treatment mineral fertilizers; 3) NPKML, soil treatment mineral fertilizers, manure and lime. The number of microorganisms participating in the nitrogen cycle (ammonificators, aminoautotrophs and diazotroph), total nitrogen, hydrolysable (mobile) nitrogen, nitrate nitrogen, and pH were determined in soils.

Findings: In the course of the work done, a significant change in the number and ratio of the studied microbial groups was found, as well as the amount of available soil nitrogen against the background of fertilization many years. A decrease in the number of microbial pool involved in the nitrogen compounds transformation was recorded in all experimental plots. The minimum number of these microorganisms is noted on NPK sites.

Conclusion & Significance: Based on the presented results, it can be concluded that one of the factors affecting the decrease in the amount of available nitrogen in the soil of the experimental plots is with inhibition of amino heterotrophic and nitrogen-fixing microflora while simultaneously increasing the number of microorganisms using mineral nitrogen. Such changes in the structure of soil microbiocenosis directly affect the natural nitrogen metabolism in soils and in the future may adversely affect the overall mineral balance of the soil.

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