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AGRICULTURAL BIOTECHNOLOGY
(БІОТЕХНОЛОГІЯ СІЛЬСЬКОГОСПОДАРСЬКОГО ВИРОБНИЦТВА)

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В статті розкриваються способи використання біотехнологій у сільському господарстві.

Ключові слова: *біотехнології, сільське господарство, мікроорганізми, інженерія, рослини, середовище, генетика.*

In the article the ways of using biotechnology in agriculture are represented.

Keywords: *biotechnology, agriculture, microorganisms*, engineering, plants, environment, genetics.

Agricultural biotechnology, also known as agritech, is an area of agricultural science involving the use of scientific tools and techniques, including genetic engineering, molecular markers, molecular diagnostics, vaccines, and tissue culture, to modify living organisms: plants, animals, and microorganisms [3]. Crop biotechnology is one aspect of agricultural biotechnology which has been greatly developed upon in recent times. Desired trait are exported from a particular species of crop to an entirely different species. These transgene crops possess desirable characteristics in terms of flavor, color of flowers, growth rate, size of harvested products and resistance to diseases and pests.

Farmers have manipulated plants and animals through selective breeding for tens of thousands of years in order to create desired traits. In the 20th century, a

surge in technology resulted in an increase in agricultural biotechnology through the selection of traits like increased yield, pest resistance, drought resistance, and herbicide resistance. The first food product produced through biotechnology was sold in 1990, and by 2003, 7 million farmers were utilizing biotech crops. More than 85% of these farmers were located in developing countries [4].

Agricultural biotechnology is the use of different scientific techniques to modify plants and animals. The undesirable characteristics like susceptibility to diseases and low productivity are bred out. If there is a particular trait that the plant or animal can benefit from, it can be bred in by using a gene that contains the characteristic.

Biotechnology has especially been beneficial in improving agricultural productivity and increasing the resistance of plants to diseases. Scientists do this by studying the DNA. They first identify the gene that would be beneficial to the plant or animal then work with the characteristics conferred in a precise and exact manner to achieve the desired outcome.

Biotechnology provides tools and technologies that provide solutions to many of today's global environmental challenges. Agricultural biotechnology provides environmental benefits by: increasing production yields, thereby reducing pressures to force more land, often marginal and highly erodible land, into production; using biotech herbicide tolerant crops that allow the use of no-till farming practices, enhancing soil moisture content, reducing erosion and limiting carbon dioxide emissions; using biotech crops that need fewer applications of pesticides, and that thrive in a no-till environment, greatly reducing on-farm energy consumption and associated environmental impacts; and reducing waste production from livestock feedlots and concentrated animal agriculture operations via biotechnology-improved feed products and biotech nutritional supplements for livestock [1].

Biotechnology has been beneficial in many ways. First, stabilized plants that have higher yields have been produced successfully. The resistance of these plants to pests, diseases and abiotic factors such as rainfall has played a major role in

increasing the yields. Animal feeds are being improved by biotechnology to increase their nutrient intake and reduce environmental wastes. Another advantage of biotechnology is that it has led to the development of better vaccines that don't necessarily have to be stored in very cold temperatures. Penicillin, one of the most important components of antibiotics was produced through biotechnology.

Genetic engineering, also referred to as genetic improvement or modification, is the movement of a gene from one organism to another. This process allows for the transfer of a useful characteristic into an organism by inserting it with a gene containing the particular trait. In crops, genetic engineering has been used to increase productivity and resistance to weeds and harsh weather conditions.

Breeding was previously concerned with the removal and insertion of desirable physical traits, an example being the aggression of Bulldogs. By studying the DNA, scientists were able to find molecular markers that showed traits that were not visible. Using molecular markers, breeding has been made more precise and accurate, and this has countered the undesirable characteristics that may have appeared in future generations.

Biotechnology is used for making vaccines for both animals and human beings. These vaccines are better than the traditional ones because they are cheaper, safer, and can survive warmer tropical temperatures. Vaccines to prevent new infections have also been developed using biotechnology.

A genome is an entire set of chromosomes found in the DNA, and through the study of genomes and genetic mechanisms, breakthroughs have been made in biotechnology. Through genomics, the structure, function, location, and impact of a particular gene and genome are identified. This makes it easy to determine the characteristics that will be transferred to another organism and the exact results of the transfer of the gene.

This technique is used to produce a plant that is free from undesirable characteristics, which are mostly, diseases. A disease-free plant part is used to generate types that are disease-free. The different types of plants in which tissue

culture works include bananas, avocados, mangoes, coffee, and papaya, among others.

Biotechnology has positively influenced the economy and social life of most developing countries. The increased food production by biotech plants means that more people can now enjoy food security while spending less on pesticides. This has, subsequently, led to increased standards of living.

Biotechnology in agriculture, both for plants and for animals is a reality. It offers a tool through which these organisms can be understood, and their genetic resource management improved. Plants and animals have, thus been able to increase their productivity and get better resistance to diseases through the study of their genes and the manipulation of their characteristics. There are different ways through which biotechnology is done, and they include genetic engineering, vaccination, molecular marker, tissue culture, and genomics. Technology is evolving and so does the world of science, and who knows, there might be another fascinating breakthrough in genetics and biotechnology [2].

Responsible scientists, farmers, food manufacturers, and policy makers recognize that the use of transgenic organisms should be considered very carefully to ensure that they pose no environmental and health risks, or at least no more than the use of current crops and practices. Modern biotechnology represents unique applications of science that can be used for the betterment of society through development of crops with improved nutritional quality, resistance to pests and diseases, and reduced cost of production. Biotechnology, in the form of genetic engineering, is a facet of science that has the potential to provide important benefits if used carefully and ethically. Society should be provided with a balanced view of the fundamentals of biotechnology and genetic engineering, the processes used in developing transgenic organisms, the types of genetic material used, and the benefits and risks of the new technology [5].

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