



United States Department of Agriculture - Agricultural Research Service
Food Safety Research Information Office
FSRIO

FOOD SAFETY RESEARCH: A FOCUS ON

Agricultural Biotechnology

Agricultural biotechnology is a science that includes both traditional plant breeding and genetic engineering techniques to develop, modify, or improve living organisms such as plants, animals and microorganisms. It represents a technology gradient ranging from traditional biotechniques such as artificial insemination and embryo transfer to modern innovations which involve genetic engineering, monoclonal antibody production for diagnostics, tissue-culture methods leading to transgenics, and DNA markers to assess variation.

Modern agricultural biotechnology allows a specific gene(s) to be moved from one organism into another unrelated species to confer a desired trait.

Genetically modified (GM) food crops and agricultural biotechnology have generated interest and controversy around the world. Understanding both the benefits and the potential negative effects to the food supply and the environment are the focus of many scientific bodies. GM crops are planted on more than 109 million acres worldwide. The United States accounts for more than two-thirds of all biotech crops planted globally. GM food crops grown by U.S. farmers include corn, cotton, soybeans, canola, squash, and papaya.



Traditional plant breeding: A breeder collects pollen.

FSRIO Web site: A Resource for Food Safety Research Projects

For biotechnology-related research projects, search the Food Safety research database at:

<http://fsrio.nal.usda.gov/quicksearch.php>

The ARS National Program 301 Genomics and Genetic Improvement Annual Report 2004

http://www.ars.usda.gov/research/programs/programs.htm?np_code=301&docid=7289



Transgenic Cotton: A transgenic crop plant contains a gene(s) that has been artificially inserted. The inserted gene sequence is called a transgene.

RESEARCH AREAS

- Develop new technologies to improve the control of expression of specific transgenes and their localization in the host genome.
- Identify factors that confer tolerance to drought, flooding, heat, freezing in order to transfer these traits to present crops.
- Identify and characterize plant genes for disease resistance.
- Enhance disease resistance in plants by incorporating the gene through conventional and genetic engineering techniques.
- Conduct risk assessment studies in domesticated animals; microorganisms; plants; and fish.

GENERAL FACTS

- Many food products contain genetically engineered ingredients due to four biotech crops: soybeans, corn, canola and cotton. These biotech crops were engineered for insect control and weed management.
- Soybean - More than 70 percent of the U.S. soybean crop is a biotech variety making genetically engineered herbicide-tolerant soybeans the most common biotech plant products on the market. Soybean-based ingredients are soybean oil, soy lecithin, and soy protein.
- Corn - In 2002, over 25 percent of the U.S. field corn crop grown was a biotech variety. Corn-based ingredients include corn flour, corn oil, and corn syrup. Genetically modified sweet corn is less prevalent and almost no canned or frozen corn is from biotech corn plants.
- Canola - The U.S. imports most of its canola from Canada. In 2002, 50 percent of the rapeseed crop (canola oil is extracted from the rapeseed plant) was genetically engineered. Products containing canola include: canola oil, salad dressings, margarines, processed cheese, "non-dairy" products, chips, cookies, pastries, chocolates, candy coatings, and confections.
- Cotton - Nearly 70 percent of the cotton crop is genetically engineered. Products containing cotton seed oil include: peanut butter, cooking oils, chips, crackers and cookies.

ONLINE RESOURCES

Transgenic Crops: An Introduction and Resource Guide

<http://www.colostate.edu/programs/lifesciences/TransgenicCrops/>

Genetically Engineered Organisms

<http://www.geo-pie.cornell.edu/>

Biotechnology in Food and Agriculture

<http://www.fao.org/biotech/>

Biotechnology at the CFIA

http://www.inspection.gc.ca/english/sci/biotech/biotech_e.shtml

Biotechnology Fact Sheets/Frequently Asked Questions

<http://www.inspection.gc.ca/english/sci/biotech/gen/queste.shtml>

List of Completed Consultations on Bioengineered Foods

<http://www.cfsan.fda.gov/~lrd/biocon.html>

Agricultural Biotechnology

<http://www.usda.gov/wps/portal/!ut/p/s.7.0.A/7.0.1.OB?navid=BIOTECH&parentnav=AGRICULTURE&navtype=RT>

Safety Assessment of Foods Derived from Genetically Modified Animals Including Fish

http://www.who.int/foodsafety/biotech/meetings/ec_no_v2003/en/

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<http://www.nysaes.cornell.edu/comm/gmo/>

Pew Initiative on Food and Biotechnology

<http://pewagbiotech.org/>

The International Center for Genetic Engineering and Biotechnology

<http://www.icgeb.trieste.it/>

Agricultural Biotechnology Support Project

<http://www.iaa.msu.edu/absp/>

This fact sheet is one of several information products developed by the Food Safety Research Information Office (FSRIO) at the USDA's National Agricultural Library (NAL). Fact sheets on specific food safety research topics are available on the FSRIO web site at:

<http://fsrio.nal.usda.gov/topics.php>

FSRIO is a unique resource for the food safety research community. The program features a web site that serves as a gateway to research information and includes a database of federally-funded research projects. The database is available for researchers, policymakers, consumers and others to learn about research initiatives, and assist the government in assessing food safety research needs and priorities, thereby minimizing duplication of effort. FSRIO also provides a reference service at no charge.

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<http://www.nal.usda.gov>

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