APAC Agricultural Policy Analysis Center
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PolicyPennings by Daryll E. Ray & Harwood D. Schaffer

More unresolved GMO issues

In this third column in our series identifying issues that remain unresolved by the recent labeling law adopted by both chambers of Congress, we complete the series with a discussion of seven additional contentious issues surrounding GMOs that we believe will remain long after the President signs the GMO labeling legislation.

Different technologies – Most of the debate about GMOs has focused on transgenic crops in which a gene from one species is inserted into the DNA of another species. With herbicide-tolerant crops, a gene from a plant that is resistant to the desired herbicide is inserted into the genome of a crop like corn or cotton that normally is killed when sprayed with the given herbicide. Similarly, scientists have inserted a gene that induces the production of the toxin produced by the bacterium Bacillus thuringiensis into a corn plant. The corn plant then produces the toxin and kills European corn borer caterpillars, reducing the need for spraying the plant with an insecticide that would be used to kill the caterpillars, saving the farmer a field pass and the cost of the insecticide.

In recent years, as scientists have increased their knowledge of the function of various genes in a given species, they have developed the technology (CRISPR) needed to edit a gene to express a desired trait. In this case a "foreign" gene is not inserted into the organism's genome, rather the organism's own genome is slightly modified.

At present transgenic organisms are subject to government regulation while gene-editing using CRISPR technologies is not, because the organism does not contain any "foreign" DNA. For a more thorough summary of the technologies and their risks, readers can download "Genetically Engineered Crops: Experiences and Prospects" by the National Academies Press (http://tinyurl.com/j5kvhg7).

In the current debate, some have argued that these technologies are little different from conventional breeding which uses a less precise means of selecting for preferred genetic traits in all domesticated crops.

Potential benefits for consumers – Supporters of fewer regulations and the wider use of GMO crops and animals have pointed out that GMOs like Golden Rice could help farmers and consumers in developing countries. To produce the Golden Rice, genetic engineering has been used to insert a gene into white rice that enables it to produce beta-carotene, a precursor of Vitamin A. Increasing the availability of beta-carotene in the diet of poor children, who are dependent on the consumption of rice for most of their nutrition, could improve their health.

A GMO variety of cassava has been developed. It is resistant to the virus that has resulted in low yields for farmers who grow cassava as a staple both for marketing and self-consumption. Cassava provides the caloric base in the diets of a large number people in the Global South.

A recent article, Spilled Milk: Scientists engineered goats whose milk could save thousands of poor children's lives. A world wary of GMOs was not ready, discusses milk produced by transgenic goats that can combat diarrhea in poor countries where people drink goat milk (http://tinyurl.com/hqmojrc) and making the goats available to people around the world.

GMO rules – A couple of years ago we met with an employee of the US State Department who sat down to talk to us about the benefits of GMO crops for farmers and consumers in the Global South. We asked about whether or not farmers would have to pay a technology fee and purchase the Golden Rice seed each year. He said the companies that own the patents would be willing to make the Golden Rice and virus-resistant cassava available at no cost if the countries involved would be willing to adopt US patent regimens to protect other GMO crops. From a policy perspective, that raises the question of whether these crops are being developed as a humanitarian gesture or a means to ensure the profits of the companies who hold the patents.

Generics – Another question that will raise its head sooner or later concerns the rules that need to be put into place to enable the production of generic GMO seeds when the patent on a particular GMO event ends. We have rules in place for medicines produced by basic manufacturing processes. What we don't have are rules for medicines produced using biological processes or for seeds like the original glyphosate-resistant soybean seeds.

What should the rules look like for obtaining the seedstock for GMOs coming off patent and can the generic producer depend upon the documentation developed by the patent owner as generic drug manufacturers can? Who is responsible for continuing the registration of the product so it can be sold in international markets? How can farmers distinguish the generic GMO seeds from newer seeds that are still under patent?

Protection of non-GMO crops – An ongoing issue is finding ways to protect heritage varieties and organic seeds from contamination with pollen from GMO crops. To some extent, now that the "genie is out of the bottle" it is very difficult to maintain corn seedstock that has zero percent of seeds containing GMO genetics. As we move forward, this may become an increasingly important issue for some consumers.

Safety – GMO producers think of safety in terms of reducing false negatives. That means they want to reduce the chances of rejecting as statistically unsafe a technology that is in actuality safe (a false negative). On the other hand, opponents of GMOs want to reduce the risks of accepting a technology as statisti-

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cally safe that is really harmful (a false positive), a position known as the precautionary principle. As a result, society as a whole has not been able to come to an agreement on what is a tolerable level of risk. But then again, anyone who has been following the Flint (Michigan) water crisis knows that there is little agreement on what constitutes a safe lead level in drinking water.

When it comes to public water systems, the operators of those systems have to make an annual disclosure of water tests for contaminant levels and the US federal standards for acceptable levels of those contaminants in drinking water. With regard to GMOs, we would argue that the companies that produce them should be required to publically disclose all of the studies they have conducted on their products and any possible adverse reactions. The disclosure of any possible risks should be similar to that required of drug manufacturers.

Liability – Drug manufacturers are required to list the potential negative effects that have been identified in studies of the drug. Even if one does not read the insert sheet listing possible side effects, one cannot avoid hearing them in the rapid mono-tonal listing of them at the end of television commercials for these products. Even then, once the product is in general use there are often unidentified serious side effects which result in lawsuits.

We are troubled when we hear GMO supporters announce that there are no harmful side effects. What's to say that something won't show up after a quarter or half century of use? What makes GMOs different from the pharmaceuticals we take every day? What makes GMOs different from DDT, asbestos, or any number of industrial chemicals?

Who will be liable if there is a GMO event released for general use that ends having a previously undetected adverse reaction? As a general public, we have not even opened up that issue, but for the firm that produced such a product the result could be catastrophic, not to mention the effect on the lives of the persons who experience the adverse reaction. The best time to discuss the issue of liability is before anything happens.

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