Environmentally safe 'super-fertilizer' will significantly increase the yield of grain crops

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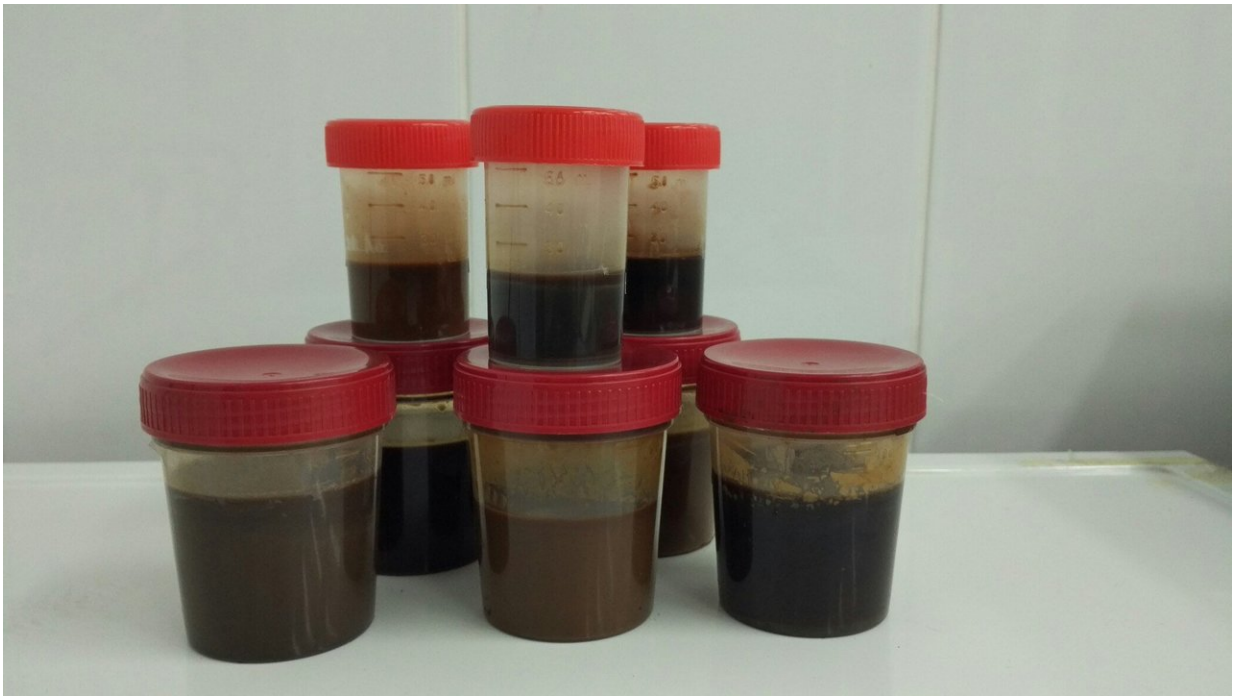

Developing high-performance microelement compositions with a pronounced fungicidal effect that are obtained in the course of industrial waste utilization. Credit: Lobachevsky University

The biological potential of agricultural plants can only be realized with a balanced mix of trace elements that take part in key metabolic events. An imbalance of microelemental nutrition disrupts the development of plants, which results in their diseases and even death. Ultimately, plants

do not realize their biological capabilities and yield a poor harvest. Therefore, the use of microelement fertilizers is growing in crop production. The high cost of microelement fertilizers currently available in the world market is mainly due to the fact that they are produced from expensive synthetic raw materials.

A large amount of salts of microelements (zinc, copper, manganese, iron, etc.) is lost via industrial waste. These salts could become an inexpensive and readily available raw material for the synthesis of microelement fertilizers instead of causing environmental problems posed by their formation and accumulation in water bodies. Currently, there are no microelement preparations with fungicidal properties that would also protect plants from fungal diseases, thus reducing the environmental impact associated with the use of chemical fungicides.

Scientists of the National Research Lobachevsky State University of Nizhny Novgorod are developing high-performance microelement compositions with a pronounced fungicidal effect that are obtained in the course of industrial waste utilization. "Our task is to create a technology for producing and applying a complex, innovative fertilizer that would significantly increase the yield of grain crops and improve their resistance to pathogenic microflora while reducing the chemical load on the soil," says Professor Victor Novikov, Director of the UNN Center for Molecular Biology and Regional Ecology, who is in charge of technology development.

According to Prof. Novikov, the project is based on the unique proprietary technology for producing environmentally safe compositions comprising microelements and bacteria. The technology uses a number of industrial wastes as raw materials.

"Microelement compositions have been tested successfully in crop production in the Nizhny Novgorod region and in other Russian regions

showing high efficiency and competitiveness of such fertilizers. With the proposed technology and microelement compositions that have been already tested, it will be possible to develop a resource-saving concept that considers the waste of one industry as a source of raw materials for another production sector," says Victor Novikov.

The most promising area for developing research in this direction is biological modification of film-forming microelement fertilizers for seed treatment that involves the production and application of compositions comprising microelements and bacteria in crop production. To achieve the synergistic effect of microelement and bacterial components, a series of studies will be conducted to determine the optimal ratio of microelement ions, bacteria and lignin base in the compositions. To optimize the "super fertilizer", metagenomic analysis of rhizosphere microorganisms in the root zone of the plants treated with the composition will be performed. By using molecular immunology methods, protective forces of germinating plants whose seeds were treated with the fungicidal super fertilizer will be assessed. As a result, higher yields will be achieved along with an increased resistance of plants to unfavorable factors and a reduced environmental burden on soil and agricultural products.

Provided by Lobachevsky University

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