What are Genetically Modified (GM) Plants?

Although “biotechnology” and “genetic modification” commonly are used interchangeably, GM includes technologies that alter the genetic makeup of plants. Biotechnology, a more general term, refers to using organisms or their components, such as enzymes, to make products that include wine, cheese, beer, and yogurt.

Combining genes from different organisms is known as recombinant DNA technology, and the resulting organism is said to be “genetically modified”, “genetically engineered”, or “transgenic”. Current GM products and those in development include medicines and vaccines, foods and food ingredients, feeds, and fibers.

What are some of the benefits of GM foods you ask? They could be engineered to deliver more nutrients, reduce spoilage, curtail chemical contamination, and even provide immunization against disease. There is research underway to genetically introduce vaccines against diarrhea-causing bacteria into third world crops such as bananas. Although today great progress has been made in inoculating children in much of the world, there are still the poorest nations that have had relatively little effect with their inoculation process. That means that nearly 20 percent of the world’s infants and small children are left vulnerable to many horrible diseases according to the World Health Organization. Inoculating these children is almost impossible with the current technology, because today the vaccines that are available have to be injected, with the exception of the oral polio vaccine, and injections are expensive. There is also the fact that they are problematical in much of the world. Vaccines need to be refrigerated from the point of manufacture to the point of use and their delivery by needle usually requires skilled medical personnel. Then there is the fact that the needles themselves are potentially hazardous. Contaminated needles can often do more to spread a disease than contain it. But if children could be inoculated by simply eating a genetically modified banana, it would be possible for millions to be protected from life-threatening diseases like dysentery in a relatively inexpensive and easy manner.

For centuries, farmers and plant breeders selectively bred plants that were the largest, strongest and least susceptible to disease. They did not know it, but they were practicing a rudimentary form of genetic engineering – the removal, modification or addition of genes to a living organism. Genetic engineering is a fundamental process used in biotechnology, which enables researchers to develop improved crop plants, such as crops naturally protected from diseases and insects.

Crop biotechnology is the most precise form of plant breeding that we currently do. Scientists are trying to discover what the genes do and how they give function to a plant – how they give it drought tolerance or disease resistance or more vitamins. And, then implant the genetic information through biotechnology to give them the new instructions. Locating genes for important traits, such as insect resistance or desired nutrients, is one of the most limiting steps in the process.

Scientists have found ways of taking a good gene, say from a bacterium, and putting it into plants such as tomatoes or beans or corn. The bacterial gene produces a protein that makes the tomato less appetizing to a pest. Or perhaps the gene allows the tomato to survive a heavy dose of chemical spray that farmers sometimes

use to control weeds in the fields. Or maybe the scientists find a gene in one species of plant and they put it into another species to help the plant survive the cold better or taste or look better. These are just a few of the ways gene modification of plants is taking place

What actually happens is genetic engineers have found that if they want to insert a new beneficial gene into a plant, it works better if you inject a second gene with it. The second gene is one that produces an antibiotic. It is called a marker gene because it is easy to test for its presence and see if both genes have gotten into the plant cell.

So suppose the DNA that protects plants against insects is injected into the plants and it works? Won't the insects eventually evolve a resistance to these toxins? This has been a concern and problem among farmers for many years, but mutations in the insect population are not caused just because of transgenic crops. It happens all of the time. It is the process of evolution. Pests evolve a resistance to chemical pesticides being sprayed now, so it seems logical to believe that insects might evolve resistance to the toxins in the transgenic plants.

In 2006, 252 million acres of transgenic crops were planted in 22 countries by 10.3 million farmers. The majority of these crops were herbicide- and insect-resistant soybeans, corn, cotton, canola, and alfalfa. The United States grew over 50% of the worlds transgenic plants that year, but the percentage will drop as growth in developing countries is increased. Researchers developed the first commercial application of genetic engineering in 1982 when they produced human insulin for the treatment of diabetes.

Technologies for genetically modifying foods offer dramatic promise for meeting some of the 21st Century's greatest challenges, but like all new technologies, they also pose some risks, both known and unknown. Controversies surrounding GM foods and crops commonly focus on human and environmental safety, labeling and consumer choice, ethics, food security, poverty reduction, and environmental conservation.

On the horizon are fish that mature more quickly; cows that are resistant to bovine spongiform encephalopathy (mad cow disease); fruit and nut trees that yield years earlier, and plants that produce new plastics with unique properties.

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