



## Agricultural Biotechnology and Its Pros and Cons

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Agricultural technology refers to the utilization of organisms and living systems in the development of products for human use incorporating techniques such as genetic engineering, molecular diagnostics, tissue culture, and molecular markers. Biotechnology is widely applied in agriculture to propagate desired traits in order to increase productivity. This is achieved through the manipulation of an organism's genome in a process known as selective breeding. Agricultural biotechnology enhances the growth of crops and animals, minimizes pesticide use, and improves the nutritional quality of produce, even though it affects human health and the environment negatively.

### Agricultural biotechnology's benefits

The application of biotechnology in agriculture has many benefits. They include nutritional quality improvement, enhancement of crop growth, and minimization of pesticide use. Biotechnology has been applied successfully in the genetic engineering of plants and animals.

**Enhancement of Nutritional Quality:** Research has shown that the application of biotechnology in crop production improves the nutritional content of agricultural products. For example, the percentage of vitamins and other nutrients increases. In that regard, the dietary quality of food products is enhanced. For example, golden rice is nutritionally improved and contains three genes that facilitate the production of vitamin A in humans. The Banana 21 project has resulted in the improvement of the nutritional quality of bananas to contain iron and vitamin A.

**Improvement of Positive Attributes:** Biotechnology facilitates the propagation of good traits in plants and animals. For example, it has been used to create animals that possess traits such as fast growth and increased resistance to disease. The cloning of the growth hormone gene in cattle has been done to increase milk production in dairy cows. Certain climates are unsuitable for crop growth because of factors such as low temperatures and high atmospheric pressure. However, the application of biotechnology overcomes these challenges and crops can be grown in all climates. Scientists alter the reactions of plants to harsh climates by inserting certain genes into a plant's genome (Smyth et al., 2014). For example, genes that are tolerant to high temperatures are inserted into the genome of plants to make them temperature-tolerant.

**Reducing the Use of Pesticides:** Pesticide use can be minimized by designing crops that have high resistance to diseases and pests. Enhanced resistance improves growth and increases food production. The reduction of excessive chemical use lowers the cost of production and increases yields. In addition, it reduces water and soil pollution since the usage of chemicals in agriculture is one of the major causes of environmental pollution.

### Drawbacks of Biotechnology in Agriculture

Agricultural biotechnology is beneficial, but it also has several disadvantages. They include potential effects on the environment and health, risk of a decrease in biodiversity, and a

negative impact on the environment. Biotechnology has not been fully embraced as a mitigation strategy for food insecurity.

**Effects on Human Health:** Agricultural biotechnology has been in practice for a relatively short time. Therefore, it is difficult to determine its potential effects upon the environment and health. There are varied opinions regarding this issue as experts are unsure of the health effects of genetically modified products on human beings. Genetic engineering involves the use of antibiotic resistant genes as markers. The insertion of these genes into a plant's genome could be detrimental to health because they could reduce the effectiveness of antibiotics. The resistance gene could also be transferred to pathogens, and thus, increase their resistance to antibiotics.

**Decrease in Biodiversity:** As mentioned earlier, biotechnology involves taking genes with desired traits from one organism and inserting them into another to improve its qualities. Farmers are likely to abandon certain crop varieties if they find out that there are others that are easy to grow and that give high yields (Smyth et al., 2014). Modified crops could be favored over traditional varieties that exhibit slow growth and low yields. Loss of biodiversity is harmful to the environment as it alters the ecosystem and increases the risk of climate change

**Negative Impact on the Environment:** Agricultural biotechnology is in its infancy and its effects upon the environment are not well known. However, research has shown that it may lead to the proliferation of herbicide resistant weed. As mentioned, genetic engineering involves the transfer of specific genes between organisms. In that regard, the technology could transfer unwanted genes into weeds and pests, thus making them more difficult to eradicate. In addition, it may create new microorganisms such as bacteria and viruses through the transfer of genes that make them more virulent. Genetically engineered plants produce new products such as proteins that might be toxic to wildlife.