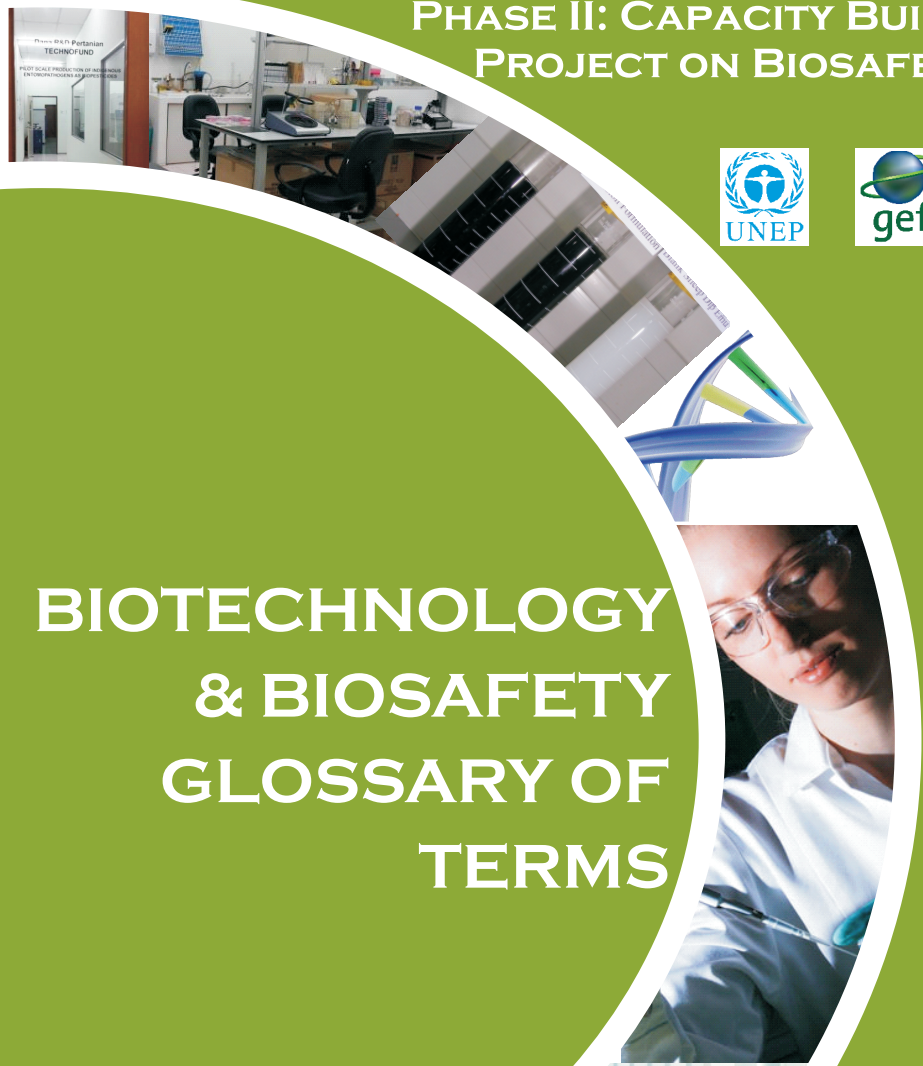
PHASE II: CAPACITY BUILDING
PROJECT ON BIOSAFETY



BIOTECHNOLOGY & BIOSAFETY GLOSSARY OF TERMS

Ministry of Environment,
Forest and Climate Change
Government of India

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Accession	1. A distinct, uniquely identifiable sample of seeds representing a cultivar, breeding line or a population, which is maintained in storage for conservation and use. [4]* 2. Act whereby a State becomes a Party to an international agreement already negotiated and closed for signature. Accession has the same legal effect as ratification, although an acceding State has not signed the agreement. [12]
Adaptation	Adjustment of a population to changes in environment over generations, associated (at least in part) with genetic changes resulting from selection imposed by the changed environment. [17]
Additive genes	Genes whose net effect is the sum of their individual allelic effects, i.e. they show neither dominance nor epistasis.[17]
Adenine (A)	One of the bases found in DNA and RNA. [17]
Adenosine triphosphate (ATP)	(Adenosine 5' triphosphate) A nucleotide of fundamental importance as the major carrier of chemical energy in all living organisms. It is also required for RNA synthesis since it is a direct precursor molecule. [17]
Adoption	1) Adoption by a country of an international agreement refers to the process of its incorporation into the domestic legal system, through signature, ratification or any other process required under national law. 2) Adoption by the international community of an international agreement is the formal act by which the form and content of a proposed treaty text are established. 3) Adoption of a decision, resolution, or recommendation is the formal act (e.g. strike of gavel) by which the form and content of a proposed decision, resolution or recommendation are approved by delegations. [12]

*References (Please see at pages 62-63)

Advanced Informed Agreement	Principle or procedure whereby the international exchange of resources or products that could have adverse effects on the environment should not proceed without the informed agreement of, or contrary to the decision of, the competent authority in the recipient country. [12]
Adventitious presence of genetically modified (GM) material	Detection of unintentional presence of GM crops that have not been approved in any country. [10]
Aerobe	A microorganism that grows in the presence of oxygen. [17]
Agenda 21	Programme of action on sustainable development adopted at the UN Conference on Environment and Development in 1992, often referred to as the "Blueprint for Sustainable Development." Agenda 21 has 40 chapters dealing with all aspects of sustainable development, including social and economic dimensions (combating poverty and promoting human health), conservation and resource management, major groups (e.g. women, indigenous people, business and unions), and means of implementation (e.g. financial resources, transfer of technology, public awareness and education). [12]
Agrobacterium	A genus of bacteria that includes several plant pathogenic species, causing tumour-like symptoms. [17]
Alien species	Species occurring in an area outside of its historically known natural range as a result of intentional or accidental dispersal by human activities. Alien species are not necessarily invasive species. [12]
Allele	A variant form of a gene. In a diploid cell there are two alleles of every gene (one inherited from each parent, although they could be identical). Within a population there may be many alleles of a gene. [17]
Allergen	An antigen that provokes an immune response. [17]

Allergy	A reaction by the body's immune system after exposure to a particular substance, often a protein. [15]
Amino acid	A compound containing both amino (NH_2) and carboxyl (COOH) groups. In particular, any of 20 basic building blocks of proteins having the formula $NH_2CRCOOH$, where R is different for each specific amino acid. [17]
Ampicillin (Ap)	A penicillin-type antibiotic that prevents bacterial growth by interfering with synthesis of the cell wall. Commonly used as a selectable marker in the creation of transgenic plants. [17]
Anaerobe	An organism that can grow in the absence of oxygen. [17]
Androgenesis	Male parthenogenesis, i.e. the development of a haploid embryo from a male nucleus. The maternal nucleus is eliminated or inactivated subsequent to fertilization of the ovum, and the haploid individual (referred to as androgenetic) contains in its cells the genome of the male gamete only. Androgenesis is detected by cytological staining. [17]
Angiosperms	A division of the plant kingdom that includes all flowering plants, i.e. vascular plants in which double fertilization occurs resulting in development of fruit containing seeds. [17]
Anthesis	The period during which anthers bear mature and functional pollen. [17]
Antibiotic	A class of natural and synthetic compounds that inhibit the growth of or kill some microorganisms. Antibiotics are widely used medicinally to control bacterial pathogens, but resistance in bacteria to particular antibiotics is often rapidly acquired through mutation. [17]
Antibiotic resistance	The ability of a microorganism to disable an antibiotic or prevent its transport into the cell. [17]

Antibiotic resistance marker gene (ARMG)	Genes (usually of bacterial origin) used as selection markers in transgenesis, because their presence allows cell survival in the presence of normally toxic antibiotic agents. These genes were commonly used in the development and release of first-generation transgenic organisms (particularly crop plants), but are no longer favoured because of perceived risks associated with the unintentional transfer of antibiotic resistance to other organisms. [17]
Antibody (Ab)	An immunological protein produced by the lymphocytes in response to contact with an antigen. Each antibody recognizes just one antigenic determinant of one antigen and acts by specifically binding to it, thus rendering it harmless. [17]
Anticodon	A triplet of tRNA nucleotides that corresponds to a complementary codon in an mRNA molecule during translation. [17]
Antigen (Ag)	A macromolecule (usually a protein foreign to the organism) that elicits an immune response on first exposure to the immune system by stimulating the production of antibodies specific to its various antigenic determinants. During subsequent exposures, the antigen is bound and inactivated by these antibodies. [17]
Antisense DNA	One of the two strands of double-stranded DNA, usually that which is complementary (hence "anti") to the mRNA, i.e. the non-transcribed strand. [17]
Antisense gene	A gene that produces an mRNA complementary to the transcript of a normal gene (usually constructed by inverting the coding region relative to the promoter). [17]
Antisense RNA	An RNA sequence that is complementary to all or part of a functional mRNA molecule to which it binds, blocking its translation. [17]
Apomixis	The production of an embryo in the absence of meiosis. Apomictic higher plants produce asexual seeds, derived only from maternal tissue. [17]

Arbitrary primer	An oligonucleotide primer whose sequence is chosen at random, rather than one whose sequence matches that of a known locus. These primers therefore amplify DNA fragments that have not been preselected. [17]
Attenuation	A mechanism for controlling gene expression in prokaryotes that involves premature termination of transcription. [17]
Assay	1. To test or evaluate. 2. The procedure for measuring the quantity of a given substance in a sample (chemically or by other means). [17]
Autonomous	A term applied to any biological unit that can function on its own, i.e. without the help of another unit, such as a transposable element that encodes an enzyme for its own transposition. [17]
Autosome	A chromosome that is not involved in sex determination. [17]
Auxotroph	A mutant cell or microorganism lacking one metabolic pathway present in the parental strain and that consequently will not multiply on a minimal medium, but requires for growth the addition of a specific compound, such as an amino acid or a vitamin. [17]
Avirulence gene (*avr* gene)	Many plants contain *R* genes, which confer simply inherited resistance to a specific pathogen race. The plants are able to recognize the presence of the pathogen by an interaction between their *R* gene and the matching pathogen's avirulence gene. Successful recognition triggers a cascade of further genes, often leading to a hypersensitive response. [17]
Authorization	A letter of intent or permit issued by the regulatory authority (RCGM or GEAC) to conduct any research experiment on genetically engineered plants under specified terms and conditions. [5]

***Bacillus thuringiensis* (Bt)**	A bacterium that produces a toxin against certain insects, particularly *Coloeoptera* and Lepidoptera; a major means of insecticide for organic farming. Some of the toxin genes are important for transgenic approaches to crop protection. [17]
Bacterial artificial chromosome	A plasmid vector that can be used to clone large inserts of DNA (up to 500 kb). [17]
Bacteriophage (phage)	A virus that infects bacteria. Altered forms are used as cloning vectors. [17]
Baculovirus	A class of insect virus used to make DNA cloning vectors for gene expression in eukaryotic cells. Production of a target protein can be up to 50% of the cells' protein content and several proteins can be made simultaneously, so that multi-subunit enzymes can be made by this system. [17]
Barnase	A bacterial ribonuclease that, when transformed into plants and expressed in the anthers, generates a male sterile phenotype. Thus it is a technology applicable to F_1 hybrid seed production, which relies on the ability to genetically sterilize genotypes to ensure that all seed borne on the plant is the result of outcrossing. The sterility phenotype is suppressed by the barstar protein, which can therefore be used to reverse the sterility where this is necessary. [17]
Barstar protein	A polypeptide inhibitor of barnase. [17]
Base	One of the components of nucleosides, nucleotides and nucleic acids. Four different bases are found in naturally occurring DNA: the purines A (adenine) and G (guanine); and the pyrimidines C (cytosine) and T (thymine, the common name for 5-methyluracil). In RNA, T is replaced by U (uracil). [17]
Base analogue	A non-natural purine or pyrimidine base that differs slightly in structure from the normal bases, but can be incorporated into nucleic acids. They are often mutagenic. [17]

Base pair (bp)	The two separate strands of a nucleic acid double helix are held together by specific hydrogen bonding between a purine and a pyrimidine, one from each strand. The base A pairs with T in DNA (with U in RNA), while G pairs with C in both DNA and RNA. The length of a nucleic acid molecule is often given in terms of the number of base pairs it contains. [17]
Benefit sharing	Benefit sharing in relation to a variety, means such proportion of the benefit accruing to a breeder of such variety or such proportion of the benefit accruing to the breeder from an agent or a licensee of such variety, as the case may be, for which a claimant shall be entitled as determined by the Authority under section 26 of The Protection of Plant Varieties and Farmers' Rights Act, 2001. [6]
Betaglucuronidase (GUS)	An enzyme produced by certain bacteria, which catalyses the cleavage of a whole range of betaglucuronides. Because this activity is largely absent in plants, the encoding bacterial gene has been widely used as a reporter gene in plant transgenesis. [17]
Binary vector system	A two-plasmid system in *Agrobacterium tumefaciens* designed to transfer TDNA into plant cells, while avoiding the formation of crown gall tumours. One plasmid contains the virulence gene (responsible for transfer of the TDNA),and the other the TDNA borders, the selectable marker and the DNA to be transferred. [17]
Bioassay	1. The assessment of a substance's activity on living cells or on organisms. Animals have been used extensively in drug research in bioassays in the pharmaceutical and cosmetics industries. Current trends are to develop bioassays using bacteria or animal or plant cells, as these are easier to handle than whole animals or plants, are cheaper to make and keep, and avoid the ethical problems associated with testing of animals. 2. An indirect method to detect submeasurable amounts of a specific substance by observing a sample's influence on the growth of live material. [17]

Bioconversion	Conversion of one chemical into another by living organisms, as opposed to their conversion by isolated enzymes, fixed cells or chemical processes. Particularly useful for introducing chemical changes at specific points in large and complex molecules. [17]
Biodiversity	The variability among living organisms from all sources, including, inter alia, terrestrial, marine and other ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems. [17]
Bioethics	The branch of ethics that deals with the life sciences and their potential impact on society. [17]
Biofuel	A gaseous, liquid or solid fuel derived from a biological source, e.g. ethanol, rapeseed oil or fish liver oil. [17]
Bioinformatics	The use and organization of information of biological interest. In particular, concerned with organizing biomolecular databases (particularly DNA sequences), utilizing computers for analysing this information, and integrating information from disparate biological sources. [17]
Biolistics	A technique to generate transgenic cells, in which DNA-coated small metal particles (tungsten or gold) are propelled by various means fast enough to puncture target cells. Provided that the cell is not irretrievably damaged, the DNA is frequently taken up by the cell. The technique has been successfully used to transform animal, plant and fungal cells, and even mitochondria inside cells. *Synonym*: microprojectile bombardment. [17]
Biological containment	Restricting the movement of organisms from the laboratory which can take two forms: making the organism unable to survive in the outside environment; or making the outside environment inhospitable to the organism. For microorganisms, the favoured approach is to engineer organisms to require a supply of a specific nutrient that is usually available only in the laboratory. For higher organisms (plants and animals), it is more possible to ensure that the outside environment is unsuited to growth, spread and reproduction. [17]

Biological control	Pest control by biological means. Any process using deliberately introduced living organisms to restrain the growth and development of other organisms, such as the introduction of predatory insects to control an insect pest. [17]
Biological resources	Genetic resources, organisms or parts thereof, populations, or any other biotic component of ecosystems with actual or potential use or value for humanity. [1]
Bioluminescence	The enzyme-catalysed production of light by a number of diverse organisms (e.g. fireflies and many deep ocean marine organisms). Utilized as a reporter gene in plant transgenesis, and for the detection of foodborne pathogenic bacteria. [17]
Biopharming	The use of genetically transformed crop plants and livestock animals to produce valuable compounds, especially pharmaceuticals. *Synonym*: molecular pharming. [17]
Biopiracy	The patenting of genetic stocks, and the subsequent privatization of genetic resources collections. The term implies a lack of consent on the part of the originator. [17]
Bioprospecting	Exploration of biodiversity for commercially, scientifically, or culturally valuable genetic and biochemical resources. [12]
Biosafety	Also known as 'biological safety', the management of risks to human and animal health and safety, and to the conservation of the environment, as a result of activities with genetically modified organisms. [13]
Biosafety Clearing House	A clearing house mechanism as established under Article 18(3) of the Convention on Biological Diversity. [13]
Biosafety Protocol	See Cartagena protocol
Biosecurity	Encompasses all policy and regulatory frameworks (including instruments and activities) to manage risks associated with food and agriculture (including relevant environmental risks), including fisheries and forestry. [13]

Biotechnology	Any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for a specific use. [13]
Biotransformation	The conversion of one chemical or material into another using a biological catalyst: a near synonym is biocatalysis, and hence the catalyst used is called a biocatalyst. Usually the catalyst is an enzyme or a fixed, whole, dead microorganism that contains an enzyme or several enzymes. [17]
Breeder	A person or group of persons or a farmer or group of farmers or any institution which has bred, evolved or developed any variety. [6]
Breeding	The process of sexual reproduction and production of offspring. [17]

Callus	1. A protective tissue, consisting of parenchyma cells, that develops over a cut or damaged plant surface. 2. Mass of undifferentiated, thin-walled parenchyma cells induced by hormone treatment. 3. Actively dividing non-organized masses of undifferentiated and differentiated cells often developing from injury (wounding) or in tissue culture in the presence of growth regulators. [17]
Capacity building	The strengthening and/or development of human resources and institutional capacities. [14]
Carrier DNA	DNA of undefined sequence that is added to the transforming (plasmid) DNA used in physical DNA transfer procedures. This additional DNA increases the efficiency of transformation in electroporation and chemically mediated DNA delivery systems. [17]
Cartagena Protocol	The *Cartagena Protocol on Biosafety to the Convention on Biological Diversity* is an international agreement that aims to ensure the safe handling, transport and use of living modified organisms (LMOs) resulting from modern biotechnology, which may have adverse effects on biological diversity, also taking into account risks to human health. It was adopted on 29 January 2000 and entered into force on 11 September 2003. [1]
Cauliflower mosaic virus (CaMV)	A DNA virus affecting cauliflower and many other dicot species. Its importance is due to the promoter of its 35S ribosomal DNA, which is constitutively active in most plant tissues, and has therefore been widely used as a promoter for the expression of transgenes. [17]
CBD	Convention on Biological Diversity. Adopted in 1992, entered into force in 1993. One of the Rio Conventions. [12]
cDNA clone	A double-stranded complimentary DNA molecule propagated in a vector and used as a probe in RFLP analyses, as a template for the production of EST sequences, and for gene expression studies. [17]

Cell	The fundamental level of structural organization in complex organisms. Eukaryotic cells contain a nucleus (with chromosomes) and cytoplasm with the protein synthesis machinery, bounded by a membrane. Prokaryotic cells have no nucleus. [17]
Cell fusion	Formation *in vitro* of a single hybrid cell from the coalescence of two cells of different species origin. In the hybrid cell, the donor nuclei may remain separate or may fuse, but during subsequent cell divisions a single spindle is formed so that each daughter cell has a single nucleus containing complete or partial sets of chromosomes from each parental line. [17]
Cell selection	The process of selecting cells exhibiting specific traits within a group of genetically different cells. Selected cells are often sub-cultured on to fresh medium for continued selection and exposed to an increased level of the selection agent to eliminate false positives. [17]
Centre of origin for diversity	The place or region where the source of diversity is located. [14]
Chakrabarty decision	A landmark legal case in the USA, in which it was held that the inventor of a new microorganism, whose invention otherwise met the legal requirements for obtaining a patent, could not be denied a patent solely because the invention was alive. This has set the precedent for the patenting of life forms. [17]
Chimera	A recombinant DNA molecule that contains sequences from different organisms. [17]
Chimeric gene	An engineered gene in which a coding sequence is fused to promoter and/or other sequences derived from a different gene. Most genes used in transformation are chimeric. *Synonym*: fusion gene. [17]
Chloroplast DNA	The DNA present in the chloroplast. Although the chloroplast has a small genome, the large number of chloroplasts per cell ensures that chloroplast DNA is a significant proportion of the total DNA in a plant cell. [17]

Chromosome	In eukaryotic cells, chromosomes are the nuclear bodies containing most of the genes largely responsible for the differentiation and activity of the cell. They contain most of the cell's DNA in the form of chromatin. Each eukaryotic species has a characteristic number of chromosomes. Bacterial and viral cells contain only one chromosome, which consists of a single or double strand of DNA or, in some viruses, RNA, without histones. [17]
Chromosome mutation	A change in the gross structure of a chromosome, usually causing severely deleterious effects in the organism, but which can be maintained in a population. [17]
Cistron	A DNA sequence that codes for a specific polypeptide; a gene. [17]
Clone	1. A group of cells or individuals that are genetically identical as a result of asexual reproduction, breeding of completely inbred organisms, or forming genetically identical organisms by nuclear transplantation. 2. Group of plants genetically identical in which all are derived from one selected individual by vegetative propagation. 3. Verb: to clone. To insert a DNA segment into a vector or host chromosome. [17]
Cloning vector	A small, self-replicating DNA molecule, usually a plasmid or viral DNA chromosome, into which foreign DNA is inserted in the process of cloning genes or other DNA sequences of interest. It can carry inserted DNA and be perpetuated in a host cell. [17]
Codex Alimentarius Commission	An international regulatory body (part of the FAO) responsible for the definition of a set of international food standards. The Commission periodically determines and publishes a list of food ingredients and maximum allowable levels (the *Codex Alimentarius*) deemed to be safe for human consumption. [17]

Codon	One of the groups of three consecutive nucleotides in mRNA, which represent the unit of genetic coding by specifying a particular amino acid during the synthesis of polypeptides in a cell. Each codon is recognized by a tRNA carrying a specific amino acid, which is incorporated into a polypeptide chain during protein synthesis. In DNA, any informative triplet of bases, including both coding and control sequences. [17]
Competent cell	1. Bacterial cells able to take up foreign DNA molecules and thereby become genetically transformed. Can be genetically determined, or induced by physical treatment. 2. A competent cell is capable of developing into a fully functional embryo. [17]
Competent authority	The entity responsible for performing the administrative and technical functions required by the Council for the effective implementation of a policy. [13]
Complementary DNA (cDNA)	A DNA strand synthesized *in vitro* from a mature RNA template using reverse transcriptase. DNA polymerase is then used to create a double-stranded molecule. Differs from genomic DNA by the absence of introns. Also known as copy DNA. [17]
Conference of Parties	One of the designations for the main negotiating body under an international agreement. The COP is a policy-making body that meets periodically to take stock of implementation of the agreement and adopt decisions, resolutions, or recommendations for the future implementation of the agreement. [14]
Confined field trials	Field experiments of a regulated GE plant under terms and conditions that are intended to mitigate the establishment and spread of the plant. A single confined field trial may be comprised of one or more varieties/hybrids of a single event of a single plant species that are subject to the same terms and conditions of confinement, which include, but are not limited to, reproductive isolation, site monitoring and postharvest land use restrictions. The field trials are categorized into two types: Biosafety Research Level I and Biosafety Research Level II trials. [5]

Conjugation	1. Union of sex cells (gametes) or unicellular organisms during fertilization. 2. The unidirectional transfer of DNA (bacterial plasmid) from one bacterium cell to another and involving cell-to-cell contact. The plasmid usually encodes the majority of the functions necessary for its own transfer. [17]
Consensus	A mode of adoption of decisions, resolutions, or recommendations without voting. A decision is adopted by consensus if there is no formal explicit objection made. Whether there is consensus on an issue or not is determined by the presiding officer on the basis of the views expressed by delegates and his/her subjective assessment of the sense of the meeting. [14]
Consignment	A quantity of seeds, plants and plant products or any regulated article consigned from one party to another at any one-time shipment and covered by a phytosanitary certificate, bill of entry of customs, shipping or airway bill or invoice. [7]
Constitutive promoter	An unregulated promoter that allows for continual transcription of its associated gene. [17]
Construct	An engineered chimeric DNA 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. A repeatedly used construct may be called a cassette. [17]
Contained use	Any operation with GMOs undertaken within a facility, installation or other physical structure, which involves living modified organisms that are controlled by specific measures that effectively limit their contact with, and their impact on, the external environment. [14]
Containment	Prevention of the spread of organisms outside the facilities, which may be achieved by physical containment (the use of good work practices, equipment and installation design) and/or biological containment (the use of organisms that have reduced ability to survive or reproduce in the environment). [14]

Containment level	The degree of physical containment, which depends on the design of the facility, the equipment installed and the procedures used. [14]
Controlled release	Deliberate release of organisms where risk management measures are applied. [14]
Convention	A binding agreement between States. Generally used for formal multilateral instruments with a broad number of Parties. [12]
Convention country	A country which has acceded to an international convention for the protection of plant varieties to which India has also acceded, or a country which has a law on protection of plant varieties on the basis of which India has entered into an agreement for granting plant breeders' rights to the citizens of both the countries. [6]
COP/MOP	Conference of the Parties to a Convention serving as Meeting of the Parties to a Protocol (e.g. Biosafety Protocol COP/MOP). [12]
Cosmid	A synthetic plasmid that incorporates the cos ends and one or more selectable markers, such as an antibiotic resistance gene. Cosmids were designed as vectors able to incorporate DNA fragments up to 4050 kb in size. [17]
Cosuppression	A natural gene silencing phenomenon, which probably evolved as part of plants' defence against viral attack, but which has become important in the context of plant transgenesis. Operates by inhibiting the expression of transgenes with homology to native DNA through the interaction of native and transgenic mRNA. [17]

Cotransformation	A protocol for producing transgenesis, in which host (plant or animal) cells are transformed simultaneously with two different plasmids, one of which carries a selectable marker, and the other the gene to be transferred. Relies on the observation that given a sufficiently high concentration of both plasmids, transformed cells will have incorporated both plasmids, possibly at different genomic loci. If the transgenes are separable through normal meiotic recombination, transgenic individuals without the selectable marker can be selected in subsequent generations. [17]
Cross-pollination	Fertilization of a plant with pollen from another plant. Pollen may be transferred by wind, insects, other organisms or humans. [15]
Cry proteins	A class of crystalline proteins produced by strains of *Bacillus thuringiensis*, and engineered into crop plants to give resistance against insect pests. These proteins are toxic to certain categories of insects (e.g. corn borers, corn rootworms, mosquitoes, black flies, armyworms, tobacco hornworms, some types of beetles, etc.), but are harmless to mammals and most beneficial insects. *Synonym:* delta endotoxins. [17]
Cytoplasmic male sterility	Genetic defect due to faulty functioning of mitochondria in pollen development, preventing the formation of viable pollen. Commonly found or inducible in many plant species and exploited for some F1 hybrid seed programmes. [17]
Cytosine (C)	One of the bases found in DNA and RNA. [17]

Deliberate release	Any use of organisms that is not a contained use. [14]
Deoxyribonuclease (DNase)	Any enzyme that catalyses the cleavage of DNA phosphodiester bonds. [17]
Deoxyribonucleic acid (DNA)	The chemical substance from which genes are made. DNA is a long, double-stranded helical molecule made up of nucleotides that are themselves composed of sugars, phosphates and derivatives of the four bases adenine (A), guanine (G), cytosine (C) and thymine (T). The sequence order of the four bases in the DNA strands determines the genetic information contained. [15]
Directed mutagenesis	The generation of changes in the nucleotide sequence of a cloned gene by one of several procedures. Undertaken to explore the relationship between nucleotide sequence and gene function, and to modify gene products. *Synonym*: *in vitro* mutagenesis. [17]
District Level Committees (DLCs)	They have a major role in monitoring the safety regulations in installations engaged in the use of genetically modified organisms/hazardous microorganisms and its applications in the environment. [8]
DNA amplification	Many-fold multiplication of a particular DNA sequence either *in vivo* in a plasmid, phage or other vector; or *in vitro* using, most commonly, the polymerase chain reaction. [17]
Downstream processing	A general term for biotechnological processes that follow the biology, i.e. fermentation of a microorganism or growth of a plant. Particularly relevant to fermentation processes, which produce a large quantity of a dilute mixture of substances, products and microorganisms. These must be separated, and the product concentrated, purified and converted into a useful form. [17]
Donor	The organism from which genetic material is derived for insertion into or combination with another organism. [14]

***E. coli* (*Escherichia coli*)**	A commensal bacterium inhabiting the colon of many animal species, including humans. *E. coli* is widely used as a model of cell biochemical function and as a host for cloning DNA. In environmental studies, its presence is a key indicator of water pollution due to human sewage effluent. Some strains, notably *E. coli* O157:H7, are significant pathogens. [17]
Edible vaccine	Edible antigen-containing material, which activates the immune system via gut-associated lymphoid tissues. A preferred route for vaccine administration, particularly in areas where the technological infrastructure needed for maintenance of vaccines is absent. The vaccine is synthesized *in vivo* in the edible parts of transgenic plants (e.g. grains, tubers, fruits, etc.) or eggs. [17]
Electrophoresis	A ubiquitous molecular biology technique, with many variants, used to resolve complex mixtures of macromolecules into their components. Its principle is to subject samples to an electric field applied across a porous matrix. Molecules will migrate under these conditions at a rate dependent on their net electric charge and/or their molecular weight. [17]
Embryo rescue	A sequence of tissue culture techniques utilized to enable a fertilized immature embryo resulting from an interspecific cross to continue growth and development, until it can be regenerated into an adult plant. [17]
Embryogenesis	1. (General) Development of an embryo. 2. (In plants) In vitro formation of plants from plant tissues, through a pathway closely resembling normal embryogeny from the zygote. [17]
Endangered species	A plant or animal species in immediate danger of extinction because its population number has reached a critical level, or its habitat has been drastically reduced. [17]

Enhancer	1. A substance or object that increases a chemical activity or a physiological process. 2. A eukaryotic DNA sequence (also found in some eukaryotic viruses) that increases the transcription of a gene. Located up to several kbp, usually (but not exclusively) upstream of the gene in question. In some cases can activate transcription of a gene with no (known) promoter. *Synonyms*: enhancer element; enhancer sequence. 3. A major or modifier gene that increases the rate of a physiological process. [17]
Enolpyruvyl-shikimate-3-phosphate synthase (EPSP synthase or EPSPS)	An enzyme produced by virtually all plants, which is essential for normal metabolism and for the biosynthesis of aromatic amino acids. Glyphosate and sulfosate-containing herbicides act by inhibiting EPSP synthase activity, but because strain CP4 of *Agrobacterium* sp. is unaffected by glyphosate, the introduction of the CP4 EPSPS gene into crop plants generates a tolerance of glyphosate-containing herbicides. [17]
Entry into force	Coming into legal effect of an international agreement, i.e. time at which an international agreement becomes legally binding for the States that have ratified it or acceded to it or otherwise expressed their consent to be bound by the agreement. [12]
Environment	The aggregate of surrounding objects, conditions and influences that influence the life and habits of man or any other organisms or collection of organisms. [14]
Enzyme	A protein that, even in very low concentration, catalyses specific chemical reactions but is not used up in the reaction. [17]
Enzyme-linked immunosorbent assay (ELISA)	An immunoassay, i.e. an antibody-based technique for the diagnosis of the presence and quantity of specific molecules in a mixed sample. It combines the specificity of an immunoglobulin with the detectability of an enzyme-generated coloured product. [17]

Essentially derived variety	Essentially derived variety in respect of a variety (the initial variety), shall be said to be essentially derived from such initial variety when it – (i) is predominantly derived from such initial variety, or from a variety that itself is predominantly derived from such initial variety, while retaining the expression of the essential characteristics that results from the genotype or combination of genotypes of such initial variety; (ii) is clearly distinguishable from such initial variety; and (iii) conforms (except for the differences which result from the act of derivation) to such initial variety in the expression of the essential characteristics that result from the genotype or combination of genotype of such initial variety. [6]
Event	A genotype produced from the transformation of a single plant species using a specific genetic construct. For example, two lines of the same plant species transformed with the same or different constructs constitute two events. [5]
Expression vector	A cloning vector that has been constructed in such a way that, after insertion of a DNA molecule, its coding sequence is properly transcribed and the mRNA is translated. The cloned gene is put under the control of a promoter sequence for the initiation of transcription, and often also has a transcription termination sequence at its end. [17]
Extent variety	A variety available in India which is - (i) notified under section 5 of the Seeds Act, 1966; or (ii) farmers; variety; or (iii) a variety about which there is common knowledge; or (iv) any other variety which is in public domain. [6]

Familiarity	Knowledge and experience with an organism, the intended application and the potential receiving environment. [14]
Farmers	Any person who- (i) cultivates crops by cultivating the land himself; or (ii) cultivates crops by directly supervising the cultivation or land through any other person; or (iii) conserves and preserves, severally or jointly, with any other person any wild species or traditional varieties or adds value to such wild species or traditional varieties through selection and identification of their useful properties. [6]
Farmers' privilege	Rights to hold germplasm, covered by plant variety protection, as a seed source for subsequent seasons. Considered as optional for governments to include in their legislation. Synonym: farmer-saved seed. [17]
Farmers' rights	Rights first recognized by Resolution 5 of the 1989 FAO Conference as 'rights arising from the past, present and future contributions of farmers in the conservation, improvement and the making available of plant genetic resources'; this item became an attachment to the 'International Undertaking on Plant Genetic Resources'. The binding 'International Treaty of Plant Genetic Resources for Food and Agriculture' that resulted from the renegotiations of the Undertaking makes provision for the Farmers' Rights in Article 9. [17]
Farmers' variety	A variety which- i) has been traditionally cultivated and evolved by the farmers in their fields; or (ii) is a wild relative or land race or a variety about which the farmers possess the common knowledge. [6]

Fermentation	The anaerobic breakdown of complex organic substances, especially carbohydrates, by microorganisms, yielding energy. Often misused to describe large-scale aerobic cell culture in specialized vessels (fermenters, bioreactors) for secondary product synthesis. [17]
Field trial	A test of a new technique or variety, including biotech-derived varieties, done outside the laboratory but with specific requirements on location, plot size, methodology, etc. [15]
Functional genomics	The field of research that aims to determine patterns of gene expression and interaction in the genome, based on the knowledge of extensive or complete genomic sequence of an organism. [17]
Fusion protein	A polypeptide translated from a chimeric gene. The different genes are joined so that their coding sequences are in the same reading frame, and the resulting construct is transcribed and translated as a single gene, producing a single protein. These are used for a number of purposes, including: 1. To add an affinity tag to a protein. 2. To produce a protein with the combined characteristics of two natural proteins. 3. To produce a protein where two different activities are physically linked. [17]

Gene	The fundamental physical and functional unit of heredity. A gene is typically a specific segment of a chromosome and encodes a specific functional product (such as a protein or RNA molecule). [15]
Gene addition	The addition of a functional copy of a gene to the genome of an organism. [17]
Gene expression	The process by which a gene produces mRNA and protein, and hence exerts its effect on the phenotype of an organism. [17]
Gene (DNA) sequencing	Procedures for determining the nucleotide sequence of a DNA fragment. Two common methods available: 1. The Maxam Gilbert technique, which uses chemicals to cleave DNA into fragments at specific bases. 2. Most commonly, the Sanger technique (also called the di-deoxy or chain-terminating method), which uses DNA polymerase to make new DNA chains, in the presence of di-deoxynucleotides (chain terminators) to stop the chain randomly as it grows. In both cases, the DNA fragments are separated according to length by polyacrylamide gel electrophoresis, enabling the sequence to be read directly from the gel. [17]
Gene bank	1. The physical location where collections of genetic material in the form of seeds, tissues or reproductive cells of plants or animals are stored. 2. Field gene bank: A facility established for the *ex situ* storage and maintenance, using horticultural techniques, of individual plants. Used for species whose seeds are recalcitrant or for clonally propagated species of agricultural importance, e.g. apple varieties. 3. A collection of cloned DNA fragments from a single genome. Ideally the bank should contain cloned representatives of all the DNA sequences in the genome. [17]

Gene cloning	The synthesis of multiple copies of a chosen DNA sequence using a bacterial cell or another organism as a host. The gene of interest is inserted into a vector, and the resulting recombinant DNA molecule is amplified in an appropriate host cell. *Synonym*: DNA cloning. [17]
Gene flow	The spread of genes from one breeding population to another (usually) related population by migration, thereby generating changes in allele frequency. [17]
Gene pool	1. The sum of all genetic information in a breeding population at a given time. 2. In plant genetic resources, use is made of the terms 'primary', 'secondary' and 'tertiary' gene pools. In general, members of the primary gene pool are interfertile; those of the secondary can be crossed with those in the primary gene pool under special circumstances; but to introgress variation from the tertiary gene pool, special techniques are required to achieve crossing. [17]
Gene probe	A single stranded DNA or RNA fragment used in genetic engineering to search for a particular gene on another DNA sequence. The probe has a base sequence complementary to the target sequence and will thus attach to it by base pairing. By labelling the probe, it can be identified after subsequent separation and purification. [17]
Gene recombination	The appearance of gene combinations in the progeny that differ from the combinations present in the parents. [17]
Gene regulation	The process of controlling the synthesis or suppression of gene products in specific cells or tissues. [17]
Gene therapy	The proposed treatment of an inherited disease by the transformation of an affected individual with a wild-type copy of the defective gene causing the disorder. In germline (or heritable) gene therapy, reproductive cells are transformed; in somatic cell (or non-inheritable) gene therapy, cells other reproductive ones are modified. [17]

Genetic assimilation	Eventual extinction of a natural species as massive gene flow occurs from a related species. [17]
Genetic diversity	The heritable variation within and among populations that is created, enhanced or maintained by evolutionary or selective forces. [17]
Genetic engineering	The technique by which heritable material, which does not usually occur or will not occur naturally in the organism or cell concerned, generated outside the organism or the cell is inserted into said organism or cell. It shall also mean the formation of new combinations of genetic material by incorporation of a cell into a host cell, where they occur naturally (self-cloning) as well as modification of an organism or in a cell by deletion and removal of parts of the heritable material (Rules, 1989). [5]
Genetic Engineering Appraisal Committee (GEAC)	It is established under MoEFCC and is the apex body to accord notified under Rules 1989. For approval of activities involving large scale use of hazardous microorganisms and recombinants in research and industrial production from the environmental angle. The GEAC is also responsible for approval of proposals relating to release of genetically engineered organisms and products into the environment including experimental field trials (Biosafety Research Level trial-I and II known as BRL-I and BRL-II). [8]
Genetic erosion	The loss over time of allelic diversity, particularly in farmed organisms, caused by either natural or man-made processes. [17]
Genetic map	The linear array of genes on a chromosome, based on recombination frequencies (linkage map) or physical location (physical or chromosomal map). [17]
Genetic mapping	The construction of a localized (around a gene), or broad-based (whole genome) genetic map. More generally, determining the location of a locus (gene or genetic marker) on a chromosome. [17]

Genetic marker	A DNA sequence used to identify a particular location (locus) on a particular chromosome. [17]
Genetic modification	Modern biotechnology used to alter genetic material of living cells or organisms in order to make them capable of producing new substances or performing new functions. [14]
Genetic use restriction technology (GURT)	A proposed technology applying transgenesis to genetically compromise the fertility or the performance of saved seed of a cultivar or of second generation animals. The intention is to protect the market for the seed producer or to prevent undesired escape of genes. Two types of GURTs have been patented: variety-level GURT (VGURT), which produces sterile progeny, and trait-specific GURT (TGURT), in which only the added value transgenic trait is genetically protected. [17]
Genetically modified organism (GMO)/ Genetically Engineered Organism (GE)	1. An organism that has been transformed by the insertion of one or more transgenes. [17] 2. Any living organism, the genes or genetic material of which have been modified in a way that does not occur naturally through mating or natural recombination or both, and 'genetic modification' shall have a corresponding meaning. For the purpose of the policy reference to GMOs includes products and processes of GMOs. [13]
Genetic pollution	Uncontrolled spread of genetic information (frequently referring to transgenes) into the genomes of organisms in which such genes are not present in nature. [17]
Genetics	The study of the patterns of inheritance of specific traits. [15]
Genome	All the genetic material in all the chromosomes of a particular organism. [15]
Genomic library	A clone library specifically constructed from restriction fragments of the genomic DNA of an organism. [17]

Genotype	1. The genetic constitution of an organism. 2. The allelic constitution at a particular locus, e.g. Aa or aa. 3. The sum effect of all loci that contribute to the expression of a trait. [17]
Germplasm	Plants in whole or in parts and their propagules including seeds, vegetative parts, tissue cultures, cell cultures, genes and DNA based sequences that are held in a repository or collected from wild as the case may be, and are utilized in genetic studies or plant breeding programmes for crop improvement. [7]
Global Environment Facility	Launched in 1991, the Global Environment Facility (GEF) provides grant and concessional funds to developing countries for projects and programmes targeting global environmental issues: climate change, biological diversity, international waters, ozone layer depletion, land degradation and persistent organic pollutants. Its implementing agencies are UNEP, UNDP, and the IBRD. Designated as the operating entity of the financial mechanism for some MEAs (e.g., the CBD and the UNFCCC). [12]
Guanine (G)	One of the bases found in DNA and RNA. [17]

Hazard	The potential of an organism to cause harm to human health and/or the environment. [14]
Hardening off	Adapting glasshouse- or controlled-environment-grown plants to outdoor conditions by reducing availability of water, lowering the temperature, increasing light intensity, or reducing the nutrient supply. The hardening-off process conditions plants for survival when transplanted outdoors. [17]
Heat shock protein (HSP)	A class of protein chaperones that are typically overexpressed as a response to heat stress. Two such proteins, HSP 90 and HSP 70, have a role in ensuring that crucial proteins are folded into the correct conformation. *Synonym*: stress protein. [17]
Herbicide-tolerant crops	Crops that have been developed to survive application(s) of particular herbicides by the incorporation of certain gene(s) either through genetic engineering or traditional breeding methods. The genes allow the herbicides to be applied to the crop to provide effective weed control without damaging the crop itself. [15]
Heredity	Transmission of traits from parents to offspring. [17]
Homology	1. The degree of identity between individuals, or characters. 2. The degree of identity of sequence (nucleotide or amino acid) between a number of DNA or polypeptide molecules. [17]
Host	An organism in which the genetic material is altered by modification of a part of its own genetic material and/or insertion of foreign genetic material. [14]
Hybrid	The offspring of two genetically unlike parents. [17]

Institutional Biosafety Committee (IBSC)	It is established under the institution engaged in GMO research to oversee such research and to interface with the RCGM in regulating it. [8]
Idiotype	An identifying property or characteristic of an item or system. 1. A plant form expected on physiological grounds to represent an optimal type for the environment in which the plant is to be grown. 2. A classification of antibody molecules according to the antigenicity of the variable regions. Each idiotype is unique to a particular immunoglobulin raised to a particular antigen. [17]
Immunization	The production of immunity in an individual by artificial means. Active immunization involves the introduction, either orally or by infection, of specially treated bacteria, viruses or their toxins so as to stimulate the production of antibodies. [17]
Import	An act of bringing into any part or place in the territory of India any kind of seed, plant or plant product or any other regulated article from a place outside India by sea, land or air or across any customs frontier. [7]
Import permit	An official document authorizing importation of a consignment in accordance with specified phytosanitary requirements. [7]
In vitro	Outside the organism, or in an artificial environment. Applied, e.g. to cells, tissues or organs cultured in glass or plastic containers. [17]
In vivo	The natural conditions in which organisms reside. Refers to biological processes that take place within a living organism or cell under normal conditions. [17]

Insecticide resistance	The development or selection of heritable traits (genes) in an insect population that allow individuals expressing the trait to survive in the presence of levels of an insecticide (biological or chemical control agent) that would otherwise debilitate or kill this species of insect. The presence of such resistant insects makes the insecticide less useful for managing pest populations. [15]
Insect-resistance management	A strategy for delaying the development of pesticide resistance by maintaining a portion of the pest population in a refuge that is free from contact with the insecticide. For Bt crops this allows the insects feeding on the Bt toxin to mate with insects not exposed to the toxin produced in the plants. [15]
Insect-resistant crops	Plants with the ability to withstand, deter or repel insects and thereby prevent 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 novel genes such as Bt genes through genetic engineering. [15]
Intellectual property	Refers to creations of the mind: inventions, literary and artistic works, and symbols, names, images and designs used in commerce. Intellectual property is divided into two categories: Industrial property, which includes inventions (patents), trademarks, industrial designs, and geographic indications of source; and Copyright, which includes literary and artistic works such as novels, poems and plays, films, musical works, artistic works such as drawings, paintings, photographs and sculptures, and architectural designs. [9]
Intellectual property rights	Intellectual property rights are like any other property right. They allow creators, or owners, of patents, trademarks or copyrighted works to benefit from their own work or investment in a creation. [16]

International norms	Standards, guidelines or code of practices that are generally agreed on by the international community. [13]
International Undertaking on Plant Genetic Resources	The first comprehensive voluntary, international agreement (adopted in 1983) dealing with plant genetic resources for food and agriculture. Designed as an instrument to promote international harmony in matters regarding access to plant genetic resources for food and agriculture. Following extensive negotiations to revise the Undertaking in harmony with the Convention on Biological Diversity, the binding International Treaty on Plant Genetic Resources for Food and Agriculture was adopted by the 2001 FAO Conference. [17]
International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA)	The international treaty resulting from the revision of the International Undertaking on Plant Genetic Resources was adopted by the 2001 FAO Conference as a binding international instrument entered into force in 2004 after ratification by 40 states. Its objectives are the conservation and sustainable use of plant genetic resources for food and agriculture and equitable sharing of the benefits of this use. [17]
Invasiveness	The ability of a plant, particularly a weed, to spread beyond its presently established site, and become established in new locations. [17]
Isolation distance	A mandated distance used to spatially separate a confined field trial from the nearest plant of the same or any sexually compatible species. Minimum spatial isolation distances vary depending on the reproductive biology of the plant species, and minimum distances for a number of plant species have been established by the RCGM. [5]
Isolating mechanism	The properties of an organism that prevent interbreeding (and therefore exchange of genetic material) between members of different species that inhabit the same geographical area. [17]

Kanamycin	An antibiotic of the aminoglycoside family that inhibits translation by binding to the ribosomes. Important as a substrate for selection of plant transformants. [17]

Landrace	In plant genetic resources, an early, cultivated form of a crop species, evolved from a wild population and generally composed of a heterogeneous mixture of genotypes. [17]
Liability	Legal responsibility for one's acts or omissions. Failure of a person or entity to meet that responsibility leaves him/her/it open to a lawsuit for any resulting damages or a court order to perform (as in a breach of contract or violation of statute). [9]
Library	A collection of cells, usually bacteria or yeast, that have been transformed with recombinant vectors carrying DNA derived from an unrelated organism. [17]
Life cycle	The sequence of events from a given developmental stage in one generation to the same stage in the following generation. In sexually reproduced organisms, the starting point is the fusion of gametes to form the zygote. [17]
Linkage	The tendency of a set of genes to be inherited together more often than would be expected if they were assorting independently. Exists between two genes when they are located sufficiently close to one another on the same chromosome that a proportion of gametes is produced without crossing-over occurring between them. [17]
Linker	A synthetic double-stranded oligonucleotide that carries the sequence for one or more restriction endonuclease sites. [17]
Living modified organism (LMO)	Any living organism that possesses a novel combination of genetic material obtained through the use of modern biotechnology. [1]
Locus	A site on a chromosome. [17]
Low level presence of GMOs (LLP)	Detection of low levels of GM crops that have been approved in atleast one country on the basis of a food safety assessment according to the relevant Codex guidelines. [10]

Marker gene	A gene of known function or known location, used for marker-assisted selection or genetic studies. [17]
Medium	1. In plant tissue culture, a term for the liquid or solid formulation upon which plant cells, tissues or organs develop. 2. In general terms, a substrate for plant growth, such as nutrient solution, soil, sand, etc., e.g. potting medium. [17]
Meeting of the Parties	A body equivalent to the Conference of the Parties. The terminology differs according to agreements. In practice, there is a tendency within environment negotiating fora to use 'Conference of the Parties' for the conventions and 'Meeting of the Parties' for the protocols. [12]
Messenger RNA (mRNA)	The RNA molecule resulting from transcription of a protein-encoding gene, following any splicing (definition (1). The information encoded in the mRNA molecule is translated into a gene product by the ribosomes. [17]
Meiosis	The two-stage process in sexual reproduction by which the chromosome number is reduced from the somatic to the haploid number. The first division, in which homologous chromosomes pair and exchange genetic material, is followed by amitotic division. The nucleus divides twice but the chromosomes only once, generating haploid nuclei, which develop into the gametes (egg and sperm in animals; egg and sperm in plants). [17]
Memorandum of Understanding (MoU)	A simplified type of international instrument, which can be concluded between States, between States and international organizations or between international organizations. MoUs can provide a framework for cooperation or be concluded for specific time-bound activities. [12]

Meristem	Undifferentiated but determined plant tissue, in which the cells are capable of active division and differentiation into specialized tissues such as shoots and roots. [17]
Metabolomics	The largescale study of the full complement of secondary metabolites produced by a given species in all its tissues and growth stages. [17]
Microarray	A large set of cloned DNA molecules immobilized as a compact and orderly pattern of sub-microlitre spots on to a solid matrix (typically a glass slide). Used to analyse patterns of gene expression, presence of markers, or nucleotide sequence. The major advantage of microarrays is the extent to which the process of genotyping can be automated, thereby enabling large numbers of individuals to be simultaneously genotyped at many loci. A similar approach may be used with other immobilized components for other purposes. [17]
Microorganism	Organism visible only under magnification. [17]
Micropropagation	Miniaturized in vitro multiplication and/or regeneration of plant material under aseptic and controlled environmental conditions. [17]
Mitosis	Splitting of replicated chromosomes, and the division of the cytoplasm to produce two genetically identical daughter cells. On the basis of the appearance of the chromosomes, it is separated into five stages: interphase, prophase, metaphase, anaphase and telophase. [17]
Modern biotechnology	The application of: 1. *In vit*ro nucleic acid techniques, including recombinant deoxyribonucleic acid (DNA) and direct injection of nucleic acid into cells or organelles. 2. Fusion of cells beyond the taxonomic family, that overcome natural physiological reproductive or recombination barriers and that are not techniques used in traditional breeding and selection. [13]

Molecular cloning	The biological amplification of a DNA sequence via the mitotic division of a host cell into which it has been transformed or transfected. [17]
Molecular genetics	The study of the expression, regulation and inheritance of genes at the level of DNA and its transcription products. [17]
Monitoring	The maintaining of regular surveillance over, the checking of, the warning about or the recording of a solution or process. [13]
Monoclonal antibody (mAb)	An antibody, produced by a hybridoma, directed against a single antigenic determinant of an antigen. [17]
Moratorium	A legally authorized postponement before an obligation must be discharged or the suspension of an ongoing activity. [9]
Mutation	Any change in the genome with respect to a defined wild type. Can occur at the level of ploidy, karyotype, or nucleotide sequence. Most of the latter mutations are silent (i.e. cannot be associated with any change in phenotype), either because the DNA sequence affected is in the non-coding part of the genome, or because the specific change does not alter the function of a coding sequence. [17]

Natural selection	The differential survival and reproduction of organisms because of differences in characteristics that affect their ability to utilize environmental resources. [17]
Nitrogen fixation	The conversion of atmospheric nitrogen gas to oxidized forms that can be assimilated by plants, particularly by blue-green algae and some genera of bacteria (e.g. *Rhizobium* spp.; *Azotobacter* spp). An important source of nitrogen in unfertilized soils. [17]
Non-Party	Refers to a State that has not ratified, acceded, or otherwise become a Party to an international agreement. As a Non-Party, a State may have limited rights to participate in negotiations or deliberations under the agreement, or to invoke provisions of the agreement. [12]
Nucleic acid	A macromolecule consisting of polymerized nucleotides. Two forms are found, DNA and RNA. Nucleic acids may be linear or circularized, and single- or double-stranded. [17]
Nucleolus	An RNA-rich nuclear organelle in the nucleus of eukaryotic cells, produced by a nucleolar organizer. It represents the storage place for ribosomes and ribosome precursors. The nucleolus consists primarily of ribosomal precursor RNA, ribosomal RNA, their associated proteins, and some, perhaps all, of the enzymatic equipment (RNA polymerase, RNA methylase, RNA cleavage enzymes) required for synthesis, conversion and assembly of ribosomes. Subsequently the ribosomes are transported to the cytoplasm. [17]

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). Many of nucleotides are linked to form a DNA or RNA molecule. [15]
Nucleus	A dense protoplasmic membrane-bound region of a eukaryotic cell that contains the chromosomes, separated from the cytoplasm by a membrane; present in all eukaryotic cells except mature sieve-tube elements and red blood cells. [17]

Open pollination	Pollination by wind, insects or other natural mechanisms. [17]
Operon	A functionally integrated genetic unit for the control of gene expression in bacteria. It consists of one or more genes that encode one or more polypeptides and the adjacent site (promoter and operator) that controls their expression by regulating the transcription of the structural genes. [17]
Organic agriculture	A concept and practice of agricultural production that focuses on production without the use of synthetic inputs and does not allow the use of transgenic organisms. The USDA's National Organic Program has established a set of national standards for certified organic production, which are available online. [15]
Organism	Any entity, including viruses, able to replicate its own genetic material. [14]
Organisms with novel traits	Organisms produced by genetic modification and whose resultant genetic make-up is unlikely to occur in nature. These do not include organisms obtained by conventional techniques and traditional breeding methods. [14]
Outcrossing	Mating between different populations or individuals of the same species that are not closely related. The term 'outcrossing' can be used to describe unintended pollination by an outside source of the same crop during hybrid seed production. [15]
Oversight	A system for addressing questions of potential risk through guidelines, regulations or other structures. [14]

Parents	Organisms from which an organism with novel trait(s) is derived. [14]
Party	Refers to a State (or regional economic integration organization such as the European Union) that has ratified, acceded to, or otherwise formally indicated its intent to be bound by an international agreement, and for which the agreement is in force. [12]
Patent	A patent is an exclusive right granted for an invention – a product or process that provides a new way of doing something, or that offers a new technical solution to a problem. A patent provides patent owners with protection for their inventions. Protection is granted for a limited period, generally 20 years. [16]
Pathogen	An organism that can cause disease. [14]
Permitted Party	The Applicant or designated AS will be considered the 'Permitted Party' for the purposes of authorization and is the person who shall accept responsibility for compliance with the terms and conditions of the permit. The 'Permitted Party' may designate a Trial-in-Charge, who will be responsible for ensuring compliance with the requirements of authorization as specified by the Regulatory Authority. [5]
Pesticide	A toxic chemical product that killsPlant Quarantine (Regulation of Import into India) Order harmful organisms (e.g. insecticides, fungicide, weedicides, rodenticides). [17]
Photosynthesis	A chemical process by which green plants synthesize organic compounds from carbon dioxide and water in the presence of sunlight. [17]
Phenotype	The visible appearance of an individual (with respect to one or more traits), which reflects the reaction of a given genotype with a given environment. [17]

Phytosanitary certificate	A certificate issued in the model format prescribed under the International Plant Protection Convention of the Food & Agricultural Organization and issued by an authorized officer at the country of origin of consignment or re-export. [7]
Plant breeding	The use of cross-pollination, selection and certain other techniques involving crossing plants to produce varieties with particular desired characteristics (traits) that can be passed on to future plant generations. [15]
Plant breeders' rights (PBR) or plant variety rights	Legal protection of a new plant variety granted to the breeder or his successor in title. The effect of PBR is that prior authorization is required before the material can be used for commercial purposes. [17]
Plant genetic resources (PGR)	The reproductive or vegetative propagating material of: 1. Cultivated varieties (cultivars) in current use and newly developed varieties. 2. Obsolete cultivars 3. Primitive cultivars (landraces). 4. Wild and weed species, near relatives of cultivated varieties. 5. Special genetic stock (including elite and current breeders' lines and mutants). [17]
Plant material	Propagable material (e.g. seed, transplants, tubers, rhizomes, shoots, budwood, whole plant), and non-propagable material (e.g. leaves, devitalized material). [5]
Plant-incorporated protectants (PIPs)	Pesticidal substances produced by plants and the genetic material necessary for the plant to produce the substance. For example, scientists can take the gene for a specific Bt pesticidal protein, and introduce the gene into the plant's genetic material. Then the plant manufactures the pesticidal protein that controls the pest when it feeds on the plant. [11]

Plasmid	Circular self-replicating, non-chromosomal DNA molecule found in many bacteria, capable of transfer between bacterial cells of the same species, and occasionally of different species. Antibiotic resistance genes are frequently located on plasmids. Plasmids are particularly important as vectors for genetic engineering. [17]
Point of Entry	Any sea port, airport, or land-border check-post or railway station, river port, foreign post office, courier terminal, container freight station or inland container depot as specified in Schedule I or Schedule II or Schedule III of PQ order, 2003. [7]
Pollination	Transfer of pollen from anther to stigma in the process of fertilization in angiosperms; transfer of pollen from male to female cone in the process of fertilization in gymnosperms. [17]
Polymorphism	1. The occurrence of allelic variation at a locus. 2. The occurrence of two or more forms in a population. [17]
Polymerase chain reaction (PCR)	A widespread molecular biology procedure that allows the production of multiple copies (amplification) of a specific DNA sequence, provided that the base pair sequence of each end of the target is known. It involves multiple cycles of DNA denaturation, primer annealing and strand extension, and requires a thermostable DNA polymerase, deoxyribonucleotides and specific oligonucleotides (primers). [17]
Polyploid	Organism, tissue or cells having more than two complete sets of chromosomes. Many crop plants are polyploid, including bread wheat (hexaploid, 6x), cotton and alfalfa (tetraploid, 4x), and banana (triploid, 3x). [17]
Population	A defined group of interbreeding organisms. [17]

Post-entry Quarantine	Growing of imported plants in confinement for a specified period of time in a glass house, screen house, poly house or any other facility, or isolated field or an off-shore island that is established in accordance with guidelines/standards and are duly approved and certified by an inspection authority. [7]
Post-harvest period	A period of time that follows the harvest or termination of a confined field trial when restrictions are imposed on the use of the trial site. [5]
Potential receiving environment	An ecosystem or habitat, including humans and animals, which is likely to come in contact with a released organism. [14]
Precautionary approach/ principle	As provided for in the Cartagena Protocol on Biosafety, 'Lack of scientific certainty due to insufficient relevant scientific information and knowledge regarding the extent of potential adverse effects of genetically modified organism on the conservation and sustainable use of biological diversity in the Party of import, taking also into account risks to human health shall not prevent that Party taking a decision, as appropriate, with regard to the import of the GMO in question, in order to avoid or minimize such potential adverse effects. [13]
Primary container	The container into which regulated plant material is placed (e.g. sealed bag, envelope, polythene bag, cardboard box, etc). [5]
Primer	A short oligonucleotide annealed to a template of single-stranded DNA, providing a doubled stranded structure from which DNA polymerase will synthesize a new DNA strand to produce a duplex molecule. [17]
Productivity	The amount of economically significant product generated within a given period of time from a specified quantity of resource. [17]
Progeny	New individuals resulting from sexual or asexual reproduction. [17]

Prohibited plant	Plants of any species that are sexually compatible with the regulated plant under field conditions, including volunteers that may arise in the isolation area during the conduct of confined field trials. [5]
Promoter	A short DNA sequence, usually upstream of (5′ to) the relevant coding sequence, to which RNA polymerase binds before initiating transcription. This binding aligns the RNA polymerase so that transcription will initiate at a specific site. The nucleotide sequence of the promoter determines the nature of the enzyme that attaches to it and the rate of RNA synthesis. [17]
Propagable	Any plant or plant part that can be used in the field to regenerate a whole plant under typical field conditions. [5]
Protein	A macromolecule composed of one or more polypeptides, each comprising a chain of amino acids linked by peptide bonds. [17]
Protocol	The step-by-step experiments proposed to describe or solve a scientific problem, or the defined steps of a specific procedure. [17]
Provirus	A double stranded DNA copy of the single RNA strand of a retrovirus, which has been integrated into a host genome. [17]

Qualitative trait	A trait that shows discontinuous variation, i.e. individuals can be assigned to one of a small number of discrete classes. [17]
Quantitative trait	A measurable trait that shows continuous variation (e.g. height, weight, colour intensity, etc.), i.e. the population cannot be classified into a few discrete classes. [17]
Quarantine	Isolation for a period after arrival in a new location, to allow any pre-existing disease symptoms to appear. Used in the context of regulations restricting the sale or shipment of living organisms, usually to prevent disease or pest invasion of an area. [17]

Ratification	Formal process by which a Head of State or appropriate governmental official or authority signs a document that signals the consent of the State to become a Party to an international agreement once the agreement has entered into force and to be bound by its provisions. [12]
Recombinant DNA	The result of combining DNA fragments from different sources. [17]
Recombinant DNA Advisory Committee (RDAC)	The functions are of an advisory nature and involve review of developments in biotechnology at national and international levels and recommend suitable and appropriate safety regulations for India in recombinant research, use and applications from time to time. [8]
Recombinant DNA technology	A set of techniques for manipulating DNA, including: the identification and cloning of genes; the study of the expression of cloned genes; and the production of large quantities of gene product. [17]
Recombination	The production of a DNA molecule with segments derived from more than one parent DNA molecule. In eukaryotes, this is achieved by the reciprocal exchange of DNA between nonsister chromatids within an homologous pair of chromosomes during prophase of the first meiotic division. [17]
Regeneration	The growth of new tissues or organs to replace those injured or lost. In plant tissue culture, regeneration refers to the development of organs or plantlets from an explant. [17]
Regulation	The act of regulating; a rule or order prescribed for management or government; a regulating principle; a precept. Rule of order prescribed by superior or competent authority relating to action on those under its control. [3]

Reproduction	1. Sexual reproduction: the regular alternation of meiosis and fertilization, which provides for the production of offspring. The main biological significance of sexual reproduction lies in the phenomenon of recombination. 2. Asexual or agamic reproduction: the development of a new individual from a single cell or group of cells in the absence of meiosis. [17]
Reproductive isolation	Refers to the means used to prevent movement of plant material, particularly pollen, from a confined field trial site. [5]
Reservation	Unilateral statement made by a State upon signature, ratification, acceptance, approval or accession to an international legal instrument, indicating that it wishes to exclude or alter the legal effect of certain provisions in their application to that State. Reservations are generally permitted, but some international agreements expressly prohibit reservations. [12]
Resistance	The ability to withstand abiotic (high temperature, drought, etc.) or biotic (disease) stress, or a toxic substance. Often in the context of genetic determination of resistance. [17]
Resolution	Formal expression of the opinion or will of the governing body of an international organization or international agreement. Usually non-binding. [12]
Restriction enzyme	A class of enzymes that cut DNA after recognizing a specific sequence. *Synonym*: restriction endonuclease. [17]
Reverse transcription	The synthesis of DNA on a template of RNA, accomplished by reverse transcriptase. [17]

Review Committee on Genetic Manipulation (RCGM)	It is established under the Department of Biotechnology, ministry of Science and technology is to monitor the safety related aspects in respect of on-going research projects and activities (including small scale field trials) and bring out manuals and guidelines specifying procedure for regulatory process with respect to activities involving genetically engineered organisms in research, use and applications including industry with a view to ensure environmental safety. [8]
Ri plasmid	A class of large conjugative plasmids found in the soil bacterium *Agrobacterium rhizogenes*. Ri plasmids are responsible for hairy root disease of certain plants. A segment of the Ri plasmid is found in the genome of tumour tissue from plants with hairy root disease. [17]
Ribonucleic acid (RNA)	An organic acid polymer composed of adenosine, guanosine, cytidine and uridine ribonucleotides. The genetic material of some viruses, but more generally the molecule, derived from DNA by transcription, that either carries information (messenger RNA), provides sub-cellular structure (ribosomal RNA), transports amino acids (transfer RNA) or facilitates the biochemical modification of itself or other RNA molecules. [17]
Rio Conference	Shorthand for the United Nations Conference on Environment and Development (UNCED), held in Rio de Janeiro, Brazil, in 1992. The outcomes of the Conference include The Convention on Biological Diversity (CBD). [12]
Risk	The probability of causing or incurring a loss or damage or an adverse impact or a misfortune. It is the combination of the magnitude of the consequences of a hazard, if it occurs, and the likelihood that the consequences will occur. [13]

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. [14]
Risk communication	The interactive exchange of information and opinions throughout the risk analysis process concerning hazards and risks, risk-related factors and risk perceptions, among risk assessors, risk managers, consumers, industry, the academic community and other interested parties, including the explanation of risk assessment findings and the basis of risk management decisions. [17]
Risk management	The measures to ensure that the production and handling of an organism are safe. [14]
RNA polymerase	A polymerase enzyme that catalyses the synthesis of RNA from a DNA template. [17]
Rules, 1989	Rules for the Manufacture, Use, Import, Export and Storage of Hazardous Micro-Organisms, Genetically Engineered Organisms or Cells Rules, 1989 conferred by sections 6, 8 and 25 of the Environmental (Protection) Act, 1986. [5]

Salt tolerance	The ability of a plant in soil or in culture to withstand a concentration of common salt (sodium chloride) that is damaging or lethal to most other plants. Breeding and selection for increased tolerance and resistance in crop plants is of great current interest. *Synonym*: saline resistance. [17]
Secondary container	The container into which a primary container is placed. [5]
Secondary metabolism	The production by living organisms of substances not essential for primary metabolic functions or physiology. Their role is associated with interaction with the environment, e.g. for defence, as elicitors or as attractants. Some of these have useful pharmacological or nutritional properties, while others are toxic. [17]
Selectable marker	A gene whose expression allows the identification of a specific trait or gene in an organism. [17]
Selection	1. Differential survival and reproduction of phenotypes. 2. A system for either isolating or identifying specific genotypes in a mixed population. [17]
Selective breeding	Breeding of plants having desirable characters. [2]
Self-incompatibility	In plants, the inability of the pollen to fertilize ovules (female gametes) of the same plant. [17]
Sequence	The linear order of nucleotides along a DNA or RNA molecule, and the process of obtaining this. Genome sequencing aims to generate the linear order of all nucleotides present in the nuclear DNA of an organism. [17]
Serology	The study of serum reactions between an antigen and its antibody. Mainly used to identify and distinguish between antigens, such as those specific to particular microorganisms or viruses. [17]

Sexually compatible	Ability of a plant to cross-pollinate with other cultivated plants of the same species, or with wild plants of a related species, and form viable hybrids without human intervention. [5]
Sexual reproduction	The process whereby two gametes fuse to form one fertilized cell (zygote). [17]
Silencing	Loss of gene expression either through an alteration in the DNA sequence of a structural gene or its regulatory region, or because of interactions between its transcript and other mRNAs present in the cell. [17]
Site map	Map of the trial site providing sufficient details on the dimensions, distances to physical landmarks, layout of the site, etc. to allow regulatory officials/ monitoring agencies to locate each field trial site during the planting season as well as during any required period of post-harvest land use restriction. [5]
Signatory	A party that signs a document, personally or through an agent, and thereby becomes a party to an agreement. [9]
Single nucleotide polymorphism (SNP)	A polymorphism (q.v.) at a particular base site in a coding sequence, e.g. at base 306 in a particular gene, one individual could be heterozygous for A and G: the maternal allele could have an A at this site, while the paternal allele has a G at this site. This type of polymorphism is extensive throughout the genome, and has the great advantage of being detectable without the need for gel electrophoresis, which opens the way for largescale automation of genotyping. [17]
Somaclonal variation	Epigenetic or genetic changes induced during the callus phase of plant cells cultured *in vitro*. Sometimes visible as changed phenotype in plants regenerated from culture. [17]

Species	A class of individuals capable of interbreeding, but which is reproductively isolated from other such groups having many characteristics in common. A somewhat arbitrary and sometimes blurred classification, but still quite useful in many situations. [17]
Splicing	During the maturation of eukaryotic mRNA, the process that eliminates intervening intron sequences and covalently joins exon sequences of RNA. *Compare*: split gene; exon; guide sequence. In recombinant DNA technology, the term refers to the latter of the two processes just described, namely joining fragments of DNA together. [17]
Spontaneous mutation	A mutation occurring in the absence of any known mutagen.[17]
Sport	An individual plant, or portion thereof, showing a recognizably different phenotype from the parent, presumably as a result of spontaneous mutation. Novel traits displayed by some sports can become of great agricultural worth, but generally they are disadvantageous. [17]
State Biotechnology Coordination Committee (SBCC)	It has a major role in monitoring. It also has powers to inspect, investigate and take punitive action in case or violations of statutory provisions. [8]
Sterility	Complete or partial failure of an individual to produce functional gametes or viable zygotes under a given set of environmental conditions. [17]
Stress	Non-optimal conditions for growth. Stresses may be imposed by biotic (pathogens, pests) or abiotic (environment, such as heat, drought, etc.) factors. [17]
Substrate	1. A compound that is altered by an enzyme. 2. Food source for growing cells or microorganisms. 3. Material on which a sedentary organism lives and grows. [17]

Sui generis	A latin term meaning “being the only example of its kind; constituting a class of its own; unique”. Often used to describe a unique (legal) system. [12]

Template	An RNA or single-stranded DNA molecule, used by polymerases to generate a complementary nucleotide strand. [17]
Terminator	1. A DNA sequence just downstream of the coding segment of a gene, which is recognized by RNA polymerase as a signal to stop synthesizing mRNA. 2. A term used in GMO technology for a transgenic method which genetically sterilizes the progeny of the planted seed, thereby preventing the use of farmsaved seed. [17]
Thymine (T)	One of the bases found in DNA and RNA. [17]
Traditional breeding	The process of sexual reproduction and production of offspring. [17]
Ti plasmid	Tumour-inducing plasmid. A large plasmid present in pathogenic *Agrobacterium tumefaciens*, responsible for the induction of tumours in plant with crown gall disease. Engineered forms of this plasmid are central to the production of transgenics in many crop species. [17]
Trait	One of the many characteristics that define an organism. The phenotype is a description of one or more traits. [17]
Transboundary movement	Movement from an area under the national jurisdiction of one State to or through an area under the national jurisdiction of another State or to or through an area not under the national jurisdiction of any State. [12]
Transcription	Synthesis of RNA from a DNA template via RNA polymerase. [17]
Transduction	the transfer by means of a viral vector of a DNA sequence from one cell to another. [17]

Transfer RNA (tRNA)	Small RNA molecules that transfer amino acids to the ribosome during protein synthesis. Each tRNA binds just one species of amino acid and recognizes a specific codon in the mRNA, thus implementing the genetic code. [17]
Transformation	1. The uptake and integration of DNA in a cell, in which the introduced DNA is intended to change the phenotype of the recipient organism in a predictable manner. 2. The conversion, by various means, of cultured animal cells from controlled to uncontrolled cell growth, typically through infection with tumour virus or transfection with an oncogene. [17]
Transgene	An isolated gene sequence used to transform an organism. Often, but not always, the transgene has been derived from a different species than that of the recipient. [17]
Transgenesis	The introduction of a gene or genes into animal or plant cells, which leads to the transmission of the input gene (transgene) to successive generations. [17]
Transgenic	An individual in which a transgene has been integrated into its genome. In transgenic eukaryotes, the transgene must be transmitted through meiosis to allow its inheritance by the offspring. [17]
Transposable (genetic) element	A DNA element that can move from one location in the genome to another. *Synonym*: transposon. [17]
Treaty	International agreement concluded between States in written form and governed by international law, whether embodied in a single instrument or in two or more related instruments and whatever its particular designation (Vienna Convention on the Law of Treaties). [12]

Trial-in-Charge	The technical person designated by the Permitted Party as responsible for management of the field trial, ensuring compliance with the terms and conditions of a confined field trial authorization and providing information required by Regulatory Authorities. The Trial-in-Charge must, at a minimum, be an agriculture graduate. [5]
Trial protocol	The protocol for conducting a confined field trial approved by the Regulatory Authorities. [5]
Trial site	The area where one or more confined field trials of the same plant species may be grown. For example, three confined field trials of cotton surrounded by a shared 50 m isolation area would constitute a single trial site. [5]
Trial site location	The geographic location of a confined trial site, e.g. village, address and plot number. [5]
TRIPS Agreement	Agreement on Trade-Related Aspects of Intellectual Property Rights. One of the agreements under the World Trade Organization (WTO). [12]

Users	Any persons, institutions or organizations (including companies) responsible for the development, production, testing, marketing and distribution of organisms with novel traits. Any member of the general Public who purchases and/or uses an organism is not a user in the meaning of these Guidelines, unless specific conditions are attached to its use. [14]

Variation	Differences between individuals within a population or among populations. [17]
Variety	1. A naturally occurring subdivision of a species, with distinct morphological characters. 2. A defined strain of a crop plant, selected on the basis of phenotypic (sometimes genotypic) homogeneity. [17]
Vector	A small DNA molecule (plasmid, virus, bacteriophage, artificial or cut DNA molecule) that can be used to deliver DNA into a cell. Vectors must be capable of being replicated and contain cloning sites for the introduction of foreign DNA. [17]
Virus	An infectious particle composed of a protein capsule and a nucleic acid core (DNA or RNA), which is dependent on a host organism for replication. [17]
Volunteers	Self-sown plants of the same species as the regulated plant that may germinate and grow on the trial site and/or within the isolation distance. [5]

Weed	A plant growing where it is not wanted. Generally used to describe plants that colonize readily and can compete for resources with a planted crop. [17]
Weediness	The ability of a plant to colonize a disturbed habitat and compete with cultivated species. [17]
WIPO	World Intellectual Property Organization. A UN specialized agency, established in 1970 to administer all matters related to intellectual property. WIPO has established an Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore, which meets periodically. [12]
WTO	World Trade Organization. An international organization established in 1995 to provide a forum for trade negotiations, handle trade disputes, monitor national trade policies and provide technical assistance and training for developing countries, among others. [12]

Yeast artificial chromosome (YAC)	A vector that can be propagated in budding yeast (*Saccharomyces pombe*), consisting of the minimal elements required for a chromosome to replicate, and allowing for the cloning of large DNA fragments (hundreds of kilobase pairs). [17]

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