

# **Implementation of the innovative technologies in the field of organic agriculture in the territory of the Russian Federation**

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## **Abstract**

To solve the problem of minimizing the use of toxic and carcinogenic pesticides in the cultivation of agricultural crops, the leading scientists of the Russian Federation in the field of plant physiology and biochemistry within the framework of various RFBR grants conducted extensive research for many years and the article provides brief summarized data of new multifunctional drugs Furolan and Grivlag, and also describes the types of their effects on plants.

## **Keywords**

Furolan, Grivlag, antidotes, plant growth regulators, immunizer, elicitor, environmental safety

The market for organic products in the Russian Federation is more than 120 million US dollars, 0.12% of agricultural land (over 246 thousand hectares) is certified as organic according to international standards. In total, there are 20 certified organic agricultural producers in the field of crop production in Russia. Basically, these are farms that grow grain and oilseeds. The prospects of the Russian Federation in the global organic market are estimated at 15-17% (about 130 million US dollars). The Russian domestic market is in its infancy, and for the development of organic agriculture, agricultural producers most of all need a symbiosis of planning, knowledge and investment. The potential of organic products in the domestic market is estimated at 10% of the food market, the level of implementation of agricultural biologization can potentially reach 50-80%. The introduction of organic agriculture and the biologization of agriculture will provide up to 70% of the healthy lifestyle of Russians through high-quality healthy food and a safe environment.

The agrobiological potential of lands in Russia is used by a little more than 2%. Organic agriculture provides a medium and long term impact on the agro-ecosystem. It aims to produce food in conditions of an ecological balance that prevents soil depletion or pest problems. Organic farming uses a proactive approach as opposed to solving problems after they have arisen.

In conditions of degradation of natural resources, the problem of studying the possibility of improving soil fertility was outlined at the beginning of the XVII century by the "father of scientific agronomy" Alfred Tower. Known are the scientific works of V.R. Williams, who created the doctrine of the small biological cycle of substances as the basis for the development of soils and expressed the idea of the unity of the development of inorganic and organic nature.

In this regard, leading Russian scientists with the support of the RF grants have developed 2 innovative drugs **FUROLAN** and **GRIVLAG**.

**Furolan**—a polyfunctional preparation, a plant growth regulator, allows increasing plant resistance to damage by phytopathogens, herbicide antidote, retardant, immunizer (RF Patents № 2284694, № 2356225, № 2475025, № 2492611, № 2370019). The drug is approved for use on the territory of the Russian Federation, it is environmentally safe and non-toxic to flora and fauna; residual quantities in agricultural products and environments are absent (Certificate of state registration 602-07-2530-1).

The drug **FUROLAN** is used in nanodoses (4-6 g / ha) and has a multifaceted effect as follows:

1. As an elicitor - getting into a plant, it corrects metabolism, which prevents infection with bacterial and fungal diseases or disrupts the course of pathogenesis and reduces morbidity. Provides environmental safety of products, reducing the cost of other pesticides of therapeutic and prophylactic action. Under its influence, protective substances in plants are formed faster and more intensively than when infected with pathogens. Induces natural mechanisms of resistance locally and systemically in the plant (reduction or elimination of the use of fungicides), reactivates the active centers of enzymes, oppressed by toxic substances; non-specificity of immunization to any pathogens, multicomponent protection, stimulation of plant growth, immunization with elicitors combines the advantages of contact and systemic fungicides.
2. As an antidote - it is used for the prevention and treatment of lesions with toxic substances (herbicides, insecticides, excessive fertilization, etc. Provides activation of seedling growth, maintaining the intensity of growth and reducing the suppression of growth processes, activates the synthesis of amino acids, increases the content of IAA, chlorogenic and caffeic acids, proline, pigments, internode wall thickness, nucleic acids and protein.

3. As growth regulators - it is used as a biotechnology tool, used in the selection of highly productive varieties of agricultural crops resistant to adverse environmental conditions, and is a mandatory technique in intensive technologies that maximize the potential of plant productivity. It is also used to reduce lodging of grain crops and grain runoff; increasing the productivity of agricultural crops; improving setting and keeping the ovary; improving vegetative reproduction; acceleration and synchronization of maturation; increasing frost and drought resistance of plants; phytoimmunocorrection, which activates a complex nonspecific resistance in a plant to many diseases of bacterial and viral and fungal origin; reducing the content of radionuclides, nitrates in the grown products, increasing its safety.

Unique advantages of using the drug furolan:

- Complete environmental safety;
- Lack of resistance in pathogens;
- Improving the sowing qualities of seeds of grain and leguminous crops and increasing the resistance of seedlings to water deficit and to damage by phytopathogens;
- Reducing the negative impact of herbicides on growth, photosynthetic activity and resistance to plant pathogens damage during the growing season;
- Improving the setting and preserving the ovary on fruit - berry and vegetable crops.
- Formation of conjugate nonspecific resistance, allowing plants to withstand the effects of adverse environmental factors of various nature;
- Increasing yields and obtaining high quality agricultural products;
- Increasing the profitability of production and increasing the economic efficiency of agricultural production.

The new growth substance **GRIVLAG** of natural organic origin has the following properties:

- high physiological activity;
- long-term preservation of properties;
- the ability to create water-soluble combinations;
- environmental friendliness, etc.

The main components of the organic growth substance GRIVLAG are a mixture of organic alicyclic monobasic and dibasic carboxylic acids containing five- and six-membered saturated carbon cycles, as well as their salts.

Treated vegetable oils are added to reduce volatility and increase penetration.

The proposed preparation is obtained by the interaction of organic acids with naphthenic olefins in the presence of an initiator of di-tertiary butyl peroxide. In order to enhance the

stimulating activity, sodium salt of synthetic individual naphthenic acids of the cyclohexane series was used as a plant growth stimulator. To establish the effectiveness of the sodium salt of six-membered naphthenic acids as a growth substance, the effect of them in the form of aqueous solutions of various concentrations on the bends of individual coleoptiles of oat seedlings by the Vent method and in the modification of Zedding and on the growth of winter wheat roots was studied. Experiments made it possible to establish the optimal dose of this growth stimulator – 5-10 g/ha. According to the research results, a patent for invention № 2713902 was received.

Organic growth substance GRIVLAG can be used in conjunction with other fertilizers and plant protection products:

- introduction into the soil during the pre-sowing period for a specific area and a specific agricultural crop;
- soaking (soaking) plant seeds in the pre-sowing period, etc.
- applying to the soil together with known organic and/or mineral fertilizers in different phases of plant growth;
- spraying plants during the growing season and flowering and pest control.

The research was carried out by leading scientists of the Russian Federation in the field of plant physiology and biochemistry within the framework of RFBR grants on the basis of the leading universities of the Russian Federation FSBEI HE Kuban State Agrarian University named after I.T. Trubilin, FSBEI HE Kuban State Technological University and FSBSI "North Caucasian Federal Scientific Center for Horticulture, viticulture, winemaking", and the introduction of technologies for the use of these drugs was carried out throughout the territory of the Russian Federation and the Republic of Crimea in different soil and climatic conditions.

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