

UDC: 63.33.30

BIOTECHNOLOGICAL ASPECTS OF PLANT DISEASE CONTROL

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Abstract: The most important place in biotechnology and bioengineering belongs to the modern selection of plants for sustainability and product quality, the creation of a new generation of varietal resources of the country and the world. The main research of biotechnologists is aimed at creating improved and fundamentally new genotypes of agricultural plants that have single, group or complex resistance to biotic or a biotic stressors of the environment while maintaining and improving their productivity and quality. The epiphytic nature of the spread of the most dangerous fungal, viral and bacterial diseases of cultivated plants, destroying up to 30% (and sometimes more) of the crop.

Key words: Training, resources, technology, science, knowledge, modern, complex, agricultural plants, environment.

The most important place in biotechnology and bioengineering belongs to the modern selection of plants for sustainability and product quality, the creation of a new generation of varietal resources of the country and the world. The main research of biotechnologists is aimed at creating improved and fundamentally new genotypes of agricultural plants that have single, group or complex resistance to biotic or abiotic stressors of the environment while maintaining and improving their productivity and quality. The epiphytic nature of the spread of the most dangerous fungal, viral and bacterial diseases of cultivated plants, destroying up to 30% (and sometimes more) of the crop, created and several other countries a situation where the need to renew varietal resources of agricultural cultures based on a combination of traditional breeding methods and new methods of biotechnology has become extremely acute.

At present, a significant part of the crop of agricultural plants - about 30% - dies from pests and diseases. The efforts of experts in the field of plant protection - a branch of agricultural science that develops methods and techniques for controlling diseases, pests and weeds of cultivated plants - have not yet yielded the desired results. In this regard, it is necessary to look for fundamentally new approaches to solving the extremely pressing problem of plant protection. And here biotechnology comes to the aid of man. For example, the use of the method of culture of isolated organs and plant tissues allows to obtain a large amount of healthy (virus-free) planting material.

The development of biotechnology has made it possible to evaluate in a completely new way the methods used to protect plants. For example, in the light of advances in biotechnology, it has become clear that we clearly underestimate the potential of the biological method of pest and disease control of agricultural plants and, conversely, overestimate the role of the chemical method. Thanks to the development of biotechnology, it became possible to create an industry of insecticidal viruses, their production and cultivation in animal cells.

As is well known, the biological method of plant protection is understood as the use of living organisms or products of their vital activity to prevent or reduce damage caused by harmful organisms. The idea of a biological method of combating pests of plants was put forward at the end of the last century, but did not receive intensive development in part because at that time the chemical method seemed more promising. The creation in the middle of the twentieth century of a powerful industry for the production of various pesticides gave confidence that the problem of plant protection will finally be solved. However, it soon became clear that these hopes were illusory. The fact is that with the increase in the use and "expansion of the range of pesticides" there is an increase in the number of resistant insects. In addition, chemicals are usually unintended. They kill not only harmful but also beneficial insects, including which, being the natural enemies of pests, reliably assist man in his struggle for the salvation of the crop. It should also be noted that pesticides are toxic to animals and humans, many of which persist in

the natural environment for a long time, leading to significant contamination. -up to ten years, remain in the soil and accumulate in the body izme animals in adipose tissue.

Thanks to the efforts of scientists from different countries, the toxicity of pesticides has been significantly reduced in recent years. With the appropriate selection of the range of drugs, with their proper alternation, undesirable concentrations of pesticides in the environment are sharply reduced. Drugs have been created that decompose quickly and without the formation of a harmful residue in the soil.

Nevertheless, the production and use of pesticides in agriculture has a number of serious shortcomings. According to statistics, only one in ten thousand synthesized drugs becomes the property of practice.

The shortcomings of the chemical method of pest control and plant diseases have led researchers to pay more attention to the biological method. Interest in it has increased sharply due to advances in biotechnology. The areas of interest of specialists in the field of biotechnology and biological plant protection should be clearly distinguished. Bio-technology is engaged in the development of technological processes that ensure the production of viruses, bacteria, fungi, protozoa and insects, as well as biologically active substances of living organisms (antibiotics, hormones, pheromones, etc.), designed to control pathogens, pests agriculture and weeds. Thus, if a specialist in the field of biological plant protection is interested in the problem of using appropriate tools, the biotechnologist is primarily concerned with the organization of their production, and here it is worth noting that them to obtain various substances, such as antibiotics. At the same time, biotechnology and genetic engineering significantly expand the possibilities of effective use of biological plant protection products.

Viruses cause about 300 different diseases of crops. Compared to phytopathogenic fungi and bacteria, this is not so much; the number of fungi and bacteria that harm crops is about 100 times greater. However, the harmfulness of viral diseases in some cases is not only not inferior to fungal or bacterial, but also

surpasses them. Diseased plants change their appearance, give a low and poorer yield.

The fight against viral infection is complicated by the fact that viruses are obligate parasites of plant or animal cells. Their destruction is accompanied by the death of the cell itself. As it is almost impossible to cure plants affected by viruses, measures to control them are mainly preventive, they are designed to prevent the emergence of the disease and its spread.

The method of culture of isolated tissues and organs opens up excellent prospects for improving the health of planting material and freeing it from viral infection. As early as 1934, F. White, the founder of the plant tissue culture method, pointed out the absence of viruses in the tips of plant roots infected with the tobacco mosaic virus. Similar results were obtained by other authors. Based on these facts, scientists from the National Agronomic Institute (France) proposed a method of obtaining healthy planting material of dahlias from cultured on a nutrient medium meristem. From the apical meristem of these plants, they raised adults who were free of viral infection. The Bel de Fontaine potato variety, which has virtually disappeared as a result of virus infection, has been revived from a healthy meristem isolated from an infected plant and grown on an artificial nutrient medium. The research of French scientists was fundamental in carrying out work aimed at obtaining healthy planting material.

Meristem explants of 0.1-0.2 mm in size are usually used for effective virus removal. However, the smaller the size of the explants, the more difficult it is to take root and regenerate into a whole plant. To obtain potato meristems, either light sprouts formed on tubers or tops of shoots of whole plants are used. Before taking the explants, the ends of the shoots are sterilized in a solution of calcium hypochlorite, and then washed several times with sterile water.

Heat treatment of explants promotes release from viruses. It is established that at a temperature of about 30--40 ° there is a decrease in the concentration of viruses, especially in growing parts of plants. This technique allows you to use larger explants, which are easier to take root.

The isolated piece of tissue is then transferred to the surface of the agar nutrient medium, poured in an amount of 3-4 ml into a test tube, which is immediately closed with a cotton plug.

Tubes with meristems are placed in a bright room with a temperature of 25 ° C. Every twenty to thirty days in separate test tubes meristems give shoots. Shoots 3-4 cm long are cut into fragments of 0.5-1.0 cm, each of which must have a leaf and axillary bud and transplanted to a nutrient medium of the same composition for rooting. The plants are then transferred to the soil.

The method of tissue culture as a means of radical removal of viruses is now widely used in the world practice of potato growing, because potatoes, being a vegetatively propagated crop, are significantly exposed to the harmful effects of viral infection. Spreading throughout the plant, the viruses enter the tubers and stems, infect the offspring and from year to year reduce the yield, deteriorating its quality. Due to the defeat of viruses, many valuable varieties of potatoes have been withdrawn from production. To restore the variety, it is necessary to find single clones that are free of viral infection. However, quite often valuable varieties are affected by viruses 100%. In this case, only the method of meristem culture can contribute to the restoration of the variety.

The method of improvement of planting material developed by plant physiologists is introduced not only in potato growing, but also in the cultivation of strawberries, raspberries, fruit crops, ornamental plants.

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