

How Square Watermelons Get Their Shape, and Other G.M.O. Misconceptions

By [AMY HARMON](#) UPDATED July 11, 2016

Photo



While they might look unusual, these watermelons were not genetically modified. They were simply grown in a box. Credit The Asahi Shimbun, via Getty Images

As early as this week, the House is expected to vote on a bill that would require most foods containing genetically engineered ingredients to be identified as such. The Senate [passed the legislation](#) last week, just a few days after Vermont [became the first state](#) to require written labels on foods with genetically modified organisms.

If the House bill were to pass, it would move Americans closer to what they

[have said they want](#): more transparency about how the genes of foods they are about to eat have been manipulated. But dispelling [confusion over](#) genetically modified organisms, known as G.M.O.s., may be difficult for any labeling program. As lawmakers hash out the details, here are some popular misconceptions.

To start with, those odd-looking square watermelons in the picture above? Their genes weren't messed with. They were grown in boxes.

Photo



Products are sometimes marketed as "Non-G.M.O." even when genetically modified versions do not exist. Credit James Nieves/The New York Times

Misconception: G.M.O.-free oats are better than the alternative.

Actually: There is no alternative. Stores do not sell genetically modified oats because they don't exist.

The white and gold aluminum cans of McCann's Steel Cut Irish Oatmeal,

which is among tens of thousands of products certified in recent years by the [Non-G.M.O. Project](#), now carry a label indicating they have no G.M.O. ingredients. But nothing has changed about the oats inside the cans. Some flavored oatmeals may have been made with genetically modified ingredients. But as seen with the proliferation of labels on fat-free or gluten-free products — like water — that never contained fat or gluten, the G.M.O.-free label does not mean a genetically engineered version of that product exists.

Photo



Rainbow papayas are genetically modified and were developed after a disease nearly wiped out papaya production in Hawaii. Credit Jim Wilson/The New York Times

Misconception: The new labels will make it uniformly easy to identify what has been genetically

engineered.

Actually: Consumers may need to scan a package to see if an ingredient was genetically modified, and even then they are unlikely to learn which traits were altered or why.

At the most basic level, a G.M.O. is a plant or animal whose DNA was altered in a laboratory, often by inserting genes from a distant species into its cells with the help of a bacterium or with other tools. Many major food manufacturers are loath to put the words “genetic engineering” on labels for fear that they will convey an impression that the foods are suspect. Under the proposal in Congress, manufacturers could instead label packages with a symbol denoting genetically engineered ingredients, or a “quick response” (Q.R.) code that people with smartphones could scan to retrieve the information.

But manufacturers would not be required to provide information on how a food was modified or why. That a certain Hawaiian papaya, for instance, was protected against a virus that [threatened to destroy the crop](#) — with the insertion of a gene from that very virus — would be impossible to tell from a generic label indicating that it had been “produced with genetic engineering.” You also wouldn’t know, say, that the soy lecithin in your ice cream was made from soybeans endowed with a bacterial gene that lets them thrive even when sprayed with a widely used weed killer.

Photo



A bottle of Hidden Valley Ranch salad dressing with the new label mandated in Vermont. Credit Wilson Ring/Associated Press

Misconception: G.M.O. labels highlight a documented health risk.

Actually: These are not warning labels. The scientific consensus is that genetically engineered crops are as safe to eat as other crops.

In a [2014 Pew Research Center survey](#), just 37 percent of American adults said they believed genetically modified foods were safe to eat. Yet this spring, the National Academies of Sciences, Engineering and Medicine [reported finding](#) “no differences that would implicate a higher risk to human health” from G.M.O. crops. There was no evidence that G.M.O.s in North America, where such items have been part of the diet since 1996, had contributed to a higher incidence of cancer, obesity, diabetes, kidney disease, autism, celiac disease or food allergies, in comparison with Western Europe, where G.M.O.s are rarely eaten, the organization said.

Several other [regulatory](#), [scientific](#) and [health](#) organizations have also concluded that G.M.O.s are safe to eat. And the Food and Drug Administration [warned in the fall](#) that it would consider a label false or misleading if it implied that a food was “safer, more nutritious or otherwise

has different attributes” than comparable foods simply because it was not genetically engineered.

That doesn't mean it's impossible to engineer a plant or animal that would be bad for you. It has been done at least once, with [a soybean that was not released](#) for commercial use because its allergenic property was discovered in a routine screening. The risks of every genetically engineered crop, the 420-page National Academies report emphasized, should be evaluated individually.

Photo



Breeders crossed two species of strawberry to create white pineberries. Credit Yulia Shaihudinova/Getty Images

Misconception: White strawberries were altered in a lab.

Actually: They were created through old-fashioned crossbreeding.

“Every week or so, I see a tweet about [G.M.O. strawberries](#),” said Karl Haro

von Mogel, a co-founder of [Biology Fortified](#), a nonprofit website that publishes articles about genetic engineering. About 40 percent of respondents in a [2013 New York Times/CBS poll](#) of American adults said they thought “most” or “a lot” of fresh fruits and vegetables were genetically engineered.

But, except for a few fruits and vegetables, American produce uses older breeding methods that do not fall under regulations governing genetically engineered crops, and they would not need to be labeled.

Japanese geneticists made seedless watermelons [in the 1930s](#) by exposing watermelon seeds to chemicals that doubled their usual pair of chromosomes, and by crossing those with pollen from a regular watermelon. It was because their offspring had an odd number of chromosomes that they could not make seeds of their own; it was not the result of foreign DNA.

And the popular red grapefruit now grown in Texas is the descendant of one of thousands of mutants produced by a breeder in the mid-1960s by bombarding pink grapefruit tree buds with radiation, a technique for accelerating evolution that has yielded new varieties in [dozens of crops](#), including barley and rice. The crops created through that method, called mutagenesis or radiation breeding, can be certified as organic.

And if genetic mutation sounds scary, it’s worth remembering that genetic mutations constantly happen in nature, without human intervention. Orange carrots, for instance, arose from a natural mutation and became prevalent only because humans planted them. The purple and yellow ones you might have thought were G.M.O.s were [the originals](#). As for those white pineberries, breeders crossed two species of strawberry to create a hybrid with some of the characteristics of both — combining the genetic diversity that exists in both species.



Commercially available wheat has not been genetically modified. Credit Orlin Wagner/Associated Press

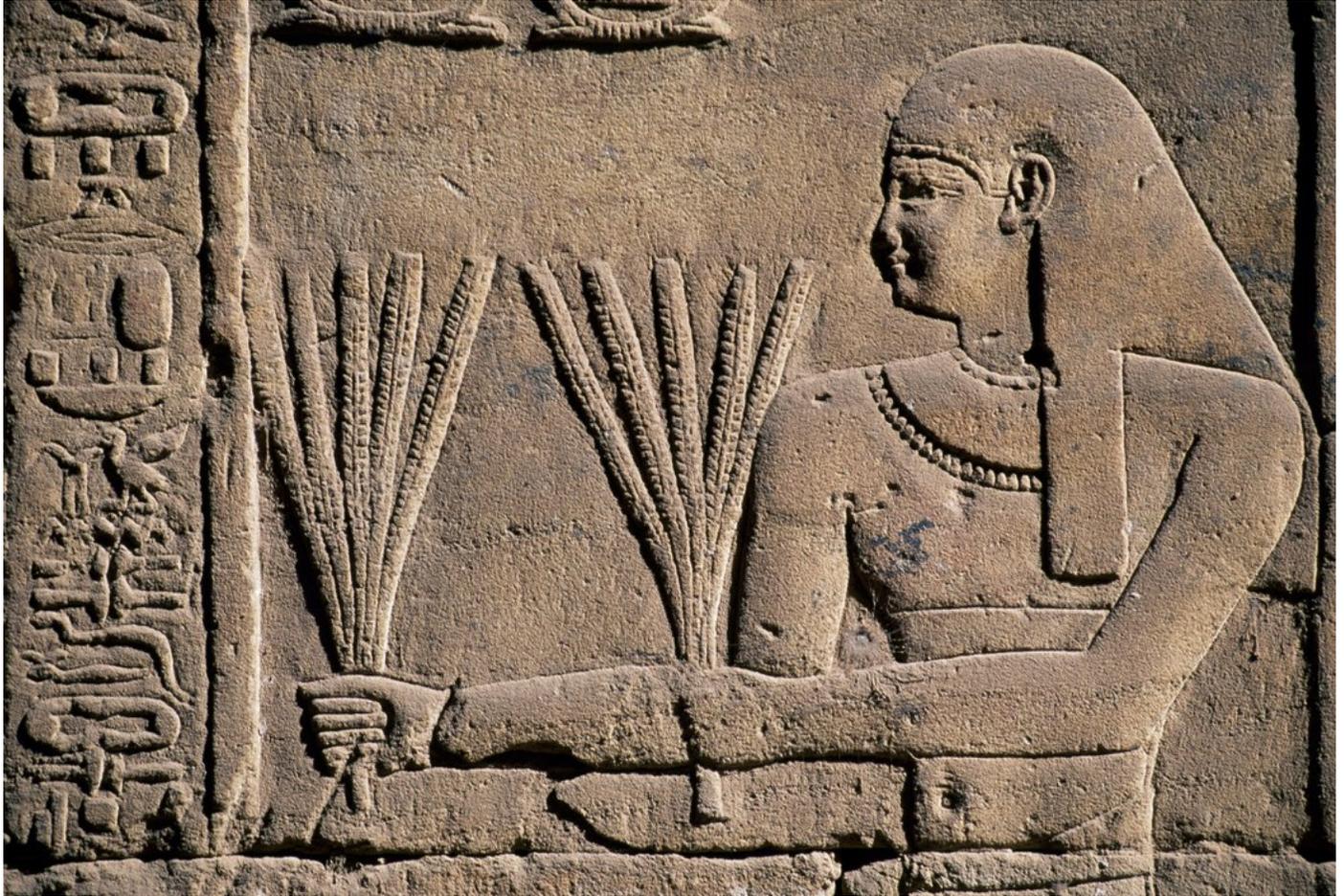
Misconception: Genetically modified wheat may be responsible for gluten sensitivity.

Actually: Genetically modified wheat is not sold to the public.

Countless websites, blog posts and messages on Twitter [blame genetically modified wheat](#) for the increase in gluten sensitivity. The fundamental hole in this argument is that genetically modified wheat is not sold to the public.

To be clear, wheat has been genetically modified. Monsanto has [field-tested wheat](#) that was altered to tolerate the herbicide glyphosate. A British research institute [field-tested modified wheat](#) to repel insects. (It didn't work.) In 2014, Chinese researchers modified wheat [to resist a disease](#) called [powdery mildew](#), but just to see if they could.

Spanish researchers are testing [wheat engineered](#) to contain, yes, significantly [less gluten](#). But it is not yet on store shelves.



Ancient corn. Credit DeAgostini, via Getty Images

Misconception: Humans have been making G.M.O.s for millenniums.

Actually: While selective breeding is a form of genetic modification, G.M.O. refers to foods made with specific forms of modern biotechnology.

Proponents of genetic engineering in agriculture like to point out that people have been genetically modifying organisms for millenniums through selective breeding and other techniques. If you look at it that way, they say, nearly everything we eat is a G.M.O. But a majority of Americans have consistently said in polls that they would like labels on G.M.O.s, apparently believing that a distinction between a product of traditional breeding methods and one produced through modern molecular biology should be made.

Both the Vermont labeling law and the proposed national one define a G.M.O. not as any crop in which the genetic material has changed over

time, but as a crop that has been altered using specific forms of biotechnology that allow for the transfer of genetic material from one species to another or the insertion of synthetic or heavily modified DNA into an organism's genetic code. This genetic engineering has been possible for only about three decades.

Photo



These mushrooms were not genetically modified. Deleting a bit of DNA enabled a scientist to make a version that does not brown as quickly after being sliced, but no DNA from another organism was added. Credit Lance Cheung/United States Department of Agriculture

Misconception: If scientists change the DNA of a mushroom in a lab, it would be labeled as genetically modified.

Actually: If no DNA from another organism is added, then it is not genetically modified under the rules for new labels.

If you've ever held a typical white-button mushroom in one hand while slicing it with the other, you know it takes only the faintest pressure to produce a brown mark.

But Yinong Yang, a plant pathologist at Pennsylvania State University, has engineered [one that resists browning](#). Using a new technique, he simply deleted a bit of DNA, but added no DNA from another species. The Department of Agriculture told him this month that the mushrooms could be sold [without regulatory oversight](#), and it's not clear how such products would be labeled.

Photo



So-called golden rice, in development since the 1990s. Credit Jes Aznar for The New York Times

Misconception: Genetically engineered rice is saving the lives of malnourished children in the developing

world.

Actually: The rice is still being tested.

Some proponents of genetic engineering say the technology could be used to endow crops with important traits, especially in [places with high rates of malnutrition](#) and [hunger](#). One variety of rice has been modified with genes from corn and a common soil bacterium that together produce beta carotene, which the human body uses to make vitamin A. The lack of the vitamin causes blindness in hundreds of thousands of children in Asia and Africa each year.

The variety, called golden rice and in development since the 1990s, has long been a point of contention in the debate over genetic engineering. Several anti-G.M.O. groups, including [Greenpeace](#), have organized protests against it, saying, without evidence, that it could pose unforeseen risks to human health and the environment while profiting big agrochemical companies. Proponents have accused activists of essentially having blood on their hands for delaying the crop's approval: "How many poor people in the world must die before we consider this a 'crime against humanity'?" asked a [letter](#) signed by more than 100 Nobel laureates this month, petitioning Greenpeace to change its stance.

But even if Greenpeace changes its stance, the rice is not ready. In 2013, a trial that had found that a bowl of the rice supplied more than half of [a child's daily vitamin A requirement](#) was deemed to have been [conducted unethically](#) because it had [not been disclosed](#) to the participants that they were eating genetically modified rice. That set back plans to distribute it. And last spring, the nonprofit institute responsible for the rice's development said it had [gone back to the drawing board](#) because the rice strains that had the improved nutrition did not grow well enough to be embraced by farmers. Golden rice may one day help save lives. But not yet.

Photo



A G.M.O.-free burrito. Credit Karsten Moran for The New York Times

Misconception: Chipotle's burritos used to be stuffed with G.M.O.s.

Actually: Only the cooking oil and the tortillas had ingredients from genetically modified crops.

Last year, the Chipotle restaurant chain ran its "[G-M-Over It](#)" campaign to announce the elimination of G.M.O.s from its menu. But [according to the company website](#), only its soy cooking oil and the soy and corn in its tortillas had come from genetically modified crops. Even the corn in its roasted chili-corn salsa was not genetically modified. The genetically modified corn we eat usually comes in the form of syrup, starch or oil, though a small amount of sweet corn, as it is known, is also genetically engineered.

Almost all soybeans and most corn grown in the United States are modified so farmers can spray them with glyphosate (the main ingredient in Roundup) to kill weeds without harming the crop. But, [according to Andrew Kniss](#), an agronomist at the University of Wyoming, Chipotle's replacement ingredients also came from crops cultivated with weed killers

— just different ones.

Photo



The DNA of today's large, strange-looking chickens was not manipulated in a laboratory. Credit Matt Carr/Getty Images

Misconception: Huge chickens are G.M.O.s.

Actually: They got that way through regular breeding.

Over the last 60 years, chickens have [become bigger](#). They grow faster and require less food per pound of meat they produce. But despite [what you may read on the internet](#), their DNA has not been manipulated in a laboratory. Their size results from farmers selecting and crossbreeding the ones with the most desirable qualities, and because Americans like white meat, that process has produced birds with oversize breasts that their legs can [barely support](#).

Those chickens, like most farm animals, do eat feed [made from genetically engineered corn and soybeans](#). But any added or modified genes, and the proteins they produce, are broken down during digestion. And the

nutrients in eggs, meat and milk have been [found to be the same](#) as those from animals fed with plants that were not genetically engineered.

Some chickens have been engineered so that their eggs [contain an enzyme](#) that can treat a rare disease. And some [goats](#) have also been modified to produce enzymes that are lacking in some humans. But the animals that generate these “farmaceuticals” are not sold for human consumption. And the only genetically modified animal to be approved for sale as food in the United States, a salmon engineered to grow faster to its market size, is not yet available.