

PART THREE

Appendixes



APPENDIX 1: Glossary of Terms

Agrobacterium (a) A soil bacterium that can be used to transfer DNA genes into plants; (b) a genus of bacteria that includes several plant pathogenic species that cause tumor-like symptoms.

antibiotic-resistance (marker) gene (a) A bacterial gene coding for a protein that confers resistance to one or more antibiotics (such as ampicillin or kanamycin), used to identify transformed cells in the laboratory phase of research; (b) a gene used as a selection marker to distinguish cells that have taken up foreign DNA from those that have not; its action allows cells to survive in the presence of normally toxic antibiotic agents. Biosafety concerns include potential toxicity or allergenicity of the resulting protein and possibility of horizontal transfer from food or animal feed products to microorganisms in the human or animal gut, or the environment, which may compromise the therapeutic efficiency of clinically useful antibiotics.

Bacillus thuringiensis (Bt) A group of soil bacteria found worldwide that produce a class of proteins that are toxic to the larvae (caterpillars) of certain insects, particularly *Coleoptera* and *Lepidoptera*. Genes coding for Bt proteins are

now commonly used to genetically engineer plants to resist insect attack; spores of Bt are a major means of insect control in organic farming.

biodiversity The total variability within and among species of living organisms and their habitats.

biosafety (a) The goal of ensuring that the development and use of genetically engineered organisms and products made from them do not negatively affect plant, animal, or human health; genetic resources; or the environment; (b) policies and procedures adopted to avoid risk to human health and safety, and to the conservation of the environment, as a result of the use of genetically modified organisms for research and commerce.

biotechnology (a) The scientific or industrial use of living organisms to make or modify new products or improve existing plants, animals, or microorganisms. The term applies to the technique of gene splicing and, more generally, to other modern technologies such as plant tissue culture, embryo transfer, cell fusion, and fermentation; (b) any technological application that uses biological systems, living organisms, or derivatives thereof to make or modify prod-

ucts or processes for specific use; (c) interpreted in a narrow sense, a range of different molecular technologies such as gene manipulation and gene transfer, DNA typing, and cloning of plants and animals.

Bt crop A crop plant genetically engineered to produce insecticidal proteins derived from the bacterium *Bacillus thuringiensis*.

center of diversity A location(s) having a significant genetic diversity of a particular species; often but not always the center of origin.

center of origin The place or region where a crop species is thought to have originated.

chromosome (a) A highly compact, thread and spool-like structure comprising a long DNA molecule and associated proteins on which thousands of genes are arranged in a linear sequence; (b) the nuclear bodies containing most of the genes largely responsible for the differentiation and activity of the eukaryotic cell. Each eukaryotic species has a characteristic number of chromosomes.

commercialization (a) Placing on the market; (b) large-scale planting or importation of a GM crop or ornamental or tree species for the purpose of export or sale to the public.

confinement Isolation of an organism from its environment, including other sexually compatible plants using biological, spatial, temporal, and genetic mechanisms, e.g., isolation by distance, male sterility.

construct (noun) (a) An engineered DNA fragment designed to be transferred into a cell or tissue. Typically the construct comprises the gene or genes of interest, a marker gene, and appropriate control sequences as a single package; (b) a piece of DNA that has been intentionally assembled from various DNA segments and that may code for a protein or regulate gene expression.

containment (a) Physical isolation of an organism from its environment; (b) measures and protocols applied to limit contact of genetically modified organisms or pathogens with the external environment; (c) use of physical means (e.g., greenhouses, indoor growth facilities, isolated locations) and/or biological methods (e.g., male sterility, flower removal) to ensure that neither the organism nor its genetic material (in the form of propagative structures, seeds, pollen) is released into the environment.

deliberate release (a) Any intentional introduction into the environment of a GMO or a combination of GMOs for which no specific containment measures are used to limit their contact with and to provide a high level of safety for the general population and the environment; (b) any intentional use of organisms that is not under containment.

DNA Deoxyribonucleic acid; the material of which genes are made; a linear molecule consisting of a sequence of chemical subunits called bases, which encodes genetic information in the sequence of bases. It is present in chromosomes in the cell nucleus and also in chromosomal material of subcellular units such as mitochondria and chloroplasts.

electroporation (a) Use of an electric shock to facilitate transfer of isolated DNA into recipient cells, one of several procedures used for transformation; (b) the induction of transient pores in bacterial cells or plant protoplasts by the application of a pulse of electricity. These pores allow the entry of DNA into the cell.

environmental risk assessment The evaluation of risks to human health and the environment, whether direct or indirect, immediate or delayed, that are posed by the deliberate release or placing on the market of GMOs.

field test Experimentation with crops in a field situation to evaluate phenotypic traits, agronomic performance, and other parameters of interest.

gene (a) The physical and functional unit of heredity transmitted from generation to generation during sexual and asexual reproduction; (b) a linear segment of DNA that is made up of an ordered sequence of nucleotide bases that specifies the structure of a protein or has an defined function. More generally, the term is used in relation to the transmission and inheritance of particular identifiable traits.

gene flow (a) The exchange of genes in one or both directions at a low rate between different (usually) related and sexually compatible populations of organisms; (b) the horizontal movement of genes via pollen transfer among related or even unrelated plant species; (c) the spread of genes from one breeding population to another population.

genetic engineering See *genetic modification*.

genetic modification (a) Modifying an organism's genetic makeup by the introduction of a gene or genes into its cells in a way that allows transfer of the gene to successive generations; (b) the process of intentionally altering the genetic makeup of an organism, usually by insertion of one or more genes and/or regulatory sequences that may come from the same or any other organism. Modern biotechnology is used to alter the genetic material of living cells or organisms in order to make them capable of producing new substances or performing new functions.

genetically modified organism (GMO) (a) The broad term used to identify organisms in which the genetic material has been altered by use of molecular techniques (i.e., in a way that does not occur naturally by mating and/or natural

recombination); (b) an organism that has been transformed by the insertion of one or more genes.

genome The entire complement of genetic material present in each cell of an organism.

GM product A preparation consisting of or containing a GMO or a combination of GMOs that is placed on the market.

hazard The potential of an organism to cause harm to human health and/or the environment; may also be referred to as "adverse effect."

hybrid The offspring of genetically different parents.

organism Any biological entity able to replicate or transfer its own genetic material.

phenotype (a) The visible or measurable qualities of an organism as distinguished from its genetic constitution (genotype); (b) the visible appearance of an individual that reflects the reaction of its genome with a given environment.

promoter (a) A short DNA sequence to which RNA polymerase and certain regulating molecules bind to initiate synthesis from a DNA template (gene); (b) a DNA sequence associated with a gene that determines under what conditions that gene is expressed. Promoters may be: (1) *tissue-specific*, meaning they determine that the gene will be expressed only in e.g., seeds or leaves or roots, etc.; (2) *inducible*, meaning the gene will be expressed only in response to an external trigger such as exposure to insect attack, heat, etc.; (3) *developmentally specific*, meaning the gene will be expressed only at certain stages of development, such as in embryos or during flowering or in senescing organs; (4) *constitutive*, meaning the gene will be expressed under virtually all conditions.

risk The combination of the magnitude of the consequences of a hazard, if it occurs, and the likelihood that the consequences will occur.

risk assessment The measures to estimate what harm might be caused, how likely it would be to occur, and the scale of the estimated damage.

risk communication (1) The science of understanding scientific and technological risk and how it is communicated within a socio-political structure (Dr. Vincent Covello); (2) the presentation of information, sometimes technical in nature, regarding risk – its nature, magnitude, likelihood, consequences, management, etc. – in a manner that is accessible and understood by a nontechnical audience.

risk management The measures to ensure that the production and handling of an organism are safe.

stakeholder (1) A person or group that has an investment, share, or interest in something, such as a business or industry; (2) somebody or something with direct interest – a person or group with a direct interest, involvement, or investment in something, for example, the employees, shareholders, and customers of a business concern.

toxin A biological compound produced by one organism that is deleterious to the growth

and/or survival of another organism.

transformation (a) The uptake and integration of DNA in a cell in which the introduced DNA is intended to change the recipient organism in a predictable manner; (b) the introduction and assimilation of DNA from one organism by another.

transgene A gene that has been introduced into a genetically modified or transformed organism.

transgenic (organism) (a) An organism in which one or more new genes (“transgenes”) have been integrated into its genome by genetic modification; includes the offspring of a genetically modified organism.

vector A self-replicating agent (for example, a plasmid or virus) used to deliver DNA into a cell.

weediness The plant phenotype of interfering with human activities, being a nuisance in agro-nomic settings, and/or disrupting native ecosystems. A plant may be designated a weed based on various traits, some of which may be subjective, such as rapid growth, invasiveness, persistence, pest and disease resistance, high reproductive capacity, and causing reduced crop yields.

APPENDIX 2: Annotated List of Internet Sites

General Information

AgBiosafety

<http://www.agbiosafety.unl.edu>

A source of scientific, regulatory, and educational materials relevant to crop biotechnology and the current debate on the genetic modification of food. The site offers up-to-date information on current issues in biotechnology and food safety and a searchable database of safety information on GM crops that have received regulatory approval in Canada, the United States, and elsewhere. It provides educational resources and lesson plans on crop biotechnology for both consumers and educators and links to other biotech education sites.

AgBiotechNet

<http://www.agbiotechnet.com>

Ag BiotechNet covers all aspects of the application of biotechnology and genetic engineering in agricultural production and food processing and marketing. The focus is on scientific reports and findings and technical analysis, although the site

also covers emerging issues of widespread interest, developments in the policy arena, and major media coverage.

AgBioWorld

<http://www.agbioworld.org>

Devoted to bringing information about technological advances in agriculture to the developing world; provides information to teachers, scientists, journalists, and the general public on the relevance of agricultural biotechnology to sustainable development; maintains the declaration of "Scientists In Support Of Agricultural Biotechnology," and offers a discussion listserve.

Biotechnology Australia

<http://www.biotechnology.gov.au>

Biotechnology Australia is a multidepartmental government agency responsible for coordinating nonregulatory biotechnology issues for the Commonwealth Government. It seeks to provide balanced and factual information on biotechnology to the Australian community.

NOTE: The Web addresses in this list were correct as of July 2002. Given the dynamic nature of the Internet, over time some sites may be moved to a new address, become inactive, or closed.

Checkbiotech

<http://www.checkbiotech.org>

The aim of this site, sponsored by Syngenta, is to provide trustworthy and up-to-date information on agricultural biotechnology and thereby to contribute to an open debate. The collection of documents gives an overview of ongoing discussions in agricultural biotechnology. The information provided comes from different sources and thus may not always reflect the opinion of the sponsor. This site will be useful for people with a special interest in the field of ag-biotech and GM-food, primarily opinion makers and decision makers around the globe. It also serves as an informational and educational tool for the general public and for schools.

Council for Biotechnology Information

<http://www.whybiotech.com>

This site carries extensive information organized in sections for consumers, farmers, journalists, teachers, and students. Also found are up-to-date, in-depth reports, publications, and news articles.

Information Systems for Biotechnology (ISB)

<http://isb.vt.edu>

Here you will find documents and searchable databases pertaining to the development, testing, and regulatory review of genetically modified plants, animals, and microorganisms within the United States and abroad.

Life Sciences Knowledge Center (Monsanto)

<http://www.biotechknowledge.monsanto.com>

This site maintains an evolving collection of news items, technical reports, and other documents representing many points of view on agricultural biotechnology; sections on biotechnology basics, glossary, topic library, and a discussion board.

Transgenic Crops: An Introduction and Resource Guide

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

This Colorado State University site provides broad coverage of the subject, including the history of plant breeding, a clear explanation of what transgenic plants are and how they are made, biosafety evaluation and regulation, current and future transgenic products, and a question-and-answer format for information on risks and concerns.

International Organizations and Programs

Agricultural Biotechnology Support Project (ABSP)

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

ABSP is a project funded by the U.S. Agency for International Development based in the Institute for International Agriculture at Michigan State University. The project, which began in 1991, aims to assist developing countries in the development and management of the tools and products of agricultural biotechnology.

BIO-EARN – East African Regional Programme and Research Network for Biotechnology, Biosafety and Biotechnology Policy Development

<http://www.bio-earn.org>

The overall objectives of the BIO-EARN Programme are to: enable countries in the region to develop biotechnologies and policies according to their own needs, abilities, and opportunities; promote collaboration in biotechnology, biosafety, and biotechnology policy development to address key challenges and opportunities in the region; and foster communication nationally and regionally between scientists, policy makers, biosafety regulatory officials, and private sector.

Biosafety Information Network and Advisory Service (BINAS)

<http://www.binas.unido.org/binas>

BINAS, a service of the United Nations Industrial Development Organization (UNIDO), monitors global developments in regulatory issues in biotechnology providing information on world-wide national regulations and field trials.

Biotechnology Advisory Center (BAC) (Stockholm Environment Institute)

<http://www.sei.se/biotech/bac.html>

The BAC was established to help meet the challenge of biosafety capacity building in developing countries. The BAC's support consists of three components: training, independent advice, and biosafety and biotechnology information exchange. The East African Regional Programme and Research Network for Biotechnology, Biosafety and Biotechnology Policy Development (BIO-EARN) is the main activity at present. The principal objective of the BIO-EARN programme is to build national capacity and competence in biotechnology, biosafety, and biotechnology policy. Selected academic and governmental institutions in Ethiopia, Kenya, Tanzania, and Uganda will receive support through a regional network.

BioTrack Online

<http://www.oecd.org/EN/home/0,,EN-home-528-nodirectorate-no-no-no-27,FF.html>

BioTrack Online was created in 1995 as a pioneer site at the Organization for Economic Cooperation and Development (OECD) in the field of the safety in biotechnology. This site focuses on information related to the regulatory oversight of products of biotechnology. BioTrack Online currently includes: information related to major legislative developments in OECD member countries (including details of the relevant regulatory authorities); an online database of products of biotechnology as

well as field trials; a number of free documents; and links to other related Web sites. BioTrack is used by governments, industry, other stakeholders, and all who need the information in the field.

CamBioTec

<http://www.promega.com/latinamerica/cambiotech.htm>

CamBioTec is an international network with the mission to facilitate biotechnology-based applications in the fields of agri-food and environmental management in Latin America by promoting a favorable environment for the development of the industry, and by increasing public awareness on the associated benefits and eventual risks.

Cartagena Protocol on Biosafety (CBP)

<http://www.biodiv.org/biosafety>

This is the main site for information about the CPB, including the background and full text of the agreement, articles, updated list of signatures and ratifications, meetings, and documents of the Intergovernmental Committee for the Cartagena Protocol (ICCP), the Biosafety Clearing House, and a database of biosafety capacity-building activities.

International Centre for Genetic Engineering and Biotechnology (ICGEB)

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

The Biosafety Unit of the ICGEB is dedicated to biosafety and risk assessment for the environmental release of genetically modified organisms. It offers information on biosafety concerns, upcoming meetings and training courses, and a regularly updated index of selected scientific articles published on biosafety and risk assessment from 1990 onward. This site also carries an outstanding collection of links to databases on GMO releases, scientific bibliographies, decision support systems, patents, and numerous other topics.

International Service for the Acquisition of Agri-biotech Applications (ISAAA)

<http://www.isaaa.org>

The primary site describes ISAAA's activities and initiatives in biosafety, food safety, intellectual property, and technology transfer. The Global Knowledge Center on Crop Biotechnology section (http://www.isaaa.org/activities/knowledge_center.htm) is organized into several main areas. Global Network provides a status of biotechnology in the developing countries of Asia, South America, and Africa. Crop Biotech Update is a weekly summary of world developments in agricultural biotechnology for developing countries. Separate pages cover GM products and biotechnology issues. ISAAA is a not-for-profit international organization co-sponsored by public and private sector institutions with the aim of facilitating the acquisition and transfer of agricultural biotechnology applications from the industrial countries, particularly proprietary technology from the private sector, to developing countries for their benefit.

UNEP-GEF Biosafety Project

<http://www.unep.ch/biosafety>

The UNEP-GEF Biosafety Project is funded by the Global Environmental Facility and is based on its "Initial Strategy for assisting countries to prepare for the entry into force of the Cartagena Protocol on Biosafety" (GEF/C.16/4). The main objectives of this strategy are to assist countries in the establishment of their national biosafety frameworks; promote information sharing and collaboration, especially at the regional and sub-regional level; and promote collaboration with other organizations to assist capacity-building for the the Cartagena Protocol on Biosafety.

National Biosafety Agencies

Australia: Office of the Gene Technology Regulator (OGTR)

<http://www.health.gov.au/ogtr>

The OGTR was established in 2000 to be responsible for a national scheme to regulate genetically modified organisms. The new Gene Technology Technical Advisory Committee will provide expert scientific advice on applications for contained research, field trials, and general releases involving GMOs. The scientific committee will also provide advice on other matters related to gene technology, GMOs, and GM products and on the need for, and proposed content of, policy principles, policy guidelines, codes of practice, and technical and procedural guidelines for GMOs and GM products.

Belgium: Biosafety Server

[http:// biosafety.ihe.be](http://biosafety.ihe.be)

This site is run by the Service of Biosafety and Biotechnology (SBB) and hosted by the federal Scientific Institute of Public Health under the Belgian Ministry for Consumer Protection, Public Health and Environment. It contains regulatory information for Belgium, Europe, and other countries; risk-assessment data; biosafety related meetings, conferences, and courses.

Canada: Canadian Food Inspection Agency

<http://www.inspection.gc.ca/english/ppc/biotech/bioteche.shtml>

The Canadian Food Inspection Agency (CFIA) is responsible for the regulation of products derived through biotechnology including plants, animal feeds and animal feed ingredients, fertilizers, and veterinary biologics. For genetically modified crop plants, the CFIA assesses the potential risk of

adverse environmental effects and authorizes and oversees import permits, confined trials, unconfined release, and variety registration.

United Kingdom: Advisory Committee on Releases to the Environment (ACRE)

<http://www.defra.gov.uk/environment/acre>

ACRE, a nondepartmental public body, advises the Department for Environment, Food and Rural Affairs on applications to field test or release for commercial use agricultural GMOs. The site has extensive background information on the release of GMOs in the European Union, lists of applications for experimental trials and to market GMOs, application formats for deliberate releases and marketing of higher plants and organisms other than higher plants, a statement on GM animals, and more. The Guidance on Principles of Best Practice in the Design of Genetically Modified Plants documents how the design and construction of GM plants could be used to further improve their safety and/or to simplify the risk assessment.

United States: Department of Agriculture Animal and Plant Health Inspection Service (APHIS)

<http://www.aphis.usda.gov/biotech>

This Web site contains detailed information on how the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (APHIS) regulates the movement, importation, and field testing of genetically modified plants and microorganisms through permitting and notification procedures. It links to other sites containing information on permits for other types of genetically modified organisms or products such as transgenic arthropods and veterinary biologics.

United States: Regulatory Oversight of Biotechnology

<http://www.aphis.usda.gov/biotech/usregs.htm>

This site is a portal to the agencies primarily responsible for regulating biotechnology: the U.S. Department of Agriculture (USDA), Environmental Protection Agency (EPA), and the Food and Drug Administration (FDA). Products are regulated according to their intended use; some products are regulated under more than one agency.

Field Test Information

BioBin

<http://www.oecd.org/ehs/biobin>

BioBin is a cooperative resource on safety in biotechnology developed between OECD's BioTrack Online and Biotechnology Information Network and Advisory Service (BINAS) sponsored by the United Nations Industrial Development Organization (UNIDO). A resource for regulations, field trials, biotechnology product database, biotechnology libraries, and tools related to biosafety.

International Field Test Web Sites

<http://www.isb.vt.edu/cfdocs/globalfieldtests.cfm>

This site is a list of links to information about field tests conducted in twenty-nine countries.

Organization for Economic Cooperation and Development (OECD) Database of Field Trials

<http://www.ois.oecd.org/biotrack.nsf>

This database includes records of field trials of genetically modified organisms that have taken place in OECD member countries. It also includes data from other countries that have been provided through UNIDO's BINAS.

Food Safety

Canada Food Inspection Agency

<http://www.inspection.gc.ca/english/toc/bioteche.shtml>

This site carries comprehensive information about the structure and operations of Canada's regulatory framework for biotech foods, consumer information, technical reports, and more.

Codex Alimentarius

<http://www.codexalimentarius.net>

The Codex Alimentarius, or the food code, has become the seminal global reference point for consumers, food producers and processors, national food control agencies, and the international food trade. Codex standards have become the benchmarks against which national food measures and regulations are evaluated. This site carries provisional agendas for forthcoming meetings and working papers and reports of Codex Meetings. Of particular interest is the Preliminary Report of the ad hoc Intergovernmental Task Force on Foods Derived from Biotechnology (final report due in 2003).

Food and Agriculture Organization (FAO) of the United Nations

<http://www.fao.org/biotech/index.asp?lang=en>

This site on food and agriculture is available in Arabic, French, Chinese, Spanish, and English. It carries news and events, FAO documents, sectoral overviews, and a glossary (English only).

Food Products Unit (FPU)

<http://food.jrc.it>

The FPU of the European Commission's Joint Research Council works in two main areas: activities within the field of food safety and quality, and issues on genetically modified organisms. The unit's main clients and partners are the European Com-

mission Directorates involved in establishing legislation related to food and feed. Other aspects of the unit's work are harmonization of analytical procedures in order to produce reliable data for risk assessment, detection of fraud, and monitoring of compliance with labeling regulations.

Health Canada Food Program: Novel Foods

<http://www.hc-sc.gc.ca/english/protection/novel-foods.html>

Information on Canada's food safety reviews and decisions of GM commodities. This site also has GM food fact sheets and frequently asked questions about biotechnology and GM foods.

Institute of Food Technologists (IFT)

<http://www.ift.org>

The Institute of Food Technologists advances the science and technology of food through the exchange of knowledge. This site features the Biotech Board, weekly newsletter, related links, information about membership and benefits, meetings and training opportunities, and a wealth of additional information.

International Food Information Council (IFIC) Foundation

<http://ific.org/food/biotechnology.vtml>

The purpose of the IFIC Foundation, a nonprofit organization based in Washington, D.C., is to provide sound, scientific information on food safety and nutrition to journalists, health professionals, educators, government officials, and consumers. This link connects to the section on food biotechnology.

U.S. Center for Food Safety and Applied Nutrition (CFSAN)

<http://vm.cfsan.fda.gov/~lrd/biotechm.html>

CFSAN, in conjunction with the field staff of the U.S. Food and Drug Administration, is responsible for promoting and protecting the public's health by ensuring that the nation's food supply is safe, sanitary, wholesome, and honestly labeled, and that cosmetic products are safe and properly labeled.

U.S. Food and Drug Administration (FDA): Biotechnology

<http://vm.cfsan.fda.gov>

The FDA regulates foods and feed derived from new plant varieties (GMOs) as well as conventional products. The biotechnology site carries extensive documentation on regulations, labeling, consumer information, and products approved for commercial sale.

World Health Organization (WHO) – Biotech Foods

<http://www.who.int/fsf/GMfood/index.htm>

WHO has been addressing a wide range of issues in the field of biotechnology and human health, including safety evaluation of vaccines produced using biotechnology, human cloning, and gene therapy. This site briefly describes the activities of WHO in regard to biotechnology and food safety.

Commentary / Expert Opinion

Ag Biotech Infonet

<http://www.biotech-info.net>

This site carries commentary on a wide variety of genetic engineering topics. Articles gleaned from newspapers and magazines around the world cover, for example, current uses for insect and disease resistance, herbicide tolerance and other traits,

costs and benefits, environmental impacts, policy, and more.

Center for International Development, Harvard University

<http://www.cid.harvard.edu/cidbiotech>

This site includes background papers and a forum to promote exchange of views on topical issues related to biotechnology and development. These include: the evolution of the biotechnology industry; biotechnology in international trade; intellectual property rights in biotechnology; biotechnology and international relations; bio-prospecting; biotechnology in developing countries; environmental aspects of biotechnology; biotechnology and human health; and ethics, social values, and biotechnology.

Council for Agricultural Science and Technology (CAST)

<http://www.cast-science.org>

CAST assembles, interprets, and communicates science-based information regionally, nationally, and internationally on food, fibre, agricultural, natural resources, and related societal and environmental issues to stakeholders—legislators, regulators, policy makers, the media, the private sector, and the public.

International Life Sciences Institute (ILSI)

http://www.ilsa.org/site_search/index.cfm

ILSI is a nonprofit, worldwide scientific research foundation seeking to improve the well-being of the general public through the pursuit of sound and balanced science. Its goal is to further the understanding of scientific issues relating to nutrition, food safety, toxicology, risk assessment, and the environment. This site lists ILSI publications pertaining to biotechnology.

Public Perception

Center for Consumer Research, University of California–Davis

<http://ccr.ucdavis.edu>

This site focuses on consumer attitudes toward food safety and quality. It includes an informative section defining biotechnology and some current issues. A “Biotechnology Message Board” allows for questions and answers.

Electronic Forum on Biotechnology in Food and Agriculture

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

This site provides an open forum that will allow a wide range of parties, including governmental and nongovernmental organizations, policy makers, and the general public, to discuss and exchange views and experiences about specific issues concerning biotechnology in food and agriculture for developing countries.

European Federation of Biotechnology (EFB) Agri-Biotechnology (Europe)

<http://www.agbiotech.org>

The EFB is an association of European scientific and technological societies in biotechnology together with universities, scientific institutes, companies, biotechnology associations, and individual members. Their mission is “. . . to promote the safe, sustainable, and beneficial use of Nature’s resources in the life sciences and technologies; to facilitate exchange of people and ideas; and to contribute to a better understanding and perception of biotechnology by the general public in Europe.”

European Federation of Biotechnology (EFB) Task Group on Public Perceptions of Biotechnology

<http://www.efbpublic.org>

This group works to increase public awareness and understanding of biotechnology and the life sciences throughout Europe, to advance the public debate about their applications, and to facilitate dialogue between interested parties. The site’s primary aim is to foster greater public awareness and understanding of biotechnology and to encourage public debate.

Food Future: Genetically Modified Crops and the Environment (United Kingdom)

<http://www.foodfuture.org.uk>

The Food and Drink Federation’s Food Future program aims to improve public understanding of genetic modification. The program has initiated wider discussion of the technology – the perceived benefits and disadvantages as well as the ethical and moral concerns. The site provides consumers with facts and figures about GM crops so that they can make informed decisions about what they buy. The site has informative sections on the benefits, risks, and regulation of GM crops in the United Kingdom.

Genetically Engineered Organisms – Public Issues Education Project (GEO-PIE)

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

GEO-PIE was developed at Cornell University to create objective educational materials exploring the complex scientific and social issues associated with genetic engineering to help readers consider those issues for themselves.

Publications

AgBioForum Magazine

<http://www.agbioforum.org>

AgBioForum publishes articles that enhance the on-going dialogue on the economics and management of agricultural biotechnology. The purpose of *AgBioForum* is to provide unbiased, timely information and new ideas leading to socially responsible and economically efficient decisions in science, public policy, and private strategies pertaining to agricultural biotechnology.

Bioline International Biosafety Journal Online

<http://bioline.bdt.org.br/by>

This free site provides peer reviewed journals containing papers on the effects of GMOs and introduced species on people and the environment, and other materials in biotechnology, biodiversity, environmental and ecological sciences, food/agriculture/veterinary science, medicine, microbiology, and taxonomy.

Biotechnology and Development Monitor

<http://www.biotech-monitor.nl>

The *Monitor* provides a forum for discussion on the positive and/or negative impact of biotechnological innovations and international regulations on issues such as economic growth, agricultural production, food security, shifts in national and global markets, access to technology, employment, social differentiation, and human rights. The analyses are interdisciplinary and emphasize the integration of theoretical and empirical information from social sciences and natural sciences.

Environmental Biosafety Journal

<http://www.edpsciences.org/ebr>

Environmental Biosafety Research (EBR) is a new interdisciplinary, international journal that

publishes the results of research related to science-based risk-assessment of GMOs. Included are peer-reviewed original research papers and review articles, as well as scientific correspondence on all types of GMOs, including plants, animals, and microbes. The scope of material encompasses: ecological studies of the impact of novel organisms; studies of their interactions with pests and pathogens; food- and feed-safety evaluation; impact of novel organisms on agronomy and farming practice, effect on microbial populations; economic and sociological studies; means for reducing or managing risk; and assessment of horizontal gene flow.

Donors

McKnight Foundation, USA

<http://www.mcknight.org>

The mission of the McKnight Foundation is to improve the quality of life for present and future generations and to seek paths to a more humane and secure world. The foundation also hopes to contribute to food security by focusing attention on often-neglected crops and on issues involved in food security. Such issues include food storage, distribution, the dwindling supply of arable land, water shortages, agricultural education, indigenous farming practices, agricultural technology, and nutrition.

National Agricultural Biotechnology Council (NABC), United States

<http://www.cals.cornell.edu/extension/nabc>

The National Agricultural Biotechnology Council is a not-for-profit consortium of more than thirty leading agricultural research and teaching universities in the United States and Canada. The organization has been hosting annual public meetings about the safe, ethical, and efficacious devel-

opment of agricultural biotechnology products since 1988. NABC continues to provide all stakeholders the opportunity to speak, to listen, and to learn about the issues surrounding agricultural biotechnology.

Novartis Foundation

<http://www.foundation.novartis.com>

The Novartis Foundation is engaged in programs in developing countries that directly contribute to an improvement in the quality of life of the poorest people. The Risk Fund, a fund for the promotion of creative and out-of-the-ordinary commercial projects and programs in developing countries is highlighted.

The Rockefeller Foundation, USA

<http://www.rockfound.org>

The Rockefeller Foundation seeks long-term, systemic, enduring change, and accomplishing that takes time—far longer than just one year. Grant-making is organized around four thematic lines: creativity and culture, food security, health equity, and working communities. A cross-theme of global inclusion supports, promotes, and supplements the work of these themes. In addition, the foundation supports a number of programs that are developing or in transition.

Business/Professional Organizations

AfricaBio

<http://www.africabio.com>

AfricaBio seeks to promote the enhancement of the quality of life in Africa through the safe and responsible application of biotechnology. The site provides two e-publications: *BioLines* — AfricaBio's "Biotechnology Headlines" — and *MedBioLines*,

which focuses on developments in medical and pharmaceutical biotechnology.

BIOTECCanada

<http://www.biotech.ca>

This site was created to help people gain a better understanding of biotechnology and how it improves our quality of life. It represents Canadian health care, agricultural, food, research, and other organizations that are involved in biotechnology. BIOTECCanada also offers a range of services to its members.

Biotechnology Industry Organization

<http://www.bio.org>

This organization is the largest trade organization to serve and represent the emerging biotechnology industry in the United States and around the globe. The site includes a media guide to biotechnology; a biotechnology food products list; a citizen's guide to biotechnology; laws and policies; and a guide to bioethics.

Council for Biotechnology Information

<http://www.whybiotech.com>

Called *Whybiotech*, the site provides objective, balanced information to help understand and appreciate the benefits that biotechnology offers, as well as to encourage informed debate about the issues it raises. The site includes recent news articles, essential background information, sections on the benefits and regulations of biotechnology, media and resource centers, frequently asked questions, links, and an events calendar.

EuropaBio

<http://www.europabio.org>

EuropaBio, the European Association for Bioindustries, represents nearly forty member compa-

nies operating worldwide and eighteen national biotechnology associations. This site features an "Info Kit" with nineteen modules on topics including an introduction to biotechnology, environmental effects and food safety of GM crops, and frequently raised arguments against biotechnology, commercial GM crops, industrial biotechnology, and others. It also carries the latest news reports and information on forthcoming events.

Miscellaneous

On-Line Courses in Biotechnology

<http://project.bio.iastate.edu>

Guided by faculty and administrators in seven departments and programs at Iowa State University, the program strives to develop and share biology education resources via the Internet.



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APPENDIX 3: Sources and Suggested Reading

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