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A Short Note on Agricultural Biotechnology

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Commentary

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DESCRIPTION

Agricultural biotechnology is a branch of agricultural science that involves the use of scientific tools and techniques to modify living organisms such as plants, animals, and microorganisms, such as genetic engineering, molecular markers, molecular diagnostics, vaccines, and tissue culture. Crop biotechnology is one area of agricultural biotechnology that has made significant progress in recent years. Desirable traits are passed down from one crop species to the next. These transgene crops have desirable traits such as flavour, flower colour, growth rate, harvested product size, and disease and pest resistance.

Traditional crossbreeding has been used for centuries to improve crop quality and quantity. Crossbreeding combines two sexually compatible species to create a new and distinct variety with the desired traits of both parents. Because of its parents' crossbreeding, the honey crisp apple, for example, has a distinct texture and flavour. Pollen from one plant is traditionally placed on the female part of another, resulting in a hybrid with genetic information from both parent plants. Plant breeders choose plants that exhibit the traits they want to pass on and continue to breed them. It should be noted that crossbreeding is only permitted within the same or closely related species. Mutations can occur at any time in the DNA of any organism. Scientists can create variety in crops by randomly inducing mutations within plants. Mutagenesis is the use of radioactivity to cause random mutations in the hopes of discovering the desired trait. Scientists can use mutating chemicals such as ethyl methane sulfonate or radioactivity to generate random mutations within the DNA. Crops in atomic gardens are mutated. In the centre of a circular garden, a radioactive core is raised out of the ground to radiate the surrounding crops, causing mutations within a certain radius. Mutagenesis through radiation was used to create ruby red grapefruits.

In crops, polyploidy can be induced to alter the number of chromosomes and thus influence fertility or size. Normally, organisms have two sets of chromosomes, a condition known as diploidy. The number of chromosomes in a crop, on the other hand, can change naturally or through the use of chemicals, resulting in changes in fertility or

crop size. A 4-set chromosome watermelon is crossed with a 2-set chromosome watermelon to produce a sterile (seedless) watermelon with three sets of chromosomes. Agricultural biotechnology has been used to improve the nutritional content of a variety of crops in order to meet the needs of a growing population. Genetic engineering can be used to create crops with higher vitamin concentrations. For example, golden rice contains three genes that allow plants to produce compounds that are converted to vitamin A in the human body. This nutritionally enhanced rice is designed to combat vitamin A deficiency, the leading cause of blindness in the world. Similarly, the Banana 21 project in Uganda has worked to improve banana nutrition in order to combat micronutrient deficiencies. By genetically modifying bananas to contain vitamin A and iron, Banana 21 has helped foster a solution to micronutrient deficiencies through the vehicle of a staple food and major starch. Agriculture biotechnology regulation in the United States is governed by three major government agencies: the Department of Agriculture (USDA), the Environmental Protection Agency (EPA), and the Food and Drug Administration (FDA). The USDA must approve the release of any new GMOs, the EPA regulates insecticides, and the FDA evaluates the safety of a specific crop before it can be sold. It takes nearly 13 years and $130 million in research and development to bring a genetically modified organism to market. The regulatory process in the United States can take up to eight years. The safety of GMOs has become a global debate, but scientific articles are being published to test the safety of consuming GMOs in addition to the FDA's work.