

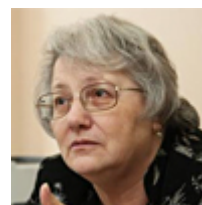
SibFU scientists propose a gentle method of herbicide treatment of crops

Biotechnologists of Siberian Federal University have proposed new forms of drugs to combat agricultural pests, i. e. weeds and fungi affecting crops. Crop protection is one of the top priorities of the Russian agricultural industry due to the fact that our country is the leader in wheat exports. For example, in 2019 more than 29 million tons were sold to other countries.



The Siberian Federal University scientists initiated a study aimed at creating new forms of drugs to fight root rot pathogens of crops. According to the scientists, the new form of the drug will look like oblong granules containing biodegradable polymers and available natural materials (clay, wood sawdust or peat), loaded with the active substances, i. e. herbicides used to control weeds, and fungicides that destroy harmful fungi. The main feature of the developed forms is their high selectivity — they are dangerous exclusively for phytopathogens and harmless to beneficial microorganisms, including microbiota of agricultural land. Interestingly, the active substance releases slowly from the granules into the soil, which means that new “medicines” for plants continue to work from early spring until harvest. Repeated treatment of leaves and inflorescences of plants using traditional powders or emulsions is not required anymore.

*‘The work was carried out as part of the mega-grant led by Sabu Thomas, a leading researcher at the Laboratory of Innovative Preparations and Materials of Siberian Federal University, and was aimed at creating biopesticides that will effectively fight grain diseases without damaging the environment. These drugs should have a relatively low cost, since Russian farmland occupies huge territory, and the biodegradable polymers of microbiological origin used in the project — polyhydroxyalkanoates (PHA) — are considered quite expensive and unprofitable for widespread use. Therefore, to increase the economic affordability of PHA, SibFU scientists suggested using polymers not in pure form, but in a mixture with cheap natural filler materials (fillers). Our team managed to create pioneer forms of pesticidal preparations and comprehensively study their behavior in laboratory soil microecosystems. The next stage of the work is the study of the effectiveness of new forms in laboratory grain crops infected with weeds and plant pathogens, followed by field trials,’ said **Tatiana Volova**, research co-director, head of the specialized department of biotechnology, Siberian Federal University.*



The scientist said that the developed preparations are safely made from a homogeneous mass, 50% of which consists of a biopolymer, 30 % consists of fillers (ash, peat, clay or sawdust) and 20 % consists of pesticides. Granules are made without the use of aggressive organic solvents chloroform and chloromethane.

Granules are conveniently applied to the soil, and they have already proven their effectiveness in a special experimental garden where scientists grew wheat, barley, tomatoes and beets. A laboratory experiment conducted using a specially recreated soil system (soil from the lands of Krasnoyarsk Territory was used) lasted 83 days. He showed that the prolonged forms developed in SibFU are in effect throughout the whole growing season.

'Plants have different lifespan. While wheat is ripening, several generations of weeds have time to change. Therefore, new preparations need to work slowly, creating a background pest control effect. We completely abandoned the traditional concept of shock emissions of large doses of pesticides. Prolonged forms are better for grain plants, soil microorganisms and for the consumer who receives food made from pure grain that has not accumulated toxic sanitation products over the summer,' concluded **Anna Shumilova**, one of the research authors, assistant professor of the specialized department of biotechnology, Siberian Federal University.



The main results of this study are presented in International Journal of Biological Macromolecules.

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