

BIOPROTECTION AND BIOSAFETY AS COMPONENTS OF AGRICULTURAL INNOVATIVE DEVELOPMENT

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Abstract. *The article substantiates the areas of promoting the innovative solutions for bioprotection and biosafety in the agricultural sector of Ukraine as a condition for ensuring national food security and building the potential of agricultural exports.*

Keywords: *agricultural sector; novation; biotechnology; innovative activities.*

One of the main goals of agricultural and economic policy of any state is food security. However, now man and nature are increasingly suffering from harmful and highly toxic environmental factors caused by the scientific and technological revolution.

4 million toxic substances are registered in the external environment, and their number grows by 6 thousand every year, of which about 100 thousand toxic compounds enter the human body with food, water and air. One of the most significant sources of environmental pollution is the intensive chemicalization of agriculture.

The further development of the global and domestic agricultural sector faces serious challenges, including: bioprotection, closely linked to food security; technological challenges caused by the need to move agriculture to a new technological paradigm, which includes biotechnology, precision agriculture, robotics, composite fertilizers; integrated biosecurity; formation of resource-efficient agriculture, etc.

Solving these global problems requires abandoning the use of mineral fertilizers and chemical plant and animal protection products through the introduction of organic agricultural production using microbiotechnology and biologically active preparations derived from compost. This will restore the lost natural qualities of agricultural products while maintaining and subsequently increasing the productivity of livestock and crop production. Currently, in developed countries, biotechnology in crop and livestock production is at a stage of rapid growth and development.

Ensuring national food security and adequate export potential for domestic agricultural potential is possible only in the context of strict compliance with bioprotection and biosafety requirements. The basis of such systems is formed by biotechnologies in crop and livestock production, which are currently at the stage of strong growth and development all over the world.

An alternative to the chemical method in crop production is the biological protection of plants from pests, diseases and weeds, which is safe for humans and warm-blooded animals. The active substance of biological protection does not pollute the environment, shows high selectivity, is convenient for mass production and has inexhaustible resources for this. Therefore, in countries that pay considerable attention to the environmental component of their development, biological plant protection is a priority in long-term pest control programs.

Unlike chemicals, biological products for plant protection contain live microorganisms and natural biologically active substances that are synthesized by the same microorganisms. Today, neither in Ukraine nor in other countries, biological products have not become widely used, but it is obvious that in the future they will become necessary. Based on special, selected microorganisms, biological preparations are technological in use, safe for plants, humans, warm-blooded animals, honey bees, fish and the environment. The basis of biological drugs are effective for plant protection, actually existing in nature microorganisms and products of their activities, which cause the death of pests and pathogens of plant diseases. It is very important that biological drugs are not intended for the complete extermination of the population of the harmful species, but only to significantly limit the development of pests and pathogens, reducing the level of their harmfulness to economically insignificant levels.

Biotechnologies in crop production compete with chemical methods in terms of yield and cost. Excessive chemicalization has led to the development of a number of phytopathologies and toxicants in agroecosystems. It is noticeable that in the EU countries in organic agriculture without agrochemicals and mineral fertilizers the yield is higher than with agrochemicals and a full range of fertilizers. In domestic agriculture,

the main means of increasing yields are still chemical plant protection products. This does not take into account the negative consequences of their use.

Domestic agricultural microbiology can offer producers a wide range of biological products to increase soil fertility and plant productivity, protect them from phytopathogenic microflora and pests, improve crop quality and reduce the application of fertilizers and pesticides. Domestic developments are more or less able to synthesize growth hormones, fix atmospheric nitrogen, convert phosphorus compounds into digestible forms, and have a fungicidal, which has a favorable effect on the physiological state and overall productivity of crops.

However, the current level of use in domestic agriculture of biotechnology and scientific potential does not meet modern requirements, as existing developments primarily due to lack of information and lack of interest of the manufacturer are not widely implemented in production.

At the same time, in Ukraine there is a significant number of scientific developments adapted to local conditions, but their entry into the market for widespread use in production is a significant problem. Farmers must have information on the economic and environmental efficiency of production biologization in order to actively introduce elements that show rapid changes (biofungicides, microbiological fertilizers, entomophagous, etc.) and a long cycle (crop rotations, green crops, etc.).

The world market of agrobiological drugs is very promising and powerful. In the next 20 years, its annual growth will be 15%, reaching in 2035 the level of 57 billion USA dollars. In European countries, the rate of application of mineral fertilizers is declining, various pesticides are banned every year, the list of banned agrochemicals is growing. The United States currently has the world's largest biotechnology economy (35% of the global bioeconomy) and almost 50% of the World's clean market.

Domestic developments, with the proper support of their widespread introduction, can form another promising direction to increase the level of innovation in production, help increase the competitiveness of domestic agricultural products, as well as enter foreign markets, which will be actively expanded in the near future.

Domestic developments of biological plant protection products against pests can be used in the following areas: the use of promising species of entomophagous; use of microbiological preparations based on entomopathogenic, nematophage fungi and fungi-antagonists of plant pathogens; joint use of entomophages, microbiological drugs and plant growth regulators; implementation of measures for the accumulation of natural entomophages [1].

The competitive advantages of using bioprotection drugs in crop production include: low costs and a high degree of return; compatibility with most plant protection products; versatility; no need to make changes to conventional technologies; ecological purity, safety for the environment, people and animals; possibility of use in the territories where chemicalization is forbidden; comprehensive improvement of soil condition.

Among the areas of crop biologization in Ukraine should be noted:

- introduction into production of modern biotechnologies, use of the biological products directed on increase of stability of production and quality of the made production;
- development of own adaptive selection;
- strengthening the requirements for the application of pesticides;
- development and implementation of an integrated approach using chemical and biological plant protection products.

In animal husbandry, biological safety, along with environmental and ensuring the quality and safety of agricultural products, is a key element of food security and should be considered in conjunction with them. In particular, environmental factors affect the spread of infectious diseases of animals and humans, which, in turn, are the subject of bioprotection systems.

Ensuring the effective development of animal husbandry is possible only if there is a stable epizootic (absence of epidemics among animals) animal welfare and health; production of safe livestock products of high quality; introduction of high international standards of bioprotection and biosecurity.

The basis of means and measures to counteract biological threats and risks in veterinary medicine in general and in the biological industry in particular is laboratory and industrial biosafety.

The domestic market of veterinary drugs is about 100 million USA dollars, of which immunobiological - 40%. At the same time, state-owned enterprises in the biological industry sell less than 10% of the demand, which proves the existence of potential for increasing the relevant production. At present, Ukraine is almost entirely dependent on imports of a number of veterinary immunobiological drugs. [2, p. 139].

The main problem of the domestic market of veterinary drugs is the weak link between veterinary science and education with biotechnological production, despite the fact that scientific institutions of NAAS develop vaccines, diagnostics, treatment and prevention drugs, disinfectants, but they are little mastered by domestic industry. With their full development and intensification of import substitution, the growth potential of domestic production of veterinary drugs is about 90 million USA dollars.

Among the areas of development of bioprotection and biosecurity of livestock in Ukraine should be noted the following:

- creation of control of infectious and invasive diseases of animals;
- providing quality control systems and safety of livestock products on biochemical, biophysical, immunological and environmental principles;
- use of nano-, molecular and cellular biotechnologies in the development of animal protection products.

Creating an effective system of bioprotection requires completed domestic developments in the field of ecologically oriented agriculture in the full cycle. Existing developments must be combined into systems, brought to the level of technological schemes and maps and subsequent implementation in production. To solve the problem of increasing the production of agricultural biologization products, a concept was developed for the formation and development of a strategy for regional networks of enterprises for the production of agricultural biologization products. [3].

The main purpose of the introduction of innovative technologies and bioprotection products for agriculture should be to ensure the quality and safety of agricultural products. Support of domestic developments, wide informing of producers on efficiency of their use will provide wide introduction in manufacture of domestic biotechnologies that will promote growth of productivity in plant growing and animal husbandry; increase the quality and competitiveness of agricultural products; will provide an opportunity for domestic producers of biological products to expand their positions in the domestic and foreign markets, which will actively grow in the near future.

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