What You Need to Know About Genetically Engineered Food

By Greg Jaffe

The facts about health, corruption, and saving the world

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American farmers started growing genetically engineered (GE) crops (which are also commonly referred to as "GMOs") in 1996, and now plant 165 million acres annually. Food manufacturers estimate that 70 percent of processed foods contain at least one ingredient made from GE crops. But along with such rapid adoption of a scary-sounding technology have come myths propagated by proponents and opponents. Here are some facts that sometimes get lost in the hype--and that will come as a surprise to people on both sides of the constant arguments.

Myth: "Frankenfoods" made with GE ingredients are harmful to eat.

There is no reliable evidence that ingredients made from current GE crops pose any health risk whatsoever. Numerous governmental and scientific agencies, including the Food and Drug Administration (FDA) and National Academy of Sciences, have conducted reviews that did not identify

any health concerns. Indeed, even the fiercest opponents have not shown any health risks.

That should not come as a surprise. The DNA inserted into GE seeds, and the protein it produces, are largely digested in the gastrointestinal tract. And the proteins are sometimes molecules that humans have already been exposed to in our diets. For example, GE crops that fend off viruses contain components of plant viruses that we've long eaten without any harm.

Furthermore, current GE crops enter our food supply primarily as highly processed ingredients that are essentially free of the engineered DNA and its protein products. High-fructose corn syrup and corn oil made from GE corn, soybean oil from GE soybeans, and sugar from GE sugar beets are identical to ingredients made from non-GE crops.

While current GE foods are not harmful, they haven't improved our diet, though that may change. Farmers have started growing soybeans that produce high-oleic oil that could substitute for trans-fat-rich partially hydrogenated oil. And the long-awaited "golden rice," engineered with beta carotene to combat vitamin A deficiency, is expected to be grown by Southeast Asian farmers in 2014.

Myth: FDA approves GE foods before we eat them.

Despite industry claims, the FDA does not formally approve the foods or ingredients made from GE crops. Laws only requires pre-market approval of "food additives" such as aspartame or dyes. In 1992, FDA decided that inserting a gene into a crop does not make the protein it produces a food additive.

Instead, FDA adopted a voluntary process whereby seed developers submit data showing that the GE crop is "substantially equivalent" to its traditional counterparts and does not pose novel health risks. FDA reviews those data and alerts developers to any concerns, but doesn't formally approve the seeds or foods made from the crops.

It is worth noting that many traditional crop varieties, such as some red grapefruit and barley varieties, which could even be grown on organic farms, were developed by blasting seeds with mutagenic chemicals or gamma radiation. In theory, those human-modified crops could pose similar risks as GE crops. But they are not subject to special regulation (and have never caused problems).

Senator Richard Durbin has supported legislation that would establish an approval process, but it has failed to win support from either ardent GE advocates or opponents.

Myth: Monsanto and other seed developers are the main beneficiaries of GE crops.

Seed developers have certainly benefited from engineered crops. They spend millions developing them and then charge hefty premiums to recoup their costs and make a nice profit. However, others also obtain significant benefits.

American farmers growing GE cotton that contains a biological insecticide have greatly reduced their use of highly poisonous insecticides. That cuts their costs and the harms from using those chemical insecticides.

Outside the United States, small-scale farmers growing GE cotton in India and China cut their use of insecticides sharply, obtained increased yields, and enjoyed higher income. In China, studies have documented that reduced insecticide use has led to fewer hospitalizations of farmers and reduced harm to beneficial insects and other species.

In the United States, planting herbicide-tolerant soybeans has not reduced herbicide use, but the glyphosate herbicides used are less toxic than the ones previously used. Department of Agriculture economists found that farmers planting those soybeans had greater income because saving time in the field allowed for more off-farm employment.

Remarkably, a study by William Hutchison, an entomology professor at the University of Minnesota, estimated that farmers who grew *non*-GE corn benefited *more* from GE crops than neighboring farmers planting pesticide-producing GE corn--benefits of $4.3 billion versus $2.6 billion from 1996 to 2009. The reason is that engineered corn reduces insect loads in the whole area, reducing non-GE farmers' need for expensive insecticides. Moreover, farmers growing non-GE crops don't pay any licensing fee to seed companies and often get paid a premium for their crops.

Myth: GE crops are environmentally sustainable.

Biotech giant Monsanto brags that it is "one of the world's leading companies focused on sustainable agriculture." While some biotech seeds provide substantial environmental benefits, sustainability claims are exaggerated.

Monsanto's most successful products are its herbicide-tolerant crops--soybeans, corn, cotton, sugar beets, and alfalfa that are tolerant to glyphosate. Those crops, planted on millions of acres each year, led to skyrocketing glyphosate use--*and* the emergence of glyphosate-resistant weeds. At least 10 weed species in 22 states have shown resistance to glyphosate, which prevents farmers from using that relatively benign herbicide on an estimated 7 to 10 million acres. The industry's proposed solution is for farmers to temporarily use herbicide "cocktails" containing multiple herbicides to combat resistant weeds while they develop new GE varieties engineered tolerant to other herbicides.

Insects may also become resistant to pesticide-producing corn. The Environmental Protection Agency requires farmers to protect the effectiveness of that corn, since it reduces the need for harmful chemical insecticides. However, more than one out of four corn farmers doesn't follow EPA's rules, jeopardizing the technology's long-term sustainability.

Finally, GE crops, like conventional crops, are part of our industrial agriculture system that uses large amounts of fertilizer and are sometimes grown in vast monoculture fields where crops are not rotated adequately. If sustainability is the goal, *all* farmers, not just GE crops farmers, need to move in a more sustainable, organic direction.

Myth: Mandatory GE labeling would increase consumer choice.

If the government mandated labels for products containing GE foods or ingredients derived from GE crops, you might expect to see labeled and unlabeled cereal boxes side-by-side in the supermarket. Yet in the dozens of countries around the world that require labeling, the reality is quite different.

The European Union has mandatory labeling, and food manufacturers use more-expensive, non-engineered ingredients to avoid having to put "genetically modified organisms" on their labels. They fear losing even a small percentage of consumers who are scared off by that phrase (the "organisms" are merely bits of DNA or protein, if they are present at all) or a blacklist campaign. In many countries with mandatory GE labeling, local farmers are not permitted to grow engineered crops, so domestically

produced foods are GE-free. Imported packaged foods arrive without labels, whether or not they would require labels under that country's law; enforcement of labels on imported packaged foods is non-existent. Mandatory labels have not given consumers a choice between cereal boxes with and without GE-ingredients--just non-GE cereal that costs more to produce and is no safer.

The United States' current voluntary labeling system probably provides more choice for consumers. All certified-organic products don't contain any GE ingredients, and thousands of other products are certified "GE-free" by private labeling systems such as the "Non-GMO Project." Consumers can assume that virtually all unlabeled food products may contain engineered ingredients if any ingredient is made from corn or soybeans. While this system is not perfect and may lead to consumer confusion and some misleading or inaccurate label claims, Americans probably have more choice at the grocery store than consumers in any country with mandatory labeling.

Myth: GE is the best way to increase farm productivity and reduce world hunger.

If only it were that simple. Under proper conditions, GE crops could help farmers in developing countries increase production. However, farmers need suitable GE varieties of the crops they grow; education about their proper use; and credit to purchase fertilizer, pesticides, and other products that maximize productivity.

GE-seed companies spend lavishly developing products for industrialized farmers growing corn, soybeans, and other commodities, but invest mere pennies developing GE cassava, cowpea, sorghum, and other staple crops for subsistence farmers. Fortunately, governments such as in China and Brazil invest heavily in developing GE crops that could be used on any size farm.

Meanwhile, providing conventional technologies, such as irrigation equipment, quality seeds, post-harvest storage facilities, and roads to help get crops (GE or not) from farms to cities, could greatly increase the incomes of farmers in developing countries.

Setting aside the heated rhetoric from both proponents and opponents of GE crops, there is abundant evidence that currently grown GE crops have major benefits worldwide and that foods made from those crops are safe to eat. However, certain farming practices utilizing those crops are unsustainable. Federal regulation of GE crops needs to be improved. Finally, GE crops are not the primary solution to food security in developing countries--but they could be helpful. Armed with those facts, one can begin to determine the true value and worth of genetic engineering and its proper place in agriculture.

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