ENVIRONMENTAL WORKING GROUP
THE POWER OF INFORMATION

GENETICALLY ENGINEERED CROPS AND THE DEVELOPING WORLD

March 2013

Nearly 1 billion people went hungry worldwide in 2010.[1] Although there is enough food available to feed Earth's entire population, problems of infrastructure, distribution, politics and war all contribute to an ongoing world hunger crisis.

As the global population grows, moreover, feeding everyone will take the very best solutions. Many new technologies, methods and products have been developed to make agriculture more efficient, but results have been mixed.

The companies that develop and market genetically engineered (GE) crops and foods have made bold promises of increased yields and solutions to world food shortages, but the facts show that these promises have yet to be realized. Farmers growing GE crops have instead relied on massive increases in toxic herbicides, grappled with the evolution of herbicide-resistant "superweeds" and "superbugs" and struggled with their growing dependence on the patented seeds that cause these very problems.

As a result, genetically engineered crops are facing increased scrutiny and rejection in some countries. Already 62 countries demand that GE crops and foods be labeled. Many have banned their cultivation or refused to import them. This state of affairs warrants a serious discussion of the risks of overreliance on GE products.

YIELDS

The biotech industry routinely claims that GE crops have yields higher than conventionally bred varieties and issues studies to support its assertions, but much of these data reflects the combined effects of genetic engineering along with other technologies.

In 2009 the Union of Concerned Scientists published a report that measured the yield impact of GE crops and concluded: "Commercial GE crops have made no inroads so far into raising the intrinsic or potential yield of any crop. By contrast, traditional breeding has been spectacularly successful in this regard; it can be solely credited with the intrinsic yield increases in the United States and other parts of the world that characterize the agriculture of the twentieth century."[2]

Other data suggest that some GE crops actually have lower yields than non-GE varieties.[3] For example, field trials of soybeans found a 50 percent drop in the yield of GE varieties because of gene disruption.[4] And hybrid corn varieties engineered with the Bt bacterium to produce a pest-killing protein were slower to develop and ultimately had a 12 percent lower yield than non-GE varieties.[5]

A U.S Department of Agriculture report on the overall performance of GE crops concluded, "GE crops available for commercial use do not increase the yield potential of a variety. In fact, yield may even decrease… Perhaps the biggest issue raised by these results is how to explain the rapid adoption of GE crops when farm financial impacts appear to be mixed or even negative."[6]

DROUGHT RESISTANCE AND GE CROP PERFORMANCE

Climate change has increased the urgency of finding ways for agriculture to withstand extreme weather variations. The USDA has approved only one GE corn seed designed to withstand drought. Limited field-testing of it began in 2012. But the crop is predicted to increase corn productivity by just 1 percent. That's no better than traditional breeding techniques. Improved farming practices have also increased drought tolerance in U.S. corn by 1 percent a year – without the high costs and decades of development of genetically engineered versions.[7]

Industry is promoting the adoption of GE crops worldwide, but the failures of its proprietary technologies are often overlooked. Consider these examples:

- A virus-resistant African sweet potato was introduced in Uganda at a cost of $6 million in development funds, only to find it had low yields and was not resistant to the local virus it was created to fight.[8] A conventional breeding project produced a virus-resistant strain for a much smaller investment.[9]
- Developers of cassava genetically engineered to be virus-resistant promised a tenfold increase in yield when it was introduced to Africa in the 1990s.[10] The GE crop soon lost its resistance to the virus and has fed fewer people than the previous varieties. Yet the positive press continued.[11] Ultimately, however, conventional breeding produced a truly virus-resistant variety that is also drought-tolerant.[12]
- After a highly touted "Green Revolution" initiative in South Africa introduced GE soy and corn in 2003-2004, a study by development and educational professionals found that the GE crops damaged internal organs of animals who ate them as feed, worsened weed growth and contaminated non-GE crops with GE pollen. The farmers in the project lost income as a result.[13]

POLICY AND POLITICAL BARRIERS

Efforts to promote genetically engineered foods as a way to expand the global food supply are facing public resistance and international labeling requirements worldwide. As a result of the known deficiencies of GE crops and their uncertain long-term health effects, more than 60 countries now require that GE foods be labeled. Topping the list are the world's two most populous developing countries, China and India.[14] The list will continue to grow: In 2011, the Codex Alimentarius Commission (the international food standard-setting body created by the United Nations' World Health Organization and the Food and Agriculture Organization) issued an official guidance supporting countries' right to determine their own GE food labeling requirements.

The U.S. and other developed countries that seek to donate GE crops as food aid have run into barriers. Some developing nations have viewed these crops as "political food" and rejected the aid. After the 2010 Haitian earthquake, for example, the Haitian Ministry of Agriculture rejected Monsanto's offer to donate GE Roundup Ready seeds.[15]

THE DEVELOPING WORLD: NEEDS AND MARKET OPPORTUNITIES

In 2010, a UN General Assembly Report concluded that the key to improving prospects for small and subsistence level farmers is basic technical assistance, training and agro-ecological practices, not genetic engineering. According to the report, these practices could increase yields in developing countries in South America, Africa and Southeast Asia by 86-to-113 percent, essentially doubling yields while reducing pesticide use by 85 percent or more.[16]

Developing countries wishing to grow crops for export have little incentive to choose GE crops. The United States is not a viable market as it already produces a surplus of GE crops, and the European market has been largely hostile to GE foods.

CONCLUSION

World hunger is a complex issue. Distribution, access, poverty, politics, war and waste than are often more important than yields or food supply. Biotechnology has not been employed in a meaningful way so far to address world food shortages. GE technology has not produced higher crop yields but instead an escalation in herbicide use and the emergence of "superweeds" and even "superbugs." Moreover, an increasing number of countries, including key emerging markets, require labeling of GE foods, restricting access to those markets for U.S. growers. Someday more sophisticated biotechnology techniques may increase crop yields, reduce water needs and deminished chemical use in agriculture, but applied biotechnology to date has not achieved those worthy goals. To the contrary, it has consistently failed to meet expectations while raising new concerns about safety, health and sustainability.

ENDNOTES

1. Food and Agriculture Organization of the United Nations. http://www.fao.org/news/story/en/item/20568/icode/
2. Gurian-Sherman, D. "Failure to yield: Evaluating the performance of genetically engineered crops," Union of Concerned Scientists, 2009. http://www.ucsusa.org/assets/documents/food_and_agriculture/failure-to-yield.pdf
3. Benbrook, C. "Evidence of the magnitude and consequences of Roundup Ready soybean yield drag from university-based varietal trials in 1998," Sandpoint, Idaho, July 13, 1999. http://www.mindfylly.org/GE/RRS-Yield-Drag.htm
4. Elamore, RW, Roeth, FW, Nelson, LA, et. al. "Glyphosate-resistant soyabean cultivar yields compared with sister lines," Agronomy Journal, 2001, 93:4080412. http://bit.ly/11ZAG10
5. Ma, BL, Suedi, KD. "Development, yield, grain, moisture and nitrogen uptake of Bt corn hybrids and their conventional near-isolines," Field Crops Research, 2005; 93: 199-211. http://www.saveourseeds.org/downloads/Btmaize_inferior_yield.pdf
6. Fernandez-Cornejo, J, McBride, WD. "The adoption of bioengineered crops," Agricultural Economic Report No. 810. Washington, DC, US Department of Agriculture, 2002. http://www.ers.usda.gov/publications/aer810/aer810.pdf
7. Gurian-Sherman, D. "High and dry: Why Genetic Engineering Is Not Solving Agriculture's Drought Problem in a Thirsty World," Union of Concerned Scientists, 2012. http://www.ucsusa.org/assets/documents/food_and_agriculture/high-and-dry-report.pdf
8. Gathura, G. "GM technology fails local potatoes," The Daily Nation (Kenya)," Jan. 29, 2004. http://bit.lyKPQPxL
9. deGrassi, A. "Genetically modified crops and sustainable poverty alleviation in Sub-Sahara Africa:An assessment of current evidence," Third World Network – Africa, June 2003. http://allafrica.comsustainable/resources/view/00010161.pdf
10. Groves, M. "Plant researchers offer bumper crop of humanity," Los Angeles Times, Dec. 26, 1997. http://articles.latimes.com/1997/dec/26/news/mn-2352
11. Donald Danforth Plant Science Center, "Danforth Center cassava viral resistance update 2006." http://bit.ly/13sROqU
12. International Institute of Tropical Agriculture (IITA), "Farmers get better yields from new drought-tolerant cassava," Nov. 3, 2008. http://bit.ly/L3s946
13. Jack, M. "GM project faces ruin," The New Age (South Africa), June 28, 2011. http://www.thenewage.co.az/21688-1008-53-GM_project_faces_ruin
14. Gruere, G, Rao, S.R. "A review of international labeling policies of genetically modified food to evaluate India's proposed rule" AgBioForum, 2007, 10(1): 51-64. http://bit.ly/YHDXeV
15. Greenhalgh, M. "Farmers Reject Monsanto Donation," Food Safety News, June 7. 2010. http://www.foodsafetynews.com/2010/06/haitian-farmers-burn-monsanto-hybrid-seeds/#.UFs2x1HXiZR
16. De Schutter, O. "UN General Assembly Report submitted by the Special Rapporteur on the right to food," Dec. 20, 2010. http://www2.ohchr.org/english/issues/food/docs/A-HRC-16-49.pdf

Source: Just Label It