

FOREST PATHOLOGY

→Forest Pathology deals with the diseases of forest timber species and

→Forest pathology pertains to the study of disease of forest trees, their origin, nature, prevention and control.

Diseases:-

→A disease is a continuous process not a temporary one such as injury to a tree that may be caused by lopping or browsing.

→Moreover a disease is different from a symptom in the same way as fever is a symptom of a disease and not the disease in itself.

Symptoms:-

(i) Apparent expressions of the process of diseases in plants are termed as symptoms.

→These may be in the form of canker, lesions, fruiting bodies etc.

(ii) When a plant or tree is infected by disease, symptoms do not develop immediately.

→This time lag is known as the incubation period.

(iii) There may be one or more symptoms manifested by a disease though similar symptoms may appear for two or more diseases.

→Thus, it is not always possible to identify the disease with the help of symptoms alone.

However:-

→A parasite can be immediately identified from its fruiting bodies which are manifested symptoms.

Type of Symptoms:- There are two distinct types of symptoms of diseases in forest trees;-

(1) Systemic Symptoms ;- The whole plant or a major part of the tree show symptoms of the disease. However this does not mean that the whole tree has been affected by disease.

(2) Localised Symptoms;-

→ These symptoms appear only on the particular part the tree that is affected e.g. root, shoot, leaves, branches etc.

→ Only these parts develop symptoms depicting the disease.

Classification of disease symptoms

Disease symptoms may be classified into ^{three} ~~two~~ classes viz; (1) Necrotic (2) Atrophic or hypotrophic, (3) Hypertrophic.

(1) Necrotic Symptoms:- The term necrosis describes death of the affected tissues

→ A part of the tree may be killed e.g. in leaves the tissues die and the symptoms appear in the form of discolouration of the leaf;-

→ Leaf spots are also necrotic symptoms which show the death of the tissues.

→ Die back or top dying means that the tree is dying from the top down wards.

(1) wilt (Lack of moisture)

(a) Physiological wilt:- The plant or ^{seedling} ~~sapling~~ may wilt due to lack of moisture. However this is not a disease and occur naturally in summer when there is very high transpiration and less moisture availability during the day plant recover in evening when transpiration reduced.

(b) Pathological wilt:- This is a disease caused by root or shoot fungus causing permanent wilt.

Fungi; living in the soil, such as *Fusarium*, *Pythium* and *Rhizoetonia* may attack nursery seedlings at the base causing them to die and fall on the ground. This is known as **damping-off**.

(2) Canker:-

→ Canker is localized lesion on woody stems caused by killing of the tissues of the bark or cambium.

→ This results in an open wound, thereby exposing the wood.

→ Canker grows slowly and their spread is also restricted by the defensive mechanism of the plant or tree.

Canker:-

(i) Cankers caused by pathogens are known as pathogenic cankers.

(ii) Physiogenic cankers are caused by frost, sun, scorch, fire and drought.

(iii) They expose wounds in the stem through which decay fungi invade.

(3) Decay:-

→ Breaking down of tissues is known as decay.

→ There may be several types of decay in tree caused by pathogens.

→ Some examples (are) of decay:-

(a) Heart rots are caused by decay fungi in dead heart wood.

(b) white rots are formed as a result of the breakdown of all components of the cell wall due to action of decay fungi.

(c) Brown rots result when decay fungi attack the cellulose.

(2) Atrophic or hypotrophic symptoms:-

The slowing down of growth and development of a tree or its parts is due to subnormal cell division or cell degeneration from atrophic or hypotrophic symptoms.

Some examples of these symptoms are:-

(a) Dwarfing;-

→ In which the plant or tree becomes stunted in growth due to pathogenic causes.

→ Dwarfing occurs because of adverse locality factors such as poor soil and high altitude.

(b) Chlorosis due to sub-normal development of the chlorophyll mechanism.

→ As a result the green leaves become yellowish.

ETIOLATION;- Lack of sunlight also causes yellowing of leaves which is known as Etiolation.

(3) Hypertrophic symptoms:-

→ These symptoms result due to overgrowth or abnormal increase in the number of cells that is excessive cell division or abnormal increase in cell size. **Examples:-**

(i) Galls and tumors form when the parts of a tree become abnormally swollen.

(ii) Erinoses are the profuse development of hairs on leaves.

(iii) Witches broom occurs when the dormant buds develop many branches in close groups.

→ Appearing like a broom.

Disease:-

Signs:-

→ These are other evidences of disease in the tree as not all disease manifest themselves as symptoms.

→ Important signs of pathogenic disease are;-

(i) Fruiting bodies:-

→ fruiting symptoms are important signs which appear externally.

→ In same disease like heart rots, Are the only reliable evidence showing decay in the wood

(ii) Epicormic branches:-

→ These are shoot branches of limited develop. That form in clusters on the main stem as a result of activity of the advertitions or dormant buds. They are called Epicormic branches.

→ Some due to infections causes, insect attack or non-infections causes.

(iii) Exudations:-

→ Though exudations may form due to normal physiological processes in plant (e.g. guttation), Pathogens may also result in exudation e.g. Water blister in teak or excessive flow of resin from conifers.

UNIT:- Forest pathology

Importance of pathology

Scope and significance of plant pathology;-

→The term pathology etymologically means (*Gr. Pathos = suffering; logos = the study or to speak or discourse*) the "**study of the suffering**"

→Thus plant pathology is the "**study of the suffering plants**"

→Plant pathology has the following four main objectives;-

1)Etiology, 2)Pathogenesis, 3)Epidemiology and 4)Control.

1) Etiology (or Aetiology):- It concerns with the causal organism(s). this is the study of living and non-living eutectics including environmental condition that cause diseases in plants.

2) Pathogenesis:- This is the actual mechanism of disease development;-

→It mainly concerns with the processes of infection and colonization of host by the pathogen.

→This phase involves complex host pathogen interactions.

3)Epidemiology:- →It is mainly concerned with epidemics (more correctly termed epiphytoties in case of plant diseases).

→It is infect spread of the pathogen with in crop area.

→It is interaction of crop pathogen and environment, where populations of plants and pathogens rather than individuals are involved.

→Thus , epidemiology in this wider sense includes also the seasonal carryover and subsequent dispersal of pathogen.

4) Control:- This concerns with the development of suitable method of controlling the diseases with the objective of reducing the loss in the yield of the crop to its minimums.

Broadly, plant pathology involves two phases:-

- (i) Science of leaving and under study the disease and
- (ii) The ~~art~~ ^{art} of applying the knowledge to need life problems. ✓

Thus, plant pathology is both, a science as well as an art.

→ A plant pathologist is concerned both, with its science i.e. learning and understanding the nature of a disease, as well as its art i.e. diagnosis, treatment or control of plant diseases as an attempt to solve real problems of life.

Scope and Significance of plant pathology:-

→ Plant pathology is concerned with all aspects of plant disease and has a much wider scope than ~~woman~~ ^{Animal} pathology.

→ However, plant pathologists have begun to specialize in similar individual aspects of disease in plants.

→ Notable advances have been made in interactions between host and pathogen at chemical, molecular and genetic levels, plant virology, chemistry of fungi toxicity and disease forecasting systems.

→ On practical side, there has been much progress in development of plant protection chemicals, and breeding;

- i. Disease-resistant varieties.
- ii. Rapid rise in world population.
- iii. To meet the food needs of all people
- iv. It is necessary to provide & supply food all possible methods to increase the world food supply are being pursued.

These include:-

- (i) Expansion of crop area.
- (ii) Improved the wood of cultivation.
- (iii) Increased use of fertilizers.
- (iv) Use of improved varieties.
- (v) Increased irrigation and,
- (vi) Improved crop protection.

(A) Crop protection from disease and pests reduces substantial amount of the plant products.

→ Thus welfare of plants through protection from pests and disease is of particular interest to main kind.

(B) Plant disease are important as they cause damage to plants and plant products.

(C) Kind and amount of losses caused by plant diseases vary with the plant or plant product, the pathogen locality environment control method etc.

(D) With advancement in woman societies, need for **fibers shelter, paper, rubber, drugs etc.**

→ Increased tremendously. The plants yielding these products suffer from severe losses each year due to pests and disease.

(1) Paper 1 (3rd SEM.)

- (i) Disease symptoms:**
- (ii) Nursery disease:**
- (iii) Heart rot disease:**
- (iv) Disease management:**

(2) Seed pathology:- seed treatment and seed certification.

Terminology of plant Pathology:-

Disease:-

- This involves harmful physiological changes in the plant.
- We consider nature of disease.
- The disease is "a Pathological process caused by continuous irritation."
- Generally abnormal physiological changes due to non- parasitic agents are referred to as disorders.

Pathogen:- Pathogen is any agent which causes damage, but the term is generally used to denote living organisms, as fungi, bacteria.

Parasite:- Most Pathogens are also parasites. They derive the nutrients for growth from a living plant.

Pathogenicity:- Pathogenicity is the ability to cause disease.

Virulence:- Virulence is used as a measure or degree of pathogenicity in a qualitative sense .

Aggressiveness:- Aggressiveness is the capacity of a parasite to invade and grow in its host plant and to reproduce on or in it.