

Questioning GMOs

November 7 2014, by Gail Bambrick



"The U.S. grows more GMOs than any other country," says Sheldon Krimsky.
Credit: Depositphotos

Are genetically engineered foods safe? Truth is, we probably don't know. "The scientific debate is not resolved, even though many people are claiming it is," says Sheldon Krimsky, the Lenore Stern Professor of Humanities and Social Sciences at Tufts.

"There is a lot we don't know," he says, "and there are scientists trying to get the word out about that, but they have been marginalized by other

studies, often funded by corporations whose profits come from GMOs."

Krimsky's new book, *The GMO Deception* (Skyhorse Publishing), which he co-edited with Jeremy Gruber, president of the nonprofit Council for Responsible Genetics, and in which he authored a number of essays, argues that the controversy over [genetically modified organisms](#) (GMOs) is far from settled. The book contains more than 60 essays by independent scientists and science writers that explore what is known and not known about the science of [genetic modification](#) and its impact on human health, the environment and agriculture.

"As I reviewed all the studies on GMOs, some preeminent scientists were saying everything was perfectly safe. On the other hand, small groups of scientists were claiming everything wasn't so safe," says Krimsky, who is also an adjunct professor of public health and community medicine at Tufts School of Medicine. "If there is honest science that warns us of possible dangers, this should be addressed."

Krimsky has been studying the relationship between science and technology and public policy his entire career, with an emphasis on genetics. He served on the National Institutes of Health's Recombinant DNA Advisory Committee from 1978 to 1981 and is the author or editor of 14 books, including *Genetic Alchemy: The Social History of the Recombinant DNA Controversy* (1981), *Biotechnics and Society: the Rise of Industrial Genetics* (1991) and *Genetic Justice: DNA Databanking, Criminal Investigations and Civil Liberties* (2011). His next book, coming soon from Columbia University Press, is titled *Stem Cell Dialogues: A Philosophical and Scientific Inquiry into Medical Frontiers*.

Genetic modification is the process of inserting a gene from one organism into the DNA of another. Since DNA is what controls how any organism functions, this gene switch changes how a plant or animal, for

example, operates.

In food crops, this can include increasing a plant's nutritional value by having it naturally produce more vitamins. Or the new gene may allow plants to thrive in climates beyond their natural range. But most of the [genetically modified crops](#) today have been engineered to naturally produce insecticide or to be resistant to herbicides that kill surrounding weeds, says Krimsky.

Widespread Usage in the U.S.

About 89 percent of all corn grown in the U.S. has been [genetically modified](#) to be herbicide resistant, according to the United States Department of Agriculture. This genetically engineered herbal resistance is shared by 94 percent of U.S. grown soybeans. About 80 percent of U.S. grown corn has also been genetically modified to produce its own naturally occurring insecticide.

In the United States, more than 80 percent of many major food crops—including soy, corn, sugar beets, zucchini and summer squash—are grown from genetically engineered seeds, and about 70 percent of processed foods contain GMOs, he says.

"The U.S. grows more GMOs than any other country, on 70.1 million hectares [173.2 million acres], compared with Brazil's 40.3 million hectares and China's 4.2 million hectares," Krimsky notes.

Because labeling of GMO foods is not mandated in the United States, it's hard to know what we are eating, he says, and because GMOs only went into agricultural use in the mid-1990s, there have been no long-term studies about their effects on our health.

Delving deep into all the scientific literature produced on GMOs since

the 1990s, Krimsky found 22 experiments that demonstrated adverse consequences, such as compromised immune systems and digestive problems for lab animals that ate GMO foods. That said, he acknowledged that more than 100 other studies, most funded by industry, found no ill effects. Most of the 22 papers demonstrating adverse consequences were published by foreign scientists funded from public sources, he pointed out.

"Although there may be more feeding studies that found no adverse effects, when you are looking at the safety of a product, the negative effects that you see in a study are more important than the positive—they have more weight, and they have to be examined and replicated to see if there was a mistake or if you can get consistent results," Krimsky says.

Concerns about lack of evidence on GMO safety have prompted at least 26 nations to introduce total or partial bans on GMOs, including China, Austria, Switzerland, Australia, India, Germany, Poland, Mexico and Russia. Significant restrictions on GMOs exist in about 60 other countries.

On the other hand, the U.S. government has taken the position since 1992—and has held to it—that no studies of GMO food safety are needed. But that position was taken well before any studies were done, Krimsky says.

"Of course, people look around and say 300 million Americans are eating these GMO products, and if there were going to be any problems, we'd know by now. But the fact is it doesn't work like that," Krimsky says, pointing to the decades Americans used lead paint and smoked tobacco before the health risks became known.

Unsustainable Trends?

GMOs also raise questions about the future of sustainable agriculture, he says. Creating a plant that is naturally toxic to pests, thereby eliminating the use of insecticides, is an environmentalist's dream. But there are already cases where the insects have developed resistance to GMO plant toxins, much like bacteria become resistant to antibiotics. And that has meant reverting to pesticides.

Case in point: Monsanto took the naturally occurring bacteria *Bacillus thuringiensis*, or Bt, that organic farmers had used as an insecticide for years and introduced the bacteria's gene into major crop plants like corn in the U.S. and rice in India so the plants themselves would continually produce the toxin, Krimsky says. But after worldwide use of this genetic modification, the insects are becoming resistant to Bt. If that resistance continues to grow, organic farmers may have to switch to a more toxic option for controlling pests, says Krimsky.

"The many voices represented in the book say that using GMOs for insect control is not the approach to sustainable agricultural—it will eventually turn against us," Krimsky argues. The answer, several essayists suggest in the book, is the evolving technique of integrated pest management that combines a variety of controls, including the use of natural enemies and competitors to control pests, as well as screens and barriers to limit birds and insects and mulches for weed management.

Using genetics to create herbicide-resistant plants is similarly problematic. In September, the Food and Drug Administration gave Dow Chemical the go-ahead to sell [genetically modified corn](#) and soybean seeds that are resistant to the company's new herbicide Enlist Duo, which was itself approved by the Environmental Protection Agency on Oct. 15. Enlist Duo was developed because weeds are becoming resistant to the now widely used Roundup herbicide produced by Monsanto.

Because the corn and soybean seeds are genetically modified, crops are

not harmed by a particular herbicide. But according to Dow research, croplands with weeds resistant to Roundup have doubled since 2009. The U.S. Environmental Protection Agency reports that more than 70 million acres out of about 400 million total acres of crop-producing farmlands in the U.S. are effected.

Resistance leads to the use of stronger and potentially more dangerous kinds of herbicides, and that creates a vicious cycle, Krimsky says. He notes that the Dow-manufactured herbicide contains a chemical that was a component of the Vietnam-era defoliant Agent Orange, which has been linked to health and environmental problems. "Big agribusiness seeks to adapt the land to the seed," he says, "while agri-ecology seeks to adapt the seed to the land."

"It has to be a balancing act that weighs the promise of GMOs against the risks, and that is driven by science, not profits," Krimsky says. "I produced the book so people would have new ways to think about GMOs and resources to better understand the state of the research as well as the health and ethical implications."

Provided by Tufts University

Citation: Questioning GMOs (2014, November 7) retrieved 26 April 2024 from <https://phys.org/news/2014-11-gmos.html>

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