MODERN AGRICULTURAL BIOTECHNOLOGY: WORLD EXPERIENCE IN ENSURING FOOD SECURITY

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Based on the data presented in the study ("Transgenic Plants and Food Security in the Context of Human Development") of the Bishop's Academy of Sciences, it can be assumed that biotechnology can create the basis for solving a number of existing global problems. For example, such as providing the population with food (more than 1 billion out of 6.8 billion of the world's population are currently undernourished), intensive population growth (by 2050, the world's population will grow by another 2-2.5 billion people and will reach 9 billion), climate change and, as a result, a decrease in water reserves (including for agriculture), a massive loss of the fertile soil layer (due to the intensive use of pesticides). These and other problematic issues require the urgent development of new agricultural systems and technologies. Agricultural biotechnology is one of the options for solving these problems.

Before talking about biotechnology (GMO), it is necessary to briefly describe the process of plant breeding and give an explanation of the term "genetic engineering".

Today there are many different terms to describe the process of plant breeding. All living organisms are made up of cells that carry genes that are responsible for certain traits. The complete set of genes of any organism (genotype) is encoded in the DNA molecule and is called a "genome". It contains information inherited from parents to descendants. Plant breeding, and essentially all evolution, is genetic change or modification, fixed as a result of the selection of plants of each generation for the desired characteristics. Most of the new phenotypic, i.e. The external traits of a plant (for example, physical structure, development, biochemistry, or nutritional properties) occur as a result of a change in the plant's genotype. In plant breeding, random mixing of genes of closely related or compatible species is traditionally used, often accompanied by unpredictable consequences and always some genetic changes that have not yet been studied. In the middle of the twentieth century, another method appeared, the so-called. mutagenic selection, when seeds or plants are treated entirely with mutagenic chemicals or high energy particles in the hope of obtaining an improved phenotype. From the plants obtained, the breeder selects specimens with the desired characteristics. But it also leads to unplanned and unexplored genetic changes. And more recently, methods have been developed for transferring a block of known, with detailed characteristics of genes responsible for the traits we need, with an accurate analysis of genetic and phenotypic changes. This technique is called "transgenesis" (since genes are transferred from the donor to the recipient's body), or "genetic engineering". However, in essence, the term applies to any breeding technique.

Considering the role of agricultural technologies, it should be noted right away that modern biotechnologies mean only those technologies that fall under the definition of the Biosafety Protocol to the UN Convention on Biological Diversity:

"Modern biotechnology" means the use of: in vitro methods using nucleic acids, including recombinant deoxyribonucleic acid (DNA) and direct injection of nucleic acids into cells or organelles, or methods based on the fusion of cells of organisms with different

taxonomic status, which allow to overcome natural physiological reproductive or recombination barriers and which are not traditional breeding and selection methods. "

Thus, modern agricultural biotechnologies are practically identical to the use of genetic engineering and the use of genetically modified organisms. Despite the fact that these technologies have been widely used in the world for more than 10 years, society's attitude towards them is very heterogeneous and ambiguous - from general acceptance to complete denial. At the same time, it is these technologies and production products that have enormous potential in ensuring the stability and security of the food and agricultural markets.

The most important resource that ensures life (not only biological, but also industrial, as well as everyday life) is fresh water and its reserves, including the efficiency of using water resources. Water resources and agriculture - the connection is obvious, but this tandem is also an important factor affecting the security and stability of countries. Suffice it to recall the recent border conflict between Tajikistan and Kyrgyzstan over water resources needed to irrigate agricultural fields, which almost escalated into an armed clash. Or the change of the President of Madagascar in March 2009, in no small measure related to water problems ... in South Korea. Due to growing food supply problems in South Korea and insufficient water resources for its own production, Daewoo has signed an agreement with Madagascar to lease at least half of Madagascar's agricultural land in order to produce grain for South Korea. Dissatisfaction with the terms of the agreement largely led to a drop in the president's popularity. No wonder the new leadership of the country first of all disavowed the agreement with Daewoo.

Agriculture is the largest consumer of fresh water - it requires at least half of all fresh water consumed in the world, and, according to the forecasts of the UN Food and Agriculture Organization, this share will increase to 60% by 2030. For the production of a daily food ration per 1 person. up to 5 thousand liters of water is consumed (the production of 1 kg of beef requires 15 thousand liters; 1 kg of basic cereals - on average, about 2 thousand liters of water). It is no coincidence that one of the main and rather successful areas of agricultural biotechnology is the creation of plants that are resistant to lack of water and grow on saline soils. The use of biotechnological crops promotes the use of non-moldboard land cultivation, which allowed the United States in 2002 alone to save up to $ 3.5 billion on the treatment of drainage and irrigation systems, wastewater, and drinking water. Agriculture in general and arable land in particular is one of the main sources of carbon dioxide released into the atmosphere as a result of human activity. The use of genetically modified crops made it possible only in 2005 to reduce carbon dioxide emissions into the atmosphere (due to less use of machinery in the processing of fields with chemical plant protection products and the spread of non-moldboard tillage) by 9 million tons, which is equivalent to removing almost 4 million cars from the roads. ...

Property Rights And Geopolitics

Provision of any country with its own technologies is the basis of any production. It is not without reason that the UN Convention on Biological Diversity calls for countries that "... providing genetic resources to be granted access to technologies and to the transfer of technologies using these resources by mutual consent, including technologies protected by patents and other intellectual property."

Property issues are at the heart of one of the main arguments of opponents of agricultural biotechnology, as well as of anti-globalization: "Farmers and the country will

lose their safety, falling into dependence on foreign and multinational corporations - the main producers of seeds of biotech plants and their protection." But, on the one hand, there is globalization, which gives a choice of who to buy from. And although the main producers are few, they are different and fiercely compete with each other, and on the other hand, countries that have made their choice in favor of agricultural biotechnology find their own way of ensuring technological independence. India, for example, mainly uses the mechanism of joint ventures, which ultimately gives the Indian product. The PRC, having declared agricultural biotechnology a priority a few years ago, is making large-scale investments in it and prohibits foreign investment. Fortunately, the PRC does not experience a shortage of qualified personnel in the person of repatriates who are purposefully attracted to genetic engineering development.

The mechanisms for creating property rights may vary, but it is clear that a country can feel fully protected when the bulk of the technologies it uses belongs to it. This increases the country's competitiveness and can serve as an effective geopolitical tool. It is not for nothing that the same PRC expanded its international influence precisely through agricultural technologies, becoming a major donor to the Food and Agriculture Organization of the United Nations and allocating $ 30 million in the form of a trust fund to support the improvement of agriculture in developing countries (within the framework of the Millennium Development Goals program)). Under the agreement, the PRC will provide expert technical and educational assistance to developing countries, including assistance with agricultural materials and small equipment. Using its developments in the field of plant biotechnology, the PRC is also strengthening its regional influence. Thus, Pakistan is close to breaking the agreement of intent with the Monsanto Company on the purchase and development of genetically modified cotton technology and to acquire similar technology from the PRC, which offers more favorable financial conditions. It would not be a big mistake to assume that the significant geopolitical influence of the United States, especially in developing countries, is due to the fact that they are the largest supplier of international humanitarian food aid, agricultural technologies and seeds, and the main agricultural exporter. Obviously, geopolitical influence and agricultural exports are a related synergistic mechanism: the more you export food and feed, the more geopolitical influence, and the greater your influence, the more you have the opportunity to promote your products, increasing your competitiveness.

The Problem Of Agroterrorism

The possibility of a terrorist attack on agricultural targets (agroterrorism) as a threat to national security is seriously considered and studied by many countries, especially after September 11, 2001. Agroterrorism is defined as the deliberate introduction of pathogens of animal and plant diseases in order to create an atmosphere of fear, cause economic damage and / or undermine public order and stability. Therefore, plants that are resistant to terrorist tools - pathogens and pests - can be an effective protective agent. In addition, the creation of genetically modified organisms is always accompanied by the development and creation of diagnostic kits and methods for the qualitative and quantitative determination of DNA, which is extremely important for monitoring and early detection purposes.

The ultimate goal of agroterrorism is not the destruction of animals and plants, it is only a means of causing economic harm, its main and final goal is to create an atmosphere of social tension.

Everyone has the right to their attitude to certain technologies, but it often happens that the opposition to agricultural biotechnology is based on mythical and often false risks in order to make it more accessible to the layman. Spread by the media in the form of frightening sensations, this criticism perfectly achieves the terrorist goal of sowing fear and distrust of government decisions. And here the state should play an extremely important role. This role is to create and implement a program for the education of the population, which will be the most important contribution to strengthening their own security. Many countries understand this and act. Thus, in September 2008, the PRC decided to invest $ 3.5 billion in parallel programs for the development and creation of genetically modified plants and consumer education.

Thus, genetic engineering gives a person a lot of new opportunities. First of all, make the plant resistant to pests, pesticides, fungi, microbes and even viruses. No less interesting things were possible with animals, birds and microbes. For example, before insulin was obtained only from the glands of animals (eternal deficiency), but now they have created bacteria that produce insulin, which helps diabetics as well as ever. GM bacteria have long been producing vitamins, enzymes, amino acids, preservatives, and are used in the production of cheese, bread, baked goods, alcoholic beverages, juices, syrups and other products.

However, it is GMOs that have sparked a wave of demands to root them out. The tone of the demands is harsh, it is clear that they are really afraid. Despite the fact that scientists carefully check whether GMOs are harmful, they still cannot detect this harm. Opponents of GMOs suggest that the methods of genetic engineering can remove the terrible microbes, which will be used by terrorists. This is true, but who you forbid ... and since something has been created, it is better to study in order to know how to resist the harmful consequences. Of course, there are other concerns, too, which cannot be enumerated.

As a result, the people are scared. What are we afraid of? As always, what we don't know. In this regard, I would like to cite some statements about inventions of the 19th century. "Electricity will never become a practical source of energy, since the losses in the wires are too great" (Osborne Reynolds, English physicist, 1888). And one more thing: "If this Bell was a specialist, he would never have come up with such a ridiculous device" (Thomas Edison, an outstanding physicist and inventor, on the telephone invented by the rhetoric teacher Alexander Bell, 1876). There were a lot of similar statements regarding new inventions at one time. But, as we can see, almost all of them today seem ridiculous, because the objects and phenomena characterized by them have now found wide application in human life.

The same is observed today with regard to genetic engineering. But it is likely that in a few decades, genetic engineering will be perceived by humanity no more difficult than a mobile phone is perceived now.

So think, because only you can decide whether to accept GMOs or not.

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