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THE COMPARATIVE CHARACTERISTICS OF MICROBIOME OF TYPICAL CHERNOZEM IN AGROCENOSIS OF WINTER WHEAT UNDER DIFFERENT FARMING SYSTEMS

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Microflora is an important component of soil biomes. Its role is defined by active involvement in the metabolism of organic matter and transformation of nutrients, which are vital for other trophic chains of biocenose.

Microorganisms are the main factor in processes of soil formation and preservation of soil fertility. The diversity of microbiota has a much larger story of evolution than plants and animals. The combination of micro-climatic conditions, vegetation cover, physical and chemical properties of the soil has great influenced to the formation of microbocenosis, its size, composition and distribution in soil. Agrotechnical measures: fertilizer system, plant protection, soil tillage, crop rotation have the significant impact on microbial component of soil.

In this context, an important task of soil microbiology with rational use of microbiological factors in modern agriculture is objective, complex characteristic of microbial biome of chernozem. The study of biodiversity, spatial and functional structure of microbial complex is essential for understanding the mechanisms in the system soil – microorganisms – plant and is the basis for scientifically-based management of soil-microbiological processes for creating sustainable and highly productive agro-ecosystems.

The aim of research was to conduct comparative characteristics of microbial complex of typical chernozem, which formed in the process of growing winter wheat under different farming systems and tillage.

Studies of microflora of typical chernozem was conducted in the stationary field experiment of the Department of farming and herbology NULES of Ukraine (Agronomy Research Station). The area of study field is located in the Right of the Forest-Steppes of Ukraine. The terrain is flat. The soil of the field is the typical chernozem with low humus content. On granulometric composition – is rudely dusty medium loam.

Farming systems differed by resource level of nutrients for a balanced potential of agricultural landscape. For industrial system (control) was made 12 tons of organic and 300 kg of active ingredient of fertilizers ($N_{92}P_{100}K_{108}$) per hectare of arable land in the rotation. In the ecological model of agriculture priority was the use of organic fertilizers – 24 t/ha of crop rotation (12 tons of manure, 6 tons of non-commercial harvest (straw), 6 tons of green manure crop mass (radish). The balance of nutrient was offset by fertilizer ($N_{46}P_{49}K_{35}$). Ecologization index was 6,2, which is the basis of classification of these systems as part of ecological agriculture. The model of biological system is based on introducing 24 t/ha for crop rotation of organic fertilizers without the use of chemicals and using biological means of crop protection. In the context of resource support options were studied system of differentiated and surface tillage of soil.

According to the research of soil samples was conducted a comparative analysis of the numbers of main physiological groups of microbial cenosis of typical chernozem in agrocenosis of winter wheat.

Established that the application of ecological and biological agrarian systems allows increasing the number of ammonifying microorganisms to 2 times, oligonitrifying – 1,5 – 2,4, microorganisms that use mineral forms of nitrogen – 1,9 – 3, spore-forming bacteria – 2,6 – 7,9, cellulolytic microorganisms – 1,4 – 2,4 times in the flowering phase and reduction the number of microorganisms that use mineral forms of nitrogen to the 1,3 – 1,7 and oligotrophic to 1,5 times in wax ripeness phase of winter wheat. This points to the optimization of microbiological processes and trophic regime of typical chernozem under these conditions.

The qualitative composition and structure of distribution of the dominant forms of soil microflora are important, against the background of significant differentiation the numbers of microorganisms of main physiological groups. Established that the largest number of morphotypes were identified at the ecological farming system – 17 and 15 pieces for differentiated and surface tillage of soil in flowering phase of wheat.

At the end of the vegetation of winter wheat was observed decrease diversity of the bacterial microflora in the overall, as evidenced by the reduction in the number of identified morphotypes on all variants of the experiment. Was observed a redistribution of the dominant forms of microbial complex in relation to farming systems and increasing of biodiversity at surface tillage of soil under all farming systems.

The research found that increasing biodiversity and size population of bacteria were as follows in the flowering stage of wheat: industrial system + differentiated tillage → Industrial system + surface tillage → biological system + surface tillage → biological system + differentiated tillage → ecological system + surface tillage → ecological system + differentiated tillage of soil.

The systematic application of organic fertilizers for playback the resource potential and scientifically justified of tillage systems are promoted for the formation of homeostasis of microbial biome of soil, preservation of biodiversity, structure of microcenosis and general bioactivity of typical chernozem.

The systematic applying of large quantities of chemical fertilizers leads to disruption of trophic relationships in the microbial complex, of structure of number the main physiological groups of microorganisms, of reducing biodiversity and the formation of a homogeneous microbioms of typical chernozem with a high degree of dominance of certain species of microorganisms.

Scientifically based using of principles of formation the microbial component of soil, preservation homeostasis of biodiversity, optimization the structure of microbial complex are the basis for various levels of technologies to improve of

adaptive agrarian systems in the creation of highly stable agro-ecosystems and management of soil fertility in general.