GLOSSARY OF BIOTECHNOLOGY TERMS

Agrobacterium tumefaciens: A gram-negative, rod-shaped flagellated bacterium responsible for crown gall tumor in plants. Following infection, the TI plasmid from the bacterium becomes integrated into the host plant's DNA and the presence of the bacterium is no longer necessary for the continued growth of the cell. This bacterium is now used to deliberately transfer genetic material into plants through biotechnology.

Biobased products: Fuels, chemicals, building materials, or electric power or heat produced from biological material(s). The term may include any energy, commercial or industrial products, other than food or feed, that utilizes biological products or renewable domestic agricultural (plant, animal, and marine), or forestry materials.

Biological boundaries: A concept that differentiates one organism from another and suggests that organisms cannot or should not exchange genetic material. An alternative concept is that genes are defined not by the organism from which they came, but by their function. As scientists have identified genes in seemingly non-related organisms such as plants and humans, they have found identical genes in each.

Biotechnology: A set of biological techniques developed through basic research and now applied to research and product development. Biotechnology refers to the use of recombinant DNA, cell fusion and new bioprocessing techniques.

Biotechnology-derived: The use of molecular biology and/or recombinant DNA technology, or in vitro gene transfer, to develop products or to impart specific capabilities in plants or other living organisms.

Bt corn (maize): A maize plant that has been developed though biotechnology so that the plant tissues express a protein derived from a bacterium, Bacillus thuringiensis, which is toxic to some insects but non-toxic to humans and other mammals.

Cell: The lowest denomination of life thought to be possible. Most organisms consist of more than one cell, which become specialized into particular functions to enable the whole organism to function properly. Cells contain DNA and many other elements to enable the cell to function.

Chromosomes: The self-replicating genetic structure of cells containing the cellular DNA. Humans have 23 pairs of chromosomes.

Cry1A: A protein derived from the bacterium Bacillus thuringiensis that is toxic to some insects when ingested. This bacterium occurs widely in nature and has been used for decades as an insecticide, although it constitutes less than 2 percent of the overall insecticides used.

Cultivar: Synonymous with variety; the international equivalent of variety.

Double helix: The twisted-ladder shape that two linear strands of DNA assume when complementary nucleotides on opposing strands bond together.

DNA (deoxyribonucleic acid): The genetic material of all cells and many viruses. The molecule that encodes genetic information. DNA is a double-stranded molecule held together by weak bonds between base pairs of nucleotides. The four nucleotides in DNA contain the bases adenine (A), guanine (G), cytosine (C) and thymine (T). In nature, base pairs form only between A and T and between G and C; thus the base sequence of each single strand can be deduced from that of its partner.

Eukaryote: Organism whose cells have (1) chromosomes with nucleosomal structure and separated from the cytoplasm by a two-membrane nuclear envelope, and (2) compartmentalization of functions in distinct cytoplasmic organelles. Contrast prokaryotes (bacteria and cyanobacteria).

Gene: The fundamental physical and functional unit of heredity. A gene is an ordered sequence of nucleotides located in a particular position on a particular chromosome that encodes a specific functional product, such as a protein or RNA molecule.

Gene flow: The exchange of genetic traits between populations by movement of individuals, gametes or

spores. It involves the spread of new variants among different populations through dispersal.

Gene gun: A device invented at Cornell University that allows genetic material to be introduced into a new organism. The genetic material from the donor is "shot" into cells of the recipient and the material is incorporated into its DNA.

Gene splicing: The isolation of a gene from one organism and then the introduction of that gene into another organism using techniques of biotechnology.

Genetic engineering: The technique of removing, modifying or adding genes to a DNA molecule in order to change the information it contains. By changing this information, genetic engineering changes the type or amount of proteins an organism is capable of producing, thus enabling it to make new substances or perform new functions.

Genetically modified organism (GMO): Often the label GMO and the term "transgenic" are used to refer to organisms that have acquired novel genes from other organisms by laboratory "gene transfer" methods.

Genetics: The study of the patterns of inheritance of specific traits.

Genome: All the genetic material in the chromosomes of a particular organism; its size is generally given as its total number of base pairs.

Herbicide-tolerant crop: Crop plants that have been developed to survive application(s) of one or more commercially available herbicides by the incorporation of certain gene(s) via biotechnology methods, such as genetic engineering, or traditional breeding methods, such as natural, chemical or radiation mutation.

Hybrid: Seed or plants produced as the result of controlled cross-pollination as opposed to seed produced as the result of natural pollination. Hybrid seeds are selected to have higher quality traits, e.g. yield or pest tolerance.

Labeling of foods: The process of developing a list of ingredients contained in foods. Labels imply that the list of ingredients can be verified. The U.S. Food and Drug Administration has jurisdiction over what is stated on food labels.

Minimal tillage practices: Practices that allow farmers to reduce the tilling of the land in order to conserve topsoil and its nutrients.

Mutation: Any inheritable change in DNA sequence.

Mutation breeding: Commonly used practices in plant breeding and other areas in which chemicals or radiation are applied to whole organisms, e.g. plants, or cells so that changes in the organism's DNA will occur. Such changes are then evaluated for their beneficial effects, such as disease resistance.

Natural selection: The concept developed by Charles Darwin that genes which produce characteristics that are more favorable in a particular environment will be more abundant in the next generation.

Nucleotide: A subunit of DNA or RNA consisting of a nitrogenous base (adenine, guanine, thymine or cytosine in DNA; adenine, guanine, uracil or cytosine in RNA), a phosphate molecule, and a sugar molecule (deoxyribose in DNA and ribose in RNA). Thousands of nucleotides are linked to form a DNA or RNA molecule.

Organic agriculture: A concept and practice of agricultural production that focuses on production without the use of synthetic pesticides. The USDA has established a set of national standards which are online at <http://www.ams.usda.gov/nop>.

Ovule: An outgrowth of the ovary of a seed plant that encloses an embryo.

Pesticide resistance: A genetic change in response to selection by a pesticide resulting in the development of strains capable of surviving a dose lethal to a majority of individuals in a normal population. Resistance may develop in insects, weeds or pathogens.

Plant-incorporated protectants: Formerly referred to as plant-pesticides, plant-incorporated protectants (PIPs) are substances that act like pesticides that are produced and used by a plant to protect it from pests such as insects, viruses and fungi.

Pollen: The cells that carry the male DNA of a seed plant.

Prokaryote: Organisms, namely bacteria and cyanobacteria formerly known as blue-green algae, characterized by the possession of a simple naked DNA

chromosome or occasionally two such chromosomes, usually of circular structure, without a nuclear membrane and possessing a very small range of organelles, generally only a plasma membrane and ribosomes.

Protein: A large molecule composed of one or more chains of amino acids in a specific order. The order is determined by the base sequence of nucleotides in the gene that codes for the protein. Proteins are required for the structure, function and regulation of the body's cells, tissues and organs, and each protein has unique functions. Examples are hormones, enzymes and antibodies.

Recombinant DNA molecules (rDNA): A combination of DNA molecules of different origin that are joined using recombinant DNA technologies.

Recombinant DNA technology: Procedure used to join together DNA segments in a cell-free system (an environment outside a cell or organism). Under appropriate conditions, a recombinant DNA molecule can enter a cell and replicate there, either autonomously or after it has become integrated into a cellular chromosome.

Recombination: The process by which progeny derive a combination of genes different from that of either parent.

Resistance management: Strategies that can be employed to delay the onset of resistance. For insect resistance management, this includes the use of a "refuge" in which the insect will not be challenged by the pesticide used in the rest of the field.

Selective breeding: Making deliberate crosses or matings of organisms so that the offspring will have a desired characteristic derived from one of the parents.

Soil conservation practices: See minimal tillage practices.

Splicing: See gene splicing.

StarLink™: An insect-resistant variety of maize that was not labeled for human consumption.

Tissue culture: A process of growing a plant in the laboratory from cells rather than seeds. This technique is used in traditional plant breeding as well as when using techniques of agricultural biotechnology.

Traditional breeding: Modification of plants and animals through selective breeding. Practices used in traditional plant breeding may include aspects of biotechnology such as tissue culture and mutation breeding.

Transgenic: Containing genes altered by insertion of DNA from an unrelated organism. Taking genes from one species and inserting them into another species in order to get that trait expressed in the offspring.

Variety: Subdivision of a species for taxonomic classification. Used interchangeably with the term cultivar to denote a group of individuals that is distinct genetically from other groups of individuals in the species. An agricultural variety is a group of similar plants that by structural features and performance can be identified from other varieties within the same species.

Virus: A noncellular biological entity that can reproduce only within a host cell. Viruses consist of nucleic acid covered by protein; some animal viruses are also surrounded by a membrane. Inside the infected cell, the virus uses the synthetic capability of the host to produce progeny virus.

Vitamins: Various substances that are essential in minute quantities to the nutrition of animals and plants.❑

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