Diseases of Pulses

Disease Name: Foot and root rot of pulse
Causal organism: *Sclerotium rolfsii*
Fusarium oxysporum
Rhizoctonia solani
Host: Lentil, blackgram, gram, mungbean, grasspea, pea, pigeonpea

Stage of infection:

Mostly **seedling stage** (From after 15 days of emergence to flowering stage) but **not at mature stage**

Symptoms:

i) Yellowing of the whole plant is the first visible symptoms of the disease.
ii) The infected seedlings show black discoloration or rot at the collar region of the stem and advance in the root.
iii) In the advance stage of the disease the stem, leaf and whole plant become wilted, then dried and ultimately die.
iv) **In case of *Fusarium oxysporum***, only cotton like mycelia can be found at ground level i.e. at the point of infection and in the soil.
In case of *Sclerotium rolfsii*, white mycelia and mustard seed like sclerotia may be present.
In case of *Rhizoctoina solani*, white mycelia and dark brown to blackish coloured **larger sized** sclerotia are found and the infected area become narrow and can easily be pulled off from the soil.

Dissemination/ mode of transmission of disease:

This disease is caused by three different pathogens. So the disease is disseminated by different pathogenic units, for example,

Fusarium oxysporum is dispersed by mycelia, conidia, chlamydospores etc.
Sclerotium rolfsii is dispersed by mycelia and sclerotia
Rhizoctonia solani is dispersed by myecelia and sclerotia

Dispersion in the same season:

These pathogens disperse in the same season as follows:

i) The mycelia of the fungus can develop and infect the new plant
ii) The fungus can disperse through agricultural implements during intercultural operations.
iii) The pathogen can also disperse by irrigation or rain splash.

Survival / Overwintering:

The propagules (mycelia, slcerotia or chlamydospores etc) can associated with the seeds during harvesting and they can also survive in the infected plant parts or they may remain viable in the soil/field and they can infect the next crop in favourable conditions.

Favourable condition:

1. High temperature: 30-35ºC
2. High humidity and soil moisture content
3. High amount of organic matter in soil which encourage the growth of the pathogen

Disease cycle:

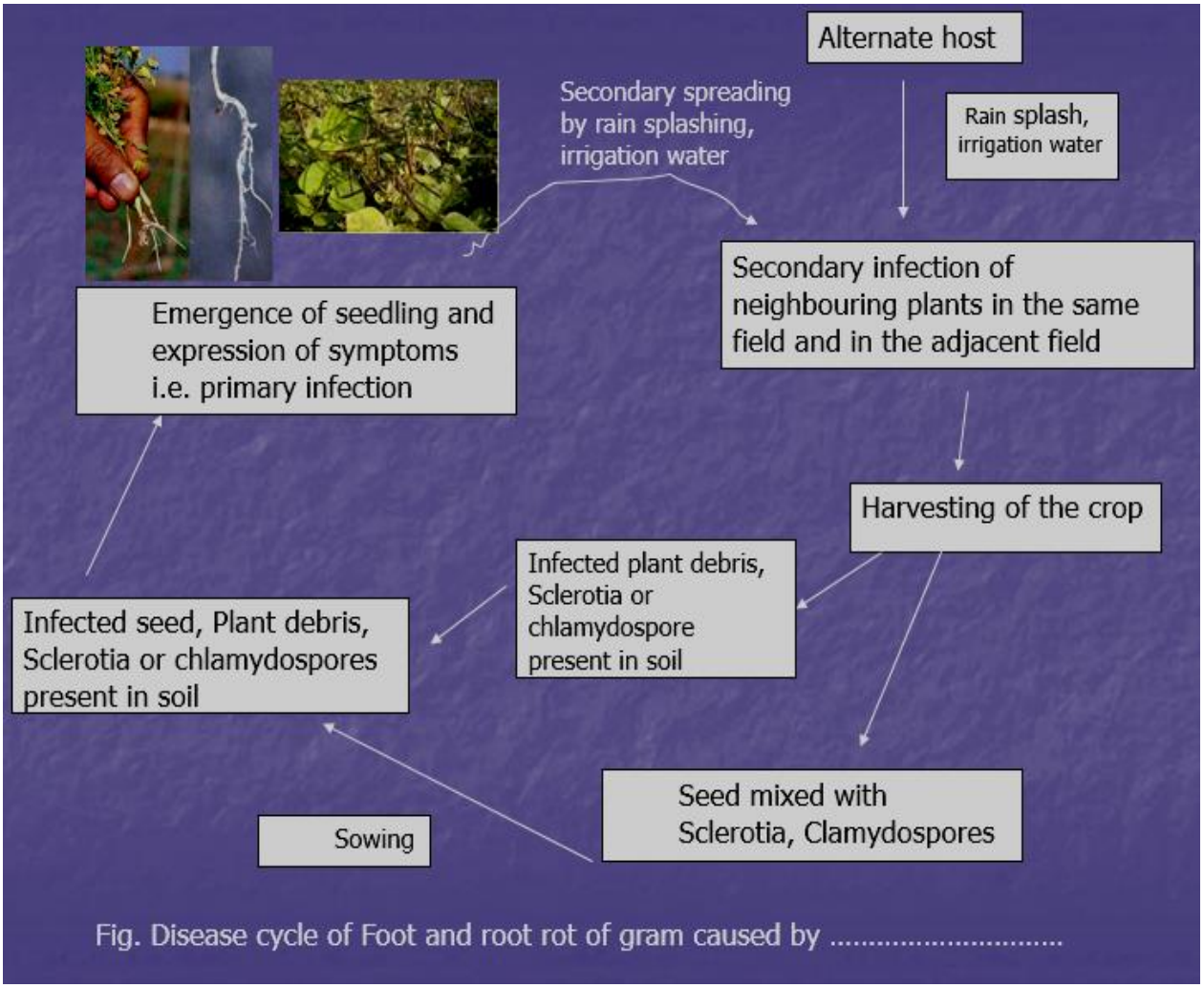

Fig. Disease cycle of Foot and root rot of gram caused by .....

Control measure:

i) Drying the soil before sowing of seeds
ii) Collection of seeds from healthy crops
iii) Destruction of crop residues and also alternate host if present
iv) Crop rotation with non host cereal crops for 2-3 years
v) Late sowing of the crop should be practiced
vi) Selection of resistant variety
vii) Soil fumigation
viii) Use balanced fertilizer
ix) Apply *Trichoderma viride* @ 4 g/kg seed reduces disease incidence.
x) Seed treatments with Provax-200 or Secure 600 wg or Rovral 50 WP or Captan 50 WP or Bavistin 70 WP @ 0.2-0.3% of seed weight.

Disease Name: Wilt of pulse

Causal organism: *Fusarium oxysporum*

Host: Mostly all pulses

Stage of infection: The disease can affect the crop at any stage.

Symptoms:

i) The field symptoms of wilt are dead seedlings or adult plants, usually in patches.

ii) Yellowing of leaves followed by rapid or sudden wilting or dropping of the plant. The wilted plants can easily be pulled up from the soil because destruction of lateral roots.

iii) Dark brown or dark discoloration of the internal stem tissues is visible if it dissected in longitudinally.

Dissemination:
Survival:
Favourable condition:
Disease cycle:
Control measures:

} **same as foot and root rot disease**

Name: Cercospora leaf spot of ……

Causal agent: *Cercospora cruenta*

C. canescens

Host: Blackgram, Mungbean, grasspea, lentil

Stage of infection: Flowering stage to maturity stage.

Symptoms:

i) Numerous small, round to oval, brown to blackish color spots are formed on the surface of the infected leaf.

ii) Several spots are coalesced together and bigger sized spots are formed

iii) The **mature spots** are characterized by angular shape, the center of this spots are pale brown or ashy which are surrounded by dark brown marky.

iv) In severe condition the centre of the spot may fall off creating '**shot hole symptom**"

Dissemination:

The spores and mycelia are disseminated by air, insect or by rain water etc.

Survival:

The spores and mycelia remain viable in the infected plant debris or in the soil which may act as primary source of infection for the next year in favourable condition.

Favorable condition:

1. High temperature >28ºc and high humidity > 80%
2. Fluctuation of humidity
3. Dense plant population
4. Inoculum present in the soil.

Disease cycle:

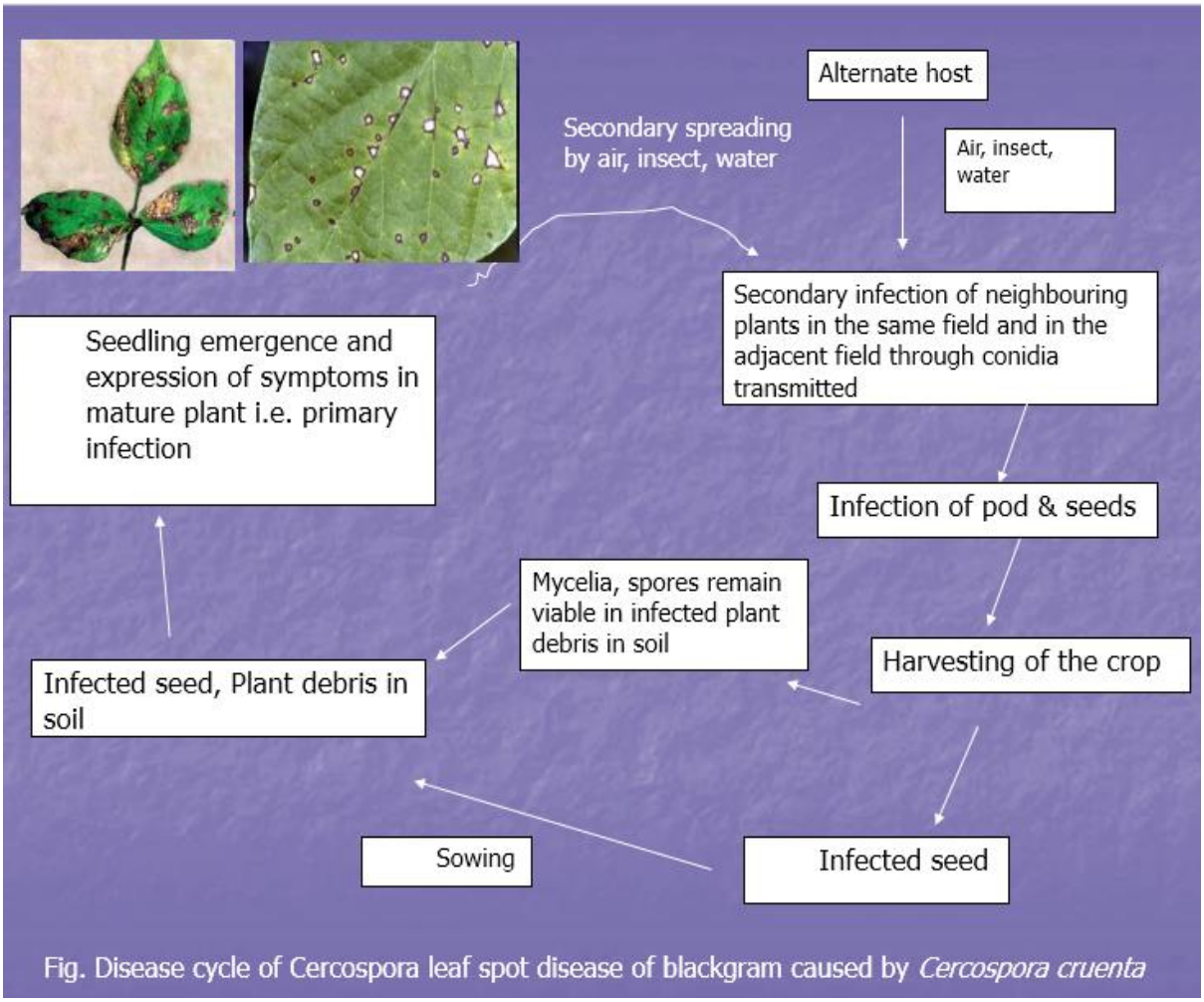

Fig. Disease cycle of Cercospora leaf spot disease of blackgram caused by *Cercospora cruenta*

Control:

i) Selection of resistant variety

ii) The infected plant uprooted after the symptom express in the field

iii) Intercrop with tall growing cereals and millets

iv) Maintain in crop population density and wide row planting

v) Spraying with Mancozeb @ 2 kg/1000 L water (i.e. 0.2% solution) per hectare or Carbendazim at 500g/ha at 15 days interval 2-3 times.

vi) Seed treatments with Provax-200 @ 0.2-0.3% of seed weight.

Name: Mosaic / Yellow Mosaic of ……

Causal agent: ……*Yellow mosaic virus*

Host: All pulses except grass pea

Stage of infection: Very beginning from seedling to maturity stage.

Symptoms:

i) The symptoms are characterized by the presence of mosaic patches of green tissues surrounded by yellow areas on the leaves.
ii) The infected plant becomes stunted and bushy
iii) The infected leaves become curled
iv) In extreme cases, the infected pods become malformed/ deformed.

Dissemination:

Insects those have sucking type mouthparts are mainly responsible for dissemination. e.g. Aphid , leaf hopper, white fly etc. In some cases the disease is also sap transmitted which disseminated by agricultural implements as well as some are seed-borne in nature.

Disease cycle:

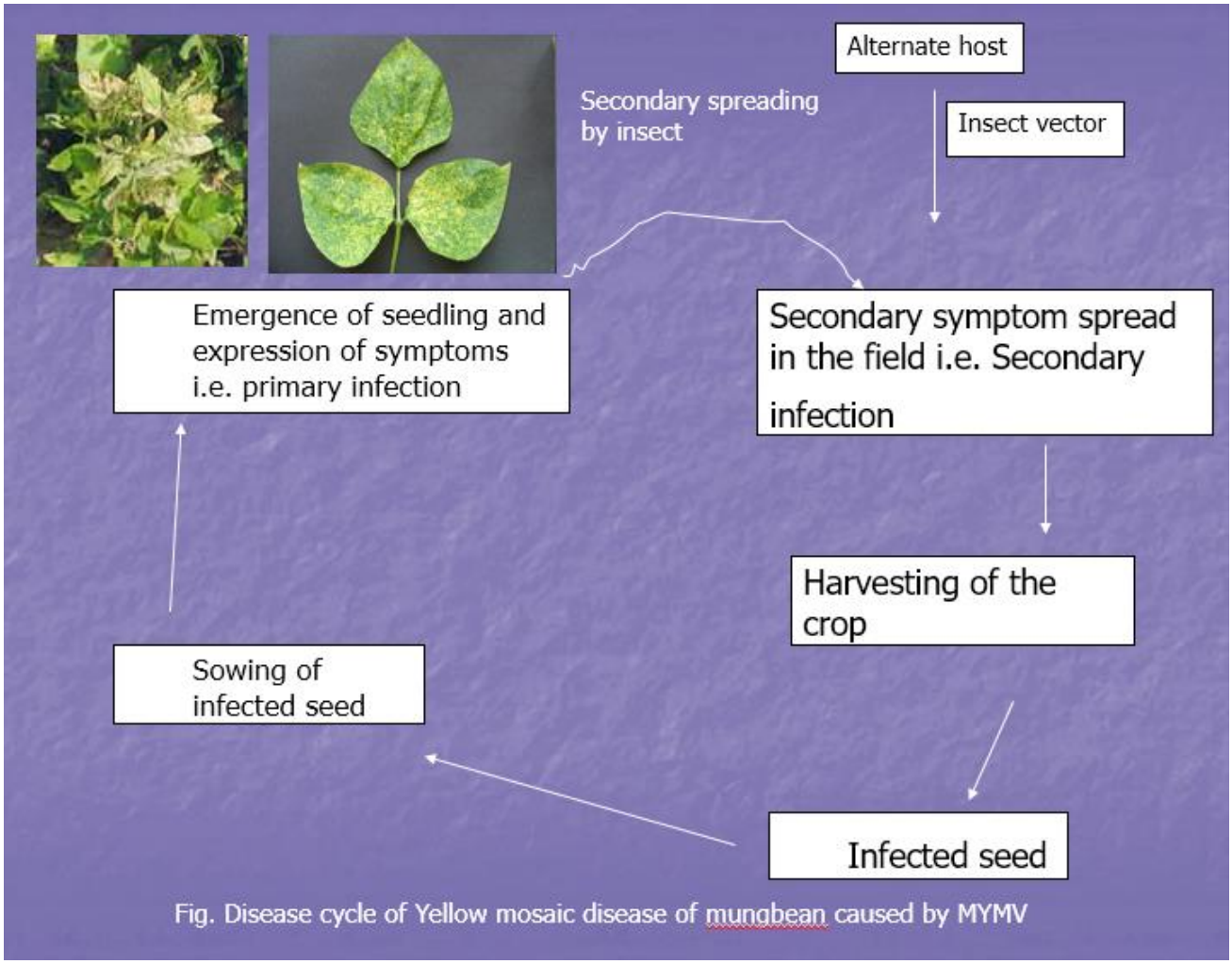

Fig. Disease cycle of Yellow mosaic disease of mungbean caused by MYMV

Control:

i) Cultivation of disease resistant varieties
ii) Collection of seed from disease free area
iii) Destruction of the alternate host
iv) The infected plant should be removed immediately after symptom development in the field.
v) Control of the insect vector by spraying with insecticide such as Malathion 57 EC etc.

Disease: Powdery mildew of …
Causal organism: *Erysiphe polygoni / Oidium* sp. (Mungbean, Blackgram, Pea)
Oidium sp (Gram, Lentil, Grass pea)

Host: All pulses except Arhar/pegion pea
Stage of infection: Flowering to mature stage

Symptoms:

i) Small irregular white powdery spots appear on the surface of leaves and the ventral side of the infected leaf becomes reddish colour.
ii) At flowering stage, the whitish powdery spots completely cover the leaves, stems and even the pods.
iii) Severely affected parts get shriveled and distorted.
iv) In severe infections, foliage becomes yellow causing premature defoliation.
v) In late season, the fungus produces cleistothecium in the form of black dots, scattered on the surface of white mycelium.

Dissemination:
Oidia, ascospores of the fungus are dispersed by air, insect, rain water from one field to another.

Survival:
Mycelia of *Oidium* sp and mycelia & ascospores of *Erysiphe polygoni* can survive in the infected plant parts which may be act as a primary source of infection.

Favorable condition:

1. High temperature and high humidity
2. Heavy dew
3. More sporulation in dry wet season

Control measures:

i) Use of disease resistant varieties
ii) Destruction of alternate host
iii) Collection and destruction of plant debris
iv) Adjustment of sowing date (early sowing)
v) Treating seeds with fungicides such as Captan, Thiram etc. before sowing.
vi) Spraying with Tilt or Thiovit @ 0.2% solution at 10-12 days interval for 2-3 times.

Name: Rust disease of **…….**

Causal organism: *Uromyces ciceris* f. sp. *arietinii* (Gram)

U. fabae – all pulses except gram

Host: All pulses

Stage of infection: Pod formation to mature stage

Symptoms:

i) Small, round to oval, brown to reddish brown pustules are formed on the both surface on the infected leaf. The pustules are slightly raised.
ii) Reddish colour pustules are also formed on petioles, stem and pods.
iii) In case of severe attack premature defoliation may occur.

Dissemination: Same as powdery mildew

Survival:

They also required living host for their survival. The fungus is survived in their alternate host.

Control measure:

i) Use of resistant variety
ii) Seed collected from healthy fields
iii) Crop rotation with cereal crops
iv) Spraying with Tilt-250 EC (0.4%) or Dithane M-45 or Mancozeb @ 0.2% solution at 12-15 days interval for 2-3 times.

Disease: Blight diseases of …….. (Seed borne)

1. Ascochyta blight caused by *Ascochyta rabiei* mainly on Gram
2. Leptosphaerulina blight caused by *Leptosphaerulina trifolii*-

All pulses except gram, major crop is Mungbean.

Stage of infection: Mature stage

Symptoms of Ascochyta blight:

i) The symptom is characterized by blackish color on the margin of the older leaves.
ii) Elongated black, rough lesion also developed on stem.
iii) Under favorable conditions, these spots enlarge rapidly and coalesce, blighting the leaves and buds.
iv) In severe condition, the black lesion may also developed on pod.
v) In severe stages pycnidia are found on infected pod even in the infected stem.

Symptoms of Leptosphaerulina blight:

i) Round to oval yellow color spots are developed on the margin of the older leaves.
ii) With the progress of the disease, some spots may coalesce forming bigger spots. In sever condition the infected plants appear as **fire burn**.

Dissemination:

The different structures of the pathogens are dispersed from one place to another through air, insects, and water. The mycelia of the fungus remain as dormant condition in **seed** which infect the crop in next season. Thus the disease is dispersed.

Control measures:

i) Destruction of the crop residues and alternate hosts
ii) Use of disease free seeds
iii) Cultivation of early cultivar
iv) Treatment of seeds with Captan/Rovral/Bavistin @ 0.2% of seed weight
v) Spraying with copper oxichloride/Dithane M-45 /Mancozeb @ 0.2% solution i.e. 2 kg/1000 L water per ha at 15 days interval for 3 times.

Disease: Anthracnose of .....

Causal organism: *Colletotrichum lindemuthianum*- Mungbean

C. graminicola- Blackgram

C. cajani- pigeon pea

Host: Black gram, Mungbean, Pigeon pea etc.

Stage of infection: At any stage

Symptoms:

i) Seedlings growing from infected seed develop small, dark brown to black sunken lesions on cotyledons and stems.

ii) As plants grow, lesions develop on mature leaves as circular, dark brick red to black, sunken spots.

iii) Water soaked spots are first formed on pod surface with time the spots become depress reddish brown to black color and within the pods, seeds develop brown to black sunken lesions

Dissemination & Survival:

The fungus can disseminate by air, water and insect and can survive in the infected seed, infected plant debris for a long time.

Control measure:

- Grow disease resistant cultivar
- Collection of seeds from healthy field
- Destruction of plant debris
- Crop rotation with wheat or corn
- Seed treatment with hot water (52°C for 11 minutes) or Carbendazim or thiram @ 2 g/kg of seed 24 hours
- Spray Mancozeb or carbendazim@ 0.25% solution at 15 days interval for 3 times.