# PLANT PATHOLOGY

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# Plant Pathology?

- *Pathos*=Suffering; *logos*= knowledge

**It is a branch of Botany which deals with:**

- **Diseases of plants**
- **Symptoms of plant diseases**
- **Development of diseases**
- **Prevention of diseases**
- **Control of plant diseases**
- **Maintenance of good health of plant**

- **Plant Pathology:**

  **Plant Pathology is a science that studies plant diseases and attempts to improve the chances for survival of plants when they are faced with unfavourable environmental conditions and parasitic microorganisms that cause disease.**

# Concept of Healthy plant:

**A plant is healthy, or normal, when it can carry out its physiological functions to the best of its genetic potential.**

# Diseased plant:

- **Disease in plants, can be defined as the series of visible and invisible responses of plant cells and tissues to a pathogenic organism or environmental factor that results in adverse changes in the form, function, or integrity of the plant and may lead to:**
  - **partial impairment**
  - **Death of plant parts**
  - **or death of the entire plant.**

# SYMPTOMS:

- A **visible expression of disease in the host plant may be regarded as Symptoms.**

**After successful penetration, the pathogen colonises on the host, as a result many structural and physiological changes occur within the host, and finally the symptoms develop.**

## ➢ SIGN:

The pathogen or its parts or products seen on the host plant is called ***Sign***

## ➢SYNDROME:

Sometime disease caused by an organism may produce more than one type of symptom & the sum total of all disease symptoms and sign is collectively called as ***SYNDROME***

# Types of Symptoms

- 1. Necrotic
- 2. Atrophic / Hypoplastic
- 3. Hypertrophic / Hyperplastic

# Necrotic Symptom

- **These symptoms are evidenced by the death (Necrosis) of cells, tissues, or organs of the infected host due to parasitic or non-parasitic causal agencies.**

# Different types of necrotic symptoms include:

a) Spots
b) Shot-hole
c) Anthracnose
d) Blight
e) Scald
f) Burn or Scorch
g) Wilt
h) Die-back
i) Streak or Stripe
j) Canker
k) Damping off
l) Rot
m) Blotch
n) Blast

# Necrotic Symptom: a) Spot

- **Spots are the Necrotic region develops on the host surface, formed by killing of tissues in a limited area.**

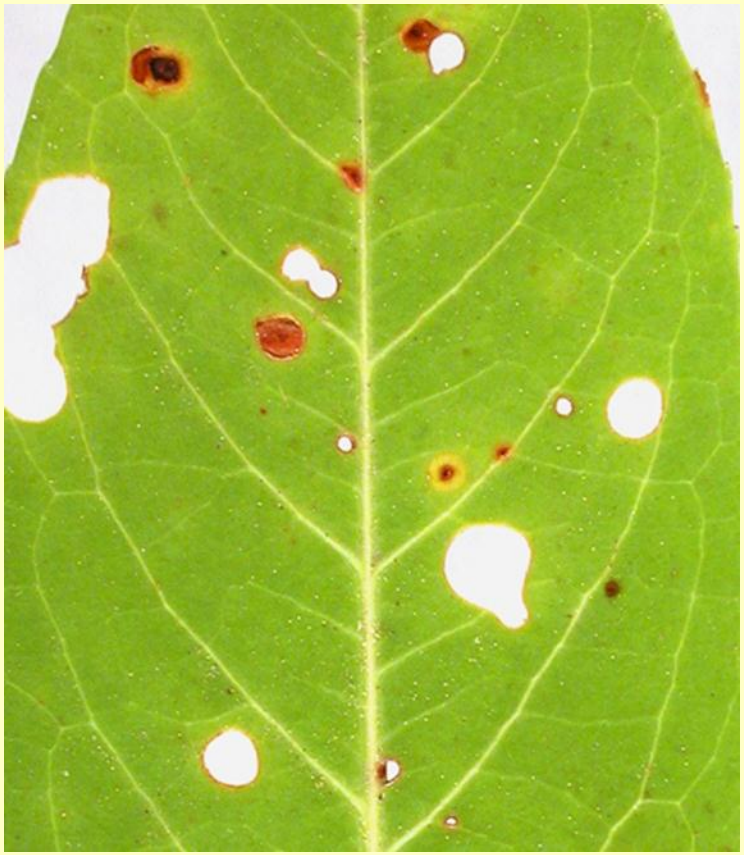
**The spots may develop as circular or angular or irregular diseased areas (lesions) and the tissue of such affected area dies, turns brown and dries. Often the central dead area become surrounded by a zone of brownish, reddish or yellowish tissue. Spots are very common in leaves.**

**Ex- Brown spot of rice *(Helminthosporium oryzae)***

a. **Spot:**

# b) Shot-hole:

- Diseased area often shrinks & separates from the surrounding healthy tissues forming depression.



# c). Anthracnose:

- These are elongated & somewhat angular spots appear near the veins of the lower surface of the leaf. Next these spots spreads into adjacent tissues & ultimately appear on the upper surface in severe cases.

Along with leaves, stems, petioles & fruits also develop anthracnose.

Ex- Anthracnose of Mango

Anthracnose of Bean

# Anthracnose:

# Necrotic: c. Anthracnose

# d) Blight:

**Blight can be defines as the rapid killing of different plant parts, such as leaves, blossoms, etc. and the killed tissues may become slimy and often emit pungent odour.**

**Ex- Late blight of potato**

***(Phytophthora infestans)***

# d. Blight

# e) Scald:

A white or pale appearance of leaves / and or fruits resembling that developed by scalding water is referred to as Scald.

Ex- Sun scald of apple

# e. Scald:

# f) Burn or Scorch:

It is characterized by rapid death and browning of large areas in succulent organs (leaves and fruits) of plants due to the effect of high temperature.

# f. Burn or Scorch

# g) Wilt:

- Here the entire plant dies or wilts. Wilting may be due to injury to the root system or to the toxic substances secreted by the pathogen and carried to delicate cells with water or complete blocking of vascular system. Owing to wilting, the leaves and other succulent plant parts loose their tuegidity, become flaccid & droop.

# g. Wilt

# h.) Die back:

- **The symptom appears due to gradual drying of twigs from apex towards the base due to attack of pathogen.**

**Ex- Die back of chilli**

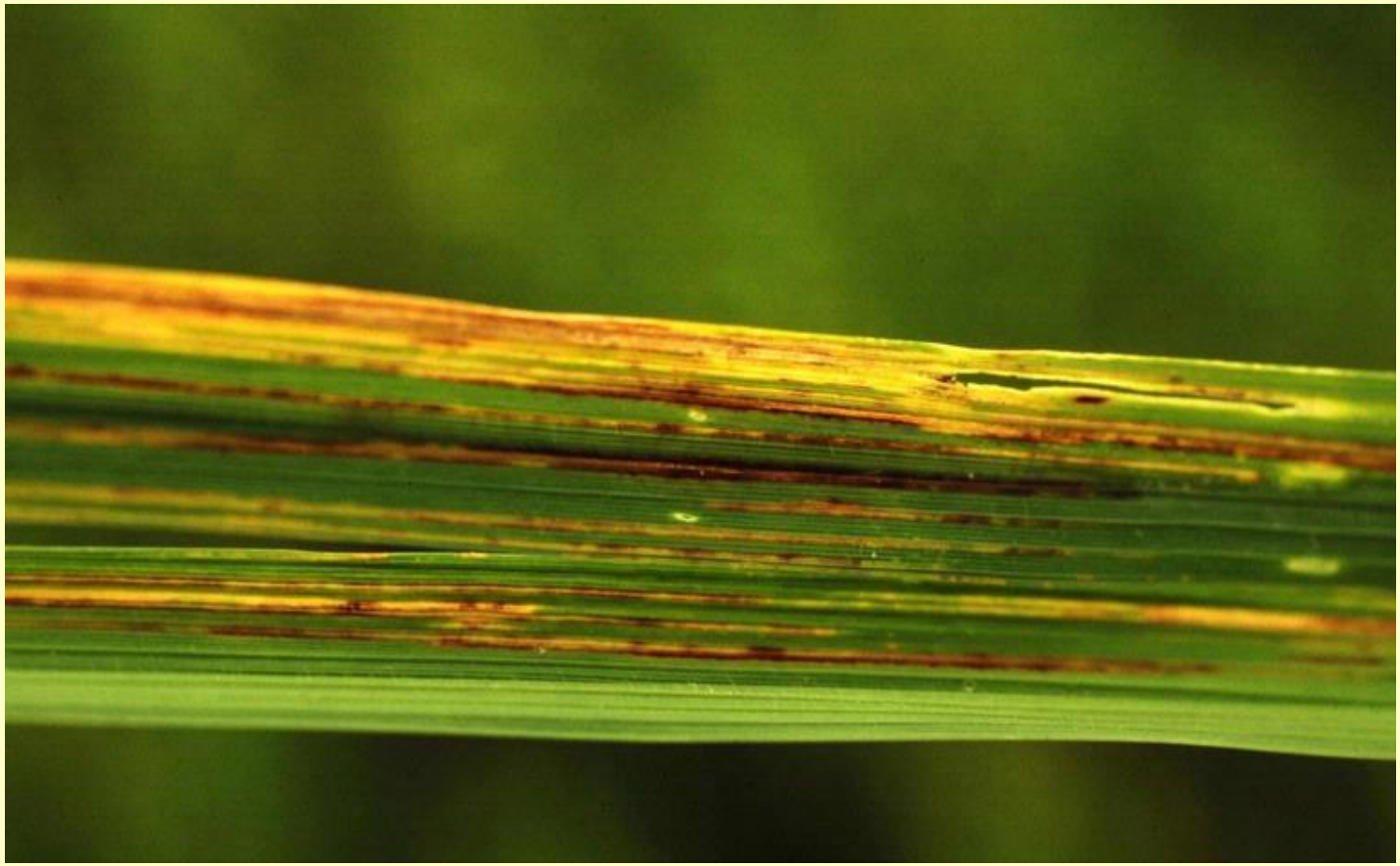
# h.) Die back

# i) Streak or Stripe:

- It appears as narrow, elongated, hydrotic, necrotic or other type of lesions on leaf veins, or stems.

- Ex- Bacterial leaf streak of rice

# i) Streak or Stripe



# j) Canker:

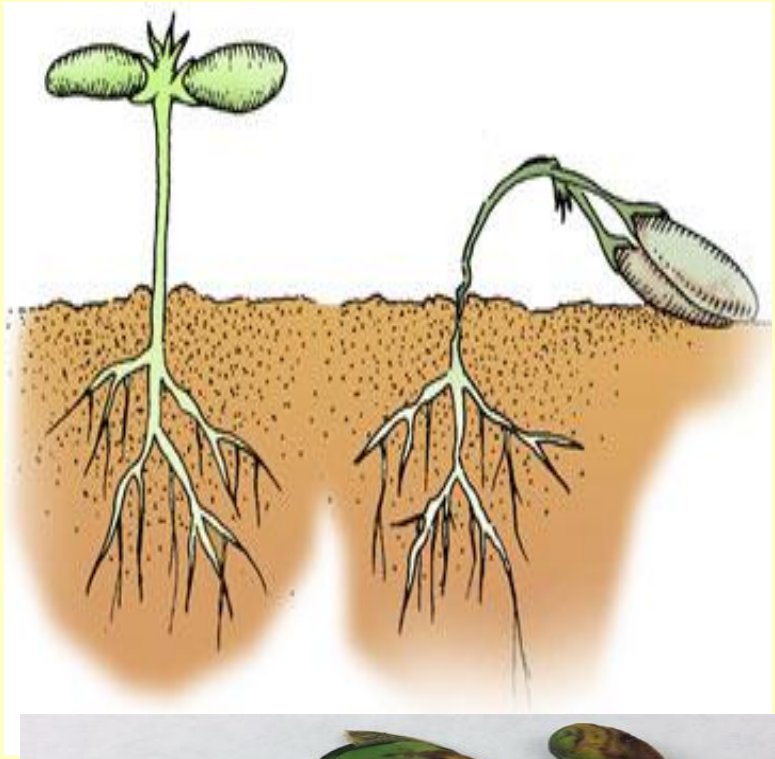
- It appears as sunken necrotic areas present in the bark and cortex of woody stems, on leaves and fruits.
- Sometime diseased portion become separated from the healthy region by cracks.
- The callus formation may take place at the healthy margin.
- Ex- Citrus Canker

# j) Canker

# k) Damping off:

- The pathogen attacks the stem of seedlings at the ground level and causes toppling down. Wet rot type lesions appear at the infected region.
- Ex- Damping off of tobacco seedlings.

# k) Damping off



# l) Rot:

- It is a type of necrosis where the dead tissues are in a more or less advanced stage of disintegration in the infected region.
- Ex- Bacterial soft rot of potato.

# I) Rot

# m) Blotch:

- It appears as superficial discoloration on leaves or on fruits in which slight suoerficial injury is usually visible by the presence of the fungus.
- Ex- Sooty blotch disease of apple.

# m) Blotch

# n) Blast:

- The symptom appears due to sudden death of inflorescence, young buds, young fruits and region of leaf showing burning at some of the region.
- Ex- blast disease of rice.

# n) Blast

# 2. Atrophic / Hypoplastic Symptom

- This type of symptoms manifest due to slowing down in development of the affected tissue or organ.
- The underdevelopment takes place due to hypoplasia i.e., subnormal cell division or rarely due to degeneration of cells.
- Some important types of Atrophic symptoms are:

# (a) Chlorosis:

- It appears as yellow or light green in colour either due to degradation of chlorophyll or its synthesis at a slower rate.
- Chlorosis may be Systemic or or it may be of different pattern i.e., Mosaic.
- Ex- Yellow vein mosaic of Lady’s finger.

# (a) Chlorosis:

# (b) Dwarfing:

- Some organ or the entire plant becomes reduced in size due to infection.

- Ex- Little leaf of bringle.

# (b) Dwarfing:

# (c) Vein –clearing:

**The green colour fails to develop along the veins, thus appearing translucent. This very common in virus infection.**

# (d) Wrinkling:

- This is very common symptom associated with mosaic, where over growth of the green region and reduced growth of the chlorotic region cause wrinkling.


# 3. Hypertrophic / Hyperplastic Symptoms

- **The symptoms are evident by the overgrowth of the of tissues or organs due to enlargement of cells (hypertrophy) or due to increase in cell number by more division of cells (hyperplasia).**
- **Some important Hypertrophic symptoms are:**

# (a) Galls:

- Galls are the abnormal, localised swelling or outgrowth, developed on the infected region of the host plants.
- Galls of larger size are called **KNOT** while those of smaller size are called **WART**.
- Ex- Wart disease of potato

# (a) Galls:

# (b) Hairy root:

- **Huge number of compactly arranged fine fibrous roots are developed due to infection.**

# (c) Curl:

- This symptom appears due to localised overgrowth on one side or certain region of the leaf or shoot which become curled, arched or distorted.
- Peach leaf curl disease.

# (d) Witches broom:

- More branches with vertical growth are developed due to infection.
- The branches grow vertically instead of normal horizontal pattern.

# d) Witches broom:


# 4. Sign

- In some parasitic diseases, the pathogen is partially or wholly visible with naked eye and the diseases are identified by seeing the structure of the pathogen.
- Types:
  - (a) Mildews
  - (b) Smuts
  - (c) Rusts

# (a) Mildews:

- Pathogen grows superficially & appears as white, violet or brown spots on young stems, leaves and on fruits.
- When the fungal spores are available in the form of spreading powdery mass on the host surface, they are called **Powdery mildews.**
- When the symptoms are visible in the form of tangled cottony growth, they are **Downy mildews.**

# (a) Mildews:

# (b) Smuts:

- The symptoms are usually developed as black powdery mass of spores like smut on on the inflorescence.
- Ex- Loose smut of wheat

# (b) Smuts:

# (c) Rusts:

- The symptoms appear as small pustules on the epidermis of leaf and stem of the host.
- Pustules may be powdery or compact and arwe  of different cloration, like black, brown or yellow.
- Ex- Black stem rust of wheat

# (c) Rusts:

# (c) Rusts:

Thank you