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Applications of the Biotechnology in Agriculture

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Abstract: Farmers with 10,000 years of age have been cultivating, plants by selecting and breeding for certain features. In the twentieth century, breeding became difficult, as the characteristics of the breeders selected include increased yield, disease and pest tolerance, drought resistance; the traits are transferred from one generation to the next by genes made of DNA (Mariani *et al.*, 1990). About 12,000 years ago, our predator-larger families started to try their hand at culturing. First, wild types of crops such as peas, barley and lentils were grown, and wild animals such as goats and wild oxen were collected. At the end of the day, they moved outward, extending farming to areas of Europe and Asia. Biotechnology typically involves a wide variety of technologies and methods for the production of useful facilities, living organisms. The incorporation of biotechnology to agriculture allows effective use of scarce resources, decreases required the pesticides and insecticides and increases productivity (Estrada, 2017).

Agricultural biotechnology

The area of agricultural science related to use of experimental techniques and methods, contain tissue culture, vaccines, molecular markers, genetic engineering and molecular diagnostics, for the modification of living organisms. Crop biotech is a part of plant biotech that has undergone tremendous growth in new times. Favorite characteristics are moved from a particular crop species to a completely different plant. These transgenic crops have desirable characteristics in relation to taste, flower color, size products collected, growth rate and resistance to diseases and pests (Chase, 2006). Today, agricultural biotech is a field that uses the methods of cell and molecular biology from advancing the genetic structure and agronome organization of plants and animals, biotechnology is the fastest- growing punishment to increase the demand for greener world (Luis *et al*., 2016; Mahanty *et al*., 2016 ; Estrada, *et al*., 2017).

There are many biotechnological techniques used in this correction by scientists and researchers, including genetic engineering, marker Option, plant tissue culture, biofertilizer technology, diagnosis of plant and livestock disease, artificial fertilization technology, and vaccine production. Biotechnology, therefore, aims to improve productivity through use above techniques (Thomas, 2008). Golden rice, for example, has three genes which allow inducing mixtures which convert to vitamin A in the human body. Similarly, bananas have been working to boost the quality of bananas to resolve micronutrient shortages in Uganda. By genetically modifying bananas for the production of vitamin A and iron, bananas have helped to compensate for this. Micronutrient shortages via a staple food vessel and a significant source of starch in Africa (Gupta and Kaushal , 2018).

Biotechnology applications in agriculture (Osamede, 2016)

The seeds biotech, and decades of recognized signals indicate that agricultural biotech is a healthy and technology that contributes to both environmental and economic sustainability from the benefits of the biotech.

Benefits are given:

- ✓ Increased the crop yield.
- ✓ Reduced the crops sensitivity to environmental stresses.
- ✓ Increased nutritional values of food crops.
- ✓ Reduced needs for pesticides, fertilizers and other agrochemicals.
- ✓ Production of vaccines.

A great deal of land is used by the various fields of agriculture applying biotechnology, both in agriculture and biotechnology. Also, their applications are use to enhance people's lives in areas that are mainly dependent on agriculture. (Kai *et al*., 2016).

Fields of biotechnological applications

Insect resistance increases crop resistance to pests and results in higher yields. Examples of this trait are genetically engineered crops updated to produce insecticide proteins that were initially present in *Bacillus thuringiensis* (Sanahuja , 2011 ; Tabashnik *et al*., 2011).

Bacillus thuringiensis is a bacterium that produces insect-blocking proteins that are not toxic to humans. The genes responsible for this insect resistance have been isolated and incorporated into several crops. Bt corn and cotton are now publicly available in soybean, cowpea, tomato, tobacco, sunflower, sugarcane and rice, all of which are under investigation for Bt. (Gómez-Barbero, 2008 ; Andreassen *et al*., 2011; Nakitto, *et al*., 2015).

Herbicide tolerance

Biotechnology has been providing alternatives to weeds that have proved the challenging to the farmers at thousands of years. They contest for nutrient mud, water, and sunlight and prove harmful to crops (Christou and Harry, 2004). Chemical herbicides applied directly to destroy weeds and so competition (Dash *et al.,* 2016; Then and Bauer-Panskus, 2017).

Disease resistance

Frequently, crops are affected by disease transmitted by insects (like aphids). This is very difficult to manage. The field of agricultural biotech provides an effective solutions to the resistance of genetically modified viruses, includes maiz, cassava and sweet potato (Gupta and Kaushal, 2018).

Temperature tolerance

Agricultural biotech also provides a treatment for plants in serious temperature disorders. Genes that help regulate cold and heat resistance can be modified to maximize crop production and prevent crop losses. Such as papaya trees have been genetically engineered to tolerant the hot and cold conditions. (Walsh *et al*., 2011).

Quality traits

Quality features include increased nutritional or nutrition levels, better food, storage, or the elimination of poisons (Boccia and Sarnacchiaro,2015).

Biofertilizer Technologies:

When plant, seed, soil, or colonize the rhizosphere promote growth by increasing the supply or availability of key nutrients to the host plants. Some of these are vital fertilizers, such as Rhizobium and Frankie, which cannot act as fertilizers individually. It is then produced within the root nodules of the legume plant species. Whereas blue-green algae are free-living, helping to replace nitrogen in wet soils. These biofertilizers help to organic compounds production which contains nitrogen, exp. nucleic acids, amino acids, proteins, etc. It's been gaining recognition, It is mostly used for crops like wheat, corn, cotton and mustard, etc. (Mahanty, *et al*., 2016).

Bio-fertilizers are environmentally friendly and do not produce chemicals that cause damage to the living earth. It acts as a secondary aid to plants or crops in correct stimulus by natural methods such as nitrogen fixation, phosphorylation and growth by providing growing elements such as Rhizobium, Azotobacter, Azospirillum, Frankia, Blue-green algae, etc. (Madigan and Martinko, 2007).

Molecular Breeding:

Plant breeders may use this technique to identify and collect the desired characters in order to speed up the process of possible new viable mergers (Chargelegue, 2001).

New crop variations resulting from marker-assisted selection have been triggered by regulatory experiments and community resistance, mostly due to not exceeding the plant's natural genetic limits. If the marker is genetically related to the treatment, use of the marker can accelerate the recognition of genetically larger plants. These superior plants are then used to grow disease-resistant plants that are immune to the adverse effects of weather. As a result, it helps to make better crops and to increase agricultural yields (Decker and Reski, 2008).

Disease Diagnostics and Vaccines:

Biotechnology methods may also have a significant effect on the treatment of disease. Diagnostic disease and vaccine contamination in agriculture is one of the most challenging problems. Similar to that, recombinant vaccinations, sterile insect techniques (STIs), etc. are typically excellent at preserving animal health. Also, helps to detect of

Pathogens, antibiotics- resistant genotypes and allows hybrid multi-species infections. *Clostridium chauvoei, Pasteurella multocida*, *Brucella abortus, Bacillus anthraci*. Biotechnology plays an important role in pharmacogenomics, genetic engineering, serological testing and gene therapy. It has advanced or positive nutritional flavors Enzymes like prebiotics, unicellular protein, etc. are provided as animal nutrients. It also helps in the detection of multiple pathogens, distinguishes betweenantibiotic-resistant genotypes and the acceptance of difficult multi-species infection, etc., of some microorganisms used in vaccines and serological tests (Awais *et al*., 2010 ; Fischer and Emans, 2000)

Biofuels

It has an important role in manufacturing the biofuels and the utilization of energy, as well as in the fermentation and treatment of biofuel, Biodiesel and bioethanol. The enzyme optimization techniques used to optimize feedstock value competitive BTU modification for high quality fuel development (Drake and Christou, 2003 ; Estrada *et al*., 2017).

Micropropagation:

It is used to increase the growing stock of essential plant material. Micropropagation can be used commercially for asexual breeding in produce a large number of the same plant with the same genetic materials from small sections of plant tissues (Cramer *et al*., 1999; Awais *et al.,* 2010).

Transgenic food

It is identified as those are generated and/or processed from organisms that have been changed to their DNA using genetic engineering techniques (Herrera-Díaz and Gómez-Solis, 2011). The GM can be includes:

- ✓ Containing an ingredient or an additive extracted from a GMO.
- ✓ Used as food genetically modified
- ✓ Foods that use a secondary product for their manufacture resulting from a GMO,

From genetic engineering techniques used in the treatment the diseases is recombination of deoxyribonucleic acid (rDNA); this technique has affected the combination of bits of deoxyribonucleic acid from different organisms, e.g. recombinant insulin, which has been generated from a human insulin gene to a DNA plasmid which has been transformed and released into a bacterium. The use of this technique has enabled the production of insulin on an industrial scale, which is currently underway. (Bagwan *et al.,*2010).

Agricultural biotech has been an authority for a long time, as people have wanted to develop agriculturally essential species through selection and breeding.

Improvement in Floriculture:

Biotechnology plays a key role in producing new variations in scale, color, fragrance and flower through gene control techniques. Floriculture is related to floral cultivation and beautiful garden and greenhouse plants, including the floral industry (Chen, 2015).

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