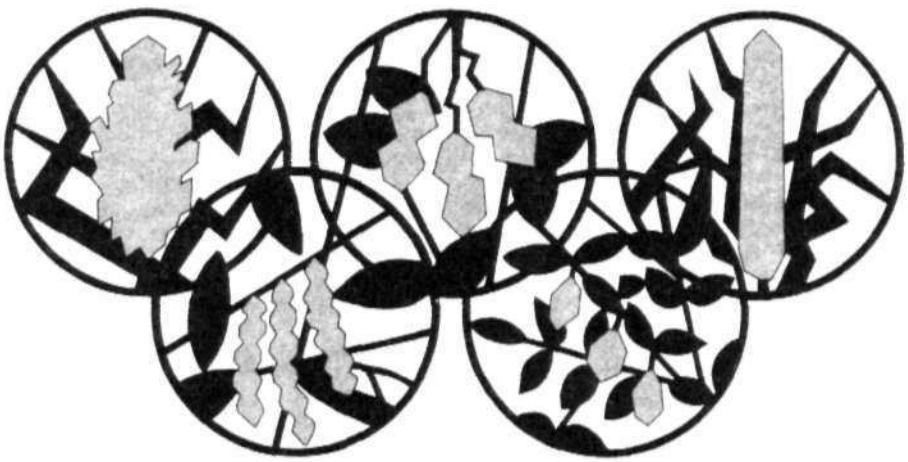
A Glossary for Crop Improvement

Compiled by

T. Nagur, D.L. Oswalt, and Faujdar Singh



Skill Development Series no. 1

ICRISAT

Human Resource Development Program

International Crops Research Institute for the Semi-Arid Tropics
Patancheru, Andhra Pradesh 502 324, India

1991

A Glossary

for

Crop Improvement

Compiled by

T. Nagur, D. L. Oswalt, and Faujdar Singh

Skill Development Series no. 1

Human Resource Development Program

International Crops Rasearch Institute for the Semi Arid Tropica
Patancheru, Andhra Pradesh 502 324, India

1991

Human Resource Development Program

Publications in this Skill Development Series (SDS) are issued semiformally for limited distribution to program participants, colleagues, and collaborators. Copies may be requested by the SDS number. Constructive criticism from readers is welcomed by: Program Leader, Human Resource Development Program, ICRISAT.

Acknowledgements

Reference materials consulted in compilation include:

Allard, R.W. 1960. Principles of plant breeding. New York, USA: John Wiley. 485 pp.

Dutta, A.C. 1989. Botany for degree students. Calcutta, India: Oxford University Press. 909 pp.

Gardner, E.J., and Snustad, D.P. 1984. Principles of genetics. 7th ed. New York, USA: John Wiley. 580 pp.

Poehlman, J.M., and Borthakur, D. 1969. Breeding Asian field crops. New Delhi, India: Oxford and IBH Publishing Co. 385 pp.

Rawal, K.M., and Wood, M.N. 1983. Crop breeding. Madison, Wisconsin, USA: American Society of Agronomy and Crop Science Society. 294 pp.

Rieger, R., Michaelis, A., and Green, M.M. 1968. A glossary of genetic and cytogenetics, classical and molecular. New York, USA: Springer-Verlag. 507 pp.

Singh, B.D. 1983. Plant breeding principles and methods. Ludhiana, India: Kalyani Publishers. 516 pp.

Sneep, J., and Hendriksen, A.J.T.(eds.), and Hobek, O.(coed.) 1979. Plant breeding perspectives. Wageningen, the Netherlands: Center for Agricultural Publishing and Documentation. 435 pp.

Somani, L.L., and Tikka, S.B.S. 1983. Dictionary of agriculture. New Delhi, India: Agricole Publishing Academy. 476 pp.

We gratefully acknowledge the contributions made by scientists, Information Services staff, and secretarial staff of ICRISAT.

CONTENTS

ADAPTATION

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.
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.
auxin:	a plant hormone that promotes cell elongation, fruit initiation, callus production, and other plant functions.
biological yield:	the total biomass of the plant.
biomass:	the mass of the plant measured by including the roots.
bud blasting:	suppression of the development of a flower beyond the stage in which the corolla emerges.
competition:	the mutually exclusive use of the same limited resources by two or more organisms.
ecotype:	a race (within a species) genetically adapted to a certain environment.
environment:	the sum of the external conditions that affect growth and development of an organism.
etiolation:	abnormally long internodes and 3mall yellowish leaves caused in plants that grow where light has been reduced.
habitat:	the natural abode of an organism.
harvest index:	ratio of economic yield to biological yield. (Ratio of dry matter in the grain to the above-ground dry matter in the plant).
leaf area index:	the area of leaf per unit area of ground.
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.
physiological maturity:	the stage when the flow of nutrients to the developing seed are stopped. Usually a black spot is observed at the hilum.
plasticity:	the extent to which the expression of an individualized genotype can be modified by environmental factors.

stability:	consistency in the performance of a genotype across locations or years.
stand:	the number of plants occurring in a given area.
translocation:	transference of materials from place to place within a plant.
transpiration:	emission of water vapor through the stomata.
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.

acropetalous:	flowering commencing from the base and progressing towards the top.
albino:	a plant lacking chloroplasts.
aleurone:	the outer layer of the endosperm.
allogamy:	pollen grains from flowers of one plant pollinate the flowers of other plant (syn. cross-pollination).
androecium:	the male reproductive organs of a plant; the stamens of a flower.
anther:	the pollen-bearing portion of the stamen.
anthesis:	the time and mode of flowering.
autogamy:	pollen grains of a flower pollinate the same flower (syn. self-pollination).
basipetalous:	flowering commencing at the top and progressing towards the base.
bract:	a modified leaf in whose axil a flower or another reproductive organ arises.
chasmogamy:	fertilization after opening of the flower.
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.
clone:	a group of plants originating by vegetative propagation from a single plant.
complete flowers:	flowers having all usual parts (sepals, petals, stamens, and pistils).
corolla:	the petals considered collectively.
corymb:	a compound inflorescence in which individual inflorescences attain the same height and together form a head shape.
cross-pollination:	the transfer of pollen from an anther of one plant to the stigma of another plant with a different genotype.
dehiscence:	splitting open of a fruiting structure or anther.
determinate:	descriptive of an inflorescence in which the terminal flower opens first, thus arresting the prolongation of the floral axis (example, a cyme).
dioecious:	having male and female flowers or other reproductive organs on separate unisexual plants.
embryo:	the rudimentary plant in a seed. The embryo arises from the zygote.

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.
fertilization:	union of an egg and a sperm nucleus to form a zygote.
filament:	the stalk of the stamen that supports the anther.
floret:	an individual flower from an inflorescence, as in a grass panicle or a composite head.
glume:	the outer husks or bracts of each spikelet in grasses.
imperfect flower:	a flower lacking either stamens or pistils (see also perfect flower).
incomplete flower:	a flower lacking one or more of the four essential flower parts (see also complete flower).
indeterminate:	description of an inflorescence in which the terminal flower is the la3t to open. The flowers arise from axillary buds, and the floral axis may be indefinitely prolonged by a terminal bud (example, a raceme).
inert matter:	nonliving matter, diseased, insect-damaged and broken seeds in a seed sample.
inflorescence:	1. A flower cluster. 2. The arrangement and mode of development of the flowers on a floral axis.
lemma:	the lower of the two bracts enclosing each floret in the grass spikelet.
life cycle:	the series of developmental changes undergone by an organism from fertilization to reproduction.
lodicule:	one of two scale-like structures at the base of the ovary in a grass flower.
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.
midrib:	the central main vein of a leaf.
monoecious:	having staminate and pistillate flowers on the same plant.
ovary:	the enlarged basal portion of the pistil in which seeds are borne.
ovule:	the structure that bear3 the female gamete and becomes the seed after fertilization.
ovum:	an unfertilized egg cell.
palea:	the upper of the two bracts enclosing each floret in the grass spikelet.
panicle:	an open and branched inflorescence with pedicelled flowers.
parthenocarphy:	the production of fruits without fertilization and, normally without seed.

parthenogenesis:	the development of an individual from a gamete without fertilization.
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.
pistil:	the female reproductive organ of the flower, consisting of ovary, style, and stigma.
pistillate flower:	a flower bearing pistils but no stamens.
propagule:	plant part used for propagation.
protandry:	maturation of the anthers prior to the receptivity of stigma.
protogyny:	receptivity of the stigma prior to maturation of the anthers.
pulses:	legumes that are used for their food value; beans, peas, lentils, pigeonpea, chickpea, and cowpea (excludes oilseed legumes).
raceme:	a type of inflorescence in which pedicellate individual flowers are borne on a common rachis.
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.
seed:	a mature ovule with its normal coverings. A seed consists of the seed coat, embryo, and, in cereals, an endosperm and, in legumes, cotyledons.
self-fertile:	self-pollination resulting in fertilization and seed setting.
self-pollination:	the transfer of pollen to the stigmas of the same plant.
sexual reproduction:	reproduction involving germ cells and union of gametes.
species:	a unit in classification, a subdivision of a genus. A group of closely related individuals descending from the same stock.
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.
sporogenesis:	production of spores from the mega- and microspore mother cells.
sporophyte:	the diploid asexual generation that usually produces spores.

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.
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.
symbiosis:	the living together for mutual benefit of two organisms belonging to different species, such as nitrogen-fixing organisms in a legume nodule.
trimonoecious:	plant having hermaphroditic, male, and female flowers.
trioecious:	plants having male, female and hermaphroditic flowers on different individuals.
unisexual flower:	a flower having only stamens or only carpels. A plant can bear either one or both kinds of unisexual flowers.
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.

amyloplast:	leucoplast specialized for synthesis and storage of starch.
agamospermy:	formation of seeds without a sexual process (adventitious embryony, diplospory, or apospory).
allele:	the other form of a gene. Alleles are located on the corresponding loci of the homologous chromosomes. Also allelomorph.
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.
androgenesis:	development of a haploid embryo from a male nucleus (sperm nucleus); the female nucleus (egg cell) degenerates.
anther culture:	culture of anthers (or pollen grains) on a suitable medium for production of callus and or haploid plants.
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.
artifact:	any structure that is not typical of the actual specimen, but which results from cytological processing, postmortem changes, etc.
asexual reproduction:	reproduction without the fusion of male and female gametes.
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.
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.
base analogues:	compounds closely related to purine or pyrimidine bases that can be incorporated into DNA during replication.
basic number:	the haploid chromosome number of ancestral diploid species of a polyploid. Represented by x.
bivalent:	a pair of synapsed or associated homologous chromosomes.
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.
callus:	a homogeneous mass of cells without differentiated structures such as shoot, bud, root, or embryoid.
cell culture:	growing of cells in vitro including the culture of single cells.
centromere:	lightly stained region of the chromosome, with which the spindle fibers become associated during mitosis and meiosis.
character:	the expression of a gene as revealed in the phenotype.
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.
chromoplast:	plastid containing yellow and orange pigments.
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.
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.
codominant alleles:	alleles that produces independent effects and both the characters appear together when heterozygous.
codon:	a sequence of three adjacent nucleotides that code for an amino acid.
colchicine:	an alkaloid drug that arrests the spindle fiber formation and separation of the daughter chromosomes.
cross-fertilization:	the union of an egg wit a sperm from a plant with a different genotype.
crossing over:	an interchange of segments between the chromatids of two homologous chromosomes at meiosis.
cytokinesis:	the process of division or segmentation of the cytoplasmic portion of a cell.
cytology:	the science dealing with the structure, function, and life history of the cell.

cytoplasm:	the protoplasm of a cell excluding the nucleus.
deletion:	the loss of a segment of the genetic material from a chromosome.
desynaptic:	relaxation of pairing between normally paired chromosomes before crossing over takes place.
dihaploid:	hybrid derived from an amphidiploid, i.e., monoploid for two distinct genomes.
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.
disomic:	individuals with two chromosome sets whose members are represented by pairs of homologues.
DNA:	deoxyribonucleic acid. Hereditary material of all cells, found in the chromosomes and cell organelles such as mitochondria and plastids----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.
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.
egg:	the female gamete or germ cell.
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.).
epigenetic:	not of genetic origin.
epistasis:	nonallelic interaction, when one gene masks the expression of a nonallelic gene.
euploid:	an individual having the chromosome number which is equal to the multiples of the monoploid (n) or haploid number.
explant:	a portion of tissue removed from a plant for tissue culture.

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.
gamete:	1. A total 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.
garnetogenesis:	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 interaction:	modification in the expression of a dominant gene by another non-allelic dominant gene.
genetic code:	the manner with which the genetic information is encoded in the DNA.
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.
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.
genotypic ratio:	the proportions of the different genotypes in a particular progeny..
gynogenesis:	formation of the haploid embryo from the maternal nucleus (egg cell) after fertilization due to the degeneration of the male nucleus.
hemizygous:	the condition in which only one allele of a pair is present, as in sex linkage or as a result of aneuploidy or deletion.
homolog:	a homologous chromosome.
homologous chromosomes:	chromosomes that synapse or pair at the first division in meiosis.
hybrid substance:	a new isozyme present in the hybrid that is different from those present in the parents.
identical twins:	two individuals resulting from the split of one zygote.
idiotype:	the morphology of the chromosomes in a genome of an organism.

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.
independent assortment:	the chance distribution of two or more pairs of segregating genes to the gametes.
inversion:	when a segment of the chromosome is rotated by 180° so that the gene order on the segment is reversed.
in vitro:	a biological processes carried out outside the living body and in an artificial environment.
in vivo:	within the living organism.
ionizing radiation	radiation in which electrons are detached as they pass through the tissue. For example, x-ray; and gamma-rays.
isochromosome:	a chromosome with identical arms.
isogenic:	genetically uniform.
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.
leucoplast:	plastid containing no visible pigments (amyloplast).
linkage:	the relationship between two or more genes that tend to be inherited together because they are located on the same chromosome. This results in parental gene combinations occurring frequently with 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).
map unit:	a number that corresponds to a recombination frequency of 1 .
maternal effect:	trait controlled by a gene of the mother but expressed in the progeny.
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.
microspore mother cell:	diploid cell in the anther that gives rise, through meiosis, to four haploid microspores.
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.
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.
monoallelic:	referring to a polyploid in which all alleles at a given locus (loci) are the same. In a tetraploia, for example, A_1, A_2, A_3, A_4.
monosome:	a chromosome that has no homolog present. A haploid chromosome in an otherwise normal diploid individual (2n-1).
monogenic character:	a character determined by a single pair of genes.
monohybrid:	the result of a cross between parents that differ by one specified gene.
monozygotic twins:	twins formed by the splitting of the zygote derived from a single fertilized egg. Such twins are genetically identical.
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:	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.

muton:	the smallest unit of DNA in which a change can result in a mutation.
nick:	a break in the phosphodiester backbone of one strand of a DNA double-stranded molecule.
nucollar 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 present 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, plastids, golgi-apparatus, etc.).
overdominant:	condition in which the heterozygote (Aa) is superior in comparison with the two homozygotes (AA and aa).
pairing:	coming together of the homologous chromosomes during meiosis.
parasterility:	incompatibility mechanism that limits the zygote formation.
partial dominance:	lack of complete dominance; the production of a hybrid intermediate between the parental types (see also incomplete dominance).

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).
plasma membrane:	membrane surrounding the outer layer of the cell's cytoplasm.
plasmagene:	a cytoplasmic-borne unit of heredity.
plasmodesm:	the fibrillar plasma connections that extend through the cell wall and bridge adjacent cells.
plasmogamy:	fusion of cytoplasms only.
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.
polygenes:	genes difficult to identify individually, but through a similar and supplementary effect, have considerable influence on the phenotype.
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.
polyembryony:	production of more than one embryo (from gametophytic or sporophytic cells) .
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.
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.
quadrivalent:	multivalent: consisting of four chromosomes that are (completely or partially) homologous.
quadruplex:	dominant alleles represented four times in an organism (AAAA).

recessive:	the condition of a gene that does not express itself in the presence of the contrasting (dominant) allele.
recombination:	formation of new gene combinations as a result of cross-fertilization between individuals differing in genotype.
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.
repression:	the alteration in the expression of a gene with the net result that specific enzyme production may fail.
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 fir3t or second meiotic division.
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.
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.
satellite:	a chromosomal segment separated from the main body of one secondary constriction.
segment:	a portion of a chromosome taken as a unit.
self-compatible:	condition where self-pollination results in fertilization.
self-incompatibility:	lack of seed set when self-polimated due to genetic or physiological reasons.
self-sterility:	inability to achieve fertilization and seed setting after self-pollination.
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.

somatic:	referring to diploid body cells, normally with one set of chromosomes coming from the mala parent and one set from the female parent.
somatic cells:	the diploid body cells of an organism; those cells other than the germ cells.
somatic mutation:	a mutation occurring in any cell that is not destined to become a germ cell.
sperm nucleus:	a male gamete.
spindle:	ellipsoidal fibers that play a role in the chromosome movement at the metaphase of cell division.
spindle poison:	mitotic poi3on affecting the formation or function of the spindle (colchicine).
spontaneous mutation:	a naturally occurring mutation.
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.
telocentric:	chromatids with the terminal centromere.
terminalization:	chiasmata moving towards the distal ends of the paired chromosome during diakinesis.
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 meiosi3. 2. The four-haploid gamete stage resulting at the end of the second meiotic division.
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.
tissue culture:	cultivation of plant cells and tissue in vitro on an artificial media.
tonoplast:	membrane bordering the vacuole.
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).
translocation:	a chromosomal aberration (rearrangement) involving an interchange between different nonhomologous chromosomes.

transversion:	the replacement of a pyrimidine base by a purine or a purine by a pyrimidine in the DNA polynucleotide chain.
trihybrid:	a hybrid heterozygous for three pairs of alleles (genes).
triplex:	the individual in which the dominant allele is represented three times (AAA).
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.
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.
vector:	a vehicle, often a plasmid, for carrying recombinant DNA into a living cell.
viability:	the capability for living or continuing to develop.
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."
xenia:	the immediate effect of pollen on the expression of endosperm characters such as color, sugariness.
xylem:	the vascular tissue that conducts water and mineral salts and provides mechanical support in vascular plants.
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.

BREEDING METHODS

A-line:	the male-sterile parent line in a cross being made to produce hybrid seed.
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.
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.
aneuploid:	an individual with other than an exact multiple of the haploid chromosome complement, e.g., 2n-1, 2n+2, etc.
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.
artificial selection:	the genotypes chosen by man contributing to the gene pool of succeeding generations of a given organism.
assortative mating:	system in which more closely related individuals are mated (syn. inbreeding).
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.
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).
BC_1, BC_2, etc:	symbols used to designate the 1st backcross generation, the 2nd backcross generation, etc.
biometry:	the science dealing with the application of statistical methods to biological problems.
biotype:	a population in which all individuals have an identical genotype.

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.

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.

center of origin: an area from which a given taxonomic group of organisms has originated and spread.

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.

combining ability, general: the average or overall performance of a genetic strain in a aeries 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.

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.

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.

crossover value: the percentage of crossing over in a hybrid population, a term used mostly in determining linkage percentage, particularly in chromosome mapping.

cultivar: a population of cultivated plants related by descent, that have genetic traits in common. Identity and reproducibility are inherent features of a cultivar.

cytoplasmic inheritance: inheritance dependent on the hereditary units in the cytoplasm.

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.
cybrid:	hybrid developed with the fusion of the cytoplasm of two cells/parents.
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_1s from a diallel cross originally made among the selected parents.
dihybrid:	the result of a cross between parents that differ by two pairs of genes.
dimorphism:	occurrence of two forms of genotypes within a population.
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.
donor parent:	the parent from which one or several 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:	cross resulting from two single crosses [(AxB) x (CxD)].
emasculate :	to remove the anthers from a bud or flower before pollen is shed.
evolution:	the cumulative change in the characteristics of populations of organisms related by descent, occurring during the course of successive generations.
exploration:	a trip for collection of germplasm of cultivated and related wild species (syn. expedition).
family:	a group of individuals having common parents.
fitness:	the reproductive value of a genotype in a population.
foundation seed:	seed stocks increased from breeder seed, and so handled as to closely maintain the genetic identity and purity of a variety.
full-sibs:	individuals of a progeny with identical parents.
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).
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 (syn. 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 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.
geneflow:	the spread of genes from one breeding population to another by migration.
generation:	the whole cycle in plant life from seed to seed.
genetic advance:	improvement in performance of selected lines over then original or base population (syn. genetic gain).
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 3mall populations.
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 load:	the extent to which a population departs from a perfect genetic constitution.
genetic variance:	that portion of the phenotypic variance caused by the varying genotypes of the individuals in a population.
genotype x environment-interaction:	differential performance of genotypes in different environments.
germplasm:	1. The material basis of heredity. 2. The potential heredity materials collectively within a species or a group of species.
germplasm complex:	open-pollinated progeny from a mixture of a number of strains of diverse origin.
half-sib mating:	mating between half-brother and half-sister. Such individuals have one parent in common.
haploid:	having a single set of chromosomes (genome) in a cell; individual with a reduced number (n) of chromosomes, as in a gamete.

Hardy-Weinberg law:	the phenomenon that both the gene frequencies and the genotype frequencies will remain constant from generation to generation in an infinitely large, interbreeding population in which mating is at random and there is no selection, migration, or mutation.
hemihaploid:	individuals with only half the normal gametic (haploid) chromosome number. They arise from polyploids.
heredity:	the transmission of genetic characters from parents to progeny; the genetic characters transmitted to an individual by its parents.
heritability:	genetic portion of the observed variance for a specified character expressed as a percentage.
heterobeltiosis:	vigor exhibited by the hybrid over the better parent.
heterogeneous:	a mixture of different types, usually different phenotypes.
heteroploid:	an individual with a chromosome number other than the normal diploid.
heterosis (hybrid vigor):	1. The increased vigor, growth, size, yield, or function of a hybrid progeny over the parents that results from crossing genetically unlike organisms. 2. The mechanism (gene actions) with which hybrid vigor is manifested.
heterozygous:	having unlike alleles at corresponding loci of homologous chromosomes. An organism may be heterozygous for one or several genes (see also homozygous).
hexaploid:	having six sets (genomes) of chromosomes: chromosome number of 6n.
homogeneous:	consisting of the individuals of the same phenotype.
homozygous:	having like genes at corresponding loci on homologous chromosomes. An organism may be homozygous for one, several, or all genes (see heterozygous).
hybrid:	the first filial generation of a cross between two genetically different parents.
hybrid seed:	the seed collected from the female parent after cross-pollination.
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.
ideotype:	ideal plant type.

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.
indirect selection:	improvement of a character is achieved by exercising selection for an another related character.
inherit:	transmission of chromosomes and genes from, one generation to the next.
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.
introgressive hybridization:	the incorporation of genes of one species into the gene pool of another.
irradiation:	exposing seed, pollen, or other plant parts to x-rays or other forms of radiation to increase mutation rates.
isogenic 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.
landrace:	a cultivar selected and used for cropping before the modern era of crop breeding. A primitive cultivat characteristic of a cropping locality constituting several biotypes.
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 het.erozygotes, whereas recessives kill homozygotes.
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.
M_1, M_2, etc.:	symbols used to designate the 1st generation, 2nd generation, etc., following exposure to mutagenic agent3 (ionizing radiations, chemical mutagens, etc.).
maintainor line:	line used for maintaining a cytoplasmic male sterile line. It possesses the same nuclear genotype as the male sterile (see also B line).

mala sterility:	a condition in which pollen is absent or nonfunctional in flowering plants.
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.
monoploid:	an individual with basic chromosome number (x), i.e., with one genome.
multilines:	mixture of several isogenic lines.
mutation breeding:	use of a mutagen to increase mutation rates t. 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.
n:	-gametic chromosome number of a species (2n): somatic chromosome number of a diploid species.
nonrecurrent parent:	that parent of a hybrid that is not again used as a parent in backcrossing.
outbreeding:	mating between individuals less closely related.
outcross:	cross-pollination, usually by natural means, with a plant different in genetic constitution.
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.
pedigree:	a record of ancestry of an individual, family, or strain.
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 arganisms with similar physical or external make up.
phenotypic ratio:	the proportions of the different phenotypes in a particular progeny.
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.

male sterility:	a condition in which pollen is absent or nonfunctional in flowering plants.
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.
monoploid:	an individual with basic chromosome number (x), i.e., with one genome.
multilines:	mixture of several isogenic lines.
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.
n:	gametic chromosome number of a species (2n): somatic chromosome number of a diploid species.
nonrecurrent parent:	that parent of a hybrid that is not again used as a parent in backcrossing.
outbreeding:	mating between individuals less closely related.
outcross:	cross-pollination, usually by natural means, with a plant different in genetic constitution.
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.
pedigree:	a record of ancestry of an individual, family, or strain.
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.
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.
polyhaploid:	haploid derived from a polyploid.
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 improvement:	improvement of a random mating population through a scheme of selection with or without progeny testing.
population:	genetically, a community of randomly mating individuals sharing a common gene pool.
population genetics:	the branch of genetics that deals with frequencies of alleles and genotypes in a breeding population.
prepotency:	ability of an individual to produce progeny that are similar to each other and to itself.
progeny selection:	selection based on progeny performance.
progeny:	the offspring of a particular mating
progeny test:	a progeny, or groups of progenies, grown for the purpose of evaluating the genotype of the parent.
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.
qualitative character:	character showing distinct classes with little or no effect of environment.
quantitative character:	a character that is influenced by a aeries of independent genes that are cumulative in their effect.
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.).
random mating:	in which an individual of one sex has an equal probability of mating with any individual of the opposite sex.
random:	by chance, without predetermined order or bias.
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 (syn. recipient parent).

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

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.

registered seed: the progeny of foundation seed produced and handled so as to maintain satisfactory 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.

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.

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.

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

sample: a set of random observations taken from a population.

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.

selfing: accomplishing self-pollination by protecting the inflorescence from receiving pollen from other plants.

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.

S_0: symbol used to designate the original selfed plant.

specific combining ability: deviation in performance of a cross from that predicted on the basis of general combining ability.

stability index: method for comparing the response of cultivars across a range of environments, considering mean (x), regression (b) and deviation from regression (s2d).

standard deviation: square root of variance. It is a measure of the spread (variation) of a sample or population.

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.

synthetic: a population at equilibrium developed from intercrossing (random mating) a number of inbred lines or clones of proven general combining ability.

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.

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

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

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.
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.
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 the 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.
wide cross:	cross between two species of the same genus or of different genera.
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 obtained through selfing or clonal multiplications.
yield plateau:	a temporary stable state in yield reached in the course of increased production.

alkylating agents:	mutagenic chemicals with one or more reactive alkyl groups that can alkylate DNA. An alkyl group is a univalent radical of CnH2n+.
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.
enzyme:	proteins produced in living cells that catalyze biochemical reactions.
polymerase:	any of several enzymes that catalyze the formation of DNA or RNA from precursor substances in the presence of DNA or RNA templates.
precursor:	a substrate molecule whose chemical change is metabolized by an enzyme in a metabolic pathway.
zein:	a seed protein of maize classified as prolamin. It is low in tryptophane and lysine.

aestivate: to pass the summer in a resting state.

antibiosla: the adverse reaction shown by the resistant host plant towards the insects feeding onit----------eitherto allow the insects to lay few eggs, or to slow down their rate of growth.

avirulent: a parasite unable to infect and cause disease in a host plant.

dilatory resistance: the epidemiological concept of resistance that delays pathogen development regardless of the means of genetic control.

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 pathogen parents.

disease: harmful deviations from normal functioning of physiological processes of a plant (malfunctions) caused by pathogenic organisms or viruses.

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

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.

general resistance: resistance that functions against all biotypes of a pathogen.

heterocaryosis: in fungi, a condition in which a hypha has nuclei of two different genotypes.

hibernate: to pass the winter in a resting state.

horizontal resistance: the level of resistance offered by a host cultivar against all the biotypes of an insect or pathogen. Generally polygenically controlled and considered to be stable and permanent.

hot spot: location where the incidence of a specific disease regularly occurs.

immune: free from attack by a given pest; not subject to the disease.

immunity: total freedom from pest or disease incidence.

infester row: susceptible entry sown prior to the sowing of test entries to create disease pressure.

indicator row: susceptible check sown together with test entries to assess the disease pressure in a disease nursery.

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, or other portions of pathogens, or other organisms that can infect plants.
inatar:	the period between two molts of a larva/nymph.
necrotic:	dead plant tissue usually brought by disease, insect activity, or nutrient deficiency.
nonpreference resistance:	when a plant has factors that make it unattractive to insect pests to lay their eggs or to find food or shelter.
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.
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).
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.
phytoalexin:	a chemical substance produced by a plant to combat infection by a pathogen.
phytopathology:	study of plant diseases.
prophylactic-	preventive treatment for a disease.
quarantine:	a period of forced isolation because of a contagious-disease.
susceptible:	characteristic of a host plant that is incapable of suppressing or retarding an injurious pathogen or other factor.
systemic:	a chemical generally distributed throughout or affecting the whole organism.
test row:	the testing material for the resistance of a disease/pest.
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.

vector:	insect or mite that transmits viruses.
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.
virulence:	relative capacity of a pathogen to incite a disease.