Genetic Engineering Risks and Impacts

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Any technology that offers benefits will usually come with risks as well. In order to make wise decisions about using a technology, we must understand its potential impacts well enough to decide whether the risks are acceptably low.

What are the risks posed by the use of genetic engineering (GE) in agriculture? The answers fall mostly into two categories: risks to human health, and environmental impacts.

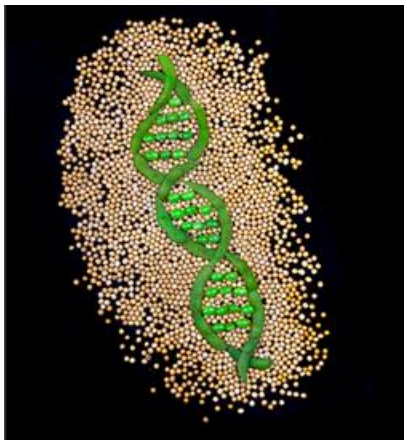

Photo: Roy Kaltschmidt, Lawrence Berkeley National Laboratories

GE Health Risks

Health risks of genetic engineering have sometimes been described in exaggerated, alarmist terms, implying that foods made from GE crops are inherently unsafe. There is no evidence, for instance, that refined products derived from GE crops, such as starch, sugar and oils, are different than those derived from conventionally bred crops.

It is also an exaggeration, however, to state that there are no health risks associated with GE. For one thing, not enough is known: research on the effects of specific genes has been limited—and tightly controlled by the industry.
But we do know of ways in which genetically engineered crops could cause health problems. For instance, genes from an allergenic plant could transfer this unwanted trait to the target plant. This phenomenon was documented in 1996, as soybeans with a Brazil nut gene—added to improve their value as animal feed—produced an allergic response in test subjects with Brazil nut allergies.

Unintended consequences like these underscore the need for effective regulation of GE products. In the absence of a rigorous approval process, there is nothing to ensure that GE crops that cause health problems will always be identified and kept off the market.

GE Environmental Impacts

Genetically engineered crops can potentially cause environmental problems that result directly from the engineered traits. For instance, an engineered gene may cause a GE crop (or a wild relative of that crop) to become invasive or toxic to wildlife.

But the most damaging impact of GE in agriculture so far is the phenomenon ofpesticide resistance. Millions of acres of U.S. farmland are now infested by weeds that have become resistant to the herbicide glyphosate. Overuse of Monsanto's "Roundup Ready" trait, which is engineered to tolerate the herbicide, has promoted the accelerated development of resistance in several weed species.

Looking for ways to fight back against these "superweeds," farmers are now turning to older, more toxic herbicides such as 2,4-D and dicamba. As if on cue, agribusiness companies have begun to develop new GE crops engineered to tolerate these older herbicides—with no guarantee that the Roundup Ready story will not repeat itself, producing a new wave of resistant weeds.

And this issue is not confined to herbicides: recent reports suggest a growing problem of corn rootworms resistant to the insecticide Bt, which some corn varieties have been engineered to produce.

GE and Industrial Agriculture

As the superweed crisis illustrates, current applications of genetic engineering have become a key component of an unsustainable approach to food production: industrial agriculture, with its dependence on monoculture—supported by costly chemical inputs—at the expense of the long-term health and productivity of the farm.

A different approach to farming is available—what UCS calls "healthy farms." This approach is not only more sustainable than industrial agriculture, but often more cost-effective. Yet as long as the marketplace of agricultural products and policies is dominated by the industrial model, prioritizing expensive products over knowledge-based agroecological approaches, healthy farm solutions face an uphill battle.

In the case of GE, better solutions include crop breeding (often assisted by molecular biology techniques) and agroecological practices such as crop rotation, cover crops, and integrated crop/livestock management.

Such healthy farm practices are the future of U.S. agriculture—and policymakers can help speed the transition by supporting research and education on them. In the meantime, stronger regulation of the biotechnology industry is needed to minimize health and environmental risks from GE products.