



Grains of truth about **BIOTECHNOLOGY**

Definition

Biotechnology, sometimes referred to as genetically engineered food, biotech, bioengineered, genetically modified or recombinant DNA (rDNA) technology is food that has been produced from crops whose genetic makeup has been altered through a process using recombinant DNA, or gene splicing, to give the plant a desirable characteristic. In simpler terms, it is the application of living organisms to develop new products. These terms are often used interchangeably.

Methodology

To fully understand biotechnology, having a knowledge of genetics is useful. Proteins, made up of various combinations of amino acids, are essential for an organism's life and function. The number, kind and order of those amino acids in a specific protein determine the properties of that protein. DNA, or deoxyribonucleic acid, contains the necessary information for each cell to place the order of amino acids correctly.

It was not until 1953 that the DNA structure was discovered. It was this discovery that enabled researchers to determine that a DNA segment which encodes the proper information to make one protein is called a gene. It is DNA's specific order of these genes that determine an organism's traits. Genes were first isolated by scientists in the 1970s and gene transfers from one organism to another followed in the 80s. This transfer of traits allowed all future generations to pass to the recipient organism.

To simplify, biotechnology refers to foods from plants altered through other breeding methods. This has been done naturally for hundreds of years and is also referred to as hybrid foods. Examples include tangelos, which is a hybrid of a tangerine and a grapefruit, or broccoflower, a combination of broccoli and cauliflower. Many varieties of apples we enjoy today are produced through genetic modification.

Using traditional genetic modification methods such as cross-fertilization, scientists can produce a

desired trait, such as a hardier plant to withstand weather, longer growing seasons or pest resistance.

Newer methods of genetic modification are more precise, predictable and faster. By controlling the insertion of one or two genes into a plant, scientists can give it a specific new characteristic without transferring undesirable traits.

Uses and Benefits

Biotechnology provides other tools to make farming production less expensive and more efficient. Tolerance to specific herbicides and pests make weed and pest control simpler, more efficient and reliable, giving the farmer more time to spend on other crop production areas. It can also decrease the use of synthetic pesticides. These crop production options can help farmers keep pace with demand while reducing production costs.

Biotechnology has benefits to not just farmers but to producers and manufacturers. Examples include:

- disease resistance
- increased crop quality
- increased crop yield
- growth in adverse conditions like drought, salty soil or poor soil
- pharmaceutical research
- food safety

Safety Considerations

Crops developed through genetic engineering are always tested with the USDA, to make sure they are safe to grow; the FDA, to make sure they are safe for humans and animals to eat; and the EPA to ensure they pose no significant risk to the environment. In fact, crops produced in this way are the only ones formally reviewed to assess the potential for transfer of novel traits to wild relatives.

Other potential risks that are considered and assessed are those that include any environmental effects on birds, mammals, insects, worms and other organisms, especially in the case of insect or disease resistance traits.

In the area of food safety, once new traits are introduced into biotech-derived plants have been examined by the EPA and FDA, the plant proteins are studied for their potential toxicity and allergic responses. Exhaustive tests are done before any genetically engineered foods are introduced into the food supply.

To put all these considerations into perspective, one should note that while particular biotech traits being used are often new to crops, the same basic types of traits often can be found naturally in most plants. These basic traits, like insect and disease resistance, have allowed plants to survive and evolve over time.

Foods developed through plant biotechnology are safe to eat. They are basically equivalent to foods developed through traditional plant breeding, meaning there is no meaningful change in nutritional value or composition of the food.

More than 50 biotech food products have been evaluated by the FDA and found to be safe including: canola oil, corn, cottonseed oil, papaya, potatoes, soybeans, squash, sugar beets, sweet corn and tomatoes.

In addition to the USDA, FDA and EPA, the safety of plant biotechnology is also recognized by the American Dietetic Association, (http://www.eatright.org/cps/rde/xchg/ada/hs.xsl/advocacy_abiotechnology_ENU_HTML.htm), the American Medical Association (http://www.ama-assn.org/apps/pf_new/pf_online?f_n=browse&doc=policyfiles/HnE/H-480.985.HTM), the National Research Council (<http://www4.nationalacademies.org/onpi/WebExtra.nsf/1924512cf0cbdc53852567a1006fac27/8a1f6fa7fa83efab85256945004b3907?OpenDocument>), and the World Health Organization (<http://www.who.int/foodsafety/biotech/en/>).

Labeling

The same labeling laws that apply to all other foods and food ingredients apply to biotech foods. Standard requirements for all food labels mandate proper identification of products and notice of health or safety concerns. Labeling would be required in some instances, but not necessarily because the products were made using biotechnology.

A potential food allergy is an example of a health or safety risk that would mandate a product label. Generally, there must be something tangibly different about the food product, not the process by which it is made, for the FDA to require labeling. Disclosure of genetic engineering techniques is not required on the label. However, any significant

differences between the bioengineered food and its conventional counterpart do have to be disclosed in the labeling.

Consumer Impact

Bioengineered foods would have a positive impact on the consumer in many ways. There is the convenience of having favorite fruits and vegetables available year-round instead of waiting for them to be 'in-season'. Biotechnology can remove undesirable traits, like allergens and toxins, from foods by creating a healthier product. It can also add desirable traits like additional nutrients which help prevent diseases. It positively impacts the environment by making farming practices quicker, more efficient and eliminating the need in some cases for certain types of pesticides and herbicides because their resistance has been bred into the plant.

Position Statements

For further information on other organizations' biotechnology positions, please check the following websites:

National Association of Wheat Growers (NAWG): <http://www.wheatworld.org/pdf/NAWG%20Issues%20-%20Biotech.doc>

U.S. Wheat:

<http://www.uswheat.org/biotechnology/doc/AA3AB149DE586F0E8525710E0054007A?OpenDocument#>

Food and Drug Administration:

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

Environmental Protection Agency:

<http://www.epa.gov/scipoly/biotech/pubs/overview.htm>

United States Department of Agriculture:

http://www.usda.gov/wps/portal/!ut/p/s_7_0_A/7_0_1_OB?navid=BIOTECH&parentnav=AGRICULTURE&natype=RT

Sources

SOURCES: National Agricultural Statistics Service (www.usda.gov/nass), USDA (www.usda.gov/agencies/biotech), National Association of Wheat Growers (www.wheatworld.org), Growers for Biotechnology (www.growersforwheatbiotechnology.org), FDA (www.cfsan.fda.gov), Monsanto Company (www.monsanto.com), in conjunction with the American Dietetic Association (www.eatright.org).



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