Are GMOs causing an increase in allergies?

According to a national survey, the potential that food derived from genetically engineered crops might cause allergies has long been a concern of consumers. The survey was conducted by GMO Answers, an initiative of the Council of Biotechnology Information, an industry trade group. Scientists and experts provide answers but are not paid to do so. The answer to that question is “no,” writes Lisa D. Katic, a food policy consultant:

No commercially available crops contain allergens that have been created by genetically engineering a seed/plant. And the rigorous testing process ensures that will never happen.

Food allergies are tricky issues. According to Food Allergy Research and Education, “nearly any food is capable of causing an allergic reaction.” Most allergens are proteins, and the organization states that ninety percent of food-allergic reactions in the United States are caused by allergens from only eight foods: peanuts, tree nuts, milk, eggs, wheat, soy, shellfish and fish.

Of those, only soy is commercially available in genetically modified varieties. But if a person is allergic to conventional soy, s/he will also be allergic to GM soy as it is not different compositionally. The Food Allergy Service, maintained by the Institute of Food Research in the United Kingdom, asserts that “to date, no food derived from GMOs has been found to cause new allergies.”

Follow the latest news and policy debates on sustainable agriculture, biomedicine, and other disruptive innovations. Subscribe to our newsletter.

The AllergenOnline database at the University of Nebraska, Lincoln, independently managed by a panel of internationally recognized allergy experts who review and vote on allergen inclusion, does not list any allergens coming from GMOs. The database “lists every known protein that has been shown to cause an allergy and or even might be suspected of possibly causing a reaction,” said Richard Goodman, a food allergy research professor who runs the database at the university. Three main tests are conducted to ensure that any new proteins from GM foods do not cause allergies: in vitro test, in silico test and digestion.

The in vitro test introduces new proteins into serum from people with existing allergies. The new proteins pass the test if the antibodies in the serum do not attack it. The in silico test compares the new proteins to known allergens, making sure that they are not similar. Finally, digestion involves destroying the proteins with heat, acid and stomach enzymes, going by the rationale that many allergens are resistant to digestion.
These tests kept the only documented case of a GM soybean that was potentially allergenic off the market. Researchers who tried to improve the nutritional quality of soybeans using a Brazil nut protein realized that they were working with an allergen and immediately stopped the work. This is strong evidence that scientific methods to prevent allergy-causing GMOs from reaching consumers are robust and work.

But these existing tests are based largely on comparisons with known allergens. What about unknown allergenic proteins that could be introduced? GLP executive director Jon Entine investigated an article in Elle magazine written by Caitlin Shetterly, who claimed that GMOs caused her allergies. If the claim had been true, it would have been the first documented case anywhere in the world. In the story, Shetterly went to a doctor who encourage to pursue alternative medical treatments for her allergies, saying he believed her condition might be linked to GMOs. Shetterly says she stopped eating any foods with GMOs—a prodigious challenge in the United States as an estimated 70% of foods contain genetically modified ingredients—and was cured. She’s now writing a book that claims that GMOs are causing random allergies. But experts, including Goodman, told Entine in his investigation
that Shetterly’s claims, commonly echoed by anti-GMO activists, are scientifically far-fetched—“a fundamental misunderstanding of the science and of risk.”

“Yes, in principle, you might find a heretofore unknown reaction in some individuals to a protein not yet listed in the database. Certainly not every protein of the millions of proteins from every food or inhalation source of allergy has been tested for allergies. But those proteins occur in non-GMO sources—well, he noted. When a new genetically modified crop is created, only one or a few new proteins are made—he added, and those are evaluated specifically for potential risks of allergy—.

Steve Taylor, food allergies professor and co-director of the Food Allergy Research and Resource Program at the University of Nebraska-Lincoln, said that while the (testing) process might not be as robust as many would prefer, I am not aware of any other test methods that I would recommend for use.”

The potential for allergies in genetically modified foods is less than in new conventional foods introduced into the marketplace. “The risk of novel allergens in GMOs is actually quite low, in my opinion,” Taylor said. While the novel proteins in genetically modified foods go through rigorous testing, conventional foods including organics are not tested. “It’s much riskier to introduce a new food from another country, each of which contains hundreds of new proteins,” he added. For example, when the first kiwis were introduced to the United States in 1962, they weren’t tested because they were an established food, but as it turned they did cause allergies in some people. Some GMs don’t have new proteins; the flavr Savr tomato is an example.

Speculation that GMOs might produce new allergens has been challenged by scientists. Kevin Bonham, a Harvard immunologist, responds to one such claim by the Union of Concerned Scientists:

Before getting started, let’s go back to the statement from UCS that I find so objectionable:

[GE crops] may produce new allergens and toxins
This is patently false—genetic engineering techniques allow us to precisely add genes of known structure and function to crops. It would in principle be possible to engineer corn that expresses anthrax toxin, or introduce peanut allergens into soybeans, but this would have to be by malicious intent of the scientists, not some accident. We know how genes work, and we know what kind of protein an individual gene will make.

A recent widely circulated report claiming to link GMOs with celiac disease, a severe form of gluten allergy, by Jeffrey Smith, who heads the one man Institute of Responsible Technology, is absurd because there is no approved GM wheat on the market. The claim was immediately challenged by the Celiac Disease Foundation’s CEO Marilyn Geller, who stated, “there has been no scientific evidence
put forward for a GMO/celiac disease link that is supported by the CDF Medical Advisory Board.” Yet the claim still shows up on many anti-GMO websites.

Genetic engineering can even help to reduce allergenicity in foods. Geneticists are experimenting with highly allergenic foods like peanuts to develop versions that do not contain the allergen proteins. Although they are not yet fully tested and approved for commercial sale. horticulture expert Peggy Ozias-Akins at the University of Georgia has made and tested peanuts that do not produce two proteins that are among the most intense allergens. The next generation of GM foods might cause less allergies than conventional or organic foods.

XiaoZhi Lim is a freelance science reporter based in Massachusetts. Her work has appeared in Nature, The New York Times and HuffPost, among other publications. She is originally from Singapore.

This article originally appeared on the GLP January 14, 2022.