

Lesson 5:
The Impact of Plant Biotechnology

Many biotechnology products recently released on the commercial agricultural market have been genetically modified plants. *Bt* corn, *Bt* cotton, Roundup Ready™ soybeans, and modified canola are a few examples. The effect of these products and of plant biotechnology is only beginning to be realized. This lesson will explore the impact that plant biotechnology is having on the creation of jobs, economics, human health, and society.

Career Opportunities in Plant Biotechnology

Plant biotechnology offers many of the same career opportunities as those listed in Unit 5 for animal biotechnology. General career areas in biotechnology are research and development, quality control, clinical research, manufacturing and production, regulatory affairs, information systems, marketing and sales, and administration. However, some career positions are unique to the field of plant biotechnology. Plant scientists, greenhouse managers, and tissue culture technicians are a few examples. A bachelor of science degree in agronomy or biochemistry provides a good starting point for a career in plant biotechnology.

Economic Factors Affecting Producers

The true test of any technology is its feasibility and profitability. Developments in plant biotechnology must be financially beneficial for producers if the products are to succeed. Whether it is insect-resistant corn or herbicide-tolerant soybeans, the plant crop developed must be able to increase producer profits. The producer needs to be confident that the price charged for these genetically modified seeds will be recovered, along with a greater profit than that obtained with traditional plant crops.

Modified crops present both benefits and drawbacks for producers. Most of the genetically altered crops currently in use have been modified to resist insects, disease, or herbicides. These crops lower input costs by reducing the amount of chemicals needed to grow them. However, the seed for genetically modified crops is generally higher in price. In addition, several modified crops that producers are beginning to use yield a seed with a modified composition that must be kept separate from unmodified crops when they are harvested, transported, stored, and processed to avoid using them for the wrong application. Crops with a modified composition also must be sold to specific processors. The advantage to these specialized crops is that they are often sold at a premium price, which should offset the costs of handling them and the limited market. These additional risks to the producer require that the modified crop have a higher profit potential. If the profit potential is great enough, producers will readily accept these new crops.

Consumer Health and Safety Concerns

The public has shown much more confidence in the safety of plant biotechnology than in animal biotechnology. Consumers have some health concerns about genetically modified foods. Questions about the healthiness of modified foods arise with foods in which the composition of the edible portion of the plant has changed. The FDA has helped to ease some of these concerns by requiring that foods in which the composition of the food has changed be labeled. Some consumers also worry that a plant altered for an industrial purpose will wind up in the food supply; for example, corn genetically modified for ethanol production could be mixed with other corn for corn meal without anyone knowing. Such safety and health concerns held by consumers must be responsibly addressed if plant biotechnology products are to succeed.

The Global Social Impacts of Plant Biotechnology

Both positive and negative global impacts are associated with the introduction of plant biotechnologies. Some transgenic plants can greatly benefit developing countries, such as the sweet potato resistant to the feathery mottle virus (FMV) developed with support from Monsanto and the U.S. Agency for International Development

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(USAID). This FMV-resistant sweet potato could nearly double the potato harvest in Africa, where sweet potatoes are grown as a staple crop, and farmers could provide more food for their families. The development of environmentally tolerant plants could help reduce the risk of famine caused by drought or flooding in some countries. Even more exciting is the possibility of developing edible plant vaccines, which would allow millions of poor people to receive vaccines.

However, the development of some genetically modified crops can destroy the profitability of agricultural cash crops that may be vital to a country's economy. For example, the new genetically modified canola seed has the same fatty acid content as many of the tropical oils, such as palm and coconut oils. Producers in the United States and Canada could raise a crop of canola cheaper than these oils could be imported. Many countries have depended on tropical oils for most of their national income, and their economies could be severely hurt if the modified canola is grown. Also, if potatoes, tobacco, and other plants are genetically modified to produce a high amount of sugar in their leaves, the price for sugar from sugar cane will drop, causing problems for growers worldwide. These changes have both an economic and social impact on the countries affected. Will the net effect of plant biotechnology be positive for most countries? Only time will reveal the answer to this question.

Summary

The field of plant biotechnology is growing quickly. Many different types of career opportunities exist in this field. As more genetically modified plants are developed and offered to producers, the ability of producers to measure the economic risks and profit potential of these crops will be vitally important. Consumer concerns about the safety and healthiness of foods made from modified plants must be addressed. The global social impact of each modified plant must also be examined to help minimize negative results.

Credits

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