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The Iowa Environmental Council's position on

Genetically Modified Organisms (GMOs) and the Environment

Genetically Modified Organisms (GMOs) have tremendous potential to help humanity. However, the use of this technology has exploded in recent years with very little analysis of its environmental risks. There are many questions that must be answered about how GMOs will affect our environment. GMO technology must be used in a system that relies on sound science, wise policy, and an informed public.

The Iowa Environmental Council believes:
1. Significantly more research is needed on the environmental effects of GMOs.
2. A strong regulatory approach is required to ensure, as much as possible, that GMO products are not harmful to the environment.
3. The public must be given complete and timely information and encouraged to participate in policy-making decisions about this issue.

(Please note: This paper covers only selected concerns surrounding GMOs and the environment.)

Background

The first farmers were plant breeders. They selected plants and cultivars within their crops that were nutritious and safe and resisted stress, insects, and disease. In this process, they narrowed the genetic diversity of the plant community. Over time, pests continued to adapt, and farmers continually worked to keep ahead of weeds, insects, and fungal diseases.

In the first half of the 20th century, Henry A. Wallace and other scientists placed plant breeding on a more scientific foundation when they developed hybrid corn. Hybrid corn was adopted enthusiastically by American farmers, because corn yields increased markedly. Farmers and the seed companies that bred and sold the hybrids profited.

About 25 percent of the corn and 60-plus percent of the cotton grown in the United States in 1999 had been modified using recombinant technologies

Following the discovery of the structure of the DNA molecule in the early 1950s, molecular genetics advanced quickly. Technologies were developed to insert single genes into the genetic code of test organisms. By the 1980s, these technologies were being applied to commercial plants.

Another seminal event occurred in 1990 when the Plant Variety Protection Act gave plant breeders intellectual property rights on seeds of hybrids they had developed. Consequently, the U.S. government permitted the patenting of genetic material. Plant breeders from industry and universities now had the ability to develop crops with specific traits — and to charge for their efforts. This also allowed the bundling of genetics and chemical treatments. The now-popular Roundup (glyphosate) Ready corn that includes Bt expression is an example.

Scientists now are able to take a piece of DNA containing a specific gene from almost any organism (including plants, animals, bacteria, or viruses) and introduce it into a specific crop species. An organism that has been modified using this modern technique of genetic exchange is what we refer to as a GMO. GMO products that now are commercially available may include traits to resist the broad-based herbicide Roundup (mainly corn, soybean, cotton, and canola products). This trait allows essentially all weeds to be killed by spraying with the herbicide. Another common genetic modification allows plants, mainly corn,

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to express a compound (Bt) that kills the European corn borer larvae.

GMO crops have proven very popular with American farmers. About 25 percent of the corn and 60-plus percent of the cotton grown in the United States in 1999 had been modified using recombinant technologies, according to the Council for Agricultural Science and Technology in Ames.

Along with the rapid rise in the use of genetically modified crops has come a highly contentious debate. In fact, members of the Iowa Environmental Council hold widely differing opinions about the safety of this new technology. Views range from the need of agriculture to increase production by using GMOs, to the fear that the technology will bring unpredictable environmental and health consequences.

The use of GMOs has exploded, but we still do not know where and how strong the risks are

If agricultural biotechnology even partially fulfills the promises claimed by its adherents, it indeed will be a remarkable human innovation. By engineering desirable traits into seeds, proponents claim that agricultural biotechnology will feed the world's growing population, combat disease, be more nutritious, and enable use of more environmentally sound agricultural practices.

For example, a gene encoding beta carotene/Vitamin A in rice will greatly reduce Vitamin A deficiency (if the rice can be grown commercially and accepted by the people of rice-eating nations). Modifying seed to increase stress tolerance in cereal grains would greatly increase crop production in many of the world's poorer nations. New strains of plants developed with GMOs could produce higher yields with fewer applications of pesticides and fertilizers. As a result, less land could be devoted to crops and more to natural areas, particularly if GMOs are adapted to food-short nations. Already, the Roundup Ready soybean has permitted farmers to utilize no-till practices, which reduce soil erosion, because the Roundup Ready soybean does not require cultivation to control weeds. (Unfortunately, however, farmers seem to be using less no-till than before such seeds were made available, indicating that GMO technology may not be key to tillage decisions.)

Despite the controversy surrounding GMOs, the technology is expanding rapidly. Long-term testing will be required to determine whether this technology is safe for our environment.

The Iowa Environmental Council's position

1. Significantly more research is needed on the environmental effects of GMOs.
A broad ecological assessment must be made of the effects of modified crops on the environment. The limited research that has been conducted so far has raised serious questions. For example:

Is there a risk to non-target species, such as birds and butterflies, from plants that have a gene from the microbe Bacillus thuringiensis (Bt)? (A gene from this bacteria is incorporated into crop plants to kill certain pests.) It will take several years and significant and expensive monitoring to show for certain that Bt expressed in the corn plant is safe to non-target species.

There is a need for research on *the potential for resistance to Bt expressed by the crop.* Resistance to sprayed Bt commonly used in organic agriculture has been documented. If this resistance becomes more common because of the widespread use of Bt in corn, Bt varieties will be of little value.

Further, *what effect does Bt in plant residues have on the long-term health of the soil?* For example, Bt presence in plant tissues remains after harvest. Does that presence in the organic residue inhibit the functioning of microorganisms that decompose crop residue and recycle it for future use by crops? If so, this could be very damaging to fragile soil biological ecosystems.

Another unknown is the *rate and magnitude of development of Roundup resistant weeds in fields treated each year with high doses of Roundup.* Scientists already are reporting Roundup resistant weeds. It is entirely predictable that resistance will develop, since it has occurred with virtually all herbicides used in agriculture.

Does the use of GMO crops indeed reduce the use of pesticides, as many claim? In theory, these crops should reduce pesticide use. In reality, the limited research so far shows mixed results. A recent report by the Economic Research Service of the U.S. Department of Agriculture showed that pesticide use on pesticide-tolerant crops varies with the crop and technology examined.

Are GMOs instead another technology on the "pest control treadmill"? Instead, shouldn't we promote more ecologically sound crop rotations if agriculture is to progress toward a sustainable future? This requires open discussion of the risks and benefits of particular GMO plants before they are released for commercial use.

2. A strong regulatory approach is required to ensure, as much as possible, that GMO products are environmentally benign. The recent fiasco over Starlink raises questions about the need for better regulatory control over GMO products, the safety of these products in the food chain, and the complexities of handling commodity crops.

Several federal agencies have limited oversight over GMOs. The U.S. Department of Agriculture regulates genetically engineered plants, and the U.S. Food and Drug Administration regulates foods made from those plants. If any of the plants are, themselves pesticides, the U.S. Environmental Protection Agency is involved. Genetically engineered animals other than poultry and livestock are not regulated for environmental risks under U.S. law, according to the Union of Concerned Scientists.

According to the National Academy of Sciences, uncertainties exist about the long-term effects of GMOs, and these uncertainties often force agencies to base their decisions on minimal data sets. Often pressure for quick approval means regulatory decisions are being made based on very little information.

Sound science linked with precautions must be the cornerstone of our regulatory program for GMOs. Strong government support must be obtained for this science. We cannot rely solely on research supplied from industry nor from research funded largely by industry or biased public interest groups. Regulations must be adopted to ensure that the environmental effects, including unintended consequences of GMOs on the soil, water, and biota, are evaluated thoroughly before products are released. A standard and rigorous testing protocol must be adopted. Any concerned group should be able to access the results of the testing before product approval. Since this effort will require research as well as standard testing procedures, federal support must be available so that universities and private research groups can participate.

We must act responsibly and knowledgeably about GMO technology to ensure it doesn't threaten the very humanity it is supposed to serve

3. The public must be given timely and complete information and encouraged to participate in policy-making decisions about this issue.
As the use of GMOs has exploded, the public has struggled to understand the technology and the issues involved. *There is a need for accurate and understandable information to help citizens fairly evaluate this technology, so that they can contribute to the debate and help direct its use.*

As part of the regulatory approval process, *a comprehensive risk-benefit analysis should be included that is open to public participation.* Such an analysis would help consider non-market attributes such as biodiversity concerns and erosion control. For example, even if a given GMO trait did increase yield, should it be developed if it also produces risks to the environment?

Conclusion

There are many actions that must be taken to ensure that GMO technology is not a threat to the very humanity — and the rest of creation — it is supposed to serve. As the use of this technology explodes, we still do not know where and how strong the risks are, nor do we know who will benefit and who will lose. We must act responsibly and knowledgeably about this technology. Doing so will require solid funding, appropriate research, proper regulatory oversight, and frequent and accurate communication with the public so that informed decisions can be made.

Approved by the Iowa Environmental Council Board of Directors 12/8/00

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