

The Future Benefits of Plant Biotechnology

Benefits to Increase Through the Next Decade

Over the next decade, the industry's global plant biotechnology research and development pipeline will produce products that offer direct benefits to:

- Consumers, such as enhanced nutrition, convenience and taste. Examples include:
 - Tomatoes that are enriched with lycopene, an antioxidant believed to help protect against heart disease and cancer.
 - Rice enriched with beta-carotene, which stimulates production of vitamin A. Yearly, vitamin A deficiency causes blindness in 500,000 children and up to two million deaths.
 - Cooking oils that contain higher levels of vitamin E and lower levels of trans-fatty acids, which raise cholesterol levels and contribute to heart disease. Vitamin E is believed to improve the body's immune system, lowering the risk of cardiovascular disease and some forms of cancer.
 - Lettuce fortified with resveratrol, the compound found in red grapes that acts to lower levels of "bad" cholesterol and raise levels of "good" cholesterol ([CBI, 2002](#)).
- Farmers and the environment, such as improved drought tolerance, saline tolerance, and increased yields - facilitating the conservation of natural areas. Examples include:
 - Oranges resistant to citrus canker are being developed in Florida.
 - Sweet potatoes--an important staple crop in Africa and Asia--resistant to the feathery mottle virus are being developed in Kenya.
 - Disease-resistant bananas are being developed in Africa.
 - Drought-resistant varieties of corn, soybeans, wheat and other crops are being developed in North America ([CBI, 2002](#)).

Research & Development Extends to Developing Countries

According to a recent study, 63 countries are conducting plant biotech research and development across 57 different crops. More than half the research in plant biotech is taking place in developing countries.

- China is emerging as an influential force in plant biotech and has invested hundreds of millions of dollars in biotech research, second only to the United States.
- India has more than 20 academic and research institutions involved in plant biotech research covering 16 different crops.
- North America, Europe, China, Argentina, Brazil, South Africa, Australia and India are centers of influence that will lead the development of plant biotech in the future ([Runge, 2004](#)).

Another recent report by the International Food Policy Research Institute ([IFPRI](#)) documents, "...the misconception that plant biotechnology research is confined to private companies in rich countries." According to the report:

- "The reality is that poor countries have vibrant programs of public biotech research."
- Fifteen countries surveyed for the report are conducting plant biotech research and development across 45 different crop species with traits under development to create benefits such as reduced pesticide use, drought or saline resistance, or improved nutritional value of staple foods (Cohen, 2005).

Monsanto is Developing a New Generation of Benefits

Monsanto's plant biotech crop research is aimed at providing solutions in four key areas: yield improvement and stress tolerance, agronomic pest resistance traits, food improvement traits, and improved animal feed and processing traits in [Renessen](#), our joint venture with Cargill. Examples include:

- Monsanto is working on a trait that could elevate soybean yield by increasing plant photosynthesis. By increasing a plant's photosynthesis capability, we can improve crop vigor and performance, and boost grain yield and quality.
- Monsanto is advancing a class of genes that protect plants from severe water deprivation - conditions where non-transgenic plants are unable to grow and develop normally. By increasing the plants' ability to manage water stress and continue developing, we can improve grain yields and expand crop production into more arid acres.
- Monsanto is researching an oilseed crop that could produce a vegetable oil enriched with Omega-3 fatty acids. Omega-3 enriched oil could ultimately provide consumers with a new tool to protect against heart disease. While this research is several years away from regulatory consideration, it represents a good example of the potential of plant biotech.
- Consistent with the Sharing aspect of the Monsanto Pledge, Monsanto is investing in a noncommercial application of the company's technology to develop "golden" mustard that will yield cooking oil that is high in beta-carotene, which is a precursor to vitamin A.
- Within [Renessen](#), Monsanto is developing corn higher in lysine content and soybeans higher in tryptophan content. Both products hold the potential to improve the efficiency of feed products and reduce the need for expensive feed additives.

Monsanto invests more than \$500 million annually to identify and develop new solutions for growers and look for ways to keep farmers at the forefront of a competitive global market.

Economic Impacts of Future Plant Biotechnology Research and Products

Plant biotech research and development creates new jobs with good wages and will serve as an engine for economic development in the future for all regions of the world where research and product adoption occurs.

- According to a recent study by the Australian Bureau of Agricultural and Resource Economics ([ABARE](#)), full global adoption of plant biotechnology crops over the 10-year period from 2006-15 will result in income gains of US\$210 billion per year in gross national product (GNP), by the end of the period.
- ABARE projects the largest potential gains in incomes will be in developing countries at a rate of 2.1 percent of GNP per year.
- Even at less than full global adoption, ABARE projects the range of US\$134 billion to \$167 billion in global income gains from plant biotech per year toward the end of the period 2006-15.
- The European Union is projected to gain more than US\$21 billion per year toward the end of the period 2006-15 provided they fully adopt plant biotech products versus a net loss in GNP of US\$13 billion if the EU implements bans on production or trade of these products (Abdalla, 2003).
- According to a recent report, agriculture and food science jobs pay an average of US\$52,310 or more than 1.5 times the U.S. average wage. The plant biotech sector is creating jobs that are "knowledge-based, high-paying, and highly specialized," according to the report (Runge, 2003).