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Review On Some Modification Techniques for Crops According To Agritech

Dr. P B Tiwary
Dept of Botany
S. M. Degree College Chandausi, Sambhal

ABSTRACT- *Biotechnology is often used in agriculture to promote plant growth and yields, increase pest and disease resistance, and improve nutrient value. In fact, it's estimated that up to 80% of all processed meals now on the market contain biotechnologically produced ingredients. The Sterile Pest Technique (SIT) for insect management on fruit trees and grapevines is one of many examples of biotechnology in agriculture, along with genetically modified crops and other practises. In livestock farming nowadays, biotechnology is used to help animals grow faster on less food so they can produce meat of higher quality. It can even be used for cloning. Breeding animals with disease resistance is another application of biotechnology. By utilising biotechnology technologies, farmers can increase output and improve the quality of animal products. In this article, we've reviewed a few crop modification methods used in agricultural biotechnology, putting particular emphasis on the genes and traits that are important in this area.*

Keywords- *Biotechnology, modified crops, genes and traits etc*

I. INTRODUCTION-

Agritech, or agricultural biotechnology, is a subfield of agricultural science that focuses on altering living things like plants, animals, and microbes using tools and techniques from science. These include molecular diagnostics, vaccinations, tissue culture, and genetic engineering. Crop biotechnology is one field of agricultural biotechnology that has recently shown tremendous growth. From one type of crop to another, desired qualities are transferred. In terms of flavour, floral colour, growth rate, harvested product size, and pest and disease resistance, these transgenic crops have advantageous qualities. We cannot examine examples of biotechnology in agriculture without noting the superior quality seeds that farmers now have at their disposal. Biotechnology has made it possible to enhance the crops that feed our population in more effective and efficient ways, in addition to supplying high-quality seeds at harvest time. High-quality seeds have always been the foundation of a successful crop, and biotechnology has made it feasible to enhance seeds in a variety of ways.

II. HISTORY-

Farmers have employed selective breeding to alter plants and animals for tens of thousands of years to obtain desired traits. During the 20th century, the development of agricultural biotechnology was aided by a variety of traits, such as increased yield, pest resistance, drought tolerance, and herbicide resistance. The first food product made by biotechnology was on sale in 1990, and by 2003, 7 million farmers were cultivating biotech plants. More than 85% of people in developing countries were farmers.

Advantages of biotechnology for plant growth:

- Increased tolerance to stress factors, such as drought or salinity
- Faster growth rates and shorter generation times
- Costs less than traditional breeding methods
- Improving Plant Seed Quality

CROP MODIFICATION TECHNIQUES

Traditional breeding

Traditional crossbreeding has been used for years to improve crop quality and output. Crossbreeding creates a new and distinct variant with the desired traits of the parents by mating two sexually compatible species. For instance, the honeycrisp apple's unique texture and flavour come from the crossbreeding of its parents. Using conventional techniques, pollen from one plant is applied to the female part of another, resulting in a hybrid with the genetic make-up of both parent plants. The plants that plant breeders select have the traits they want to pass on and they continue to breed those species. Remember that only individuals from the same or closely related species can successfully crossbreed.

Mutagenesis

Any creature's DNA is subject to random mutations. To promote variety in crops, scientists can randomly introduce mutations into plants. In mutagenesis, radioactivity is employed to create random mutations in the hopes of identifying the desired phenotype. Scientists can utilise radioactivity or chemical modifiers like ethyl methanesulfonate to introduce random mutations into DNA. Atomic gardens create mutant crops. Within a certain radius, radiation from a spherical garden with an enhanced radioactive core in the centre causes mutations in the nearby plants. Radiation-induced mutagenesis, a process, was used to produce ruby red grapefruits.

Polyploidy

Polyploidy can be created to adjust the number of chromosomes present in a crop in order to affect its fertility or size. Most creatures have two sets of chromosomes, or are diploid. However, that chromosome count can change, either naturally or by the use of drugs, which can affect fertility or crop size. A 4-set chromosome watermelon is crossed with a 2-set chromosome watermelon to create a sterile (seedless) watermelon with three sets of chromosomes.

Fused protoplasts

Protoplast fusion is the term for the joining of cells or cell components to transmit characteristics between species. For instance, the trait of male sterility is transferred from radishes to red cabbages by protoplast fusion. This male sterility allows plant breeders to produce hybrid crops.

Interferential RNA

RNA interference (RNAIi), a mechanism that silences genes, reduces or disables a cell's RNA to protein pathway. This kind of genetic alteration interacts with messenger RNA and hinders protein production in order to successfully silence a gene.

Transgenics

By inserting a DNA fragment into the DNA of another creature, the process of transgenics allows for the introduction of new genes into the DNA of the original organism. The genetic makeup of an organism can be altered to produce desired traits in a new variety. The DNA must be prepared and packaged in a test tube before being inserted into the new organism. New genetic information can be introduced using gene guns and biologics. An example of a transgenic plant is the rainbow papaya, which has a gene alteration that gives resistance to the papaya ringspot virus.

Editing a genome Genome editing is the process of directly altering the DNA inside a cell using an enzyme system. To help farmers control weeds, herbicide-resistant canola is being developed via genome editing.

MAKE NUTRITIONAL CONTENT BETTER

Agricultural biotechnology has been used to improve the nutritional value of a number of crops to meet the demands of a growing population. Genetically modified crops may contain more vitamins. As an example, golden rice has three genes that allow plants to produce compounds that are converted into vitamin A in the human body. The nutritional value of this rice has been improved to assist prevent vitamin A deficiency, the leading global cause of blindness. The Banana 21 project has made comparable efforts to improve banana nutrition in order to solve Uganda's vitamin shortage. Through genetic engineering, Banana 21 has made progress toward creating a treatment for micronutrient shortages by adding iron and vitamin A to bananas. In Africa, bananas are a common food and a significant source of carbohydrates. Crops may also be genetically altered to produce varieties free of allergies or with lower toxicity.

CERTAIN GENES AND TRAITS INTERESTING TO CROPS

Characteristics related to agriculture and bug resistance

One characteristic that is highly wanted is insect resistance. This trait allows for increased agricultural output while improving pest resistance. Genetically engineered crops that produce the insecticidal proteins initially discovered in (Bacillus thuringiensis). Proteins that are harmless for humans and are insect-repellent are produced by a bacteria known as Bacillus thuringiensis. The isolated genes that provide this insect resistance have been transferred to numerous crops. There is currently research being done on Bt in relation to tobacco, walnuts, sugar cane, rice, sunflower, soybeans, and tomatoes. Bt corn and cotton are already widely accessible.

Herbicide tolerance

Weeds have been an issue for farmers for thousands of years because they compete with crops for soil nutrients, water, and sunlight and because they can be fatal. Biotechnology offers a treatment called herbicide tolerance.

By removing weeds and their competition by the direct application of chemical herbicides to plants, herbicide-resistant crops are prevented from flourishing.

Disease resistance

Crops are frequently impacted by illnesses spread by insects (like aphids). Up until recently, the only option to prevent the disease from spreading to other crop plants was to remove the injured crop totally. Agricultural biotechnology offers a solution by using genetic engineering to develop virus resistance. GE crops that are resistant to disease are now being developed for cassava, maize, and sweet potatoes.

Temperature tolerance and positive traits

Agricultural biotechnology can also provide plants in hot areas with a remedy. It is possible to modify the genes that help regulate cold and heat tolerance to boost output and lower crop mortality. In order to strengthen their resistance for harsh heat and cold, papaya trees, for example, have undergone genetic alteration. Salt tolerance, nitrogen use efficiency, and water use efficiency are other traits. Examples of quality qualities include improved food processing and storage, a higher nutritional value, and the elimination of allergies and poisons from agricultural plants.

III. SUMMARY & CONCLUSIONS-

Scientists are now able to improve the ability of seedlings to endure various circumstances, such as drought or flooding, by using DNA technology that specifically targets specific genes crucial for water uptake during these stressful times. Additionally, the nutritional content of many of the foods we eat every day, such as fruits, vegetables, cereals, and oilseeds, may be improved as a result of new genetic material that biotechnologists have placed into plants. Another outstanding example is the application of biotechnology in agriculture to improve animal health and breeding.

In agriculture, biotechnology is also used to improve plant development. Since the beginning of agriculture, farmers have been breeding plants to produce more alluring traits like larger fruit size, more robust plant growth, or improved flavour. Here, a farmer selects what, in her opinion, are the best individuals from each generation for further breeding. This approach requires generations of testing in order to achieve the desired result.

However, the advancement of biotechnology has made it possible to quickly and efficiently grow plants in a sustainable manner. These plants were altered in a lab to have a certain trait, such as tolerance to pests or abiotic stress, among many other things. It only takes a few generations after the variety is created for growers to generate specimens that have all desired traits and grow substantially more efficiently since they are not worried about previous growth challenges.

REFERENCES

[1]. "Infographic: Crop Modification Techniques - Biology Fortified, Inc". Biology Fortified, Inc. Archived from the original on 2016-04-14. Retrieved 2016-12-05.
[2]. .De Beuckeleer, Mariani; De Beuckeleer, Celestina; De Beuckeleer, Marc; Truettner, Jessie; Leemans, Jan; Goldberg, Robert (1990).
[3]. "Induction of Male Sterility in Plants by a Chimaeric Ribonuclease Gene". Nature. 437.6295 (6295): 737–41.
[4]. "The Gene Gun That Saved Hawaii". American Council on Science and Health.
[5]. ."About Banana21". www.banana21.org..
[6]. "Agricultural Biotechnology". cornell.edu. PBS, ABSP II, US Agency for International Development. 2004.
[7]. "International Service for the Acquisition of Agri-biotech Applications - ISAAA.org". www.isaaa.org.
[8]. Vogel, B. (2016). New Plant Breeding Techniques. Update of the 2012 Baseline Report.
[9]. Voigt, B., and Klima, J. (2016). CRISPR-Plants & Co. – the quest for adequate risk regulation. Zeitschrift für Europäisches Umwelt Planungsrecht 15, 319–338.
[10]. Voytas, D. F., and Gao, C. (2014). Precision genome engineering and agriculture: opportunities and regulatory challenges. PLoS Biol. 12, 1–6. doi: 10.1371/journal.pbio.1001877
[11]. Waltz, E. (2014). With a free pass, CRISPR-edited plants reach market in record time. Nat. Biotechnol. 36, 6–7.
[12]. A.I., and Lema, M. A. (2015). Regulatory framework for gene editing and other new breeding techniques (NBTs) in Argentina. GM crops food 6, 253–265.
[13]. Wolt, J. D. (2015). Safety, security, and policy considerations for plant genome editing. Prog. Mol. Biol. Transl. Sci. 149, 215–241.
[14]. , J. D., Wang, K., and Yang, B. (2016). The Regulatory Status of Genome-edited Crops. Plant Biotechnol. J. 14, 510–518.
[15]. , J. D., Yang, B., Wang, K., and Spalding, M. H. (2016b). Regulatory aspects of genome-edited crops. In Vitro Cell. Dev. Biol. 52, 349–353.
[16]. Zheng, W., and Gu, F. (2015). Progress of application and off-target effects of CRISPR/Cas9. Yichuan 37, 1003–1010.