Glossary of Food & Agricultural Biotechnology Terms

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GLOSSARY

Terms are defined here only as they relate to food and agriculture and may have applications in other industries (e.g., pharmaceuticals) that are not addressed.

For additional definitions and details, please refer to the USDA Glossary of Agricultural Biotechnology Terms located on their website (www.usda.gov).

A

acrylamide
A compound that forms in some foods during the cooking process (e.g., frying, roasting, or baking), due to heat interacting with sugars and an amino acid naturally present in some foods.

agriculture
The science, art, and business of producing crops and raising livestock.

allergic reaction
A reaction by the body's immune system after exposure to an allergen, often a protein. Food can contain proteins that induce an immune response. Allergic symptoms may include rash, hives, and in extreme cases, shortness or loss of breath or unconsciousness. *See also: USDA's Glossary*

Animal and Plant Health Inspection Service (APHIS)
A government agency within the United States Department of Agriculture (USDA) that protects and promotes the health of plants and animals used in agriculture and governs the field-testing of agricultural biotechnology crops.

animal antibiotics
Drugs that treat infectious diseases in animals by inhibiting the growth of or eliminating the microorganisms causing the disease. Antibiotics are used in animals for the same reason as for people: to treat and prevent the spread of diseases.

B

***bacillus thuringiensis* (Bt)**
A common soil microorganism in bioinsecticides used by farmers, including organic farmers and home gardeners, to control insects with minimal environmental impact. *See also: bioinsecticide. See also: USDA's Glossary*

bioinsecticide
Any material used in insect control that is derived from living organisms, such as bacteria, plant cells, or animal cells. Examples include *bacillus thuringiensis* (Bt) protein (from bacteria), and Pyrethrum (made from dried flower heads of certain chrysanthemum varieties), both used to control insects. *See also: bacillus thuringiensis* (Bt)

biotechnology
The application of biological science to enhance attributes of plants, animals, and other organisms, or to improve methods for producing foods. Includes techniques such as fermentation, enzyme purification, and plant and animal breeding (particularly recombinant DNA technology). *See also: DNA, genetic engineering, recombinant DNA (rDNA) technology. See also: USDA's Glossary*

breeding (traditional or selective)
Making deliberate crosses or matings of plants or animals so the offspring will have particular desired characteristics derived from one or both of the parents. Practices used in traditional plant breeding may include aspects of biotechnology such as tissue culture, mutational breeding, and marker-assisted breeding.

C

carbon footprint
Amount of greenhouse gases, specifically carbon dioxide or other carbon compounds, emitted by individuals, companies, or countries (i.e., a person's activities or a product's manufacture and transport) during a given period of time. Indicator of air quality often used to measure an entity's environmental impact. *See also: climate change*

chromosome
Composed of proteins and a long molecule of DNA, chromosomes determine the inheritance of traits. *See also: DNA, gene. See also: USDA's Glossary*

climate change
While the term generally refers to a significant change from one climatic condition to another, 'climate change' has been used interchangeably with the term 'global warming' to refer to broad, long-term changes in the earth's climate and weather patterns. *See also: carbon footprint*

cloning
Process used to create a genetic replica of a fragment of DNA or an entire organism, without sexual reproduction. *See also: USDA's Glossary*

commodity
A product of agriculture. Examples of agricultural commodities include wheat, rice, beets, corn, beef, soybeans, and coffee.

D

deregulation
The process or act of removing government restrictions or regulations on planting, import, and/or export. Plant commodities are deregulated upon the government receiving and evaluating scientific research demonstrating food, feed, and human safety and minimal impact on the environment. *See also: commodity*

deoxyribonucleic acid (DNA)
Carries the genetic information for most living systems. The DNA molecule consists of four base proteins (adenine, cytosine, guanine and thymine) and a sugar-phosphate backbone, arranged in two connected strands to form its characteristic double-helix. The genome (all of the genetic information in a living organism), rather than single DNA molecules, determines the organism's characteristics. *See also: chromosome, gene, helix. See also: USDA's Glossary*

E

Environmental Protection Agency (EPA)
U.S. governmental agency whose mission is to protect human health and safeguard the natural environment—air, water, and land—upon which life depends. EPA is one of three agencies that review new products of agricultural biotechnology that express plant-incorporated pesticides (Bt), as well as the use of pesticides with a new crop variety developed through biotechnology. *See also: USDA, FDA*

F

field test or trial
A test of a new crop variety, including biotechnology-derived, conducted outside the laboratory with specific requirements on location, plot size, methodology, etc.

Food and Drug Administration (FDA)
U.S. regulatory agency responsible for ensuring the safety and wholesomeness of all foods sold in interstate commerce except meat, poultry, and eggs (which are under the jurisdiction of the U.S. Department of Agriculture). One of three agencies that review new products of agricultural biotechnology that are intended for the food supply. *See also: USDA, EPA*

food security
Availability of and access to sufficient, nutritious food on a consistent basis, as well as the knowledge and ability to select and prepare foods to ensure safety and adequate nutrition. Antonym: food insecurity.

G

gene
The fundamental unit of heredity. A gene contains the "blueprints" for building proteins in a specific pattern that determines the characteristics of a plant, animal, or other organism, and how those traits will be passed from one generation to the next. It is typically a specific segment of a chromosome. *See also: chromosome, DNA. See also: USDA's Glossary*

genome
All the genetic material in all the chromosomes of a particular organism.

genomics
The study of genomes, including sequencing an organism's genome, and examining the specific function of each gene and how genes work together.

genotype
The genetic identity of an individual. Genotype often is evident by outward characteristics, but may also be reflected in more subtle biochemical ways not visually evident.

genetic engineering
The selective, deliberate alteration of an organism's genes using modern molecular biology, particularly recombinant DNA techniques. Other terms used include gene splicing, gene manipulation, recombinant DNA (rDNA) technology, or transgenic technology. *See also: recombinant DNA (rDNA) technology. See also: USDA's Glossary*

genetic modification
The production of heritable improvements in plants or animals for specific uses, via either genetic engineering or other more traditional methods. Some countries other than the United States use this term to refer specifically to genetic engineering. *See also: genetic engineering. See also: USDA's Glossary*

glyphosate
An herbicide used to kill weeds, such as those that compete with commercial crops. It is also known under the trade name Roundup®. Farmers favor glyphosate for its ability to control many types of weeds and its low toxicity compared with other herbicides. *See also: herbicide, weed*

grains
The seeds of cereal grasses, such as wheat, corn, oats, barley, rye, and rice. Grain foods include bread, cereals, rice, and pasta.

H

helix
A spiral, staircase-like structure with a repeating pattern described by two simultaneous operations (rotation and translation). *See also: DNA*

herbicide
Class of crop protection and specialty chemicals used to control weeds on farms and in forests, as well as in non-agricultural applications such as golf courses, public properties, and home lawns. *See also: pesticide, weed*

herbicide-tolerant crops
Crops that have been developed to survive (tolerate) exposure to particular herbicides by the incorporation of certain gene(s), either through genetic engineering or traditional breeding methods. The herbicide can therefore be applied to the field for weed control without damaging the crop. *See also: USDA's Glossary*

hormone
A chemical substance produced naturally by the body which has one or more of three basic functions: 1) enables and promotes normal development; 2) enables and promotes the adjustment of performance level; and 3) plays a role in keeping certain physiological functions in balance.

insecticide
A class of crop protection and specialty chemicals used to control insects on farms and forests, as well as non-agricultural applications such as residential lawn care, golf courses, and public properties. *See also: pesticide*

insect-protected crops
Plants with the ability to withstand, deter, or repel insects, thereby preventing them from feeding on the plant. The traits (genes) determining resistance may be selected by plant breeders through cross-pollination with other varieties of this crop or through the introduction of genes such as *bacillus thuringiensis* (Bt) through genetic engineering. *See also: bacillus thuringiensis* (Bt). *See also: USDA's Glossary*

insecticide resistance
The development or selection of heritable traits (genes) in an insect population that allows them to survive exposure to an insecticide that would otherwise debilitate or kill them. The presence of such resistant insects makes the insecticide less useful for managing pest populations. *See also: USDA's Glossary*

integrated pest management (IPM)
The coordinated, safe, and economical use of pest and environmental information along with available pest control methods (including cultural, biological, genetic, and chemical methods) to prevent unacceptable levels of pest damage.

M

modern farming practices
Farming practices that maximize the amount of production per unit (either per acre or per animal) while conserving soil and water resources. May include use of modern government-approved aids (e.g., fertilizers, insecticides, herbicides, and antibiotics), which undergo extensive safety testing before approval. *See also: animal antibiotics, herbicide, insecticide, pesticide*

N

nanotechnology
A science that involves the design and application of structures, devices, and systems on an extremely small scale, called the nanoscale; that is, billionths of a meter, or about 1-millionth the size of a pinhead. Potential applications related to food include food packaging and processing to improve food safety and quality, and better nutrient and ingredient profiles to improve health.

nematodes
Microscopic, slender worms, some of which, feed on plant roots.

O

organic agriculture
Agricultural production without the use of synthetic pesticides or fertilizers. The *USDA Organic Standards* provides a list of pesticides (fungicides, insecticides, and herbicides) and other additives approved for production of organic crops, and currently does not allow the use of genetically engineered seeds. *See also: commodity, pesticide. See also: USDA's Glossary*

P

pesticide
A broad class of crop protection products, including four major types: insecticides used to control insects; herbicides used to control weeds; rodenticides used to control rodents; and fungicides used to control mold, mildew, and fungi. Both farmers and consumers use pesticides in the home or yard to control termites and roaches, clean mold from shower curtains, stave off crab grass on the lawn, kill fleas and ticks on pets, disinfect swimming pools, etc. *See also: herbicide, insecticide, weed*

plant pests
Organisms that may directly or indirectly cause disease, spoilage, or damage to plants, plant parts, or processed plant materials. Common examples include certain insects, mites, nematodes, fungi, molds, viruses, and bacteria. *See also: USDA's Glossary*

protein
A molecule composed of amino acids that perform major roles in body tissue structure, in the formation of enzymes, hormones, and various body fluids and secretions, and in the transport of some substances in the body. Protein is consumed in foods, then broken down and used by the body to build entirely different proteins that perform these functions. *See also: USDA's Glossary*

R

ractopamine hydrochloride
An ingredient in animal feed that works to improve the quality and protein content in meat. It is used by some pig, cattle, and turkey farmers to produce lean cuts of meat. Ractopamine increases feed efficiency by reducing the amount of feed and grain needed to produce meat. Ractopamine is an FDA approved animal feed ingredient and is not a hormone, an antibiotic, or a genetically engineered ingredient.

recombinant bovine somatotropin (rbST)
A protein produced through biotechnology that has the same genetic make-up as bovine somatotropin (BST), a naturally-occurring protein hormone produced in cows. Somatotropin is also produced by humans and most animals to support tissue health, maintenance, and growth. FDA has approved the effectiveness and safety of rbST. All milk, regardless of production method, is safe and provides the same nutritional benefits. *See also: biotechnology, FDA, gene*

recombinant DNA technology (rDNA)
Breeding technique in which a copy of a piece of DNA containing one or a few genes is transferred between organisms, or "recombined" within another organism. *See also: biotechnology, DNA. See also: USDA's Glossary*

S

stacked traits
The biotechnology process by which more than one gene can be transferred, resulting in a plant with two or more transgenic traits. Usually a result of the crossing of two transgenic plants with different transgenes *See also: genes, genetic engineering, plant biotechnology, transgenic*

staple crops
The most common crops in people's diets, such as rice, wheat, and maize (corn), which provide 60% of the world's food energy intake. Typically, staple crops are well adapted to the climate in which they are grown, and many are tolerant of drought, pests, or soil low in nutrients.

sustainable agriculture
An integrated system of plant and animal production practices that will, over the long term: satisfy human food and fiber needs; enhance environmental quality and the natural resource base upon which the agricultural economy depends; make the most efficient use of nonrenewable resources and integrate natural biological cycles and controls; sustain the economic viability of farm operations; and enhance the quality of life for farmers and society.

T

transgenic organism
A plant, animal, or other organism with different traits from the parent organism, resulting from the use of recombinant DNA techniques to insert genetic material from another organism. *See also: biotechnology, DNA, gene, genetic engineering. See also: USDA's Glossary*

tillage
Practice of preparing the ground for planting and controlling weeds between plantings by turning or aerating the soil. Conventional tillage can lead to increased risk of erosion; therefore, conservation tillage has been increasingly adopted to preserve soil, a nonrenewable resource.

conservation tillage
Practice that provides the aeration benefits of conventional tillage, but the soil is typically not overturned. The number of trips needed by a tractor across the ground prior to planting is also reduced. Cumulatively, time and money are saved and environmental impact is improved (e.g., conserving and enhancing the quality of topsoil, reducing pesticide run-off into groundwater, and reducing fossil fuel use).

no tillage/no-till farming
Planting crops directly into the residue of the previous year's crop. In addition to amplifying the benefits of conservation tillage, leaving crop residue untouched also helps to sequester carbon, a greenhouse gas, in the soil.

U

U.S. Department of Agriculture (USDA)
U.S. government agency charged with agricultural oversight to ensure a safe, affordable, nutritious, and accessible food supply. The USDA works to enhance the quality of life for the U.S. population by supporting production of agricultural products; caring for agricultural, forest, and range lands; supporting sound development of our rural communities; providing economic opportunities for farm and rural residents; expanding global markets for agricultural and forest products and services; and working to reduce hunger in the United States and throughout the world.

V

variety, plant
A group of individual plants that is uniform, stable, and distinct genetically from other groups of individuals in the same species. Also referred to as a cultivar. *See also: USDA's Glossary*

virus
A simple, non-cellular parasite that can reproduce only inside living cells of other organisms. Viruses cause a large variety of significant diseases in plants, animals, and humans.

virus resistant (crops)
Plants with the ability to withstand plant viral diseases. Developed through traditional breeding or through genetic engineering (e.g., papaya ringspot virus-resistant papaya). *See also: breeding*

W

weed
A plant that is growing in an undesired area and is able to overtake other plants by overcrowding, depleting soil nutrients and moisture that would otherwise be available to preferred plants or crops.

Y

yield
The amount of an agricultural crop, such as a grain, fruit, or vegetable, produced in a season. It can be measured in pounds or bushels per acre, or kilograms or metric tons per hectare.