

PP300 Laboratory

Summary of Symptoms and Signs

I. Macroscopic Symptoms

A. Hypertrophic Symptoms - Expressions of accelerated growth, differentiation, or development

1. Overdevelopment in cell size (hypertrophy) or number (hyperplasia)
 - a. callus
 - b. curl or roll
 - c. brooming
 - d. epinasty
 - e. scab
 - f. tumefaction or dropsy; e.g. galls, burls, warts, knots, blisters
 - g. hairy root
 - h. proliferation
 - i. witches' broom
2. Premature development of tissues or organs
 - a. abscission, drop, shelling or cast
3. Transformation of tissues or organs from one kind to another
 - a. heterotrophy
 - b. russeting, or bark roughening and scaling
 - c. fasciation
 - d. restoration
4. Abnormal change in coloration from "healthy norm"
 - a. anthocyanescence
 - b. bronzing
 - c. virescence or greening

B. Atrophic or Hypotrophic Symptoms - Expressions of retarded or halted growth, differentiation or other development.

1. Underdevelopment in size (hypotrophy) or number (hypoplasia) of cells
 - a. dwarfing and stunting
 - b. rosetting
2. Subnormal development other than in size
 - a. abortion
 - b. chlorosis
 - c. etiolation
 - d. mosaic
 - e. blasting
 - f. leaf retention

C. Necrotic Symptoms - Expressions of degeneration or death of cells and disintegration of tissues

1. Incipient protoplasmic degeneration preceding actual death
 - a. hydrosis or water-soaking

- b. mottle
- c. reddening
- d. silvering
- e. wilting
- f. yellowing
- 2. Protoplasmic death and cellular disintegration
 - a. bleeding or ooze
 - b. blight
 - c. canker
 - d. damping-off
 - e. dieback
 - f. flagging
 - g. girdling
 - h. gummosis
 - i. lesion
 - j. mummification
 - k. pitting
 - l. resinosis
 - m. rot or decay, such as heart rot, dry rot, soft rot
 - n. scorch or burn
 - o. shot-hole
 - p. spot (leaf or fruit)
 - q. staghead or spike top
 - r. streak or stripe

II. Signs (structures of the pathogen)

A. Bacterial products

- 1. oozes or exudate
- 2. bleeding

B. Nematodes

- 1. eggs and egg masses
- 2. cysts
- 3. larvae

C. Fungi

- 1. Vegetative organs
 - a. mycelia, such as mats, felts, fans and mantles
 - b. hyphae
 - c. plasmodia
 - d. rhizomorphs
 - e. sclerotia
 - f. stromata
- 2. Asexual reproductive organs
 - a. acervuli

- b. aecia
- c. coremia
- d. pycnidia
- e. sporodochia
- f. uredia

3. Asexual reproductive propagules (spores)

- a. aeciospores
- b. conidia
- c. chlamydospores
- d. sporangiospores
- e. urediniospores
- f. zoospores

4. Sexual reproductive organs

- a. antheridia
- b. apothecia
- c. ascocarps
- d. basidiocarps
- e. cleistothecia
- f. hymenia
- g. mushroom or toadstool
- h. oogonia
- i. perithecia
- j. telia

5. Sexual reproductive propagules (spores)

- a. ascospores
- b. basidiospores
- c. oospores
- d. spermatia
- e. sporidia
- f. teliospores
- g. zygosporangia

Glossary of Symptoms

Abortion - The halt in development of an organ after partial differentiation.

Abscission - Premature drop of leaves, flowers or fruit resulting from the premature formation of the abscission meristem.

Anthocyanescence - A reddish or purplish coloration of leaves resulting from abnormal development of anthocyanin pigments.

Bark roughening - The formation of rough bark where smooth bark normally occurs.

Blasting - The failure to develop fruit.

Bleeding - Chronic sap-flow from wounds or other lesions.

Blight - The sudden drying and browning of whole leaves, shoots or branches.

Blister - Large swollen patches on leaves, fruit, etc.

Bronzing - A coppery or bronze coloration of the leaves.

Brooming - The clustering of organs such as branches about some common point on the plant. Generally arises from development of adventitious buds.

Burl - A hard woody, often flattened, hemispherical outgrowth on a tree.

Burn - See Scorch.

Callus - Tissue overgrowth produced in response to injury or other irritation and which tends to cover a wound, canker, etc.

Canker - A sunken necrotic lesion beginning in the bark of branches, trunk, or roots and usually becoming deeper and wider by normal or accelerated secondary growth (callusing) of cambium, phellogen, and traumatic meristem. This deepening continues as the pathogen encroaches transversely into the cambium and wood as well as tangentially in the cambium region. A typically well-developed canker is a symptom complex exhibiting necrotic, atrophic and hypertrophic symptoms.

Cast - See Abscission.

Chlorosis - Yellowing of green tissue due to chlorophyll destruction or failure of chlorophyll formation.

Curl - Abnormal bending or curling of leaves or shoots due to localized overgrowth on one side or in certain tissues.

Damping-off - A symptom complex characterized by rapid dying, browning, and rotting of germinating seedlings. Shoots may be killed before emergence, stems may be attacked in the root collar region causing shoots to fall over, roots may be destroyed, or cotyledons may be attacked.

Decay - See Rot.

Defoliation - Loss of leaves through abscission.

Dieback - The progressive drying, shrivelling, and browning of twigs or branches from the tips inward toward the trunk.

Drop - Premature abscission of fruit or twigs.

Dwarfing - Subnormal size of a plant or some of its organs.

Epinasty - A leaf curl in which the leaves turn downward, due to a more rapid growth of cells on the upper side than on the lower side of the leaf stalk.

Etiolation - A symptom complex in which the major symptoms are dwarfing of foliage and inflorescence, spindly stem growth, and chlorosis.

Exudate - See Ooze.

Fasciation - Flattening or cohering of organs such as stems, flowers, and roots. The cause is unknown, but in some cases the condition can be propagated.

Flagging - Loss of rigidity and drooping of leaves and young shoots preceding whole plant wilting.

Gall - A pronounced tumefaction, often more or less spherical and usually composed of undifferentiated cells.

Girdling - Tangential enlargement of a canker or lateral coalescence of cankers causing a branch or stem to be encircled and resulting in the complete stoppage of conduction.

Greening - See Virescence.

Gummosis - The formation of gums by diseased cells and tissues and the extrusion of gum from wounds and other lesions.

Hairy root - Abnormal number of fine fibrous roots frequently making compact clusters.

Heterotropy - The adventitious development of normal tissues or organs in unusual areas.

Hydrosis - A water-soaked, translucent appearance of leaves, fruits and green stems due to the extrusion of water from the cells into the intercellular spaces.

Hyperplasia - An abnormal increase in number of cells in a particular tissue or organ.

Hypertrophy - An abnormal increase in the size of a plant or plant part generally due to an abnormal increase in the size of the cells.

Hypoplasia - An abnormally small number of cells in a particular tissue or organ.

Hypotrophy - An abnormally small plant part generally due to abnormally small cells.

Knot - A type of tumefaction.

Leaf retention - The abnormally long retention of leaves usually resulting from a failure to develop the abscission meristem.

Lesion - A localized area of diseased tissue.

Mosaic - Pale green mottling of leaves.

Mottle - An irregular pattern of indistinct light and dark areas.

Mummy - A dried shriveled fruit that is generally the result of a fungal disease.

Necrosis - The death and disintegration of cells and tissues.

Oozes - Viscid masses composed of living or dead pathogen structures and partially disintegrated host tissues.

Pitting - Superficial depressions in the surface of succulent organs resulting from the death and shrinkage of subepidermal cells.

Prolepsis - Premature development of a shoot from a bud.

Proliferation - Continued or extended development of a plant part beyond the point at which growth normally ceases.

Reddening - The loss of green color from chlorophyllous tissue due to the destruction of the chlorophyll and/or the degeneration of chloroplasts which un.masks red pigments. Reddening may also result from the production of decomposition products accompanying death and deterioration.

Resinosis - The flow of resin or pitch from wounds or other lesions in conifers.

Restoration - The development of tissues or organs that normally would be only rudimentary.

Rosetting - A shortening of internodes through failure to elongate, which results in a crowding of the foliage.

Roll - See Curl.

Rot - The disintegration and decomposition of dead tissues.

Russetting - Rough or corky surfaces formed where they do not normally occur.

Scab - A limited, more or less circular, raised, and sometimes roughened lesion on fruits, tubers, leaves, and stems resulting from an overgrowth of epidermal, cortical, and peridermal tissues. This overgrowth is usually accompanied by rupturing and suberization (corking of cell walls).

Scaling - The formation of scales or corky material where scales normally do not occur.

Scorch - A sudden drying and browning of large, indefinite areas on leaves and fruits. Also damage to bark resulting in drying and death.

Shelling - Large scale loss of leaves through premature abscission.

Shot-hole - Holes in leaves caused by the falling out of killed spots of tissue.

Silvering - A silvery sheen or gray luster of leaf or primary bark surfaces due to the development of unnatural air spaces beneath the epidermis

Spike-top - Death of the entire crown of a tree causing a pattern that resembles staghead.

Spot - Circular, areolate, or irregular discolored and dead areas on leaves, fruits, or green stems.

Staghead - Dieback or flagging of entire large branches in the crown, or of the entire top of a tree.

Streak - Elongated, narrow, lesions which are first water-soaked then brown, in foliage or green stems. In wood there is discoloration in axial streaks within the outer, conducting layer of sapwood resulting from deterioration of the wood structure or extraneous components.

Stripe - The streak symptom in monocots.

Stunting - A type of dwarfing in which the entire plant is subnormal in size.

Suppression - The complete prevention of organ development.

Tumor - Local swelling on any part of the plant, usually woody roots, stem, or branches, usually resulting from stimulation of the plant meristem by the pathogen.

Variation (also breaking) - Loss of color in streaks in petals of flowers.

Virescence - The process in which a normally white or colored tissue develops chlorophyll and becomes green.

Wart - A horny, hardened protuberance.

Water-Soaking - See Hydrosis.

Wilting - A flaccid appearance of leaves and shoots resulting from a temporary or permanent loss of turgor due to excess transpiration by the leaves and shoots.

Witches' broom - A type of overgrowth in which there is an abnormal bushlike development of many weak shoots or roots.

Yellowing - The loss of green color from chlorophyllous tissues, due to the destruction of the chlorophyll and/or degeneration of the chloroplasts, which unmasks yellow pigments.