

Classification of plant diseases

Type of infection

- a. Localized diseases:** These diseases are limited to a definite area of an organ or part(s) of a plant. e.g. leaf spots and anthracnoses caused by different fungi.
- b. Systemic diseases:** In these diseases the pathogen spreads from a single infection point so as to infect all or most of the host tissues. e.g. Downy mildews caused by fungi and mosaics and leaf curls caused by viruses.

Type of perpetuation and spread

a. Soil-borne diseases: The causal agents perpetuate and spread through soil. e.g. Damping off caused by fungi like *Pythium sp.* and root rot caused by *Rhizoctonia spp.*

b. Seed-borne diseases: Seed or seed materials help in the perpetuation and spread of this disease. The disease causing agents may be internally seed-borne or externally seed-borne e.g. Loose smut of wheat caused by *Ustilago nuda tritici* (internally seedborne) and blast of rice caused by *Pyricularia oryzae* (externally seed-borne).

c. Air-borne diseases: In these type of diseases the causal agents are spread by wind (air). e.g. Early leaf spot and late leaf spot of groundnut caused by *Cercospora arachidicola* and *Phaeoisariopsis personata* respectively.

Extent of occurrence and geographic distribution

a. Endemic diseases: It is also known as **enphytotic disease**. When a disease is more or less constantly occurring year after year in a moderate to severe form in a country or locality then it is called as an endemic disease. e.g. **Wart disease of potato caused by *Synchytrium endobioticum* is endemic in Darjeeling**, citrus canker caused by *Xanthomonas campestris pv. citri* is endemic in Asia and sorghum rust caused by *Puccinia purpurea* is endemic in India.

b. Epidemic or epiphytotic diseases: An epidemic or epiphytotic refers to sudden outbreak of a disease periodically over a widespread area in a devastatingly severe form causing extensive losses or complete destruction. Epidemic disease may be present constantly in the locality but assumes a severe form only on occasions. This is because of the occurrence of favourable environment responsible for the rapid development of the disease. But the pathogen may be irregular in appearance or there may be lack of sufficient inoculum to cause the disease. e.g. wheat stem rust (*Puccinia graminis tritici*) and powdery mildew (*Erysiphe graminis var. tritici*), late blight of potato (*Phytophthora infestans*).

c. Sporadic diseases: Sporadic diseases are those, which occur at irregular intervals over limited areas or locations. They occur in relatively few instances. e.g. Fusarium wilt of cotton (*Fusarium oxysporum f.sp. vasinfectum*), grain smut of sorghum (Sporisorium = *Sphacelotheca cruenta*) and wheat loose smut (*Ustilago nuda tritici*).

d. Pandemic diseases: A disease is said to be pandemic when it is prevalent throughout the country, continent or world involving mass mortality. e.g. Late blight of potato and wheat stem rust.

Multiplication of inoculum

- a. In **simple interest disease (monocyclic epidemics)** the disease increase is just like simple interest in money. Here inoculum comes from a reservoir and hence amount of inoculum for a given season's crop is fixed. So there is no repetition of the disease cycle within the crop season. Hence the disease spread will be slow. e.g. Soil inhabiting pathogens like *Pythium sp.*, *Rhizoctonia sp.* and *Sclerotium sp.*
- b. In **compound interest disease (polycyclic epidemics)** the disease increase is just like compound interest in money. Inoculum is multiplied several times (every 7 to 15 days for wheat rust) during crop growth in a season. So the disease spread will be fast. e.g. Wheat stem rust, rice blast, powdery mildew diseases of different crops.

On the basis of symptom

1. Powdery mildew:

White to dirty white powdery mass of conidia, conidiophores and mycelium present on the host surfaces in patches or covering the entire surface.

E.g Powdery mildew of pea (*Erisiphae polygoni*)

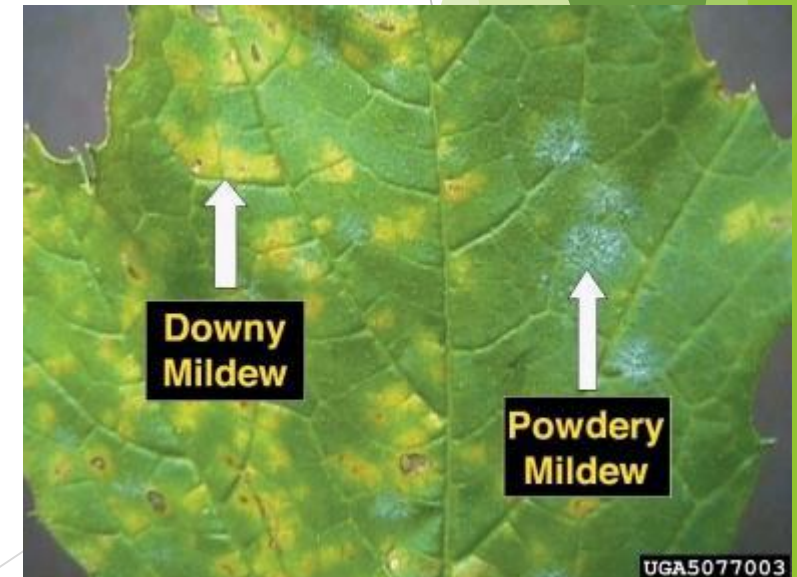


Powdery mildew of pea
(*Erisiphae polygoni*)

1. Downy mildew:

Dirty white with slight pinkish tinged cottony fungal growth consists of sporangia, sporangiophores and mycelium present on lower surface of leaves whereas light yellow or light brown patches appear on upper surface of leaves.

E.g Downy mildew of grapes (*Plasmopara viticola*)



1. Rust:

It gives rust like appearance of infected plant parts. The small pustule of spore of various colours, usually breaking through the host epidermis.

E.g Black rust of Wheat (*Puccinia graminis tritici*), Pea rust (*Uromyces fabae*)



Fig. 7.2. Black rust of Wheat

1. Smut:

Smut means charcoallike powder. The affected plant parts show black or black-purplish powdery mass of spores. Smut usually appear on floral parts but may also found on stem and leaves.

E.g Loose smut of Wheat (*Ustilago nuda tritici*), Whip smut of Sugarcane (*Ustilago scitaminea*) and Leaf smut of Paddy (*Entyloma oryzae*)



Fig. 7.3. Loose smut of Wheat

1. Leaf Spot

Spot is a definite, localized, round to regular lesion, often with a border of a different colour, characterized as to location (leaf spot, fruit spot) and colour (brown spot, black spot); if numerous or if spots enlarge and merge, a large irregular blotch or blight may develop such as gray leaf spot of tomato; black spot of rose; Angular leaf spot of beans, Leaf spot with yellow halo, Fruit spot e.t.c.



Leaf spot

1. Dieback

Dieback progressive browning and death of shoots, branches, and roots starting at the tips to downward e.g. die back of chilli/ citrus

2. Blights:

The invasion by the bacterium leads to very rapid and extensive necrosis of the affected plant parts resulting in scorched appearance of the host.

E.g Bacterial blight of paddy caused by *Xanthomonas campestris pv. oryzae*.



Fig. 7.6. Bacterial blight of paddy

Soft Rots:

The soft rot symptoms are found mainly on fleshy parts. The major effect is softening of the tissues due to disintegration of cells and dissolution of middle lamella, as a result of enzyme action. Very often a dirty liquid oozes out of the affected parts. In many causes, the disintegration is preceded by change of colour.

E.g Black leg and soft rot of potato caused by *Erwinia carotovora* sub species *carotovora* and *Erwinia carotovora* sub species atroseption.



Soft rot

Scabs and Cankers:

Scabs and cankers are corky outgrowth which is formed on leaves, twigs and all other plant parts above the ground. These outgrowths are the result of the reactions of the host tissues to the pathogen. Such reactions are mostly localised and often confined to the parenchymatous tissues of the host plant. Scab is formed by epidermal infection and is not deep seated. Cankers on the other hand, are deep seated and involve the cambium layer.

1. Citrus canker caused by *Xanthomonas Campestris* pv. *citri*.
2. Common scab of potato caused by *Streptomyces scabies*.



Wilt: