The Agricultural Biotechnology Debate: Both Sides Examined

By James Kleidon

Recent advances in the field of agricultural biotechnology have provided scientists novel ways to alter the genetic traits of crops. Because genetically modified (GM) crops may have a significant impact on the environment and food supply, opinions differ on how they should be deployed. Viewpoints are not divided based upon education or demographics. In fact, both supporters and opponents come from diverse backgrounds such as academic, government, and the general public. Biotech proponents state that GM crops should be deployed with reasonable limitations. Dissenters claim that genetically modified crops are too risky, and call for a complete moratorium.

Both sides of the GM crop controversy agree that new approaches are needed to increase crop yields, reduce farm-generated pollution, and proliferate vaccines against human pathogens. Dr. Gregory Conko and C.S. Prakash, founders of the AgBioWorld Foundation, represent the mainstream biotech community. Conko and Prakash assert that GM crops can increase food production, reduce pesticides, and "make foods safer and healthier" (1). In contrast, Ronnie Cummings of the Organic Consumers Association (OCA) argue that altering the genetic signature of naturally occurring crops can cause unpredictable environmental results and endanger humans (1).

The majority of support for GM research is found in the United States where proliferation of GM food products is widespread. Dietary supplements, cotton products, animal feed, canola oil, and soybeans are the primary domestic markets that utilize bioengineered crops. Statistics compiled by the Department of Soil and Crop Sciences at Colorado State University, report that nearly 50% of the U.S. soybean crop and 25% of the corn crop are GM species (7). At 80 million acres, America leads the world in the adoption of bioengineered crops (Col. State Univ. 3). GM supporters leverage the above facts to declare that bioengineered crops have already demonstrated safe deployment on a large scale.

For the most part, the biotech industry encountered minimal resistance during the 1970's and 1980's. A decade ago, opponents of agricultural biotechnology were unorganized and under funded. But within a few years, groups such as the 80,000-member Organic Consumers Association formed a powerful anti-GM lobby (Cummins 5). According to the OCA, increasing numbers of scientists warn that the development of GM species use "crude, inexact, and unpredictable" gene-splicing techniques (Cummins 1). The result is a modified plant whose impact to the human food supply is unknown – and potentially dangerous.

To raise public concern, anti-GM groups have coined the term "Frankenfoods" (Cummins 2). Media coverage about bioengineered products was elevated recently by the discovery of StarLink tainted Taco Bell shells. StarLink is a Bt-spliced corn hybrid approved strictly for use as animal feed (Starlink). In the fall of 2001, lab tests revealed that StarLink corn had proliferated throughout the U.S. food industry. As a result of public outcry, millions of dollars of products were recalled (Cummins 3). The StarLink incident appeared to vindicate the anti-GM arguments. However, supporters of GM crops maintain that the StarLink incident was isolated and non-life threatening.

The gene-splicing controversy has heated up recently due to discoveries by independent researchers. According to the

OCA, molecular scientist Dr. Michael Antoniou determined that gene-splicing created “unexpected production of toxic substances in genetically engineered bacteria, yeast, plants, and animals” (Cummins 2). Dr. Antoniou also noted that latent toxins embedded within GM food products might remain undetected for years until long-term human health effects are detected.

Though rarely reported by the biotech community, bioengineered food products are responsible for human fatalities. In 1989 the FDA recalled the L-tryptophan dietary supplement after 37 Americans died and over 5000 were permanently disabled (Cummins 2). Investigators concluded that the supplement experienced contamination during the gene-splicing process. GM opponents regularly cite this incident as a primary example of the inherent risks of bioengineering. L-tryptophan is not derived from a GM crop, though it uses similar gene-splicing techniques. Since the 1989 tragedy, no further cases of death or incapacitation from bioengineered products have been reported.

Nevertheless, new research continues to raise questions about specific techniques used to create GM crops. One such questionable technique is the use of viral promoters such as the Cauliflower Mosaic Virus (CaMV). CaMV is used to stimulate the gene-splicing process. According to the OCA, Rowett Institute’s Dr. Arpad Puztai discovered a strain of CaMV stimulated GM potatoes that is poisonous to mammals (Cummins 2). The genetically modified potato strain reportedly damaged the stomach linings and internal organs of lab rats.

In contrast, experts within the biotech community claim that the OCA’s alarms are unwarranted. The United Kingdom’s Royal Society states that CaMV is a “normal constituent of common plant viruses” (9). The report continues, “CaMV has never been shown to cause disease in humans” (9). In fact, the report concludes that genetically modified plants do not demonstrate an allergenic risk greater than conventional crops. Incredibly, the Royal Society report did not mention the 1989 L-tryptophan tragedy.

While the debate over potential GM health effects rage, violations of safety regulations by biotech companies continue to raise concerns. Bending to public pressure, the USDA recently established a new biotechnology compliance and enforcement unit to police tighter GM restrictions (USDA). In a follow up article, the New York Times noted that even though 115 biotech violations have occurred in the U.S since 1990, no adverse effects have been reported (1). Regardless, bioengineering opponents argue that one tainted GM product could potentially kill or maim thousands of people.

The environmental impact of GM crops is yet another area of dispute. Anti-bioengineering groups claim modified crops cause genetic pollution by inserting foreign DNA into the ecosystem. The OCA argues that gene-altered crops are “inherently more unpredictable than chemical pollutants” since they can reproduce independently (3). Once the new DNA is released, it may be impossible to recall or purge the new organisms from the environment. The biotech community disagrees. Shelton, Zhao, and Roush state, “There is no evidence that current products of GM crops produced in the U.S. are harmful to the environment” (1). Nevertheless, most biotech insiders concede that more research is required to quantify the environmental effects of genetically engineered crops.

Bioengineering opponents claim that pesticide use actually increased because of GM crop deployment. In fact, the OCA states that reports of reduced pesticide levels are only “biotech industry propaganda” (Cummins 1). In spite of the OCA assertion, peer-reviewed scientific data showing an increase in pesticide use does not exist. Moreover, according to Beatrice T. Hunter, the USDA reports that the active ingredients used in pesticides have decreased by 0.3 million pounds in 1997 and an impressive 8.2 million pounds

in 1998 (2). To be sure, the USDA is an independent government entity not funded by biotech interests and compiles pesticide usage annually.

Groups such as the OCA hold a general view that altering the food supply is dangerous. Instead, they propose a return to organic farming methods. Yet, such an approach does not increase crop yields, nor improve pest control. Supporters of bioengineering argue that farmers have been genetically altering plants though selective breeding and cross-pollination for millennia. Most early crop mutation was performed long before techniques of scientific rigor, yet farmers identified methods to prevent harmful crops from entering the food chain. However, the advent of biotechnology enables the direct splicing of foreign DNA into a species - a power that farmers of centuries past never had access to.

Through public pressure biotech researchers and corporate profiteers may be forced to curtail GM crop deployment. Regardless, anti-bioengineering groups appear to be fixated on a complete moratorium of GM crop proliferation, making compromise difficult. To help pacify this impasse, rigorous pre-market safety testing by independent specialists may at least reduce public concern. Also, biotechnology companies could agree to long-term financial responsibility if their products prove hazardous. And last, governments can enforce mandatory labeling of all GM products and ensure that independent, peer-reviewed data is publicly available. As a result, consumer economics will have a voice over the success, or failure of genetically modified food products.

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