Quadrant II – Transcript and Related Materials

Programme: Bachelor of Science (Third Year)

Subject: Botany

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Unit: 06

Module Name: Plant Pathology – Terms and Concepts

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Notes

Plant pathology (gr., path -"suffering"- "ology", the science of) is the study of plant diseases and the abnormal conditions that constitute plant disorders.

Etiology is the determination and study of the cause of disease. A pathogen can be living or non-living, but usually refers to a live agent.

A pathogen is an organism which causes a disease. **Pathological** is a condition of being diseased.
Pathogenic is having the characteristics of a pathogen and **pathogenicity** is the capability of a pathogen to cause a disease.

A plant disease is an abnormality in the structure and/or function of the host plant cells and/or tissue as a result of a continuous irritation caused by a pathogenic agent or an environmental factor. A disease is not static; it is a series of changes in the plant.
All plants, to some extent, are subject to disease. Plant disease is the result of an infectious, or biotic (a living component of an ecosystem) agent or a non-infectious, or abiotic (non-living, physical and/or chemical component) factor.

Plant injury is an abrupt alteration of form or function caused by a discontinuous irritant. Plant injury includes insect, animal, physical, chemical or environmental agents.

A causal agent is a general term used to describe an animate or inanimate factor which incites and governs disease and injury. A causal organism is a pathogen of biotic origin. When a pathogenic agent is virulent (the relative aggressiveness of a pathogen) it can cause disease and if the agent is avirulent it is a variant of a pathogen that does not cause severe disease (non-virulent is the preferred synonym to avoid confusion with “a virulent”)

A parasite (gr. “parasitos”, one who eats at the table of another) is an organism which lives on or in another organism and obtains its nutrition there from.

An obligate parasite is an organism which is wholly dependent for its nutrition on another living entity. Obligate parasites are biotrophs (gr.”bio”, life - “troph”, “nourish, feeder”) which also depend entirely on a living host for its nutrition.

An autotroph (“auto”, self - “troph, nourish, feeder”) is a plant that can make its own food through photosynthesis.

A facultative parasites has the ability, or “faculty” to adapt to an alternative mode of living (i.e.: parasite or saprophyte) saprophytes (gr. sapro, “rotten”- “phyte”, plant) are organisms that gain their nourishment by digesting dead organic material.

A host is an organism (eg.: a plant) that is harbouring a parasite or pathogen from which it obtains its nutrients. The host range refers to the various kinds of host plants that a given pathogen may parasitize. A host is considered resistant when it has the ability to exclude, hinder or overcome the effects of a given pathogen or other damaging factor. A plant may be resistant to one pathogen or condition but not others.

Tolerance is the ability of a plant to be colonized by a pathogen or exposed to an abiotic factor without dying or demonstrating disease symptoms.

Susceptibility is the antithesis of resistance.

Symbiosis is the mutually beneficial association between two or more different kinds of organisms. The organisms in this association are referred to as

symbionts. An example of symbiosis is demonstrated in the beneficial relationship between mycorrhizal fungi and the roots of over 85% of the plants in nature. The relationship between mycorrhizal fungi and the host roots of the plant result in increased surface area for absorption of nutrients and water. In return the fungi gain carbohydrates (simple sugars) from the plant. Other examples are the nitrogen-fixing nodules on the roots of legumes caused by bacteria of the genus Rhizobium and the symbiotic relationship of certain fungi and a photosynthetic partner, either an alga or a cyanobacterium, as in lichens.

The signs and symptoms of plant disorders are the appearance or manifestation of changes in the normal form and/or function of the plant. Signs and symptoms are usually the first indication you will notice in plant problems.

Signs are the appearance and/or physical evidence of the causal factor of the plant's abnormality. Signs are the physical evidence of damage caused by biotic or abiotic agents such as the pathogen itself, pests, spores, fruiting bodies, chemical residue, bacterial ooze and so forth.

Symptoms are the visible response of a plant to biotic and/or abiotic factors that result in a change or abnormality in the plant. Symptoms can take form as galls, chlorosis, ring-spots, wilt, rot and so on.

A syndrome is the totality of the effects demonstrated in a host by one disease, whether simultaneously or successively, and whether visible to the unaided eye or not.

Diagnostics is the determination of the nature and/or cause of a disease or disordered condition.

Propagules are any structure, fragment or part of an organism that can propagate the organism. The propagules, such as spores, sclerotia etc. that overwinter or over summer and initiate an infection are referred to as **primary inoculum.**

Secondary inoculum is produced by infections that take place during the same growing season. Inoculation is the process of applying inoculum to a host. Inoculum must be on a part of the host that can be invaded, this is the infection court. A repeating cycle is a series of secondary infections that continue for a specific period of time during the growing season.

Predisposition
It may be defined as the effect of one or more environmental factors which makes a plant vulnerable (able to injury) to attack by pathogen

Susceptibility
It is the inability of a plant to resist the effect of a pathogen of any other damaging factor.

Resistance
It is the inherent ability of a plant to prevent or restrict establishment and subsequent activities of a potential pathogen.

Endemic disease
When the disease is constantly present in a moderate or severe form and is confined to a particular country or district.

Epiphytotic disease or epidemic
An epidemic or epiphytotic disease usually occurs widely, but periodically, in a destructive form.

Pandemic disease
These occur all over the world and result in a mass mortality.

Sporadic disease
Occur at very irregular intervals and locations and in relatively fewer instances.

Biotroph

An organism that can live and multiply only on another living organism. They always obtain their food from living tissues on which they complete their life cycle.

Hemibiotroph (Facultative Saprophyte)

The parasites which attack living tissues in the same way as biotrophs but will continue to grow and reproduce after the tissue is dead called as facultative saprophytes.

Perthotrophs or perthophytes (Necrotroph)

A parasite is a necrotroph when it kills the host tissues in advance of penetration and then lives saprophytically.

Hypersensitivity

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

Colonization of a host results from the establishment, growth and reproduction of the pathogen on or in infected plant.

Infestation refers to the establishment (or “running over”) on the surface of a host by a large number of insects or other animal pests. With infestation there is no implication that infection has occurred.

Possible misconceptions/clarification

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