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Applications of Biotechnology in Agriculture - Review Article

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Abstract - Agricultural Biotechnology plays an important role in the research tools used by scientists to understand and control the genetic makeup for use in agriculture: plants, livestock, forests and fisheries. Biotechnology is more efficient than genetic engineering; it also includes genomics and bioinformatics, markers-assisted selection, small distribution, tissue culture, cloning, artificial seed implantation, embryonic transfer and other technologies. However, genetic engineering, especially in the field of plants, is the area where biotechnology has the strongest impact on agriculture in developing countries and where the most pressing social issues and policy issues have emerged. Therefore, this review report seeks to cover every aspect of biotechnology in the agricultural sector.

Keyword - Biotechnology, Genetic engineering, Agriculture, Crop resistance, Livestock management.

1. Introduction

Biotechnology is any method that uses living organisms or materials from these creatures to make or modify a product for a practical purpose. Biotechnology can be applied to all kinds of organisms from viruses and bacteria to plants and animals and is becoming a major component of modern medicine, agriculture and industry. Modern agricultural biotechnology includes a series of tools that scientists use to understand and control the genetic makeup of living things for use in producing or processing agricultural products. Biotechnology is used to address problems in all areas of agricultural production and processing. These include crop breeding to increase and stabilize yields; improving pest resistance (James, 2002), diseases and abiotic stress such as drought (Khan and Khan, 2010) and cold and soil acidity (Kole, 2011); and enhancing the nutritional content of foods such as potatoes and rice (Coghlan, 2003; Cordell et al., 2009). Biotechnology is used to create inexpensive plant-based plant materials such as bananas (Milu, 2008) and to develop new tools for diagnosing and treating plant and animal diseases (Tanaka et al., 2005). Biotechnology is used to accelerate plant breeding programs, livestock and fish (Fu et al., 2005) and to extend the range of traits that can be addressed.

Animal feed (James, 2002) and dietary processes are interchangeable with biotechnology to improve animal nutrition and reduce environmental pollution. Biotechnology is used in disease testing and in the production of vaccines for animal diseases (Tanaka et al., 2005), agricultural biotechnology has great potential and is very beneficial for the poor. Cereal starch is used in many starch-based biopolymers with high-value starch and bio-fuels derived from starch which may be less harmful to the environment than those found in petrochemical chemicals (Thitisaksakul et al., 2012). Therefore, the purpose of this entry is to examine the many biotechnology efforts in the agricultural sector in order to meet the growing and diverse use environment (Thitisaksakul et al., 2012).

II. Biotechnology-related work in Agriculture

Modern : biotechnology represents a unique scientific application that can be used to improve society through improved nutritional quality of plants, resistance to pests and diseases and reduced production costs on the contrary. The following is provided below:
Small spread of disease-free crops such as bananas: Bananas are commonly grown in developing countries as a source of food, employment and income. Micropropagation represents a way to regenerate disease-free banana plants from healthy tissues. It has all the advantages of being a cheap and easy-to-use technology (Milu, 2008). Cultivation in acidic soils: Improving Aluminium tolerance in grains: To maintain soil pH, lime can be added to the soil to increase pH. This treatment is expensive and temporary. Improved aluminium-resistant plants can be developed in other ways. Rye shows a fourfold increase in aluminium tolerance of wheat (Kole, 2011).

Plant nutrition: Certain plants are rich in nutrients to reduce child malnutrition in developing countries. The 'Protato' genetically modified potato in India produces about one-third to one-half of the protein above normal, and has high levels of all the essential amino acids such as lysine and methionine. . Potatoes are a basic and cheap food for the very poor (Coghlan, 2003). Similarly gold rice is genetically engineered to produce beta-carotene, a precursor to vitamin A. Therefore, it can be used to reverse the vision problem caused by Vitamin A (Ye et al., 2000).

DNA markers used in the Aqua culture: Different methods have been developed to create genetic markers for aquatic species. Highly exposed markers are widely used in aquaculture studies. Amplified fragment length polymorphism (AFLP) tags provide an inexpensive alternative to animal species while DNA sequencing is still ongoing or where there are limited resources for QTL mapping it can reproduce in both other lines or communities and in other laboratories, and can produce hundreds of markers (single-chain polymerase reactions often produce excessive markers) (McCullough et al., 2008). Breeding and reproduction of aquatic animals: Fishery biotechnology provides opportunities to increase growth rates and improve breed management and reduce the reproductive capacity of genetic species. Genetic engineering is an active area for research and development of aquaculture. The large size and solid nature of many fish eggs allow them to be easily used and facilitate genetic transfer by direct injection of the outer layer or by electroporation, where the electric field facilitates genetic transfer. Genetic transfer to fish usually involves genetically engineered growth hormone and has been shown to increase growth rates significantly in carp, salmon, tilapia, and other species. In addition, a gene derived from a winter flounder that produces a protein that prevents cripples was added to salmon in the hope of increasing fish farming. Genetics did not produce enough protein to extend the salmon range in cold water, but it did allow salmon to continue growing during the colder

months when unadulterated salmon did not grow. These applications are in the research and development phase, and no variable aquatic animals are currently available to the consumer (Fu et al., 2005).

Artificial Insemination (AI) and Multiple Ovulation / Animal Transmission in Animals: Improvements in artificial insemination (AI) and multiple ovulation followed by embryonic transfer (MOET) have already had a significant impact on animal development and development programs in developed countries and and many developing countries. because they initiate the process of genetic development, reduce the risk of disease transmission and increase the number of animals that can be raised in a high-income parent (McCullough et al., 2008). Genetically modified plants such as animal feed: Genetically modified plants, derivatives and enzymes found in small genetically modified animals are widely used in animal feed. Compound feeds are mainly used for poultry, pigs and dairy cattle and are produced from a variety of raw materials, including maize and other cereals and oilseeds such as soybeans and canola beans (James, 2002). There was no evidence of adverse effects in the animal that supplied transgenic products in any of the limited parameters, such as genetic composition, rumen fermentation, growth function or carcass traits (MacKenzie and McLean, 2002).

Herbicide-resistant plants: The common soil bacterium Bacillus thuringiensis (Bt) is genetically engineered to create a specific protein in a cotton plant. This protein is toxic to certain insects such as pink bollworm (Pectinophoragossypiella) and cotton boll worm (Helicoverpazea), and is less effective in controlling tobacco larvae (Heliothisvirescens) and fall armyworm (Spodoptera frugiperda) (James, 2002). As a result Bt varieties have a better yield than growing varieties (Fernandez-Cornejo et al., 2000).

Herbicide-resistant (HT) genetically modified plants: A gene derived from the soil bacterium Agrobacterium tumefaciens, is used in genetically modified HT plants. It makes the host plant tolerant of the broad herbicide glyphosate. HT plants can reduce production costs and help control weeds. The HT plant was developed under the name Roundup Ready (RR). RR soybeans were released in 1996 (James, 2002). The yield of RR soybeans is similar to regular soybeans, but it reduces the cost of farming (Fernandez-Corn)

III. Conclusion

Agricultural biotechnology applications are helpful in producing sustainable food. Biotechnology is an appendix and not one of the many areas for general agricultural research. It provides a variety of tools to improve our understanding and management of food and agricultural genetic resources. As a reduction in production costs by reducing the need for pesticide spray and fertilizer, the development of new varieties that produce higher yields and are more tolerant of abiotic pressure. These unchanged plants can grow in a more natural environment and have a greater amount of healthy food, and are involved in the production of vaccines and human health care products. Tissue tissue technology, Micro propagation, DNA marker assisted technique are the basic tools for a variety of transgenic. These tools are already being used in breeding and conservation programs and to facilitate the identification, treatment and prevention of plant and animal diseases. The use of biotechnology provides the researcher with new knowledge and tools that make the work more efficient and effective. Biotechnology also addresses environmental challenges that directly affect agriculture or indirectly

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