

## **THE FUNCTIONS OF CYANO-FIXING BACTERIA IN THE CONTEXT OF SOIL HEALTH**

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Part of the pedobiocenosis, nitrogen-fixing cyanobacteria in soils can be present: on their surface forming "living" crusts or films, in the soil solution contained in the aggregate capillary pores; on the surface of elementary soil particles and microaggregates and are part of the performance of functions responsible for soil functionality and health.

According to our research, the basic function of nitrogen-fixing cyanobacteria in the functioning of the soil ecosystem is realized in their function as the nucleus of the algal-bacterial pedobiocenosis (Jigău et al., 2019, Jigău et al., 2022).

Through the prism of the priority role of cyanobacteria in the functioning of the soil biome, they have an important direct and indirect role in the sequestration and stabilization of organic carbon in the soil. Their direct role is achieved through direct participation in the aggregation-structuring processes, thus ensuring their permanent presence in the structural aggregates, ensuring the continuous production of algal biomass which is subsequently humified and contributes to the stabilization of the newly formed humic substances in the structural aggregates. In larger quantities, they accumulate in aggregates of 1-0.5 and 5-1 mm. In minimal quantities they are contained in aggregates > 7, especially in those > 10 mm. In the framework of our research, it was established that in arable chernozems there is a positive dependence between the content of cyanobacterial flora and the content of 5-1 mm aggregates, as well as between the content of

cyanobacterial flora and the degree of hydrostability of 5-1 mm aggregates. Increasing the content of 5-1 mm aggregates and their hydrostability contributes to the creation of favorable conditions for the realization of the agrobiocenotic functions determined by the aggregate structure of the soils.

The indirect participation of cyanobacteria in the sequestration of organic carbon in the soil is carried out in their function of producing organic matter rich in carbon and nitrogen. Algae and cyanobacteria are characterized by autotrophic nutrition and, respectively, as a result of the photosynthesis process, part of the carbon accumulates in their biomass, which contains up to 70% carbohydrates, 50% proteins, 10% lipids and other substances that in the process of decomposition accumulates in the soil and contributes to the accumulation of carbon.

Thanks to the increased nitrogen content, the decomposed cyanobacterial biomass is not only an important source of humus formation, but also a catalyst for the process of formation and accumulation of organic humic substances that have an extremely important role in achieving production, environmental-forming and resource-regenerative functions which are basic attributes of the health of arable soils. Among the number of soil pedobiocenosis functions of nitrogen-fixing cyanobacteria are:

- nitrogen fixation and the continuous accumulation of biological nitrogen in the soil as a source of nitrogen for the humification process;
- supporting the air regime, especially the oxygen regime in the soil. At the same time, nitrogen-fixing cyanobacteria are indicator organisms of pedogenetic, pedofunctional, nutritional regimes, of salts and pollution with products of agricultural activity (fertilizers, phytosanitary products, heavy metals, etc.).