

Glossary of Plant Pathological Terms

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Compiled by J.M. Lenné

ICRISAT, Patancheru, Andhra Pradesh 502 324, India

Periodically plant pathologists develop a cooperative concern on the misuse of plant pathological terms. In an attempt to increase precision in terminological usage the American Phytopathological Society published definitions of some common phytopathological terms (*Phytopathology* 30, 361–368, 1940) and of terms applied to fungicides (*Phytopathology* 33, 624–626, 1943). Subsequently the Plant Pathology Committee of the British Mycological Society published its own definitions of terms used in plant pathology (*Transactions of the British Mycological Society* 33, 154–160, 1950). In addition, many authors have added short glossaries to their texts and a number of phytopathological terms are included in Kirk, P.M., Cannon, P.E., David, J.C. and Stalpers, J.A. (eds) (2001) *Ainsworth and Bisby's Dictionary of the Fungi* (9th edn, CAB International, Wallingford, UK) and in Snell, W.H. and Dick, E.A. (1971) *A Glossary of Mycology* (Harvard University Press, Cambridge, Massachusetts, USA). In 1973 the Terminology Subcommittee of the Federation of British Plant Pathologists prepared *A Guide to the Use of Terms in Plant Pathology* (*Phytopathological papers* no. 17, 55 pp.). *A Dictionary of Plant Pathology*, 2nd edn (P. Holliday, 1989, Cambridge, University Press, Cambridge, UK) provides the most comprehensive treatment and reference to this is recommended. The above-mentioned publications were all consulted during the preparation of the following select glossary.

Multilingual Glossaries

- Bos, L. (1978) *Symptoms of Virus Diseases in Plants*, 3rd edn. Centre for Agricultural Publishing and Documentation, Wageningen, The Netherlands, 225 pp.
- Merino-Rodriguez, M. (1966) *Elsevier's Lexicon of Plant Pests and Diseases*. Elsevier, Amsterdam, 351 pp.

- Miller, P.R. and Pollard, H.L. (1976) *Multilingual Compendium of Plant Diseases*. American Phytopathological Society, St Paul, Minnesota, USA, 457 pp.
- Miller, P.R. and Pollard, H.L. (1977) *Multilingual Compendium of Plant Diseases. Viruses and Nematodes*. American Phytopathological Society, St Paul, Minnesota, USA, 434 pp.

Glossary

- acervulus**, an erumpent, cushion-like mass of hyphae having conidiophores and conidia, and sometimes setae, characteristic of the *Melanconiales*.
- acid-fast**, (of bacteria) having cells that are relatively impermeable to simple stains, but when stained with a strong reagent (e.g. basic fuchsin in aqueous 5% phenol applied with heat), subsequently resist decolorization by strong acids (e.g. 20% sulphuric acid).
- acquisition feeding**, the feeding of a vector on a virus source in transmission tests.
- active ingredient**, the active component in a formulated product.
- adherence**, the property of a fungicide to adhere or stick to a surface.
- adjuvant**, material added to a fungicide to improve some chemical or physical property.
- aerobe**, an organism needing free oxygen for growth.
- aetiology (etiology)**, the science of the causes of disease; the study of the causal factor, its nature, and relations with the host.
- agglutinin**, an antibody that causes a particulate antigen to clump and settle out of suspension.
- air spore**, see spore.
- alternate host**, either of the two hosts of a heteroecious rust.
- alternative host**, one of several plant species hosts of a given pathogen.
- amphitrichous**, having one flagellum at each pole.
- anaerobe**, an organism able to grow without free oxygen.
- anamorph**, asexual or imperfect state of a fungus.
- antagonism**, a general term for counteraction between organisms or groups of organisms.
- anthracnose**, a plant disease having characteristic limited black lesions, usually sunken, generally caused by one of the *Melanconiales*; **spot anthracnose**, a disease caused by *Elsinoë* or *Sphaceloma*.
- antibiotic**, a substance produced by a microorganism and able to inhibit the growth of other microorganisms, or to destroy them.
- antibody**, a substance that is produced in response to injection of a foreign substance (antigen) into an animal body, and that reacts specifically with the foreign substance. Antibodies are modified serum globulins.
- antigen**, a substance that, when injected into an animal body, stimulates the production of a substance (antibody) antagonistic to the substance injected.
- antiserum**, serum that contains antibodies.
- antisporeulant**, substance preventing spore production without killing vegetative growth of a fungus.
- apothecium**, the generally cup- or saucer-like ascocarp of *Discomycetes*.
- appressorium**, a thick-walled fungal cell formed prior to penetration.
- asexual**, having no sex organs or sex spores; vegetative.

- atomize**, to reduce a liquid to fine droplets by passing it under pressure through a suitable nozzle, or by applying drops to a spinning disc.
- attenuation**, lessening of the capacity of a parasitic organism or virus to cause disease; reduction of its virulence.
- autoecious**, completing the life cycle on one host (especially of rusts), cf. heteroecious.
- autolysis**, the dissolution of tissues by enzymes within them; self digestion; cf. lysis.
- autotrophic**, living on inorganic materials as nutrients, cf. heterotrophic.
- avirulent**, lacking virulence.
- axenic**, culture of a single species in the absence of others, pure culture.
- axeny**, inhospitality, 'passive' as opposed to 'active' resistance of a plant to a pathogen.
- bactericide**, a substance causing death of bacteria.
- bacteriophage**, a virus causing lysis of bacterial cells.
- bioassay**, quantitative estimation of biologically active substances by the extent of their actions under standardized conditions on living organisms.
- biological control**, total or partial destruction of pathogen populations by other organisms.
- biological specialization**, manifestation by members of a species of physiological specialization of infective ability on a host or group of hosts. See physiologic race.
- biologic form or race**, = physiologic race (q.v.)
- biotechnology**, the use of genetically modified organisms and/or modern techniques and processes with biological systems for industrial production.
- biotroph**, an organism that can live and multiply only on another living organism.
- biotype**, a subgroup within a species or race usually characterized by the common possession of a single or a few new characters.
- blight**, a disease characterized by general and rapid killing of leaves, flowers and stems.
- blotch**, a disease characterized by large, irregularly shaped, spots or blots on leaves, shoots and stems.
- breeding**, the use of controlled reproduction to improve certain characteristics in plants (and animals).
- budding**, a method of vegetative propagation of plants by implantation of buds from the mother plant on to a rootstock.
- bunt**, a disease of wheat caused by the fungus *Tilletia* in which the contents of the wheat grains are replaced by odorous smut spores.
- callus**, a mass of thin-walled undifferentiated cells, developed as the result of wounding or culture on nutrient media.
- canker**, a plant disease in which there is a sharply limited necrosis of the cortical tissue and malformation of the bark.
- carrier**, (1) an organism harbouring a parasite without itself showing disease, (2) the material used to convey a fungicide to its target.
- chemotherapy**, treatment of disease by chemicals.
- chlorosis**, absence, partial or complete, of normal green colour.
- chronic symptoms**, symptoms that appear over a long period of time.

- circulative viruses**, viruses that are acquired by their vectors through their mouthparts, accumulate internally, then are passed through their tissues and introduced into plants again via the mouthparts of the vectors.
- clone**, the group of genetically identical individuals produced asexually from one individual.
- cloning**, the multiplication of a group of DNA molecules derived from one original length of DNA sequences and produced by a bacterium or virus into which it was introduced using genetic engineering techniques, often involving plasmids.
- collar rot**, rotting of the stem at or about soil level.
- colony**, (of bacteria and yeasts) a mass of individuals, generally of one species, living together; (of mycelial fungi) a group of hyphae (frequently with spores), which, if from one spore or cell, may be one individual.
- compatible**, (of pesticides) able to be mixed without deleterious effect.
- complement**, a thermolabile component of animal serum, which reacts non-specifically with antigen–antibody complexes.
- complementary DNA (cDNA)**, DNA synthesized by reverse transcriptase from an RNA template.
- complement fixation**, the combination of complement with an antigen–antibody complex.
- conidioma**, any hyphal structure bearing conidia.
- conidium (conidiospore)**, any asexual spore (other than a sporangiospore or intercalary chlamydospore), especially a *conidium verum*, an asexual spore (or pycnidiospore), which comes away from its conidiophore when mature.
- conjugation**, a process of sexual reproduction involving the fusion of two gametes; (in bacteria) the transfer of genetic material from a donor cell to a recipient cell through direct cell-to-cell contact.
- constitutive**, a substance, usually an enzyme, whose presence and concentration in a cell remains constant, unaffected by the presence of its substrate.
- control**, (1) to prevent or retard the development of disease; (2) untreated subject for comparison with experimental treatment.
- coverage**, distribution of a fungicide over a discontinuous area such as leaves of a tree.
- cross protection**, the phenomenon in which plant tissues infected with one strain of a virus are protected from infection by other more severe strains of the same virus.
- cryptogram**, a descriptive code summarizing some of the main properties of a virus.
- cultivar**, a variety of a cultivated plant.
- culture**, to grow microorganisms or plant tissue in a pure form, generally on a prepared food material; a colony of microorganisms or plant cells artificially maintained on such food material (or for biotrophic pathogens on a host plant).
- cuticle**, a thin, waxy layer on the outer wall of epidermal cells consisting primarily of wax and cutin.
- cyst**, a sac, especially a resting spore or sporangium-like structure.
- damping-off**, a disease that rots seedlings at soil level, or prevents their emergence (pre-emergence damping-off).
- dark mildew**, see mildew.
- deme**, a suffix denoting any group of individuals of a specific taxon.

- density-gradient centrifugation**, a method of centrifugation in which particles are separated in layers according to their density.
- deposit**, quantity of dry fungicide deposited on a unit area of material treated.
- dieback**, progressive death of shoots, branches and roots generally starting at the tip.
- dikaryotic**, mycelium or spores containing two sexually compatible nuclei per cell. Common in the *Basidiomycetes*.
- diluent**, an inert material added to a fungicide to reduce its concentration.
- dilution end-point**, the extent to which sap from virus-infected plants can be diluted with water before its infectivity is lost.
- dimorphic**, having two states, particularly of pathogenic fungi that are mycelial in culture and yeast-like in the host.
- disease**, (1) any malfunctioning of host cells and tissues that results from continuous irritation by a pathogenic agent or environmental factor and leads to development of symptoms; (2) harmful deviation from normal functioning of physiological processes.
- disease cycle**, the chain of events involved in disease development, including the stages of development of the pathogen and the effect of the disease on the host.
- disinfectant**, a physical or chemical agent that frees a plant, organ, or tissue from infection.
- disinfectant**, an agent that kills or inactivates pathogens in the environment or on the surface of a plant or plant organ before infection takes place.
- disorder**, a harmful non-pathogenic deviation from normal growth.
- dose, dosage**, quantity of toxicant applied per unit of material treated.
- downy mildew**, see mildew.
- dressing (seed)**, (1) the process of covering seeds with a fine coating of fungicide; (2) the fungicide applied to seed.
- ecoclimate**, climate within a plant community, e.g. a crop.
- ectotrophic mycorrhiza**, see mycorrhiza.
- egg**, a female gamete. In nematodes, the first stage of the life cycle containing a zygote or a juvenile.
- ELISA**, a serological test in which one antibody carries with it an enzyme that releases a coloured compound.
- elicitors**, molecules produced by the pathogen that induce a response by the host.
- endemic**, of a disease, permanently established in a defined area, e.g. a country.
- endoparasite**, a parasite that enters a host and feeds from within.
- endotrophic mycorrhiza**, see mycorrhiza.
- entomogenous**, produced in or upon insects.
- enzyme**, a protein produced by living cells that can catalyse a specific organic reaction.
- epidemic**, a disease increase in a population. Usually a widespread and severe outbreak of a disease.
- epidemiology**, study of the factors affecting outbreaks of disease and spread of infectious diseases.
- epidermis**, the superficial layer of cells occurring on all plant parts.
- epiphytically**, existing on the surface of a plant or plant organ without causing infection.
- epiphytotic**, a widespread and destructive outbreak of a disease of plants; epidemic.
- eradicant**, a chemical substance that destroys a pathogen at its source.

eradicator fungicide, see fungicide.

eradication, control of plant disease by eliminating the pathogen after it is established or by eliminating the plants that carry the pathogen.

etiology of disease, see aetiology.

facultative parasite, one able to live as a saprophyte and to be cultured on laboratory media, not obligate (q.v.).

field immune, (of plants) not becoming infected by a pathogen in the field, although susceptible under experimental conditions.

field resistance, resistance observed under natural field conditions but not always detected under experimental conditions.

filler, a diluent in powder form.

flagellum (pl. flagella), a flexible, whip-like appendage used as an organ of locomotion.

foot rot, rot involving the lower part of the stem–root axis.

form (Latin *forma*), a subdivision of a species below the rank of variety.

form genus (or species), a genus or species for imperfect states, e.g. in *Fungi Imperfecti* and *Uredinales*.

forma specialis (f.sp.), a group of races and biotypes of a pathogen species that can infect only plants within a certain host genus or species.

freeze-drying, preservation of living microorganisms etc. by removing water under vacuum while tissue remains in frozen state (lyophilization).

fruiting body, a complex fungal structure containing spores.

fumigant, (1) a toxic gas or a volatile substance that is used to disinfest certain areas from various pests; (2) a chemical toxicant used in volatile form.

fumigation, the application of a fumigant for disinfestations of an area or contained volume.

fungicidal, able to kill fungus spores or mycelium.

fungicide, a substance that kills fungus spores or mycelium. **Eradicator fungicide**, (1) one applied to a substratum in which the fungus is already present; (2) a fungicide used in disease control after infection has been established. **Protective fungicide**, one used as a protectant (q.v.).

fungistasis, the prevention of fungal growth.

fungistatic, able to prevent the growth or development of fungus spores without killing them; preventing fungus growth without being fungicidal.

gall, a localized proliferation of plant tissue producing a swelling or outgrowth.

gene, a linear portion of the chromosome that determines or conditions one or more hereditary characters. The smallest functioning unit of the genetic material.

gene cloning, the isolation and multiplication of an individual gene sequence by its insertion into a bacterium where it can multiply.

gene-for-gene concept, the concept that corresponding genes for resistance and virulence exist in host and pathogen, respectively.

genetic engineering, the alteration of the genetic composition of a cell by various procedures (transformation, protoplast fusion, etc.) in tissue culture.

genotype, the genetic constitution of an organism.

gibberellins, a group of plant growth-regulating substances with a variety of functions.

gnotobiotic growth, growth of an organism in the absence of other organisms; 'pure culture'.

grafting, a method of plant propagation by transplantation of a bud or a scion of a plant on another plant. Also, the joining of cut surfaces of two plants so as to form a living union.

Gram-positive or -negative, (of bacteria) staining or not staining by Gram's staining method.

group, any taxonomic group; taxon.

growth regulator, a natural substance that regulates the enlargement, division, or activation of plant cells.

gummosis, a plant disease having secretion of gum as a well-marked symptom.

habitat, natural place of occurrence of an organism.

haustorium, a special hyphal branch, especially one within a living cell of the host, for absorption of food.

heteroecious, undergoing different parasitic stages in two unlike hosts, as in the *Uredinales*; cf. autoecious.

heterothallism, condition of sexual reproduction in which conjugation is possible only through the interaction of different thalli; cf. homothallism.

heterotrophic, living on food substances that are made by other organisms; cf. autotrophic.

holomorph, a whole fungus in all its states.

homothallism, the condition in which sexual reproduction can occur without the interaction of two different thalli; cf. heterothallism.

horizontal resistance, resistance evenly spread against all races of a pathogen.

hormone, a growth regulator. Frequently referring particularly to auxins.

host, an organism harbouring a parasite. Potential host, an organism capable of harbouring a particular parasite.

host range, the various kinds of host plants that may be attacked by a parasite.

hybrid, the offspring of two individuals differing in one or more heritable characteristics.

hybridization, the crossing of two individuals differing in one or more heritable characteristics.

hyperparasite, a parasite parasitic on another parasite.

hyperplasia (hyperplastic), enlargement of a tissue as a result of excessive production of cells; cf. hypoplasia.

hypersensitive, giving violent local reaction to attack by a pathogen, the prompt death of tissue round the points of entry preventing further spread of infection.

hypersensitivity, excessive sensitivity of plant tissues to certain pathogens. Affected cells are killed quickly, blocking the advance of obligate parasites.

hypertrophy, excessive growth due to enlargement of individual cells.

hypha (pl. hyphae), one of the threads of a mycelium.

hypoplasia, a pathologically subnormal cell multiplication, as in dwarfing.

hypovirulence, reduced virulence of a pathogen strain as a result of the presence of transmissible double-stranded RNA.

immune, exempt from infection.

immunity, the state of being immune.

imperfect state, the state in which asexual spores (such as conidia) or no spores are produced; anamorph.

- inclusion bodies**, crystalline or amorphous structures in virus-infected plant cells that are produced by and consist largely of viruses and are visible under the compound microscope.
- incompatible**, not cross-fertile.
- incubation period**, the period of time between penetration of a host by a pathogen and the first appearance of symptoms on the host.
- indexing**, any procedure for demonstrating the presence of known viruses in susceptible plants.
- indicator plant**, one which reacts to certain viruses or environmental factors with specific symptoms, used for identification of the viruses or the environmental factors.
- inducible or induced**, a substance, usually an enzyme, whose production has been or may be stimulated by another compound, often a substrate or a structurally related compound called an inducer.
- infect**, to enter and establish a pathogenic relationship with an organism; to enter and persist in a carrier.
- infection court**, the place of invasion of a host by a pathogen.
- infective**, able to infect.
- infested**, (1) attacked by animals, especially insects; (2) (of soil or other substrata) contaminated by noxious organisms.
- injury**, damage of a plant by an animal, physical or chemical agent.
- inoculate**, to introduce a microorganism or virus into an organism or into a culture medium.
- inoculum**, the substance used for inoculating.
- inoculum potential**, the energy of growth of a fungus (or other microorganism) available for colonization of a substratum at the surface of the substratum to be colonized.
- integrated control**, the complementary use of biological, chemical and cultural methods to control pathogens.
- integrated pest management**, the attempt to prevent pathogens, insects, and weeds from causing economic crop losses by using a variety of management methods that are cost-effective and cause the least damage to the environment.
- intercellular**, between cells.
- intracellular**, within a cell.
- invasion**, the spread of a pathogen into the host.
- in vitro**, in culture. Outside the host.
- in vivo**, in the host.
- isolate**, (1) (verb) to separate a microorganism from host or substrate and establish it in pure culture; (2) (noun) a single spore or pure culture and the subcultures derived from it. The term is also applicable to viruses.
- isolation**, the separation of a pathogen from its host and its culture on a nutrient medium.
- isozymes**, the different forms of an enzyme that carry out the same enzymatic reaction but require different conditions (pH, temperature, etc.) for optimum activity.
- kilobase**, one thousand continuous bases (nucleotides) of single-stranded RNA or DNA.

klendusity, ability of a susceptible variety to escape infection because of possession of some quality preventing or hindering successful inoculation under conditions conducive to infection on other varieties.

Koch's postulates, three criteria proposed by R. Koch for proving pathogenicity.

latent infection, the state in which a host is infected with a pathogen but does not show any symptoms.

latent period, (1) time between infection and appearance of disease symptoms; (2) period after acquisition of virus by vector before it becomes infective.

latent virus, a virus that does not induce symptom development in its host.

leaf spot, a self-limiting lesion on a leaf.

lesion, a localized area of diseased or disordered tissue.

life cycle, life history, (of fungi) the stage or stages (states) between one spore form and its recurrence. There are commonly two stages, the imperfect, with one or more spore forms, and the perfect, but one or the other may not be known.

line, (1) an inbred homozygous strain; (2) an isolate; (3) a subdivision of a physiologic race.

lophotrichous, having a tuft of flagella at one or both poles.

lyophilization, see freeze-drying.

lysis, a breaking down or dissolution of cells by enzymes or viruses; cf. autolysis.

macerate, to soften by soaking.

macroscopic, visible to the naked eye without the aid of a magnifying lens or a microscope.

marbled, stained with irregular streaks of colour.

masked symptoms, virus-infected plant symptoms that are absent under certain environmental conditions but appear when the host is exposed to certain conditions of light and temperature.

masked virus, one carried by a plant that does not show symptoms of its presence.

mass median diameter (MMD), the figure dividing a total volume of spray into two equal parts; half the mass of spray is of droplets of smaller diameter than the MMD, half of droplets of larger diameter.

matrix, the material in which an organism or organ is embedded.

mechanical inoculation, inoculation of a plant with a virus through transfer of sap from a virus-infected plant to a healthy plant.

medium, culture medium, a substance or solution for the culture of microorganisms.

messenger RNA (mRNA), a chain of ribonucleotides that codes for a specific protein.

metabolism, the process by which cells or organisms utilize nutritive material to build living matter and structural components or break down cellular material into simple substances to perform special functions.

µm (micrometre), a unit of length equal to 0.001 of a millimetre.

micron, 0.001 mm (1 µm).

microscopic, very small; can be seen only with the aid of a microscope.

mildew, a fungal disease of plants in which the mycelium and spores of the fungus are seen as a growth on the host surface (usually of a whitish colour). A **powdery mildew** is caused by one of the *Erysiphaceae*, a **downy mildew** by one of the *Peronosporaceae*; a **dark (sooty) mildew** by one of the *Meliolaceae* or *Capnodiaceae*.

mm (millimetre), a unit of length equal to 0.1 of a centimetre (cm) or 0.03937 inch.

- mist spraying**, method in which concentrated spray is atomized into a high-velocity air stream, the air then acting as diluent and carrier.
- monoclonal antibodies**, identical antibodies produced by a single clone of lymphocytes and reacting only with one of the antigenic determinants of a pathogen or protein.
- monotrichous**, having one polar flagellum.
- mosaic**, symptom of certain viral diseases of plants characterized by intermingled patches of normal and light green or yellowish colour.
- mottle**, arrangement of spots or confluent blotches of colour, often symptomatic of virus diseases.
- mould**, a mycelial microfungus or a visible growth of such a fungus.
- mummy**, a dried, shrivelled fruit.
- mutant**, an individual possessing a new, heritable characteristic as a result of a mutation.
- mutation**, an abrupt appearance of a new characteristic in an individual as the result of an accidental change in a gene or chromosome.
- mycelium**, the hypha or mass of hyphae that make up the body of a fungus.
- mycoplasmas**, pleomorphic prokaryotic microorganisms that lack a cell wall (see phytoplasma).
- mycorrhiza**, a symbiotic association of a fungus with the roots of a plant: **ectotrophic mycorrhiza**, on the surface of the roots; **endotrophic mycorrhiza**, within the roots; **pseudotrophic mycorrhiza**, in which the fungus is parasitic; **tolypophagous mycorrhiza**, in which the fungus is killed and digested by the host.
- mycosis**, an infection by a parasitic fungus, or a disease so caused.
- mycostatic**, fungistatic.
- nanism**, dwarfism.
- nm (nanometre)**, a unit of length equal to 0.001 of a micrometre.
- nectrophyte**, an organism living on dead material; cf. perthophyte, saprophyte.
- necrosis**, death of plant cells, especially when resulting in darkening of the tissues; a common symptom of fungus infection.
- necrotic**, dead and discoloured.
- needle cast**, (of conifers) loss of leaves, caused generally by species of *Phacidiales*.
- nematicide**, a chemical compound or physical agent that kills or inhibits nematodes.
- nematode**, generally microscopic, worm-like animals that live saprophytically in water or soil, or as parasites of plants and animals.
- non-host resistance**, inability of a pathogen to infect a plant because the plant is not a host of the pathogen due to lack of something in the plant that the pathogen needs or due to the presence of substances incompatible with the pathogen.
- non-infectious disease**, a disease that is caused by an abiotic agent, i.e. by an environmental factor, not by a pathogen.
- non-persistent virus**, one which remains infective within its insect vector for only a short period.
- nucleic acid**, an acidic substance containing pentose, phosphorus, and pyrimidine and purine bases. Nucleic acids determine the genetic properties of organisms.
- nucleoprotein**, referring to viruses: consisting of nucleic acid and protein.
- nucleoside**, the combination of a sugar and a base molecule in a nucleic acid.
- nucleotide**, the phosphoric ester of a nucleoside. Nucleotides are the building blocks of DNA and RNA.

- obligate parasite**, a parasite that in nature can grow and multiply only on or in living organisms. cf. facultative parasite.
- oidium (pl. oidia)**, (1) spermatium formed on a hyphal branch, especially in heterothallic *Hymenomycetes*; (2) flat-ended asexual spore formed by the breaking up of a hypha into cells; arthrospore; (3) a mildew.
- omnivorous**, (of parasites) attacking a number of different hosts.
- osmosis**, the diffusion of a solvent through a differentially permeable membrane from its higher concentration to its lower concentration.
- oxidative phosphorylation**, the utilization of energy released by the oxidative reactions of respiration to form high-energy ATP bonds.
- ozone (O₃)**, a highly reactive form of oxygen that in relatively high concentrations may injure plants.
- parasexual cycle**, a mechanism whereby recombination of hereditary properties is based on mitosis.
- parasite**, an organism or virus living on or in, and getting its food from, its host, another living organism.
- particle size, average**, (1) the arithmetical mean diam.; (2) diam. of particle of average surface or (3) volume; (4) diam. of particles of same specific surface as the material. (It should always be stated which of these diam. is measured.)
- pathogen**, a parasite able to cause disease in a particular host or range of hosts.
- pathogenesis**, the sequence of processes in disease development from initial contact between pathogen and host to completion of syndrome.
- pathogenicity**, the characteristic of being able to cause disease.
- pathotype, pathovar**, a subdivision of a species distinguished by common characters of pathogenicity, particularly in relation to host range. In bacteriology, where pathovar is the preferred term, pathotype is used to describe the type (or reference) culture of a pathovar.
- pelleting**, coating of seed with inert material, often incorporating pesticides, to ensure uniform size and shape.
- perfect state** (stage or phase), the state of the life cycle in which spores (such as ascospores and basidiospores) are formed after nuclear fusion or by parthenogenesis; teleomorph.
- perithecium**, the subglobose or flask-like ascocarp of the *Pyrenomycetes*, limited by some to the thin-walled envelope and contents developed from an archicarp.
- peritrichous**, having flagella distributed over the whole surface.
- persistent virus**, one which remains infective within its insect vector for a long period.
- perthophyte**, an organism feeding on dead tissues of living hosts; cf. saprophyte.
- phage**, see bacteriophage.
- phyllody**, the replacement of floral parts by leaf-like structures.
- physiologic race**, a subspecific group of parasites characterized by specialization to different cultivars of one host species.
- phytiatry**, the treatment of plant diseases, especially by chemical methods.
- phytoalexin**, a substance that inhibits the development of a microorganism, produced in higher plants in response to certain stimuli.
- phytoncide**, a chemical substance produced by higher green plants, which can inhibit the growth of microorganisms.

- phytoplasma**, a mycoplasma-like organism (MLO) parasitic in plants (see mycoplasma).
- phytosanitary certificate**, a certificate of health of plants or plant products to be exported.
- phytosanitation**, any measures involving the removal or destruction of infected plant material likely to form a source of reinfection by a pathogen.
- phytotoxic (phytotoxicity)**, toxic to plants.
- phytotoxin**, a toxin toxic to a plant.
- pleomorphic**, having more than one independent form or spore stage in the life cycle.
- powdery mildew**, see mildew.
- precipitin**, an antibody that causes precipitation of soluble antigens.
- primary symptom**, in a virus disease, the first to appear in a case in which more than one type of symptom may be produced.
- promoter**, a region on a DNA or RNA sequence that is recognized by RNA polymerase in order to initiate transcription.
- promycelium**, the short hypha produced by the teliospore; the basidium.
- propagative virus**, a virus that multiplies in its insect vector.
- propagule**, that part of an organism by which it may be dispersed or reproduced.
- protectant**, a substance that protects an organism against infection by a pathogen.
- protective fungicide**, see fungicide.
- pseudostroma**, a mass of fungal cells combined with host cells to produce a distinct tissue.
- pseudotrophic mycorrhiza**, see mycorrhiza.
- pustule**, a blister-like spot, on a leaf etc., from which erupts a fruiting structure of a fungus.
- pycnidiospore**, a conidium in or from a pycnidium.
- pycnidium**, the fruit body of the *Sphaeropsidales*, frequently globose or flask-like.
- pycnium**, (in *Uredinales*) the pycnidium-like haploid fruit-body, or spermogonium.
- quarantine (plant)**, (1) control of import and export of plants to prevent spread of diseases and pests; (2) holding of imported plants in isolation for a period to ensure their freedom from diseases and pests.
- race**, (1) a genetically, and as a rule geographically, distinct mating group within a species; (2) physiologic race.
- recognition factors**, specific receptor molecules or structures on the host (or pathogen) that can be recognized by the pathogen (or host).
- resistance**, the power of an organism to overcome, completely or in some degree, the effect of a pathogen or other damaging factor.
- resistant**, possessing qualities that hinder the development of a given pathogen.
- resting spore**, a thick-walled spore, usually formed as the result of a sexual process, which germinates after a resting period (frequently over winter).
- restriction enzymes**, a group of enzymes from bacteria that break internal bonds of DNA at highly specific points.
- reverse transcription**, copying of an RNA into DNA.
- rhizobia**, the nodule bacteria of leguminous plants.
- rhizomorph**, a thread-like or cord-like structure made up of aggregated hyphae.
- rhizoplane**, the surface of a root.
- rhizosphere**, the soil near a living root.

- rickettsiae**, microorganisms similar to bacteria in most respects but generally capable of multiplying only inside living host cells; parasitic or symbiotic.
- ringspot**, a circular area of chlorosis, the centre remaining green, symptomatic of many virus infections.
- RNA (ribonucleic acid)**, a nucleic acid involved in protein synthesis; also, the most common nucleic acid (genetic material) of plant viruses.
- RNase (ribonuclease)**, an enzyme that breaks down RNA.
- roguing**, critical examination of a crop and removal of unhealthy (e.g. virus-infected) or otherwise unwanted plants.
- rosette**, short, bunched habit of plant growth.
- rot**, the softening, discoloration and often disintegration of a succulent plant tissue as a result of fungal or bacterial infection.
- run-off**, quantity of spray that runs off unit area of plant surface.
- rust**, (1) a disease caused by one of the *Uredinales*; (2) one of the *Uredinales*; (3) a disease with 'rusty' symptoms, e.g. red rust of tea (the alga *Cephaleuros*).
- saltant**, a discontinuous variation of unknown origin.
- saltation**, a mutation within an isolate known to be a pure genotype; dissociation.
- sanitation**, the removal and burning of infected plant parts, decontamination of tools, equipment, hands, etc.
- saprobe**, saprophyte when the organism is not a plant.
- saprophyte**, (1) a plant (organism) using dead organic material as food, and commonly causing its decay; (2) a necrophyte on dead material that is not part of a living host; cf. perthophyte, saprobe.
- scab**, a roughened, crust-like diseased area on the surface of a plant organ. A disease in which such areas form.
- sclerotium**, a compact mass of hyphae with or without host tissue, usually with a darkened rind, and capable of surviving under unfavourable environmental conditions.
- scorch**, 'burning' of leaf margins as a result of infection or unfavourable environmental conditions.
- secondary infection**, any infection caused by inoculum produced as a result of a primary or a subsequent infection; an infection caused by secondary inoculum.
- secondary inoculum**, inoculum produced by infections that took place during the same growing season.
- secondary symptom**, in a virus disease, one following the primary symptom (q.v.) in cases where more than one type of symptom is produced.
- sectoring**, 'mutation' in plate cultures resulting in one or more sectors of the culture having a changed form of growth.
- senescent**, growing old.
- sensitive**, reacting with severe symptoms to the attack of a given pathogen.
- sensitivity**, the tendency of an organism attacked by a disease to give more or less strong symptoms.
- serology**, a method using the specificity of the antigen-antibody reaction for the detection and identification of antigenic substances and the organisms that carry them.
- serotype**, (1) (of bacteria) an infrasubspecific subdivision of a species; (2) (of plant viruses) a group of viruses sharing only a few of its antigens in common with another group (serotype).

- seta** (pl. *setae*), a bristle or stiff hair, generally thick-walled and dark coloured.
- sexual**, participating in or produced as a result of a union of nuclei in which meiosis takes place.
- shock symptoms**, the severe, often necrotic symptoms produced on the first new growth following infection with some viruses; also called acute symptoms.
- shot-hole**, a symptom in which small diseased fragments of leaves fall off and leave small holes in their place.
- signal molecules**, host molecules that react to infection by a pathogen and transmit the signal to and activate proteins and genes in other parts of the cell and of the plant so they will produce the defence reaction.
- slime molds**, pseudofungi of the class *Myxomycetes*; also, superficial diseases caused by these pseudofungi on low-lying plants.
- slurry**, a thin, watery mixture.
- smut**, a disease caused by one of the *Ustilaginales* or the fungus itself; **covered smut**, one in which the mature spore mass keeps within the sorus, often till this is free of the host; **loose smut**, one in which the spores, as an uncovered mass of powder, are freed from the host by wind and rain; **stinking smut**, covered smut caused by *Tilletia* spp.
- soft rot**, a rot of a fleshy fruit, vegetable or ornamental in which the tissue becomes macerated by the enzymes of the pathogen.
- soil solarization**, attempt to reduce or eliminate pathogen populations in the soil by covering the soil with clear plastic so that the sun's rays will raise the soil temperature to levels that kill the pathogen.
- somaclonal variation**, variability in clones generated from a single mother plant, leaf, etc., by tissue culture.
- somatic hybridization**, production of hybrid cells by fusion of two protoplasts with different genetic make-up.
- sooty mould**, sooty coating on foliage and fruit formed by the dark hyphae of fungi (especially *Capnodiaceae* and *Meliolaceae*) that often live in the honeydew secreted by insects such as aphids, mealybugs, scales and whiteflies.
- spawn**, mycelium, especially that used for starting mushroom cultures; to put inoculum (spawn) into a mushroom bed or other substratum.
- spore**, a general name for a reproductive structure in cryptogams; **air spore**, the population ('spore flora') of airborne particles of plant or animal origin.
- spore ball**, a compound spore or ball of spores in certain genera of *Ustilaginales*, of varying structure.
- sporodochium**, a mass of conidiophores tightly placed together upon a stroma or mass of hyphae, as in the *Tuberculariaceae*.
- sporophore**, a spore-producing or spore-supporting structure, especially a conidiophore; a fruit body of larger fungi.
- sporulate**, to produce spores.
- spot anthracnose**, see anthracnose.
- spread**, uniformity and completeness with which a fungicide deposit covers a continuous surface.
- spreader**, a substance added to a spray to assist in its even distribution over the target.
- stage**, frequently = state but for fungi better reserved for circumstances where the succession of two or more states is regular.

- staling**, slowing of growth of fungus in pure culture as a result of accumulation of self-inhibiting metabolites, adverse pH, etc.
- state**, (1) (of fungi) one phase of a pleomorphic fungus, e.g. the anamorph characterized by asexual spores, the teleomorph characterized by sexual spores; (2) (of bacteria) 'the name given to the rough, smooth, mucoid and similar variants which arise in culture' (Bact. Code).
- sterile fungi**, a group of fungi that are not known to produce any kind of spores.
- sterilization**, the elimination of pathogens and other living organisms from soil, containers, etc., by means of heat or chemicals.
- sticker**, material added to a fungicide to increase tenacity; a substance added to a spray to make it adhere to the target.
- strain**, the many meanings include: (1) a group of similar isolates, race; form; (2) the descendants of a single isolation in pure culture, isolate; (3) (of bacteria) a cultivar; (4) (of plant viruses) a group of viruses having most of its antigens in common with another group (strain).
- stroma (pl. stromata)**, a mass or matrix of vegetative hyphae, with or without tissue of the host or substratum, sometimes sclerotium-like in form, in or on which spores are produced.
- stylet**, a long, slender, hollow feeding structure of nematodes and some insects.
- stylet-borne**, a virus borne on the stylet of its vector; non-circulative virus.
- subculture**, a culture derived from another one.
- substrate**, (1) the material on which an enzyme acts; (2) the material or substance on which a microorganism feeds and develops.
- substratum**, the material on or in which a microorganism is living.
- summer spore**, a spore germinating without resting, frequently living only a short time; cf. resting spore.
- sun scald**, superficial damage to fruits resulting from the action of intense sunlight.
- suppressive soils**, soils in which certain diseases are suppressed because of the presence in the soil of microorganisms antagonistic to the pathogen.
- surfactant**, a surface active material, especially a wetter or spreader used with a spray.
- suscept**, organism affected or capable of being affected by a given disease.
- susceptible**, lacking the inherent ability to resist disease or attack by a given pathogen; non-immune.
- symbiosis**, a mutually beneficial association of two or more different kinds of organisms.
- symptom**, the external and internal reactions or alterations of a plant as a result of a disease.
- symptomless carrier**, a plant that, although infected with a pathogen (usually a virus), produces no obvious symptoms.
- syndrome**, the totality of effects produced in a plant by a disease.
- synergism**, (1) the association of two or more organisms acting at one time and effecting a change that one alone is not able to make; (2) increased fungicidal value of certain mixtures of fungicides or of fungicides and non-toxic materials.
- systemic**, (1) (of a plant pathogen) occurring throughout the plant; (2) (of a chemical) absorbed into the plant through root or foliage, and translocated elsewhere in the plant.
- taxon (pl. taxa)**, any taxonomic group.

- teleomorph**, sexual or perfect state of a fungus.
- tenacity**, property of a fungicide deposit to resist removal by weathering etc.
- teratology**, the study of gross structural abnormalities.
- thermal death-point**, the lowest temperature at which heating for a limited period (usually 10 min) is sufficient to kill a microorganism.
- thermal inactivation point**, the lowest temperature at which heating for a limited period (usually 10 min) is sufficient to cause a virus to lose its infectivity or an enzyme its activity.
- tissue**, a group of cells of similar structure that performs a special function.
- tolerant**, able to endure infection by a particular pathogen, without showing severe disease, or giving little reaction to the effect of other factors (e.g. a virus tolerant of heat).
- tolypophagous mycorrhiza**, see mycorrhiza.
- toxic**, of, caused by, or acting as, poison.
- toxicant**, a toxic substance or preparation.
- toxicity**, the power of acting as a poison.
- toxin**, a toxic compound produced by a microorganism (see phytotoxin, vivotoxin).
- tracheomycosis**, a fungal disease in which the pathogen is mainly confined to the xylem.
- transcription**, copying of a gene into RNA. Also, copying of a viral RNA into a complementary RNA.
- transduction**, the transfer of genetic material from one bacterium to another by means of a bacteriophage.
- transfer RNA (tRNA)**, the RNA that moves amino acids to the ribosome to be placed in the order prescribed by the messenger RNA.
- transformation**, the change of a cell through uptake and expression of additional genetic material.
- transgenic (or transformed) plants**, plants into which genes from other plants or other organisms have been introduced through genetic engineering techniques and are expressed, i.e. produce the expected compound or function.
- translation**, copying of mRNA into protein.
- translocation**, transfer of nutrients or virus through the plant.
- transmission**, the transfer or spread of a virus or other pathogen from one plant to another.
- transpiration**, the loss of water vapour from the surface of leaves and other above-ground parts of plants.
- transposable element**, a segment of chromosomal DNA that can move around (transpose) in the genome and integrate at different sites on the chromosomes.
- tumour**, an uncontrolled overgrowth of tissue or tissues.
- tylose**, a balloon-like intrusion into the lumen of a vessel.
- tylosis**, the process of tylose formation.
- type**, in taxonomy, the element to which the scientific name of a taxon is permanently attached.
- variability**, the property or ability of an organism to change its characteristics from one generation to the other.
- variety**, (1) a subdivision of a species below the level of subspecies; (2) cultivar.
- vascular**, term applied to a plant tissue or region consisting of conductive tissue; also, to a pathogen that grows primarily in the conductive tissues of a plant.

- vector**, an organism able to transmit a pathogen, especially an insect, nematode, etc. transmitting a virus.
- vegetative**, asexual; somatic.
- vein banding**, development in a virus disease of dark green bands along the veins.
- vein clearing**, development in a virus disease of pale bands adjacent to the veins of young leaves.
- vertical resistance**, resistance to some races of a pathogen but not to others.
- viroid**, a pathogenic RNA of low molecular weight.
- virosis**, a virus disease.
- virulence**, the degree or measure of pathogenicity.
- virulent**, strongly pathogenic.
- viruliferous**, (of a vector) carrying or containing a virus.
- vivotoxin**, a substance produced internally in an infected host or by the pathogen within it, responsible for some or all of the harmful changes produced in the course of the disease.
- wetting agent, wetter**, material that reduces the contact angle of a liquid on a surface.
- white blister**, characteristic pustular fructification of *Albugo* spp.
- wilt**, loss of rigidity and drooping of plant parts generally caused by insufficient water in the plant.
- winter spore**, see resting spore.
- witches' broom**, broom-like growth or dense clustering of branches of woody plants caused by abnormal proliferation of shoots.
- yellow**s, applied to plant diseases of which yellowing is a conspicuous symptom, e.g. *peach yellows virus*, cabbage yellows (*Fusarium oxysporum* f.sp. *conglutinans*), etc.
- zone lines**, narrow, dark-brown or black lines in decayed wood (especially hardwoods) generally caused by fungi.