

The Benefits and Safety of Biotech Crops

The global population, approximately 1.6 billion in 1900, is expected to reach 9 billion by 2050. The Food and Agricultural Organization of the United Nations (FAO) estimates world food production will have to double on existing farmland if it is to keep pace with population growth.

Plant biotechnology can help address the challenges of feeding a growing world population by increasing crop yields in a sustainable way. This includes managing natural resources such as water effectively as well as farming in an environmentally compatible way.

IMPROVING CROP PRODUCTION

Natural Protection for Plants: Biotechnology has opened up new avenues for working with nature by providing new biopesticides, such as microorganisms and fatty acid compounds, that are toxic to targeted crop pests but do not harm humans, animals, fish, birds, or beneficial insects. A biopesticide that farmers have used since the 1930s is the microorganism *Bacillus thuringiensis*, or Bt, which occurs naturally in soil. With biotech methods, the genetic information for Bt proteins can be transferred into plants, making those crops naturally protected from attacks by certain target pests.

Herbicide Tolerance: When growing conditions are good for crops, they are also good for weeds. Many biotech crops are tolerant of specific herbicides that allow farmers to apply products to destroy weeds without damaging their crops. The method can minimize hand labor, as well as enable no-till farming, which can decrease soil erosion by up to 90 percent.

Resistance to Environmental Stresses: Crops must also contend with natural stresses such as drought, extreme cold and heat, and soils that are too acidic or salty to support plant growth. Plant biotechnologists are working to combat these challenges by developing drought-tolerant varieties, plants that require less water, as well as plants that tolerate different soils. Researchers have improved tomato and canola plants with biotechnology to tolerate salt levels 300 percent greater than conventional varieties. Other researchers have identified genes involved in cold, heat, and drought tolerance in some plants and bacteria and are working on introducing these genes to crops.

ENVIRONMENTAL & ECONOMIC BENEFITS

Because millions of farmers around the world have been growing biotech crops for over a decade, the cumulative economic and environmental impacts can now be quantified.

Global Impact of Biotech Crops: Socio Economic and Environmental Impacts 1996 - 2006

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KEY FINDINGS

- Since 1996, farmers have reduced pesticide applications in biotech crops by 286 million kgs, a reduction of 8 percent. This volume represents about 40 percent of the annual volume of pesticides used in the European Union.
- Biotech crops have made a significant contribution to reducing greenhouse gas emissions from agricultural practices – reduced pesticide and herbicide applications means fewer passes over the field with farm equipment, reducing 14.8 million kgs of carbon dioxide since 1996. This is the equivalent of removing 7 million cars from the road for one year.
- Farmers have earned higher incomes in every country where biotech crops are grown. In 2006, farmers who planted biotech crops earned over US\$7 billion in incremental income compared with farmers who planted non-biotech crops.
- Biotech crops contributed to increases in global production of corn, soybean, cotton and canola in 2006.

Studies conclusively show that biotechnology is delivering biodiversity benefits in numerous ways. No-till agriculture maintains soil health and the conservation of top soil and moisture content. These practices, coupled with reduced pesticide applications, have played a significant role in encouraging the growth of habitats that support different varieties of wildlife.

Reducing nutrients such as phosphate, potassium and nitrogen in farm runoff, increasing fertilizer efficiency and conserving top soil are ways that biotechnology helps protect water quality. Reduced insect damage in Bt crops means healthier plants use fertilizer more efficiently, reducing excess soil nutrients.

HEALTH AND NUTRITIONAL BENEFITS

Studies have shown that biotech varieties are healthier than conventional varieties. Biotech corn has been found to have fewer mycotoxins. Biotechnology can increase the nutritional value of crops, especially those that are food staples in developing countries. For example, scientists in New Delhi used a gene found in the South American plant amaranth to increase the

protein content of potatoes by 30 percent. Other examples include golden rice and canola oil, both of which are high in Vitamin A. The golden rice developers further improved rice with two other genes that increase the amount and digestibility of iron. Researchers have also been working to develop oils that have reduced trans fats, as well as allergy-free varieties of foods such as peanuts.

FUTURE BENEFITS OF AGRICULTURAL BIOTECH

Researchers worldwide are continually working to develop new biotech varieties that benefit farmers, industry, consumers and the environment. Some exciting new developments include:

- Plants and trees improved through biotech to express multiple traits, such as virus-tolerance and pest-tolerance.
- Biotech plants and trees that can tolerate or resist certain environmental stresses, such as drought or saline soil.
- Consumers will soon see biotech crops that are nutrient-enhanced and allergen-free, and oils from biotech crops that are healthier and contain fewer saturated fats and no trans fats after processing.

THE SAFETY OF BIOTECH CROPS

When new foods (crop varieties, animal breeds or microorganisms) are developed by traditional breeding methods, they are usually not subject to specific risk or safety assessment by national authorities or through international standards. This is in contrast to requirements introduced for Genetically Modified Organisms (GMOs) and foods derived from biotech crops.

- Before any biotech crop is commercialized, it undergoes rigorous government-mandated safety testing and regulatory assessment, spanning multiple years and systematic testing.
- To provide international consistency, a number of global regulatory and standard-setting bodies have introduced uniform standards for both human health and environmental safety assessment.
- The Cartagena Protocol on Biosafety came into force in 2003 and covers the environmental safety of GMOs.
- Principles developed by the Codex Alimentarius Commission, a joint program of the World Health Organization and FAO, cover food safety.

Scientific and regulatory experts worldwide have repeatedly concluded that foods from biotech crops are thoroughly evaluated through comprehensive testing for food, feed and environmental safety and are as safe as their conventional counterparts. Additionally, 25 Nobel Prize recipients and more than 3,400 prominent scientists have expressed their support for plant biotechnology as a “powerful and safe” way to improve agriculture and the environment.

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CropLife Asia promotes the benefits and responsible use of crop protection and plant biotechnology products, as well as sound regulatory frameworks in support of sustainable agriculture in the Asia Pacific region. As a regional unit of CropLife International – a global federation of the plant science industry in 91 countries – CropLife Asia supports the work of 15 member associations and is led by member companies at the forefront of crop production research and development.

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