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Frankenfoods?

The Debate Over Genetically Modified Crops

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The weather fit the mood of the day—overcast and gloomy. Sam, a work study student in the plant genetics department at State University, glanced through the hole that had been cut in the side of the greenhouse and then went back to sweeping up the floor. The greenhouse had been broken into overnight. Outside the vandals had spray-painted "Stop Genetic Mutilation!" on the walls of the greenhouse. Inside it was chaos. It looked like they had gone after the sprinkler system with wrenches and hammers, and the test plots had been overturned and the plants trampled under foot.

Sam watched Professor Bob Milikin, who normally didn't come to campus on Mondays, slowly enter the greenhouse, pale and tight-lipped, shaking his head as he stepped over the debris and surveyed the damage. There had been a recent rash of these attacks around the country, but mostly on the West Coast, and he had never imagined it might happen here. The irony was that in their case only fifteen percent of the uprooted plants were genetically engineered. The rest had been developed using traditional breeding techniques. The plants that had been genetically modified were part of an experiment testing potential genetic engineering techniques for reducing the use of pesticides. He couldn't understand it. "This was research to benefit the environment," he said out loud to no one in particular. "To find a way to develop a plentiful, safe, healthy crop without using so many chemicals."

It was no small problem. An estimated 100,000 chemicals—about 2.5 million tons—are in use worldwide. About 10 percent of the 70,000 chemicals used in the United States are carcinogenic. In 1992, the World Health Organization reported that three million pesticide poisonings occur each year, with 220,000 deaths. A study by the U.S. Department of Agriculture had shown that pesticide residues can persist on fruits and vegetables even after they have been washed, peeled, or cored. And there was strong evidence for associations between lymphomas and soft-tissue sarcomas and certain herbicides, and between lung cancer and exposure to organo-chlorine insecticides. Scientists believed that pesticides could result in immune system dysfunction and might be linked to the increasing sterility in humans and other animals, particularly in males. A number of states in the U.S. had programs in place to reduce pesticide use by 50 to 75 percent.

Mina, one of the graduate students in Bob's research group, rose from the floor where she had been sifting through some of the uprooted plants. Her research had involved breeding native varieties of sorghum to increase their resistance to drought. "They don't really understand what we're doing here, do they?" she said as she caught Bob's eye. "These plants had nothing to do with genetic engineering. But even if they did, isn't that what we're supposed to do at a research university? Try to learn whether something like transgenic plants are a good thing or not?"

Mina had come from West Africa to study plant genetics at State University on a scholarship given to her by her country's government. For her country, as for many developing nations, genetic engineering held out the promise of greater crop yields and the possibility of feeding millions of underfed and starving people. Studies conducted by Japanese researchers at Nagoya University and the National Institute of Agrobiological Resources had reported yield increases of 10 to 35 percent in transgenic rice in trials in China and Korea.

Mina thought of the other benefits of genetically modified foods. They could be engineered to deliver more nutrients, reduce spoilage, curtail chemical contamination, even provide immunization against disease. She thought of the research underway to genetically introduce vaccines against diarrhea-causing bacteria into crops such as bananas. Although great progress had been made in inoculating children in much of the world, in the poorest nations relatively little had been achieved. That meant that about 20 percent of the world's infants were left vulnerable to horrible diseases according to the World Health Organization. Inoculating these children was almost impossible with the current technology. The vaccines available had to be injected, with the exception of the oral polio vaccine. Injections were expensive and problematic 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 required skilled medical personnel. The needles themselves were 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.

But Mina knew there was growing opposition in this country to biotechnology—opposition that seemed to take its cue and many of its tactics from environmental activists in Europe and Britain. She had a friend, Erik, studying at the London School of Economics, who was vehemently opposed to corporate biotechnology. He and Mina usually steered clear of the topic in the letters they wrote one another these days, but Mina knew what his views were. He had written to Mina of the dangers of corporate mergers that concentrated plant breeding and genetics in the hands of a few large multinational corporations. Erik was outraged that these companies plundered genes from developing countries, which they immediately patented and then held hostage, making the indigenous farmers of these countries buy back the rights to grow their own seeds.

These companies, he had written Mina, weren't interested in consumer safety or preserving the environment or biodiversity except in the narrowest sense of how these might affect their profits or be profitable to them. In Europe, not only did various consumer, environmental, and conservation groups oppose the growing of genetically modified crops on their soil but also their being imported from outside. Erik had appealed to Mina's sense of history, telling her that she of all people, whose country had been under the yoke of a European imperialist power, should not aid and abet this new form of corporate imperialism.

In his last letter to Mina, Erik hadn't written anything at all. He had simply included a clipping of a newspaper article announcing the successful sequencing of the genetic code of rice by two major agrobiotech companies. The breakthrough was being hailed as a "major achievement that could pave the way for improvements in a crop that is the staple food for half the world's population." Erik had underlined those sections in the article that voiced concerns about corporations gaining more and more control over agricultural research and the world's food supply. And he had put an emphatic exclamation point next to the quote from a professor at an American university who was participating in a publicly funded rice genome project who had said: "One thing people could argue is, how can a company own the most important food crop in the world?"

Sam glanced at his watch. He had 10 minutes before his next class. He might have time to grab a coffee. As he walked toward the front of the greenhouse with the broom, he glanced over at Mina, who was still on her knees. He knew that a year's worth of her work had been destroyed and that she'd have to return to her country empty-handed. Sam felt bad about what had happened, but he had always believed that there was something not quite right about all of this—about tampering with the genes of living things—plants, and animals. He thought of that monkey he had seen on the news—the one that had been genetically engineered with the DNA of a jellyfish. Now *that*, he thought, was really creepy.

Questions

1. Find a definition of "genetically modified organism." How are genetically modified organisms different from non-genetically modified organisms?
2. The recent acts of activists intent on destruction of research plots included plants altered by molecular as well as classical genetic techniques. Is it possible to distinguish between plants altered by classical genetics and those altered by modern techniques? If it is possible, how is it done?

3. What safeguards are in place to protect Americans from unsafe food? Are these methods science based?
4. Name as many examples as you can of harm to citizens from unsafe food. What percentage of these illnesses was caused by special genetic modifications?
5. How have genetic modifications of fruits and vegetables improved crops with respect to nutritional composition, shelf life, eating quality, yields, and disease resistance?
6. Can you describe a scenario in which public health and safety might be threatened by food crops modified by biotechnology?
7. Does biotechnology pose any risks to the environment? If so, what are these risks?
8. Is there any reason to be concerned by the role of private corporations in the development of agricultural biotechnology? Should companies be allowed to patent organisms?
9. Are the activists justified in their acts of vandalism against food that has been modified through biotechnology? Why or why not?
10. Do you think there are good reasons for using legal means against the development of biotechnology-modified foods? Why or why not?

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