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Genetic engineering – a crop of hyperbole

By Doug Gurian-Sherman
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The food crisis is much in the news. It is also on the minds of the biotech industry, which is using rising food worries to suggest, contrary to the evidence, that genetically engineered, or GE, crops are needed to help the world feed itself. The recent spike in food prices is due to increased demand, drought and trade policies rather than to inadequate global production. But world population is growing, so it is worthwhile to consider the role of GE for ensuring adequate, affordable and sustainable food in the future.

After 20 years of GE research and 13 years of commercialization, GE crops have a track record that allows us to evaluate their future prospects. And so far, they have shown little progress on the biggest food production issues, such as intrinsic yield, stress tolerance and improving sustainability. The weak performance to date raises questions about how much more of our scarce research dollars should be devoted to this controversial technology. Moreover, the lax regulation of both food safety and environmental risks from GE also remains to be addressed, especially in developing countries that often have no regulatory infrastructure to evaluate GE crops.

Most relevant for food sufficiency are properties such as yield – producing more on available land – and better use of resources, especially in the face of climate change. Agriculture already accounts for about 70 percent of human water use, so using less water to grow crops is increasingly important. And because current industrialized agriculture often degrades soil and causes substantial pollution from fertilizers, pesticides and climate-changing gases, we need to do a better job of producing food without degrading the environment.

Let's be clear. As of this year, there are no commercialized GE crops that inherently increase yield. Similarly, there are no GE crops on the market that were engineered to resist drought, reduce fertilizer pollution or save soil. Not one.

The most widely grown GE crop in the United States, herbicide-tolerant soybeans, has not increased yield above its conventional non-GE counterparts, based on U.S. Department of Agriculture trend data and numerous field studies. Insect-resistant GE crops have sometimes indirectly improved yields by reducing insect damage – so-called operations yield. But such yield increases have been modest, and recent studies suggest that much of the apparent improvements may be due to other advances, such as from conventional breeding. New innovations, using new insights from our growing knowledge of crop genetics, are improving the versatility and speed of these established, productive breeding techniques, without using GE.

What about environmental benefits? Those, too, have been modest at best.

Cutting through the rhetoric, overall pesticide use (herbicides, insecticides and fungicides) has not been reduced through GE. Although there may have been some initial reductions, recent U.S. data suggest that herbicide use in GE crops is now significantly higher than it was prior to their introduction. Weeds that have developed resistance to the herbicide used with GE crops now infest several million acres, forcing greater herbicide use. Insect-resistant GE crops have reduced overall insecticide use somewhat, but on balance GE crops have not reduced our dependence on pesticides.

Soil erosion and degradation can be reduced by reducing tillage. And reduced tillage often accompanies GE herbicide-tolerant crops. But reduced-till methods were on the rise prior to the adoption of GE crops. The USDA reported in 2002 that the data did not point to GE as a significant contributor to reduced tillage.

In many cases we can accomplish the same or better results at less expense by applying the science of agroecology. Insecticide use can be reduced by alternating the use of more crop types rather than growing

nothing but corn, or only corn and soybeans. Soil erosion can be largely eliminated by the common organic practice of using cover crops between seasons. These and other practices improve soil, which thereby retains more water, helping crops during droughts. Large improvements in water use can be achieved through technologies such as drip irrigation rather than wasteful methods commonly used now.

Many of these issues are discussed in a recently published report of the International Assessment of Agricultural Knowledge, Science and Technology for Development, sponsored by the World Bank and U.N., which concluded that the role of GE in improving food security in the developing world should be secondary to other approaches.

Finally, to the extent that GE may provide benefits in the future, GE must be adequately regulated to ensure food safety and protect the environment. Unfortunately, the United States, with industry support, has neglected the regulation of GE crops. The Food and Drug Administration does not approve the safety of GE foods; it simply ushers them into the market. The FDA has only a voluntary regulatory process for GE food safety, fundamentally unchanged since 1992, that requires no specific safety tests and largely allows companies to determine the tests they conduct. USDA was criticized in 2002 by the National Academy of Sciences for insufficient scientific rigor in its environmental safety assessments, and has recently lost several cases in federal courts for its lax regulation. Its own inspector general severely criticized its regulatory apparatus in 2005. USDA is revising its regulations, but current drafts do not adequately address previous criticisms.


The challenge of growing and distributing food for a hungry world deserves serious attention. So far the inflated claims of the biotechnology industry are not backed up by scientific evidence, but its rosy rhetoric obscures our choices. This can keep us from investing in tools such as conventional breeding and agroecology that, based on their track record, should be leading the way to helping the world feed itself.

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