A Glossary

for

Crop Improvement

Compiled by

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A Glossary for Crop Improvement

A-line:	the male-sterile parent line in a cross being made to produce hybrid seed.
accession:	an individual sample of seeds or plants entered into a germplasm collection in a seed bank or clonal repository.
acclimatization:	the adaptation of an individual to a changed climate or the adjustment of a species or a population to a changed environment over a number of generations.
acropetalous:	flowering commencing from the base and progressing towards the top.
adaptation:	the process by which individuals, populations, or species change in form or function in such a way that they may survive under given environmental conditions.
addition line:	when a line has one pair of chromosomes from another variety or species in addition to the normal somatic chromosome complement of the species.
additive genes:	genes that do not show dominance over the genes at another loci but have a cumulative effect.
additive variance:	the genetic variance occurring due to the additive effects of genes.
advance breeding line:	plants whose germplasm has been manipulated to form the parental material from which new varieties or hybrids are developed.
aestivate:	to pass the summer in a resting state.
agamospermy:	formation of seeds without a sexual process (adventitious embryony, diplospory, or apospory).
albino:	a plant lacking chloroplast.
aleurone:	the outer layer of the endosperm.
alien chromosome:	a chromosome from a related species transferred to a crop plant.
alkylating agents:	mutagenic chemicals with one or more reactive alkyl groups that can alkylate DNA. An alkyl group is a univalent radical of CnH2n+.

allele: the other form of a gene. Alleles are located on the corresponding loci of the homologous chromosomes. Also allelomorph.

allogamy: pollen grains from flowers of one plant pollinate the flowers of other plant (syn. cross-pollination).

alloploid or allopolyploid: an organism with more than two sets (genomes) of chromosomes in its body cells, each set derived from a different species. Generally produced by doubling the chromosome number of a F_1 hybrid. Also amphiploid or amphidiploid.

amino acids: any of the subunits that are joined together with peptide bonds to form proteins. There are 20 amino acids usually found in proteins.

amitosis: nuclear division by a process other than mitosis (direct nuclear division) which, in typical cases, involves a dumbbell-shaped cleavage of the cell nucleus.

amyloplast: leucoplast specialized for synthesis and storage of starch.

androecium: the male reproductive organs of a plant; the stamens of a flower.

androgenesis: development of a haploid embryo from a male nucleus (sperm nucleus); the female nucleus (egg cell) degenerates.

aneuploid: an individual with other than an exact multiple of the haploid chromosome complement, e.g., 2n-1, 2n+2, etc.

anther culture: culture of anthers (or pollen grains) on a suitable medium for production of callus and or haploid plants.

anther: the pollen-bearing portion of the stamen.

anthesis: the time and mode of flowering.

antibiosis: the adverse reaction shown by the resistant host plant towards the insects feeding on it either to allow the insects to lay a few eggs, or to slow down their rate of growth.

antimetabolite: a substance that suppress or inhibits the utilization of a metabolite and results in the failure of metabolism.

apogamy:	the production of a sporophyte from the cells other than the egg of embryosac/gametophyte.
apomixis:	reproduction from an unfertilized egg or from somatic cells associated with the egg.
apospory:	a form of apomixis in which the embryo sac develops from a vegetative cell of the ovule.
approach crossing technique :	the pollen donor inflorescence is put slightly above the emasculated inflorescence and bagged or enclosed in opposite ends of a plastic sleeve.
artifact:	any structure that is not typical of the actual specimen, but which results from cytological processing, postmortem changes, etc.
artificial selection:	the genotypes chosen by man contributing to the gene pool of succeeding generations of a given organism.
asexual reproduction:	reproduction without the fusion of male and female gametes.
assortative mating:	system in which more closely related individuals are mated (syn. inbreeding).
assortment:	the random distribution of the gametes of different combinations of chromosomes.
asynapsis:	the failure or partial failure of pairing of homologous chromosomes during the meiotic prophase.
autogamy:	pollen grains of a flower pollinate the same flower (syn. self-pollination).
autoplasmy:	spontaneous origin and maintenance of male sterility inducing cytoplasm.
autoploid, autopolyploid:	an organism with more than two sets of chromosomes in its body cells, both sets derived from the same species.
autosome:	a chromosome other than a sex chromosome.
autotrophic:	cells that are capable of synthesizing their own macro-molecules and obtain energy from very simple nutrient molecules.

auxin:	a plant hormone that promotes cell elongation, fruit initiation, callus production, and other plant functions.
avirulent:	a parasite unable to infect and cause disease in a host plant.
B-line:	the fertile counterpart of the A-line. The B-line does not have fertility-restoring genes and is used as the male parent to maintain the A-line.
backcross:	1. In breeding: a cross of a hybrid with one of its parents or with a genetically equivalent organism. 2. In genetics: crossing the hybrid with a homozygous recessive (see also testcross).
base analogues:	compounds closely related to purine or pyrimidine bases that can be incorporated into DNA during replication.
base collection:	long-term storage of germplasm reserved or duplicates not intended for regular usage.
basic collection:	a working collection of lines chosen and stratified by race, subrace geographical distribution, and ecological adaptation.
basic number:	the haploid chromosome number of ancestral diploid species of a polyploid. Represented by x.
basipetalous:	flowering commencing at the top and progressing towards the base.
BC_1, BC_2, etc:	symbols used to designate the 1st backcross generation, the 2nd backcross generation, etc.
biological yield:	the total biomass of the plant.
biomass:	the mass of the plant measured by including the roots.
biometry:	the science dealing with the application of statistical methods to biological problems.
biotechnology:	is technology applied to biological or living organisms. It encompasses a series of scientific techniques to accomplish anything, must be applied to natural resource: genes. The objectives which are otherwise not possible through traditional breeding methods.

biotype:	a population in which all individuals have an identical genotype.
bivalent:	a pair of synapsed or associated homologous chromosomes.
bract:	a modified leaf in whose axil a flower or reproductive organ arises.
breeder seed:	seed (or vegetative propagating material) that is increased by the originating, or sponsoring plant breeder or institution and used as the source for the increase of foundation seed.
breeding value:	the sum of the genic value of the genes carried by an individual or the additive genetic value of the individual.
bridging species:	a species used in gene transfer from one species to another sexually incompatible species.
bud mutation:	mutation of somatic tissues usually affecting an axillary bud.
bud blasting:	suppression of the development of a flower beyond the stage in which the corolla emerges.
bud selection:	a form of clonal selection in which mutant buds are selected.
bulk-generation advance:	harvesting of all the plants from a segregating generation and bulking the seed to constitute seed material for the next generation.
callus:	a homogeneous mass of cells without differentiated structures such as shoot, bud, root, or embryoid.
carpel:	a modified leaf forming whole or part of the gynoeceum of a flower.
cell:	the structural unit of the body. It is a unit of independent mass of protoplasm with a nucleus in it, enveloped by cell wall.
cell culture:	growing of cells in vitro including the culture of single cells.
center of origin:	an area from which a given taxonomic group of organisms has originated and spread.

centromere: lightly stained region of the chromosome, with which the spindle fibers become associated during mitosis and meiosis.

certified seed: the progeny of registered seed produced and handled to maintain satisfactory genetic identity and purity, and be approved and certified by an official certifying agency.

character: the expression of a gene as revealed in the phenotype.

chasmogamy: fertilization after opening of the flower.

chiasma: the place of contact between the chromatids of the homologous chromosomes where the exchange of the chromatids occurs.

chimera: plant composed of tissues of two or more idiotypes due to somatic mutation, or part of a plant with different genetic constitution as compared with the other parts of the plant. It may result from two different zygotes, or artificial fusion or somatic mutation.

chloroplast: plastid containing chlorophyll capable of carrying out photosynthesis.

chromatid: one of the two thread-like structures formed in the duplication of a chromosome to form daughter chromosomes.

chromatin: a substance with characteristic staining properties found in the chromosomes: the genetic material.

chromomere: bead-like concentration of chromatin linearly arranged on the chromosomes of the meiotic prophase.

chromoplast: plastid containing yellow and orange pigments.

chromosome: a structural unit in the nucleus that carries the genes in a linear order. It preserves its individuality from one generation to the next. Chromosomes carry the genetic material and are species-specific for their number and morphology.

classification: the subdivision of organisms from the largest to the smallest group: kingdom, phylum, class, order, family, genus, and species.

cleistogamy:	pollination and fertilization in an unopened flower bud.
clonal selection:	method of selection of clones from a mixed population of vegetatively propagated crop.
clone:	a population of cells or organisms derived from a single cell or common ancestor by mitosis; reproduction giving rise to a clone is asexual.
codominant alleles:	alleles that produce independent effects and both the characters appear together when heterozygous.
codon:	a sequence of three adjacent nucleotides that code for an amino acid.
cohort:	the group of individuals that enter the breeding program in the same season.
colchicine:	an alkaloid drug that arrests the spindle fiber formation and separation of the daughter chromosomes.
combining ability, general:	the average or overall performance of a genetic strain in a series of crosses.
combining ability, specific:	the deviation in the performance of a specific cross combination from that predicted on the basis of general combining ability of both the parents.
competition:	the mutually exclusive use of the same limited resources by two or more organisms.
complete flowers:	flowers having all usual parts (sepals, petals, stamens, and pistils).
composite:	a population at equilibrium developed from crossing more than two parents. Often, open-pollinated cultivars are the parents.
convergent improvement:	each single cross is backcrossed independently to both of its inbred parents.
corolla:	the petals considered collectively.
correlated response to selection:	change in one or more quantitative characters due to selection for another character.

correlation:	a mutual relationship between two characters; the increase or decrease of one is generally associated with an increase or decrease of the other. Linear correlation is measured by the correlation coefficient, which may range in value from -1 to +1.
corymb:	a compound inflorescence in which individual inflorescence attain the same height and together form a head shape.
cross-fertilization:	the union of an egg with a sperm from a plant with a different genotype.
cross-pollination:	the transfer of pollen from an anther of one plant to the stigma of another plant with a different genotype.
crossing over:	an interchange of segments between the chromatids of two homologous chromosomes at meiosis.
crossover value:	the percentage of crossing over in a hybrid population, a term used mostly in determining linkage percentage, particularly in chromosome mapping.
cryogenic preservation:	the use of extremely low temperatures, created by liquid nitrogen for long-term seed and tissue storage.
cultivar:	a population of cultivated plants related by descent, that have genetic traits in common. Identity and reproducibility are inherent features of a cultivar.
cybrid:	hybrid developed with the fusion of the cytoplasm of two cells/parents.
cytokinesis:	the process of division or segmentation of the cytoplasmic portion of a cell.
cytokinin:	a plant hormone that stimulate mitosis.
cytology:	the science dealing with the structure, function, and life history of the cell.
cytoplasm:	the protoplasm of a cell excluding the nucleus.

cytoplasmic inheritance:	is controlled by extrachromosomal, cytoplasmic hereditary detriments whose sum total make up the "plasmotype", in contrast to the genotype or all hereditary determinants contained in the chromosomes.
cytoplasmic male sterility:	pollen abortion due to the interaction of male sterility inducing cytoplasm with the recessive nuclear factors for male sterility and in the absence of pollen restoring genes.
dehiscence:	splitting open of a fruiting structure or anther.
deletion:	the loss of a segment of the genetic material from a chromosome.
descriptor:	an easily identifiable and measurable trait or characteristic of a plant (e.g. height, color) used in classification of germplasm lines.
desynaptic:	relaxation of pairing (at diplotene of meiosis) between normally paired chromosomes (at pachytene of meiosis) before crossing over takes place.
determinate:	an inflorescence in which the terminal flower opens first, thus arresting the prolongation of the floral axis (example, a cyme).
diallel crosses:	all possible crosses, including reciprocals, among a set of parents.
diallel selective mating:	the process of selection and intermating among the segregating progenies of the selected F_2s from a diallel cross originally made among the selected parents.
diapause:	to pass the adverse seasonal conditions in a resting state.
differential cultivar:	a cultivar that contains known genes for disease reaction used for identification of physiological races of pathogens.
dihaploid:	hybrid derived from an amphidiploid, i.e., monoploid for two distinct genomes.
dihybrid:	the result of a cross between parents that differ by two pairs of genes.

dilatory resistance:	the epidemiological concept of resistance that delays pathogen development regardless of the means of genetic control.
dimorphism:	occurrence of two forms of genotypes within a population.
dioecious:	having male and female flowers or other reproductive organs on separate unisexual plants.
diploid:	having two sets (genomes) of chromosomes; chromosome number of 2n, as in a zygote. Somatic or body tissue is normally diploid in contrast to haploid germ cells.
disease:	harmful deviations from normal functioning of physiological processes of a plant (malfunctions) caused by pathogenic organisms or viruses.
disomic:	individuals with two chromosome sets whose members are represented by pairs of homologues.
disruptive selection:	selection of extreme classes of plants and intermating to maintain polymorphism.
distant hybridization:	hybridization between individuals belonging to two different species of the same genera or of different genera.
DNA:	deoxyribonucleic acid. Hereditary material of all cells, found in the chromosomes and cell organelles such as mitochondria and plastid —— made up of purines, pyrimidines, phosphates, and deoxyribose sugar.
dominant:	1. A gene that expresses itself to the exclusion of its contrasting (recessive) allele. 2. A character that is expressed in a hybrid to the exclusion of the contrasting (recessive) character.
donor parent:	the parent from which one or several desirable genes are transferred to the recurrent parent in backcross breeding.
dosage effect:	the effect of the number of times a genetic element is present upon a process or structure of a phenotype.

double cross:	a cross resulting from two single crosses [(AxB) x (CxD)].
double fertilization:	in angiosperms fertilization occurs twice: (a) one of the two male gametes of the pollen tube fuses with the egg cell of embryosac, and (b) the other gamete fuses with the polar nuclei.
duplicate genes:	two or more pairs of genes that produce identical effects, whether alone or together.
duplex:	an individual in which the dominant allele is representing two times (AAaa).
ecotype:	a race (within a species) genetically adapted to a certain environment.
egg:	the female gamete or germ cell.
emasculate :	to remove the anthers from a bud or flower before pollen is shed.
embryo:	the rudimentary plant in a seed. The embryo arises from the zygote.
embryo sac:	typically, an eight-nucleate female gametophyte. The embryo sac arises from the megaspore by successive mitotic divisions.
embryoculture:	removal of a developing embryo from a seed for in vitro propagation.
embryoid:	an embryo-like structure seen in cell and tissue cultures.
endoploid:	ploidy proportional to the number of endomitoses that has taken place in an organism.
endopolyploidy:	occurrence of cells in diploid organisms containing multiples of the 2n genomes (i.e., 4n, 8n, etc.).
endosperm:	triploid tissue that arises from the triple fusion of a sperm nucleus with the polar nuclei (two) of the embryo sac. It may persists as a storage tissue and be used in the growth of the embryo.
environment:	the sum of the external conditions that affect growth and development of an organism.
enzyme:	proteins produced in living cells that catalyze biochemical reactions.

epigenetic: not of genetic origin.

epiphytotic: 1. Sudden and usually widespread development of a destructive disease in plants (epidemic). 2. Creation of high disease pressure for screening for disease resistance.

epistasis: nonallelic interaction, when one gene masks the expression of a nonallelic gene.

etiolation: abnormally long internodes and small yellowish leaves caused in plants that grow where light has been reduced.

euploid: an individual having the chromosome number which is equal to the multiples of the monoploid (n) or haploid number.

evolution: the cumulative change in the characteristics of populations of organisms related by descent, occurring during the course of successive generations.

explant: a portion of tissue removed from a plant for tissue culture.

exine: the outer membrane of a pollen grain or spore.

exploration: a trip for collection of germplasm of cultivated and related wild species (an expedition).

expressivity: ability of a gene to express itself uniformly in the individuals that carry it.

F_1, F_2, etc.: symbols used to designate the 1st filial generation, the 2nd filial generation, etc., after a cross.

family: a group of individuals having common parents.

fertilization: union of an egg and a sperm nucleus to form a zygote.

filament: the stalk of the stamen that supports the anther.

fitness: the reproductive value of a genotype in a population.

floret: an individual flower from an inflorescence, as in a grass panicle or a composite head.

foundation seed:	seed stocks increased from breeder seed, and handled as to closely maintain the genetic identity and purity of a variety.
full-sibs:	individuals of a progeny with identical parents.
gamete:	1. A mature reproductive cell (in some cases only nucleus) capable of fusing with a cell of similar origin but of opposite sex to give a zygote. 2. A haploid germ cell.
gamete selection:	involves crossing a good inbred line with a random sample of pollen from an open-pollinated variety followed by individual selfing of F_1 plants.
gametocide:	chemical used to kill the gametes in plants (usually the male gamete).
gametogenesis:	formation of gametes.
gene:	the unit of inheritance, located on the chromosome. By interaction with other genes, the cytoplasm, and the environment; it affects or controls the development of a character.
gene action:	the mechanism with which the hybrid vigor is manifested.
gene bank:	a large collection of germplasm representing material from various parts of the world (world collection).
gene frequency:	in a given population, the number of loci at which a given allele is found, divided by the number of loci at which it could occur.
gene interaction:	modification in the expression of a dominant gene by another non-allelic dominant gene.
gene park:	establishment of a gene pool of a cultivated, wild, and primitive species outside the center of genetic diversity.
gene pool:	in a population of randomly mating individuals the genes constitute a pool in the form of gametes that combine randomly to give the next generation.
gene sanctuary:	an area within the center of diversity and protected from the interference of man.

gene-for-gene relationship:	a relationship in host-parasite interactions in which every gene conditioning resistance in a host plant is matched by a gene for avirulence or virulence in the pathogen.
geneflow:	the spread of genes from one breeding population to another by migration.
general resistance:	resistance that functions against all biotypes of a pathogen.
generation:	the whole cycle in plant life from seed to seed.
genetic advance:	improvement in performance of selected lines over the original or base population (genetic gain).
genetic code:	the manner with which the genetic information is encoded in the DNA.
genetic diversity:	the range of genetic differences among individuals or groups of organisms.
genetic drift:	the random fluctuations of gene frequencies due to sampling errors. While drift occurs in all populations, its effects are most evident in very small populations.
genetic engineering:	genetic manipulation (bypassing the sexual cycle) by which an individual, having a new combination of inherited properties, is established. It may be through a cellular or molecular approach.
genetic equilibrium:	the situation reached in a population where the frequencies of both alleles (i.e., A and a) are maintained generation after generation.
genetic erosion:	the gradual loss of genetic diversity, regardless of cause.
genetic load:	the extent to which a population departs from a perfect genetic constitution.
genetic marker:	an allele used to mark or identify a gene or a chromosome.
genetic resources:	germplasm containing potentially useful characteristics of plants, animals, and other organisms.

genetic stock collection:	stocks with known genes, translocations, inversions, addition or substitution lines, resistance or tolerance to known races of pathogens, insects, witch weed etc.
genetic variance:	that portion of the phenotypic variance caused by the varying genotypes of the individuals in a population.
genetics:	the science dealing with heredity, and variation.
genome:	a set of chromosomes consisting of the basic number of the primitive species, e.g., sorghum contains two genomes of 10 chromosomes each; groundnut contains two genomes of 20 each. The chromosomes in a genome differ from one another; they can be recognized individually.
genotype:	1. The genetic make up of an organism; the sum total of its genes, both dominant and recessive. 2. A group of organisms with the same genetic makeup.
genotype x environment interaction:	differential performance of genotypes in different environments.
genotypic ratio:	the proportions of the different genotypes in a particular progeny.
germplasm:	1. The material basis of hereditary. 2. The potential materials collectively within a species or a group of species.
germplasm complex:	open-pollinated progeny from a mixture of a number of strains from diverse origins.
globulin:	a class of proteins that are soluble in dilute salt solutions.
glume:	the outer husks or bracts of each spikelet in grasses.
gynaeceum:	the female organs of a flower - ovary, style and stigma.
gynodiocious:	having hermaphrodite and female flowers on different plants.

hybrid vigor:	the vigor exhibited in the first filial generation of a cross between two genetically different parents.
hybridization:	the crossing of individuals of unlike genetic constitution to obtain genetic recombinations (create variation).
hybridize:	to produce hybrids by crossing individuals with different genotypes.
I_1, I_2, etc:	symbols used to designate the 1st and 2nd inbred generations.
identical twins:	two individuals resulting from the split of one zygote.
ideotype:	ideal plant type.
idiogram:	a diagrammatic representation of chromosome morphology used diagnostically for the comparison of the karyotypes of different species.
idiotype:	the total hereditary determination of an organism consisting of its genotype and plasmotype.
immune:	free from attack by a given pest; not subject to the disease.
immunity:	total freedom from pest or disease incidence.
imperfect flower:	a flower lacking either stamens or pistils (see also perfect flower).
indicator row:	susceptible check sown together with test entries to assess the disease pressure.
in vitro:	a biological processes performed outside the living body and in an artificial environment.
in vivo:	biological processes within the living organism.
inbred line:	1. A pure line usually originated by self-pollination and selection. 2. The product of inbreeding.
inbreeding:	breeding closely related organisms; in plants, usually by self-pollination.
inbreeding depression:	decreased vigor in terms of growth, survival, or fertility following one or more generations of selfing.

incompatibility:	failure of fertilization and seed formation after pollination; can be either self- or cross-incompatibility.
incomplete dominance:	the production of an effect by two different alleles that is intermediate to the effects produced by the same alleles in a homozygous condition.
incomplete flower:	a flower lacking one or more of the four essential flower parts (see also complete flower).
independent assortment:	the chance distribution of two or more pairs of segregating genes to the gametes.
indeterminate:	an inflorescence in which the terminal flower is the last to open. The flowers arise from axillary buds, and the floral axis may be indefinitely prolonged by a terminal bud (example, a raceme).
indirect selection:	improvement of a character is achieved by exercising selection for an another related character.
inert matter:	nonliving matter, diseased, insect-damaged and broken seeds in a seed sample.
infector row:	susceptible entry sown prior to the sowing of test entries to create disease pressure in the screening nursery.
infester row:	susceptible entry sown prior to the sowing of the test entries to create insect pressure in the screening nursery (also interlard).
inflorescence:	1. A flower cluster. 2. The arrangement and mode of development of the flowers on a floral axis.
inherit:	transmission of chromosomes and genes from one generation to the next.
inoculate:	1. To place inoculum where it will produce an infectious disease. 2. To introduce nitrogen-fixing bacteria into the soil, usually by treating seeds before sowing.
inoculum:	spores, bacteria, fragments of mycelium, other portions of pathogens, or other organisms that can infect plants.

instar:	the period between two molts of a larva/nymph.
intensity of selection:	selection differential (xs-xo) expressed in terms of phenotypic standard deviation, where xo is the mean of the population before selection, and xs is the mean of selected individuals.
intergeneric cross:	a cross involving two individuals from different genera.
interspecific cross:	a cross involving two individuals from different species.
intine:	the inner membrane of a pollen grain or spore.
introgressive hybridization:	the incorporation of genes of one species into the gene pool of another.
inversion:	when a segment of the chromosome is rotated by 180° so that the gene order on the segment is reversed.
ionizing radiation:	radiation in which electrons are detached as they pass through the tissue. For example, x-ray; and gamma-rays.
irradiation:	exposing seed, pollen, or other plant parts to x-rays or other forms of radiation to increase mutation rates.
isochromosome:	a chromosome with identical arms.
isogeneic:	genetically uniform.
isogeneic lines:	lines identical in genotype except for one gene.
isolation:	the separation of one group from another, so that pollination between the groups or stray plants is prevented.
karyokinesis:	division of the cell nucleus.
karyotype:	the number and morphology of a particular chromosome complement of an individual or a group of related individuals.
lagging:	retarded movement of chromosomes: may give rise to aneuploidy.

landrace:	a cultivar selected and used for cropping before the modern era of crop breeding. A primitive cultivar characteristic of a cropping locality constituting several biotypes.
leaf area index:	the area of leaf per unit area of ground.
lemma:	the lower of the two bracts enclosing each floret in the grass spikelet.
lethal gene:	a gene that kills each and every individual when carried in a homozygous recessive state.
lethal mutation:	a mutation that results in the premature death of the organism. Dominant lethal skill heterozygotes, whereas recessives kill homozygotes.
leucoplast:	plastid containing no visible pigments (amyloplast).
life cycle:	the series of developmental changes undergone by an organism from fertilization to reproduction.
ligate:	the bonding of adjacent nucleotides by repairing enzymatically the phosphodiester backbone of DNA strand.
line:	a group of individuals from a common ancestry.
line breeding:	a method of population improvement in which a number of lines selected on the basis of a progeny test are combined to produce a new variety.
linkage:	the relationship between two or more genes that tend to be inherited together because they are closely located on the same chromosome. This results in parental gene combinations occurring frequently with less recombinations in the progeny.
linkage group:	a group of genes arranged in a linear order on a chromosome.
linkage map:	a diagram of a chromosome showing the relative position of the genes.
locus:	the position of a particular gene on a chromosome (plural, loci).
lodicule:	one of two scale-like structures at the base of the ovary in a grass flower.

M_1, M_2, etc.:	symbols used to designate the 1st generation, 2nd generation, etc., following exposure to mutagenic agents (ionizing radiations, chemical mutagens, etc.).
maintainer line:	line used for maintaining a cytoplasmic male-sterile line. It possesses the same nuclear genotype as the male-sterile (see also B line).
male sterility:	a condition in which pollen is absent or nonfunctional in flowering plants.
map unit:	a number that corresponds to a recombination frequency of 1%.
mass selection:	a system of breeding in which seed from individuals selected on the basis of phenotype is combined and used to grow the next generation.
mass-pedigree selection:	in this method the segregating progeny is maintained as a bulk for a few generations and then pedigree selection is applied.
maternal effect:	trait controlled by a gene of the mother but expressed in the progeny.
medium:	a combination of nutrients, and other substances upon which cells are grown.
megagametophyte:	(see embryosac).
megaspore:	one of the four haploid spores originating from the meiotic divisions of the diploid megaspore mother cell in the ovary and giving rise to the megagametophyte.
megaspore mother cell:	diploid cell in an ovary that gives rise, through meiosis, to four haploid megaspores.
meiosis:	two successive nuclear divisions of reproductive cells in the course of which the diploid chromosome number is reduced to the haploid.
mericloning:	vegetative multiplication through meristem culture.
meristem culture:	production of shoots and plantlets from the apical meristem.
metaxenia:	effects of pollen grains on the maternal endosperm.

micropyle: a canal through the coverings of the nucellus through which the pollen tube passes during fertilization and through which water enters when the seed begins to germinate.

microspore: one of the four haploid spores originating from the meiotic division of the microspore mother cell in the anther that gives rise to the pollen grain.

microspore mother cell: diploid cell in the anther that gives rise, through meiosis, to four haploid microspores.

midrib: the central main vein of a leaf.

mitosis: a process of nuclear division in which the chromosomes are duplicated longitudinally, forming two daughter nuclei, each having a chromosome complement identical to that of the original nucleus.

modifier: a gene that modifies the phenotypic expression of a nonallelic gene.

molecule: a group of atoms, held together by chemical, bonds that forms the smallest unit of chemically identifiable matter.

monoallelic: referring to a polyploid in which all alleles at a given locus (loci) are the same. In a tetraploid, for example, A_1, A_2, A_3, A_4.

monoecious: having staminate and pistillate flowers on the same plant.

monogenic character: a character determined by a single pair of genes.

monohybrid: individuals heterozygous with respect to the alleles of one gene locus; also of crosses involving parents that differ with respect to the alleles of one locus.

monoploid: an individual with basic chromosome number (x), i.e., with one genome.

monosome: a chromosome that has no homolog present. A uni-valent chromosome in an otherwise normal diploid individual (2n-1).

monozygotic twins: twins formed by the splitting of the zygote derived from a single fertilized egg. Such twins are genetically identical.

multilines:	mixture of several isogeneic lines.
multiple alleles:	a series of alleles, or alternative forms of a gene. A normal heterozygous diploid plant bears only two genes of an allelic series. Multiple alleles arise by repeated mutations of a gene, each mutant giving different effects.
multiple genes:	two or more independent pairs of genes that produce complementary or cumulative effects upon a single character of the phenotype.
multivalent:	association of more than two homologous chromosomes.
mutagen:	a physical or chemical agent that raises the frequency of mutation above the spontaneous rate.
mutagenesis:	induction of mutation with the aid of mutagens.
mutant:	an individual with a trait produced by a mutation.
mutation:	a sudden variation in the hereditary material of a cell. A gene mutation is a change in a gene from one allelic form to another. Chromosomal mutations include polyploidy, aneuploidy, and chromosomal aberrations.
mutation breeding:	use of a mutagen to increase mutation rates to obtain useful plants that may be used to develop improved varieties.
mutation rate:	the frequency with which mutations take place in a given variety or species.
muton:	the smallest unit of DNA in which a change can result in a mutation.
n:	gametic chromosome number of a species (2n): somatic chromosome number of a diploid species.
named variety:	all varieties (not hybrids) named and released by private or public institutions.
natural selection:	selection of organisms in nature that could adapt to the environment in question.
necrotic:	dead plant tissue usually caused by disease, insect activity, or nutrient deficiency.

nick:	a break in the phosphodiester backbone of one strand of a DNA double-stranded molecule.
nicking:	synchronization of flowering of female and male parents in a hybrid seed production plot.
nonpreference resistance:	when a plant has factors that make it unattractive to insect pests to lay their eggs or to find food or shelter.
nonrecurrent parent:	that parent of a hybrid that is not again used as a parent in backcrossing.
nucellar embryony:	reproduction where the seeds result from the nucellus rather than the zygote.
nucleolar organizer:	constriction with which the nucleolus is associated during interphase and prophase.
nucleolus:	a RNA-rich, spherical body associated with a specific chromosomal segment.
nucleoplasm:	ground substance of the interphase nucleus.
nucleoside:	constitutes a purine or pyrimidine base, and a pentose sugar (D-ribose in ribonucleic acid; 2-deoxy D-ribose in deoxyribonucleic acid).
nucleotide:	constitutes a nucleoside and a phosphate (PO_4) group (ribonucleotide in RNA; or deoxyribonucleotide in DNA).
nucleus:	the spheroidal structure in most cells that contains the chromosomes.
nulliplex:	polyploid in which all chromosomes of one homologous type carry the same recessive (aaa in triploid; aaaa in tetraploid).
nullisomic:	an otherwise normal diploid plant that lacks a specific chromosome pair.
octoploid:	an organism with eight chromosome sets (genomes) in their nuclei (symbol 8n).
oligogenes:	genes having large individual effects, producing distinct phenotypes. Also major genes.

one-gene-one-enzyme:	a gene controlling the synthesis or activity of a single protein (amino acid) with catalytic activity.
operon:	a genetic unit that consists of a control element (the operator) and associated structural genes.
organelle:	any structure with characteristic morphology and function within the cytoplasm (mitochondria, plastid, golgi-apparatus, etc.).
outbreeding:	mating between individuals less closely related.
outcross:	cross-pollination, usually by natural means, with a plant different in genetic constitution.
ovary:	the enlarged basal portion of the pistil in which seeds are borne.
overdominant:	condition in which the heterozygote (Aa) is superior in comparison with the two homozygotes (AA and aa).
ovule:	the structure that bears the female gamete and becomes the seed after fertilization.
ovum:	an unfertilized egg cell.
pairing:	coming together of the homologous chromosomes during meiosis.
palea:	the upper of the two bracts enclosing each floret in the grass spikelet.
panicle:	an open and branched inflorescence with pedicelled flowers.
panmictic population:	a population in which mating occurs at random.
panmixis:	random mating without restriction.
parameter:	numerical quantity which describes some characteristic of a population.
parasterility:	incompatibility mechanism that limits the zygote formation.
parthenocarpy:	the production of fruits without fertilization and, normally without seed.

parthenogenesis: the development of an individual from a gamete without fertilization.

partial dominance: lack of complete dominance; the production of a hybrid intermediate between the parental types (see also incomplete dominance).

patent: a limited property right granted by the government allowing investors to exclude others from making, using, or selling their inventions without their approval for a specified time.

pathogen: an organism capable of inciting a disease.

pathogenicity: the ability of an organism to incite a disease.

pathotoxin: a compound produced by a pathogenic organism capable of inducing the disease symptoms induced by the pathogen itself.

pathotype: strain of a pathogen virulent towards a specific resistant genus.

pedigree: a record of ancestry of an individual, family, or strain.

penetrance: ability of a gene to express itself in an individual carrying that gene.

pentaploid: having five sets (genomes) of chromosomes; chromosome number of 5n.

pentasomic: an organism when one of the chromosomes in the complement is represented five times (pentasomic diploid is 2n+3 and pentasomic tetraploid is 4n+1).

perennial: a plant that continues to grow year after year.

perfect flower: flower possessing calyx, corolla, stamens, and pistils (see also imperfect flower).

pericarp: the wall of the ovary after it has matured into a fruit; it may be dry and hard or fleshy.

pest: any organism of animal or plant origin, known, suspected, or likely to be harmful to plants and other objects of value to man, or to man himself.

phage: a virus that attacks bacteria (from bacteriophage).

phenotype:	(1) Physical or external appearance of an organism in contrast to its genetic constitution (genotype) due to the interaction of the genotype with the environment. (2) A group of organisms with similar physical or external make up.
phenotypic ratio:	the proportions of the different phenotypes in a particular progeny.
photoperiod:	relative length of time a plant is exposed to light (influence of uninterrupted period of darkness): affects the life cycle and physiological process of the plant.
photoperiodism:	the response of organisms to varying periods of darkness. In plants, for example, the photoperiod controls the flowering of light-sensitive genotypes.
photosynthesis:	the enzymatic conversion of light energy into chemical energy in green plant cells resulting in the formation of carbohydrates and oxygen from carbon dioxide and water.
physiologic race:	pathogens of the same species and variety that are structurally similar but which differ in physiological and pathological characters especially in their ability to parasitize varieties of a particular host.
physiological maturity:	the stage when the flow of nutrients to the developing seed are stopped. Usually a black spot is observed at the hilum of cereals.
phytoalexin:	a chemical substance produced by a plant to combat infection by a pathogen.
phytopathology:	study of plant diseases.
pistil:	the female reproductive organ of the flower, consisting of ovary, style, and stigma.
pistillate flower:	a flower bearing pistils but no stamens.
plant breeders' right:	the right of plant breeders to derive some benefit from their investment of time and money in developing varieties.
plant introduction:	the introduction of non-indigenous plant varieties into a given environment, usually from one country to another.

plasma membrane: membrane surrounding the outer layer of the cell's cytoplasm.

plasmagene: a cytoplasmic-borne unit of heredity.

plasmid: any extrachromosomonal hereditary determinant which exists solely in an autonomous state and is transferred independently of the chromosomes.

-ditto-: A small circular DNA, capable of self replication, that can carry genes which confer resistance to antibiotics. Plasmids are used as a vector in recombinant experiments.

plasmodesma: the fibrillar plasma connections that extend through the cell wall and bridge adjacent cells.

plasmogamy: fusion of cytoplasms of two (or more cells).

plasmotype: the total extra chromosomal hereditary determinants (also plasmon).

plasticity: the extent to which the expression of an individualized genotype can be modified by environmental factors.

plastid: a cytoplasmic organelle in the plant cell that is autonomous and self-replicating.

pleiotropy: the production of multiple phenotypic effects by one mutant gene.

point mutation: a mutation caused by the substitution of one nucleotide for another.

polar nuclei: two centrally located nuclei in the embryosac that unite with the second sperm in a triple fusion. In cereal seeds the product of this triple fusion develops into the endosperm.

pollen grain: the male gametophyte, originating from a microspore.

pollen mother cell: (see microspore mother cell).

pollen tube: a tube developing from the germinating pollen grain; the extension of the intine through the germ pore in the exine. The sperm cells pass through the pollen tube to reach the ovule.

pollen-restoring gene:	a gene that permits normal production of pollen to occur in the presence of a cytoplasmic male-sterility factor.
pollination:	transfer of pollen from the anther to a stigma of the same flower or another flower.
polycross:	an isolated group of plants or clones arranged in some fashion to facilitate random interpollination.
polycross progeny:	progeny from a selection, line, or clone outcrossed to other selections growing in the same isolated nursery.
polyembryony:	production of more than one embryo (from gametophytic or sporophytic cells).
polygenes:	genes difficult to identify individually, but through a similar and supplementary effect, have considerable influence on the phenotype.
polyhaploid:	haploid derived from a polyploid.
polymerase:	any of several enzymes that catalyze the formation of DNA or RNA from precursor substances in the presence of DNA or RNA templates.
polymorphism:	the occurrence of two or more distinct phenotypes together in a population.
polyploid:	an organism with more than two sets (genomes) of chromosomes in its body cells.
population:	genetically, a community of randomly mating individuals sharing a common gene pool.
population improvement:	improvement of a random mating population through a scheme of selection with or without progeny testing.
population genetics:	the branch of genetics that deals with frequencies of alleles and genotypes in a breeding population.
position effects:	a change in the phenotypic effects of one or more genes due to change in their position with respect to other genes on the chromosome.

precursor:	a substrate molecule whose chemical change is metabolized by an enzyme in a metabolic pathway.
prepotency:	ability of an individual to produce progeny that are similar to each other and to itself.
progeny:	the offspring of a particular mating.
progeny selection:	selection based on progeny performance.
progeny test:	a progeny, or groups of progenies, grown for the purpose of evaluating the genotype of the parent.
propagule:	plant part used for propagation.
prophylactic:	preventive treatment for a disease.
propriety right:	ownership of newly developed and named varieties of cultivated plants.
protandry:	maturation of the anthers prior to the receptivity of stigma.
protein synthesis:	the formation of protein molecules that results when enzyme transcribe the genetic information in DNA, transfer it as RNA, and finally translate it into chains of amino acids; proteins.
protogyny:	receptivity of the stigma prior to maturation of the anthers.
protoplasm:	cytoplasm and nucleus of the cell.
protoplast:	somatic cell without the cell wall.
protoplast fusion:	fusion of two protoplasts resulting in a somatic hybrid.
pulses:	legumes that are used for their food value; beans, peas, lentils, pigeonpea, chickpea, and cowpea (excludes oilseed legumes).
pure line:	a strain where all members have descended by self-fertilization from a single homozygous individual. A pure line is genetically pure.
pyramiding resistance genes:	putting all the resistance genes into one genetic background.

quadrivalent:	multivalent: consisting of four chromosomes that are (completely or partially) homologous.
quadruplex:	dominant alleles represented four times in an organism (AAAA).
qualitative character:	character showing distinct classes with little or no effect of environment.
quantitative character:	a character that is influenced by a series of independent genes that are cumulative in their effect.
quarantine:	a period of forced isolation because of a contagious disease.
R_1, R_2, etc.:	symbols used to designate the first generation, second generation, etc., following the exposure of seeds or plants to ionizing radiations. (Also see M_1, M_2, etc.).
raceme:	a type of inflorescence in which pedicellate individual flowers are borne on a common rachis.
rachilla	Axis of a grass spikelet, the small stem on which the flower or floret is borne as opposed to the central axis or rachis.
rachis:	main axis of spike, in compound leaves, the extension of the petion corresponding to the mid rib of the entire leaf.
random:	by chance, without predetermined order or bias.
random mating:	a situation in which an individual of one sex has an equal probability of mating with any individual of the opposite sex.
random sample:	a sample of a population selected so that all items in the population have an equal chance to be represented in the sample.
recessive:	the condition of a gene that does not express itself in the presence of the contrasting (dominant) allele.
reciprocal crosses:	two crosses between two plants or strains where the male parent of one cross becomes the female parent of the second cross (for e.g.-- A x B and B x A).

reciprocal recurrent selection: a recurrent selection breeding system in which genetically different groups are maintained and in each selection cycle, individuals are mated from the different groups to test for combining ability.

recombination: formation of new gene combinations as a result of cross-fertilization between individuals differing in genotype.

recurrent parent: in backcross breeding, the agronomic variety to which one or a few genes from the donor parent are transferred (recipient parent).

recurrent selection: a breeding system designed to increase the frequency of favorable genes for yield or other characters by repeated cycles of selection and crossing.

recurrent restricted phenotypic selection: modified mass selection where plants are selected phenotypically and intermated to provide a new cycle of selection.

reduction division: a nuclear division in which the chromosomes are reduced from the diploid to the haploid number (see also meiosis).

regeneration: the production of plants; 1. In vitro from cultured cells. 2. From the vegetative parts of the plants.

registered seed: the progeny of foundation seed produced and handled so as to maintain genetic identity and purity, which is approved and certified by an official certifying agency. Registered seed is normally grown for the production of certified seed.

repeatability: represents the proportion of variance among individuals due to permanent differences, both genetic and environmental. It represents the upper limit of heritability.

repression: the alteration in the expression of a gene with the net result that specific enzyme production may fail.

reproduction: process of propagation and perpetuation in an organism by which they give rise to offsprings of similar types.

resistance: the consequence of heritable plant qualities that result in a plant being relatively less infected, infested, or damaged by a pest than a susceptible plant that lacks such qualities.

resistant: character of a host plant that is capable of suppressing or retarding the development of an insect, pathogen, or other factor.

restitution nucleus (r.n.): mitotic r.n.: a single nucleus with tetraploid chromosome number due to the failure of mitosis.

-ditto-: meiotic r.n.: a single nucleus with unreduced chromosome number due to the failure of the first or second meiotic division.

restorer gene: the gene that overcomes the effect of male-sterile cytoplasm on male sterility, i.e., produces functional male gametes even in the presence of male-sterile cytoplasm.

restriction endonuclease: a class of enzyme that breaks both strands of a DNA molecule at specific points as a result of recognizing base sequences.

RFLP: restriction fragment length polymorphism; a strategy used for characterizing double stranded DNA by subjecting it to cleavage with restriction endonuclease followed by chemical analysis of DNA fragments.

rhizome: an underground stem, usually horizontal and often elongated, distinguished from a root by the presence of nodes and internodes and, sometimes, scale-like leaves and buds at the nodes.

ribose nucleic acid RNA: composed of a ribose sugar, phosphoric acid, and a base and synthesized in the nucleolus of the nucleus; being transcribed from DNA, it can be in different forms (rRNA, mRNA, and tRNA): these are found in the cytoplasm and are involved in the synthesis of protein from the amino acids.

S_0: symbol used to designate the original selfed plant.

S_1, S_2, etc.: symbols used for designating selfed generations.

sample:	a set of random observations taken from a population.
satellite:	a chromosomal segment separated from the main body of one secondary constriction.
seed:	a mature ovule with its normal coverings. A seed consists of the seed coat, embryo, and, in cereals an endosperm, and, in legumes the cotyledons.
segment:	a portion of a chromosome taken as a unit.
segregation:	the separation of homologous chromosomes (and genes) from different parents at meiosis.
selection:	1. Any process, natural or artificial, that permits a change in the proportion of certain genotypes or groups of genotypes in succeeding generations. 2. A plant, line, or strain that originated by a selection process.
selection index:	when selection is made for all characters simultaneously by using some kind of a total score or index of the net merit of an individual constructed by combining the scores for each component character. It is also known as the discriminant function, because it is used in discriminating individuals with high and low scores.
selection intensity:	proportion of the plants selected to grow in the next generation.
self-compatible:	condition where self-pollination results in fertilization.
self-fertile:	self-pollination resulting in fertilization and seed setting.
self-incompatibility:	lack of seed set when self-pollinated due to genetic or physiological reasons.
self-pollination:	the transfer of pollen to the stigmas of the same plant.
self-sterility:	inability to achieve fertilization and seed setting after self-pollination.
selfing:	accomplishing self-pollination by protecting the inflorescence from receiving pollen from other plants.

sex-limited:	characters limited to only one sex, the genes being located either on autosomes or on sex chromosomes.
sex-linkage:	a special case of linkage occurring when a gene that produces a certain trait is located on the X or Y chromosome.
sexual reproduction:	reproduction involving germ cells and union of gametes.
sibbing:	intermating the individuals of the same parents.
siblings:	brothers or sisters, the offspring of the same parents.
sibs:	progeny of the same parents derived from different gametes. Individuals that share common parents.
single cross:	a cross between two parents.
single seed descent (SSD) method:	collecting a single seed from each individual plant of a segregating population and bulking the seed for sowing the next generation.
somatic:	referring to diploid body cells, normally with one set of chromosomes coming from the male parent and one set from the female parent.
somatic mutation:	a mutation occurring in any cell that is not destined to become a germ cell.
somatic cells:	the diploid body cells of an organism; those cells other than the germ cells.
somoclonal variation:	the genetic changes that occur within non-reproductive or body cells.
species:	a unit in classification, a subdivision of a genus. A group of closely related individuals descending from the same stock.
specific combining ability:	deviation in performance of a cross from that predicted on the basis of general combining ability.
specific resistance:	resistance that functions against certain biotypes of a parasitic organism.

sperm nucleus:	a male gamete.
spike:	an inflorescence with a more or less elongated axis along which the flowers are sessile or nearly so.
spikelet:	a unit of the inflorescence in grasses, composed of the glumes, the rachilla, and the florets.
spindle:	ellipsoidal fibers that play a role in the chromosome movement at the metaphase of cell division.
spindle poison:	mitotic poison affecting the formation or function of the spindle (colchicine).
spontaneous collection:	wild and weedy races showing resistance or tolerance to pests and diseases.
spontaneous mutation:	a naturally occurring mutation.
sporogenesis:	production of spores from the megaspore and microspore mother cells.
sporophyte:	the diploid asexual generation that usually produces spores.
stability:	consistency in the performance of a genotype across locations or years.
stability index:	method for comparing the response of cultivars across a range of environments, considering mean (x), regression (b) and deviation from regression (s2d).
stamen:	the pollen-bearing organ in the flower, composed of an anther and a filament.
staminate flower:	a flower bearing stamens but not a pistil.
stand:	the number of plants occurring in a given area.
standard deviation:	square root of variance. It is a measure of the spread (variation) of a sample or population.
sterile:	unable to reproduce.
sterility:	failure to complete fertilization and obtain seed as a result of defective pollen or ovules, or other aberrations.

stigma:	the portion of the pistil that receives the pollen.
stolon:	a trailing stem, capable of forming roots and shoots from its nodes.
style:	the stalk connecting the ovary and the stigma.
subspecies:	race.
substitution line:	a line in which a pair of chromosomes has been replaced by a pair from another variety of the same species. Used in aneuploid analysis.
susceptible:	characteristic of a host plant that is incapable of suppressing or retarding an injurious pathogen or other factor.
sustainability:	ability to maintain the gains of agricultural development and productivity.
symbiosis:	the living together for mutual benefit of two organisms belonging to different species, such as nitrogen-fixing organisms in a legume nodule.
synapsis:	the process of pairing between two homologous chromosomes in meiotic prophase.
syngamy:	sexual reproduction: the union of male and female gametes resulting in karyogamy and zygote formation.
synthetic:	a population at equilibrium developed from intercrossing (random mating) a number of inbred lines or clones of proven general combining ability.
systemic:	a chemical generally distributed throughout or affecting the whole organism.
tandem selection:	when selection is practiced for one character at a time and, after achieving improvement, efforts are directed towards the improvement of a second character; then for a third and so on.
telocentric:	chromatids with the terminal centromere.
terminalization:	chiasmata moving towards the distal ends of the paired chromosome during diakinesis.
test row:	the testing material for the resistance of a disease/pest.

testcross: a cross of a hybrid with one of its parents or to a genetically equivalent homozygous recessive. Used to test for homozygosity or for linkage.

tetrad: 1. The four-chromatid stage of a bivalent in the pachytene stage of meiosis. 2. The four-haploid gamete stage resulting at the end of the second meiotic division.

tetraploid: having four sets (genomes) of chromosomes; chromosome number of 4n.

tetrasomic: an individual having one pair of chromosomes in addition to the normal somatic chromosome complement (2n+2).

tetravalent: structure formed by pairing among four homologous chromosomes during meiosis.

three-way cross: a cross resulting from crossing a single cross with a third parent (inbred line, strain, or cultivar).

tissue culture: cultivation of plant cells and tissue in vitro on an artificial media.

tolerance: a form of resistance that enables the plant to endure a disease or pest attack. Although the plant becomes infected or infested it shows relatively less damage and/or produces a relatively greater yield than a susceptible plant.

tonoplast: membrane bordering the vacuole.

topcross: a cross of selections, clones, lines, or inbreds to a common pollen parent. In maize, commonly an inbred-variety cross.

topcross progeny: progeny from outcrossed seed of selections, clones, or lines to a common pollen parent.

totipotency: the capacity of a cell cultured in vitro to regenerate into a plant.

transcription: the formation of messenger RNA complementary to the DNA code. The process is catalyzed by RNA polymerase.

transduction:	process by which the virulent bacteriophage mediate the transfer of genetic information from one bacterium (donor) to another (recipient).
transgressive segregation:	the segregation of individuals, in the F_2 or a later generation of a cross, that shows a more extreme development of a character than either parent.
translocation:	transference of materials from place to place within a plant. A chromosomal aberration (rearrangement) involving an interchange between different nonhomologous chromosomes.
transpiration:	emission of water vapor through the stomata.
transversion:	the replacement of a pyrimidine base by a purine or a purine by a pyrimidine in the DNA polynucleotide chain (also transition).
trihybrid:	a hybrid heterozygous for three pairs of alleles (genes).
trimonoecious:	plant having hermaphrodite, male, and female flowers.
trioecious:	plants having male, female and hermaphrodite flowers on different individuals.
triplex:	the individual in which the dominant allele is represented three times (AAAa).
triploid:	having three sets (genomes) of chromosomes; chromosome number of 3n.
trisomic:	an organism that is diploid but contains one extra chromosome (2n+1).
trivalent:	structure formed by pairing among three homozygous chromosomes during meiosis.
tube nucleus:	the vegetative nucleus that results in a growing pollen tube.
uniplex:	an individual in which the dominant gene is represented only once (Aaaa).
unisexual flower:	a flower having only stamens or only carpels. A plant can bear either one or both kinds of unisexual flowers.
univalent:	an unpaired chromosome at the first meiotic division.

vacuole: a transparent vesicle with cell sap in a matured cell limited by a cell wall called a tonoplast.

variance: the average of the squared deviations about a mean; (a) Environmental: the variance resulting from environmental or nongenetic causes; (b) Genetic: the variance resulting from genetic causes; (c) Phenotypic: the total variance, the sum of the environmental and genetic variance.

variation: divergence among individuals of a group; specifically a difference of an individual from others of the same species that cannot be ascribed to a difference in age, sex, or position in the life cycle.

variety: a subdivision of a species. An agricultural variety is a group of similar plants that by structural features and performance can be identified from other varieties within the same species (cultivar).

vector: insect or mite that transmits viruses, often a plasmid, for carrying recombinant DNA into a living cell.

vegetative: designating a stage or form of growth, especially in a plant, distinguished from that connected with reproduction.

vegetative reproduction: the formation of a new individual from a group of (somatic) cells without the production of an embryo or seed.

vernalization: the treatment of seeds before sowing to hasten the flowering. Vernalization may be accomplished in certain species by the exposure of germinating seeds to temperatures slightly above freezing.

vertical resistance: biotype-specific resistance shown by the host plant; controlled by major or oligo genes and considered less stable than the horizontal resistance.

vertifolia effect: the cultivars with and without race-specific (R) genes for resistance.

viability: ability to live, grow, and develop.

virulence: relative capacity of a pathogen to incite a disease.

wide cross:	cross between two species of the same genus or of different genera.
wild type:	the most frequently observed phenotype, or the one arbitrarily designated as "normal."
wild-type gene:	the allele commonly found in nature or arbitrarily designated as "normal."
working collection:	the short term storage of germplasm, either as seeds or clones that breeders can regularly tap for use in the development of new crop varieties.
world collection:	a collection of germplasm of a particular species from different geographic locations, used as source materials in plant breeding.
X_1, X_2, X_3, etc:	1st, 2nd, 3rd generation after irradiation (X_0) obtained through selfing or clonal multiplications.
xenia:	the immediate effect of pollen on the expression of endosperm characters such as color, sugariness.
xerophyte:	a plant structurally adapted for life and growth with a limited water supply, especially by means of mechanisms that limit transpiration or that provide for the storage of water.
xylem:	the vascular tissue that conducts water and mineral salts and provides mechanical support in vascular plants.
yield plateau:	a temporary stable state in yield reached in the course of increased production.
zein:	a seed protein of maize classified as prolamin. It is low in tryptophane and lysine.
zygomorphic:	flowers which are symmetrical on one plane only (e.g. papilinaceous flowers).
zygote:	the cell resulting from fusion of the gametes.
zygotene:	a stage at prophase I of meiosis during which homologous chromosomes pair with each other.