ERS Report Summary

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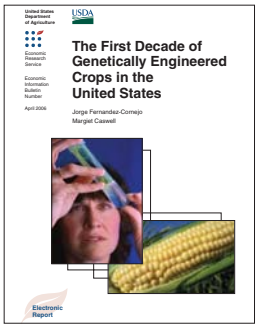

This is a summary of an ERS report.

Find the full report at ***www.ers.usda.gov/publications/eib11***

The First Decade of Genetically Engineered Crops in the United States

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Over the past decade, developments in modern biotechnology have expanded the scope of biological innovations by providing new tools for increasing crop yields and agricultural productivity. The role that biotechnology will play in agriculture in the United States and globally will depend on a number of factors and uncertainties. What seems certain, however, is that the ultimate contribution of agricultural biotechnology will depend on our ability to identify and measure its potential benefits and risks.

What Is the Issue?

Ten years after the first generation of genetically engineered (GE) varieties of major crops became commercially available, adoption of these varieties by U.S. farmers has become widespread. U.S. consumers eat many products derived from these crops--including some cornmeal, oils, sugars, and other food products--largely unaware of their GE content. Despite the rapid increase in the adoption of GE corn, soybean, and cotton varieties by U.S. farmers, questions remain regarding the impact of agricultural biotechnology. These issues range from the economic and environmental impacts to consumer acceptance.

What Did the Study Find?

This study examined the three major stakeholders in agricultural biotechnology: **seed suppliers and technology providers**, **farmers**, and **consumers**.

Seed suppliers/technology providers. Strengthening of intellectual property rights protection in the 1970s and 1980s increased returns to research and offered greater incentives for private companies to invest in seed development and crop biotechnology. Since 1987, seed producers have submitted nearly 11,600 applications to USDA's Animal and Plant Health Inspection Service for field testing of GE varieties. More than 10,700 (92 percent) have been approved. Approvals peaked in 2002 with 1,190. Most approved applications involved major crops, with nearly 5,000 for corn alone, followed by soybeans, potatoes, and cotton. More than 6,600 of the approved applications included GE varieties with herbicide tolerance or insect resistance. Significant numbers of applications were approved for varieties with improved product quality, viral resistance, and enhanced agronomic properties such as drought resistance and fungal resistance.

Farmers. Adoption of GE soybeans, corn, and cotton by U.S. farmers has increased most years since these varieties became commercially available in 1996. By 2005, herbicide-tolerant soybeans accounted for 87 percent of total U.S. soybean acreage, while herbicide-tolerant cotton

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accounted for about 60 percent of total cotton acreage. Adoption of insect-resistant crops is concentrated in areas with high levels of pest infestation and varies across States. Insect-resistant cotton was planted on 52 percent of cotton acreage in 2005—ranging from 13 percent in California to 85 percent in Louisiana. Insect-resistant corn accounted for 35 percent of the total acreage in 2005, following the introduction of a new variety to control the corn rootworm.

The economic impact of GE crops on producers varies by crop and technology. Herbicide-tolerant cotton and corn were associated with increased returns, as were insect-resistant cotton and corn when pest infestations were more prevalent. Despite the rapid adoption of herbicide-tolerant soybeans, there was little impact on net farm returns in 1997 and 1998. However, the adoption of herbicide-tolerant soybeans is associated with increased off-farm household income, suggesting that farmers adopt this technology because the simplicity and flexibility of the technology permit them to save management time, allowing them to benefit from additional income from off-farm activities.

Genetically engineered crops also seem to have environmental benefits. Overall pesticide use is lower for adopters of GE crops, and the adoption of herbicide-tolerant soybeans may indirectly benefit the environment by encouraging the adoption of soil conservation practices.

Consumers. Most surveys and consumer studies indicate consumers have at least some concerns about foods containing GE ingredients, but these concerns have not had a large impact on the market for these foods in the United States. Despite the concerns of U.S. consumers, "GE-free" labels on foods are not widely used in the United States. Manufacturers have been active in creating a market for GE-free foods. Between 2000 and 2004, manufacturers introduced more than 3,500 products that had explicit non-GE labeling, most of them food products.

In the European Union and some other countries, however, consumer concerns have spurred a movement away from foods with GE ingredients. Despite the fact that some European consumers are willing to consume foods containing GE ingredients, very few of these foods are found on European grocery shelves.

How Was the Study Conducted?

This report examined the three major stakeholders of agricultural biotechnology: GE seed suppliers and technology providers (biotech firms), farmers, and consumers. To examine biotech and seed firms, we used information from the literature as well as from the database of USDA approvals of field testing for new GE varieties. To study seed users, we drew on ERS studies based on USDA farm surveys, and to review the consumer perspective, we summarized surveys of consumers' attitudes from the literature.