Diseases of Pulse Crops

Dr. S. Parthasarathy

College of Agricultural Technology

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REDGRAM DISEASES

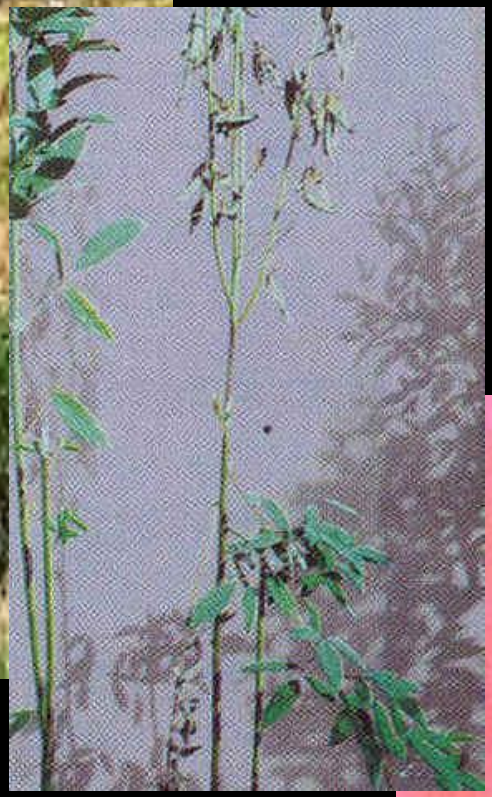
Wilt - *Fusarium oxysporum f sp. Udum*

Symptoms:

Leaves initially pale, loose their turgidity, droop down and finally results in large scale withering .

- **Gradual or sudden wilting from bottom to top is observed.**
- **Entire plant wilts or die within a few days.**
- **scattered disease incidence**
- **Dark streaks are seen when the bark of stem below the soil level and tap root are removed.**
- **The affected stem exhibit vascular browning indicating xylem plugging with mycelia.**
- **The disease is soil borne.**

Wilt - *Fusarium oxysporum f sp. udum*

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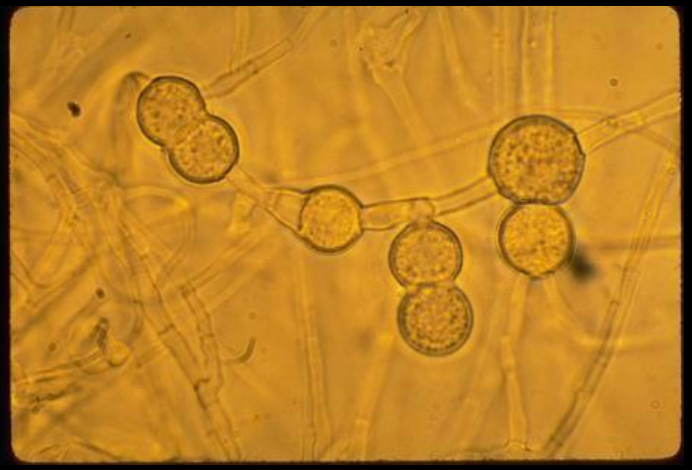


Management

Seed treatment

Talc formulation of *T. viride* @ 4g or *P. fluorescens* @ 10 g/kg Carbendazim or Thiram @ 2 g/kg

- **Basal soil application**

Neem cake @ 150 Kg/ ha

- **Soil application**

***P. fluorescens* or *T. viride*– 2.5 Kg / ha + 50 Kg of well decomposed FYM or sand at 30 days after sowing.**

- **Spot drench**

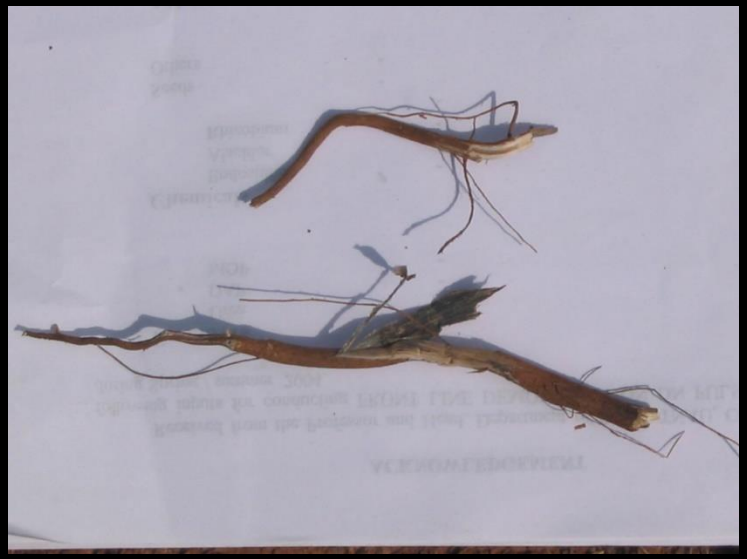
Carbendazim – 1 gm/ litre

Dry Root rot - *Rhizoctonia bataticola*
(Pycnidial stage :*Macrophomina phaseolina*)

Symptoms

- The disease occurs both in young seedlings and grown up plants.
- The lower leaves show yellowing ,drooping and premature defoliation.
- The discolored area later turns black an death of plants occur.
- The infected plants can be easily pulled out due to the rotting of the roots.
- Minute dark sclerotia are seen in the shredded bark(collar region and root).
- Large number of brown dots on the stem portion represent the pycnidial stage.
- Prolong dry weather or drought followed by irrigation or rain favours this disease build up.

Root rot - *Rhizoctonia bataticola*
(Pycnidial stage :*Macrophomina phaseolina*)



Root rot - *Rhizoctonia bataticola*
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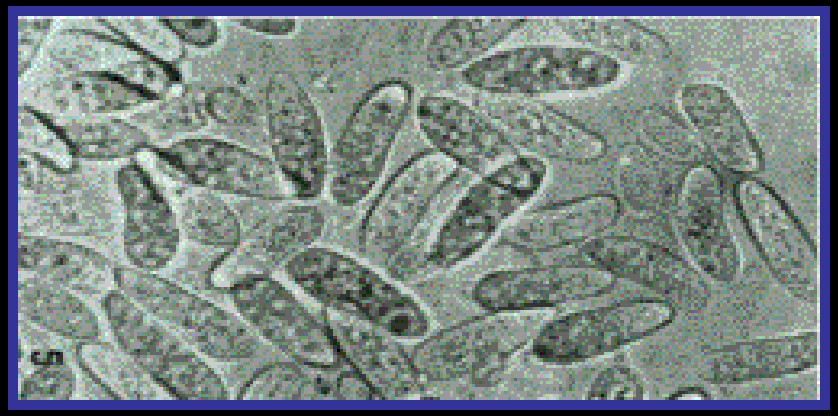

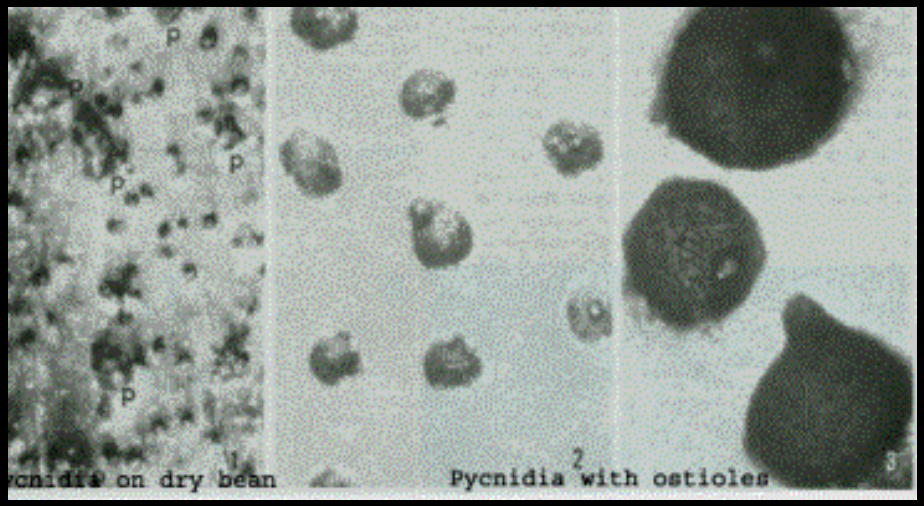

Management

- **Seed treatment**

  Talc formulation of *T. viride* @ 4g or *P. fluorescens* @ 10 g/kg seed (or) Carbendazim or Thiram @ 2 g/kgNeem cake @ 150 Kg/ha

- **Soil application**

  ***P. fluorescens* or *T. viride*– 2.5 Kg / ha + 50 Kg of well decomposed FYM or sand at 30 days after sowing.**

- **Spot drench**

  Carbendazim – 1 gm/ litre

Powdery mildew: *Leveillula taurica*

Symptoms

- It is an Oidiopsis type of powdery mildew in which the mycelium is endophytic.
- The affected leaf shows powdery patches on the lower surface corresponding with yellowing on the upper surface.
- Usually older leaves show symptom first.
- There will be premature defoliation of affected leaves.
- The disease is air borne.

Powdery mildew : *Leveillula taurica*




Management

- **Spray**
  NSKE 5% or Neem oil 3% twice at 10 days interval from initial disease appearance.

- **Spray**
  Carbendazim 250 g or Wettable sulphur 2500g/ha.

Leaf spot - *Cercospora indica*

Symptoms:

- **Light brown spots bound by veins are seen mainly on under surface of the leaves.**
- **The infection causes premature defoliation.**
- **The disease is air borne.**

Management:

Spray

Carbendazim – 250 g

Phytophthora blight / Stem blight – *Phytophthora drechsleri* f.sp. *cajani*

Soil-borne disease

- Cloudy weather and drizzling rain favor infection.
- Warm and humid weather results in rapid disease development and plant death.
- Plants are not affected after 60 days of growth.

Symptoms

- Water-soaked lesions on leaves.
- Brown to black sunken necrotic lesions on stems and petioles
- Lesions girdle the main stems or branches which break at this point.
- Seedlings die suddenly.

Pathogen

PS: Oospores (plant debris)

SS: Sporangia and zoospores, rain splashes, irrigation water

Affected stem

Breaking of stem due to girdling of lesion

Control

Select fields with no previous record of blight.

Avoid fields with low-lying patches prone to water-logging.

Use raised seed-beds with good drainage.

Seed treatment with metalaxyl 7 g/kg and foliar spray @ 500 g/ha

Phoma stem canker

Symptoms

Lesions with grey centers and dark brown margins on stems.

Lesions coalesce and girdle the stem and develop into large swollen cankers leading to premature death of plants.

Management

Select disease free fields

Plant early so that the crop escapes from drought and high temperatures at maturity.

Seed treatment with 4 g *Trichoderma viride* and soil application of 5 kg *T. viride* mixed with 50 kg FYM per ha.

Alternaria leaf blight – *Alternaria alternata*

Symptoms

Small, circular, necrotic spots on leaves forming typical concentric rings.

The lesions appear on all aerial plant parts including pods.

Blighting of leaves and severe defoliation and drying of infected branches.

Pathogen survives in infected debris and secondary spread by air-borne conidia

Management

Spray Mancozeb 1.0 kg / ha

Rust – *Uredo cajani* and *Uromyces dolichi*

Symptoms

Dark brown raised pustules full of uredia on the lower leaf surfaces

Infected leaves desiccate and drop off.

Extensive defoliation occurs in severe infections.

Control

Avoid sowing pigeonpea close to bean fields.

Rotate crops to reduce the chance of pathogen survival.

Spraying Mancozeb 2 g / l of water is effective.

Dark brown raised pustules on the lower leaf surface

Botrytis gray mould – *Botrytis cinerea*

Symptoms

Usually appears when plants are flowering, as dark gray fungal growth on the growing tips, flowers and pods.

Infected flowers drop reducing pod set.

The shed flowers and leaves on the ground are covered with sporulating mycelium of the fungus

Shed flowers with sporulation

Control

Spraying Chlorothalonil 2 g / lit of water is effective.

Sterility mosaic: virus

Symptoms

- The affected plants are stunted due to shortening of internodes.
- The auxiliary buds are stimulated to grow and the branches are crowded at the top giving bushy appearance.
- Mainly three types of symptoms are associated *viz.* severe mosaic in leaflets with complete sterility, mild mosaic with partial sterility and ring spots characterized by a green island surrounded by a chlorotic halo.
- The virus is transmitted by the mite *Aceria cajani*

Sterility mosaic : Tenui like virus

Pathogen

PPSMV (ssRNA, flexuous filaments)

Transmission by eriophyid mite, *Aceria cajani*

Management

- **Destroy sources of inoculum on perennial or ratooned pigeonpea.**
- **Uproot infected plants at an early stage of disease development**
- **Grow resistant varieties – BSR 1 , Vamban 1, 2 and 3**
- **Application of carbofuran 3 G @ 1.2 kg a.i / ha**
- **Spraying of monocrotophos 500 ml / ha to control vector population**

Yellow mosaic – Mungbean yellow mosaic virus (MYMV)

Symptoms:

- Appearance of yellow patches alternating with green colour
- Severe cases whole leaf turns to yellow
- Necrotic spots scattered on lamina and size of the leaf is reduced

Pathogen

- Mung bean yellow mosaic virus – Gemini virus (ss DNA))

Management

- Rogueing of infected plants
- Removal of weeds
- Spraying of monocrotophos or methyl demeton at 500 ml / ha

CHICK PEA OR BENGAL GRAM

Name of the Disease	Scientific Name
Root rot	*Rhizoctonia solani*
Wilt	*Fusarium oxysporum*
Ascochyta blight	*Ascochyta rabiei*
Rust	*Uromyces ciceris*
Stunt disease	*Virus*
Foot rot	*Operculella padwickii*
Cottony root or stem	*Sclerotinia sclerotiorum*

Collar rot	***Sclerotium rolfsii***
Leaf blight	***Stemphylium sarciniforme***
Bacterial leaf blight	***Xanthomonas campestris***
Bean common mosaic	***Virus***
Alfalfa mosaic	***Virus***

Alternaria blight

- Flowering stage
- Shedding of lower leaves
- Water soaked, small, circular and purple in colour.
- Infected pods turn blackish in colour.
- Infected seeds get shriveled.

Pathogen & Management

Alternaria alternata

Cultural Control

- Wide spacing
- Avoid excessive vegetative growth.
- Intercrop with linseed.
- Avoid excessive irrigation.
- Use compact varieties

Chemical Control

- Mancozeb (3g/l) or Carbendazim at 1.5g /l.

Ascochyta blight

- Attacks all aerial parts of the plant.
- The affected area shows circular brown spots with grey center.
- At the center of the spots numerous minute black dots are arranged in concentric rings, which are called pycnidia.
- In advanced stages, the leaves turn completely, brown and scorchy.
- Similar spots occur on stem and pods.
- On the stem these spots coalesce to girdle the stem causing the twig to wilt.
- Seeds shriveled, discolored and malformed.

Pathogen

- ***Ascochyta rabiei***
- **(**Perfect stage*: Mycosphaerella rabiei*)

Cultural methods

- Sow disease-free seed.
- Sow late
- Follow rotation crop.
- Intercrop with wheat, barley, mustard
- Remove and destroy dead plant debris.
- Bury diseased debris 10 cm or deeper

Management

- Seed treatment with carbendazim @ 3g/kg of seed
- Hot water seed treatment (52º C for 10 min) to lower the infestation.
- Spray the crop with mancozeb @ 3g/l or Spray wettable sulphur at the rate of 2.3g/litre of water.
- Spray with Carbendazim at 500g/ha.
- Follow crop rotation with cereals

Phoma blight

- Seed borne disease.
- Usually affects the crop during the reproductive phase.

Symptoms

- Irregular, light brown lesions on the leaves, stems and pods have dark margins.
  Seeds from infected pods are discolored and shrivelled.

Management

- A minor disease and does not require any specific control measure.

Lesions on stem, leaves and pods

Pycnidial bodies on pods

Botrytis grey blight

Seed borne disease.

Symptoms

- Lack of pod setting is the first indication of the disease.
- Lesions girdle the stem completely.
- Rotting of affected leaves and flowers.
- Water-soaked and irregular lesions on the pod.
- The pods contain either small, shrivelled seeds or no seeds at all.

Lesions on leaves, stem and pods

Collar rot - *Sclerotium rolfsii*

- Drying plants whose foliage turns slightly yellow before death,
- Seedling become chlorotic.
- Collar region turns soft slightly contracts and begins to decay.
- Black dots, like mustard in shape known as sclerotia

Management

Cultural Control

- Deep ploughing in summer.
- Avoid high moisture at the sowing time.
- Seedlings should be protected from excessive moisture

Mechanical Control

- Destroy the residues of last crop and weed before sowing and after harvest.
- All un decomposed matter should be removed from the field before land preparation.

Chemical Control

- Treat the seeds with a mixture of Carbendazim 1.5 g and Thiram 1.5 g per kg of seed

Dry root rot

- ***Rhizoctonia bataticola/Macrophomina phaseolina***
- Flowering to podding stage
- The roots of infected plants become brittle and dry.

Symptoms:

- Severe in seedling stage
- Dark brown lesion develop on the stem near ground level
- The infected seedling show yellow leaflets show drooping ,complete drying of plants
- The stem near the collar region show rotting the blackish mycelial growth and sclerotia

Pathogen

- Mycelium dark brown, constrictions in hyphal branches at junction with main hypha
- Sclerotia dark brown and irregualr in shape

FC: Heavy soil with poor drainage and warm humid weather

Dry root rot – *Rhizoctonia bataticola*

Management

Cultural Control

- **Deep ploughing in summer**
- **Grow cultivars resistant to dry root rot.**
- **Drought should be avoided.**

Chemical Control

- **Seed treatment with a mixture of Carbendazim 1.5 g and Thiram 1.5 g per kg of seed.**

Biological control

- **Seed treatment with *Trichoderma viride* formulation + 3 g thiram per kg seed can reduce the disease incidence.**
- **Soil Application of *Trichoderma viride* @ 1kg /ac**

Wet root rot – *Rhizoctonia solani*

Symptoms

- The disease occurs at 30-80% soil moisture and at high nitrogen levels.

- Affected seedlings turn yellow.
- Petioles and leaves droop.

- A distinct dark brown lesion appears above the collar region on the main stem and can extend to lower branches.

Management

- Seed treatment with captan, thiram or *T. viride* 4 g /kg or *P. fluorescens* 10 g/kg


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Robert

Fusarium wilt

Fusarium oxysporum* f.sp. *ciceri

- Affect the crop at any stage.
- At seedling stage, 3-5 weeks after sowing, whole seedlings collapse and lie flat on the ground with dull green leaves and shrunken stem.
- Dark drown or dark discoloration of the internal stem tissues.
- At adult stage, drooping of petioles, rachis and leaflets and finally entire plant occurs.

Management

- **Seed treatment**

  Talc formulation of *T. viride* @ 4g or *P. fluorescens* @ 10 g/kg seed (or) Carbendazim or Thiram @ 2g/kg

  Neem cake @ 150 Kg/ha

- **Soil application**

  ***P. fluorescens* or *T. viride* – 2.5 Kg / ha + 50 Kg of well decomposed FYM or sand at 30 days after sowing.**

- **Spot drench**

  Carbendazim – 1 gm/ litre

Rust - *Uromyces ciceris-arietini*

Symptoms

- Brown powdery rust pustules appear on the both the surface of the leaf.
- The uredosori cover the entire leaf and later teliosori appear
- Rust pustule produced on the stem and pod also

Pathogen

- Uredospore :Single celled,Brownish yellow, echinuated
- Teliospore : Round, brown, single celled

MS

- Survives as uredospore in weed *Trichonella polycerata*
- Spreads through uredospores

Management:

- Wetteble sulphur 1 kg/ ha
- Carbendazim 500 g/ha

z-Sandoval

Uredospores

Powdery mildew *Leveillula taurica*

Symptoms

- Small patches of white powdery coating initially develop on both surfaces of older leaves.

- These patches grow and may cover a large area. Affected leaves turn purple and then die.

- When infection is severe, stems, young leaves, and pods are also covered with the powdery coating.

Sclerotinia Rot

Symptoms

Chlorotic or drying branches or whole plants

The plants normally rot at the collar region or at any point on the branch.

A web of white mycelial strands appears at the collar region

Whitish or brownish mycelial strands on branches or inside the stem.


White cottony growth
Hard black sclerotia
on stem

Chickpea stunt - Bean (pea) leaf roll virus

Symptoms

- Stunting , shortened internodes, bushy appearance leaflets smaller yellow or orange or brown discolouration
- Premature drying
- Browning of pholem in the collar region

Vector: ***Aphis craccivora, Myzus persicae***

Management : Rogue out the infected plant

Spraying Methyl Dematon @500 ml/ha


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Phyllody - Phytoplasma

Symptoms

- Excessive proliferation of branches with smaller leaflets, giving a bushy appearance to the plant.

- The flowers are converted into leafy structures.

Minor diseases

Collar rot	***Sclerotium rolfsii***	**Water soaked lesion developed near collar region leads to yellowing and death**
Bean common mosaic	**BCMV, : *Aphis craccivora, A. gossypii***	**Stunting and bushy appearance with mosaic mottling**
Alfalfa mosaic	**Alfalfa mosaic virus**	**Twisting of terminal bud, necrosis, small branches with mild mottling**

BLACK GRAM AND GREEN GRAM

Mungbean		
Yellow mosaic	*Mungbean yellow mosaic virus*	Major
Root rot	*Macrophomina phaseolina*	Major
Cercospora leaf spot	*Pseudocercospora cruenta*	Major
Powdery mildew	*Oidium* sp; *Erysiphe polygoni*	Major
Anthracnose	*Colletotrichum lindemuthianum*	Minor
Sclerotinia blight	*Sclerotinia sclerotiorum*	Major
Leaf blight	*Leptosphaerulina trifolii; phoma* sp.	Minor
Blackgram		
Powdery mildew	*Erysiphe polygoni; Oidium* sp	Major
Cercospora leaf spot	*Pseudocercospora cruenta*	Major
Yellow mosaic	*Mungbean yellow mosaic virus*	Major
Stem Necrosis	*Tobacco streak virus*	Major
Root rot , Seed rot and seedling blight	*Macrophomina phaseolina*	Major
Anthracnose	*Colletotrichum caulicola*	Minor

Dry root or Charcoal rot : *Rhizoctonia bataticola* (Pycnidial stage :*Macrophomina phaseolina*)

Symptoms

- Symptoms first appear as yellowing of leaves.
- Within a day or two leaves droop and finally they may drop-off. The plants may wilt within a week.
- Dark lesions may be seen on the bark at the ground level.
- The basal stem and the main roots may show dry rot symptoms. The tissues are weakened and break off easily.

Fungus

- *Macrophomina phaseolina* (syn. *Rhizoctonia bataticola*).
- It produces numerous round and black sclerotial bodies on the host Pycnidial stage is produced on the host.
- Pycnidia are dark brown and ostiolate.
- Pycnidiospores are thin walled, hyaline, elliptical and single celled

Management

- **Seed treatment**
  talc formulation of *T. viride* @ 4g or *P. fluorescens* @ 10 g/kg seed (or) Carbendazim or Thiram @ 2 g/kg Neem cake @ 150 Kg/ha

- **Basal application**
  Zinc sulphate 25 kg / ha.

- **Soil application**
  P. fluorescens or *T. viride*– 2.5 Kg / ha + 50 Kg of well decomposed FYM or sand at 30 days after sowing.

- **Spot drench**
  Carbendazim – 1 gm/ litre

Dry root or Charcoal rot

Mungbean

charcoal rot / Dry root rot –

Macrophomina phaseolina

Basal application of zinc sulphate 25 kg/ha

Treated

Control

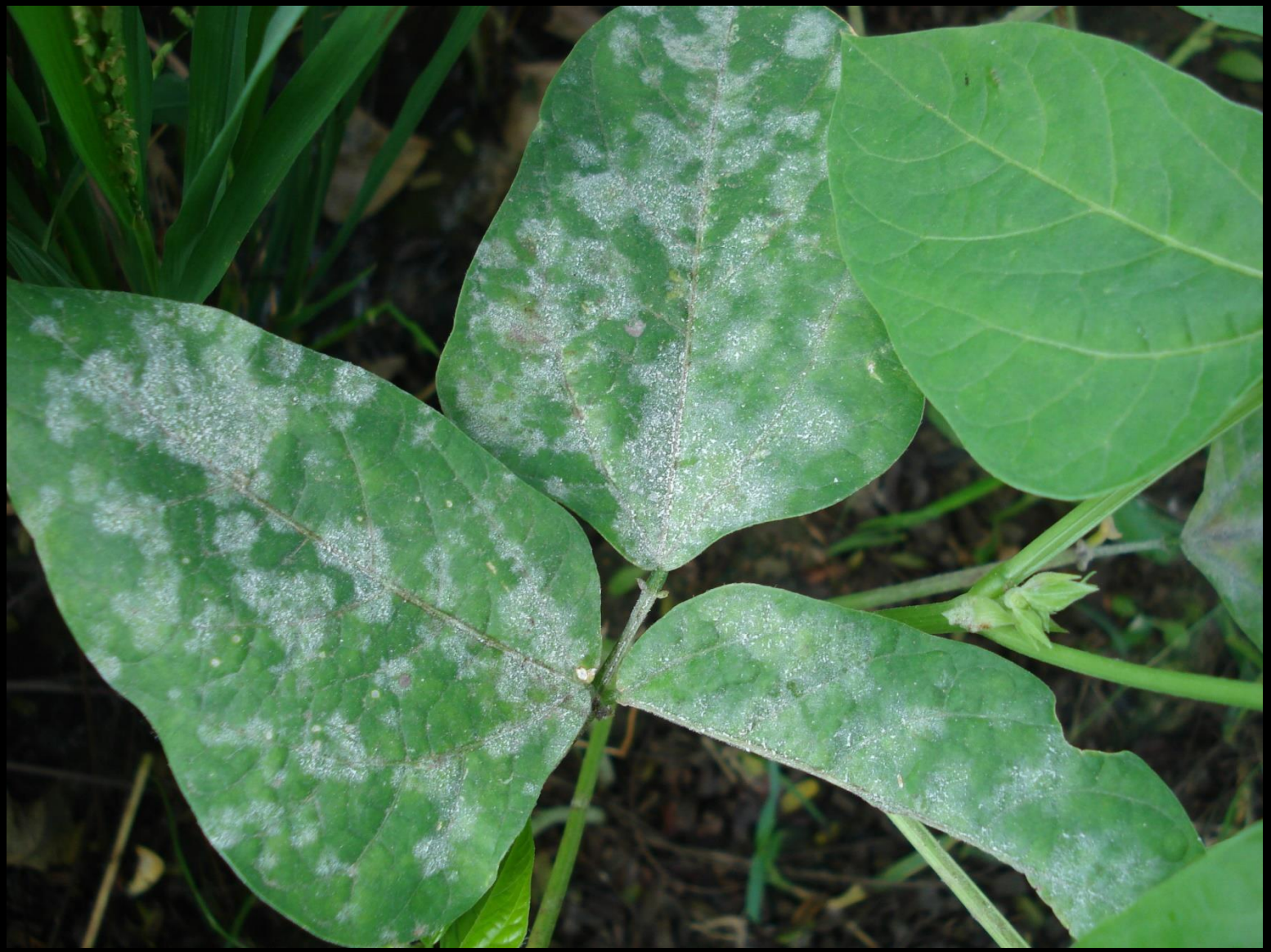
Powdery mildew - *Erysiphe polygoni*

Symptoms:

- **White powdery growth is seen in patches on the upper surface of the leaves.**
- **In severe cases the powdery growth spread to all other parts also.**
- **In advanced stages the powdery growth turns brown and the leaves drop off prematurely.**

Powdery mildew - *Erysiphe polygoni*

Mungbean powdery mildew – *Erysiphe polygoni*



Management

- **Spray**

  NSKE 5% or Neem oil 3% twice at 10 days interval from initial disease appearance.

- **Spray**

  Carbendazim 250 g or Wettable sulphur 2500g/ha.

  Eucalyptus leaf extract 10 % at initial appearance of the disease and 15 days latter.

Rust - *Uromyces phaseoli-typica* (Syn: *Uromyces appendiculatus*)

Symptoms:

- On lower surface of the leaves small, round reddish brown powdery pustules are seen in abundance which harbour the uredospores.
- Severe infection causes premature defoliation.

Rust - *Uromyces phaseoli typica*

Rust – *Uromyces phaseoli-typica*

(Syn: *Uromyces appendiculatus*)

Fungus: *Uromyces phseoli-typica*
(Syn. *U. appendiculatus*).

- The fungus is an obligate parasite and autoecious in nature.
- Uredospores are unicellular, globoid or ellipsoid, yellowish brown with echinulations.
- The teliospores are globose or elliptical, unicellular, chestnut brown with warty and hyaline papilla at the top.
- Aecia are cup shaped; orange coloured and aeciospores are unicellular and elliptical.

Management

Two sprays of chlorothalanil 0.1% or one spray with 0.1% chlorothalanil followed by 3% Neem oil after the appearance of rust disease, effectively controls the disease.

Leaf spot : *Cercospora canescens*

Symptoms

- Small, circular spots on leaves with grey centre and brown margin.
- Several spots coalesce to form brown irregular lesions.
- In severe cases, defoliation occurs.
- As the disease advances, lesions are developed on stems and pods.

Fungi - *Cercospora canescens* and *C. cruenta*.

- **Mycelia are both inter-and intracellular in the host tissue.**

- ***C. canescens* produces dark and long, straight or slightly curved multiseptate conidiophores.**

- **The conidia of *C. cruenta* are whip like, hyaline, straight or curved, thin walled and 5-6 septate.**

Leaf spot – *Cercospora canescens*

Anthracnose – *Colletotrichum lindemuthianum*

Symptoms

- **All aerial parts of the plants are affected.**

- **Water-soaked depressed lesions on pods - usually with dark centre and bright – red, yellow or orange margins.**

- **Small angular brown lesions with greyish white centre and dark brown margin on leaves, petiole and stem.**

- **The affected parts may wither off.**

Fungus

- Mycelium is septate, hyaline and branched. Conidiophores are hyaline, short and unbranched.

- A few dark coloured septate setae are seen in the acervulus.

- Conidia are cylindrical, hyaline, thin walled and single celled.

Anthracnose – *Colletotrichum lindemuthianum*

Mungbean Halo blight

Pseudomonas syringae* pv. *phaseolicola

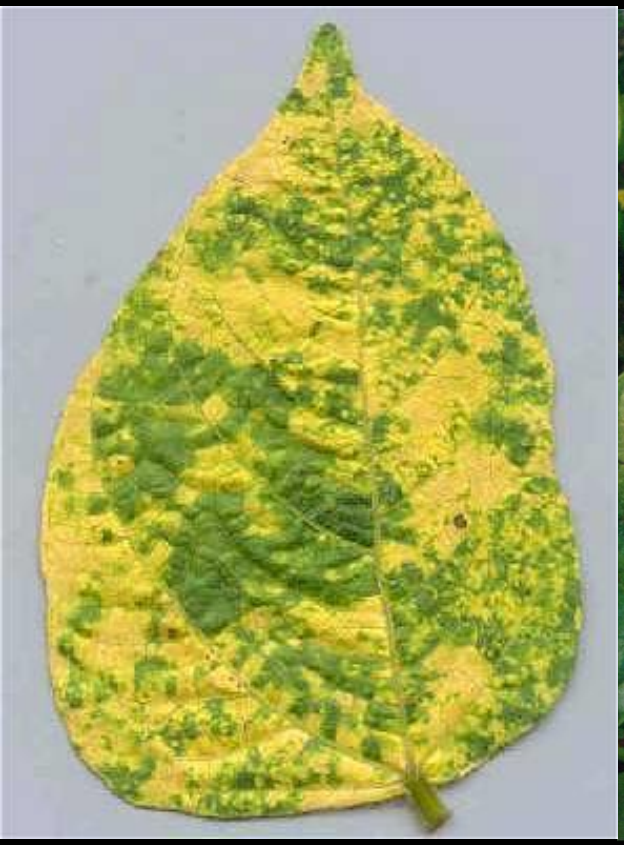
Mungbean yellow mosaic : Geminivirus

Symptoms

- The initial symptom starts with small irregular yellow patches in between veins giving mosaic mottling.
- Later, the yellowing covers the entire leaf in severe infection.
- Brown necrotic spots are also seen.
- The virus is transmitted by white fly *Bemista tabaci*
- It survives in self-sown plants, weed hosts & other cultivated hosts.

Mungbean Yellow Mosaic : Gemini virus

Yellow mosaic – Mungbean Yellow Mosaic Virus



Management

Resistant variety – VMN 4

- Grow seven rows of sorghum as border crops.
- Treat the seeds with Imidacloprid 70WS@ 5ml/kg
- Give one foliar spray of insecticide (Dimethoate @750ml/ha) on 30 days after sowing.

Leaf crinkle

Symptoms

- The affected plants very much stunted.
- The leaves show crinkling, curling and puckering.
- The leaves are dark green in colour with thick lamina and veins.
- The inflorescences are malformed. Flowers seldom open and sterile.
- The virus is transmitted by white fly (*Bemisia tabaci)* sap and also through seed.

Leaf crinkle – Urdbean Leaf Crinkle Virus

Leaf crinkle

Causal agent: *Urdbean leaf crinkle virus* (ULCV).

- **The virus is seed-borne and primary infection through seeds.**
- **Secondary spread is by the insect vector, *Bemisia tabaci*,**

  ***A. gossypii* and *A. craccivora* also transmit the disease.**
- **The virus is also sap transmissible.**

Management

- Rogue out the infected plants up to 30 days
- Spray Monocrotophos 500 ml or Methyl demeton 500 ml/ha and repeat after 15 days, if necessary
- For seed crop, the plants affected by leaf crinkle should be periodically removed upto 45 days after sowing since the leaf crinkle virus is seed borne

Leaf curl and stem necrosis

Symptoms:

- **The infection starts as chlorosis of lateral veins near the leaf margins and the leaf slowly curl downwards.**

- **The infected leaf show vein blighting and vein necrosis on the under surface of the leaves and extend to the petiole.**

- **In severe cases stem necrosis occurs and leads to death of the plants.**

- **The virus is transmitted by thrips vioz., *Frankliniella schultzi ,Thrips tabaci and Scirtothrips dorsalis.***

Stem necrosis

Symptoms

Management

- Grow seven rows of sorghum as border crops
- Treat the seeds with Imidacloprid 70WS@ 5ml/kg
- Give one foliar spray of insecticide (Dimethoate @750ml/ha) on 30 days after sowing.

Phyllody - Phytoplasma

IDM for pulse diseases

Grow resistant varieties

- Green gram – Yellow mosaic - VBN 1
- Black gram - Yellow mosaic - VBN 1, VBN 4, VBN (BG) 5
- Red gram – PPSMV – VBN 1, VBN 2, VBN 3

Raise seed crop in Rabi season (viral disease)

Use virus free seeds for sowing

Neem cake 60 kg/ac and $ZnSO_4$ 10 kg/ac as basal (root rot)

Seed treatment

Imidacloprid 70 WS @ 5 ml/kg (for virus diseases)
Trichoderma viride 4 g/kg or
Pseudomonas fluorescens 10 g/kg or
Carbendazim 2 g/kg or Thiram 4 g/kg

Soil application of *T. viride* or *P. fluorescens* 1.0 kg/ac on 30 DAS

In seed crop, rogue out infected plants up to 45 DAS

Raise barrier crop or border crop (7 rows) with millets (Sorghum)

Removal of weed hosts

Chemical control (Need based)

Powdery mildew

NSKE 5% or Neem oil 3 % or Eucalyptus leaf extract 10 % or Carbendazim 100 g or Wettable sulphur 1 kg/ac

Rust

Mancozeb 400 g/ac or Wettable sulphur 1.0 kg/ac or chlorothalonil 200 g/ha

Leaf spot

Carbendazim 100 g/ac or Mancozeb 400 g/ac

Wilt / Root rot

Spot drenching carbendazim (0.1%)

Pigeonpea Sterility mosaic

Monocrotophos 300 ml/ac

Yellow mosaic, Leaf crinkle, Leaf curl

Monocrotophos 300 ml/ac or
Methyl demeton 300 ml/ac or
Profenophos 300 ml / ac or
Dimethoate 300 ml/ac on 30 DAS and 15 days later

COWPEA

Fusarium wilt of Cowpea

Anthracnose - *Colletotrichum lindemuthianum*

Symptoms:

- **Small angular brown lesions appear in leaves mostly limited by the veins and the lesions latter exhibit reddish margin with grey centre.**
- **The prominent symptom is a characteristic spotting on the pods.**
- **Water soaked lesions appear first becoming brown and circular spots depressed with dark center.**
- **The infected spots have the acervuli and the seeds become discoloured.**

Anthracnose - *Colletotrichum lindemuthianum*

Management

Spray Mancozeb 1000g or Carbendazim 250 g/ha soon after the appearance of the disease and if necessary, afortnight later

Aphid borne mosaic

Symptoms:

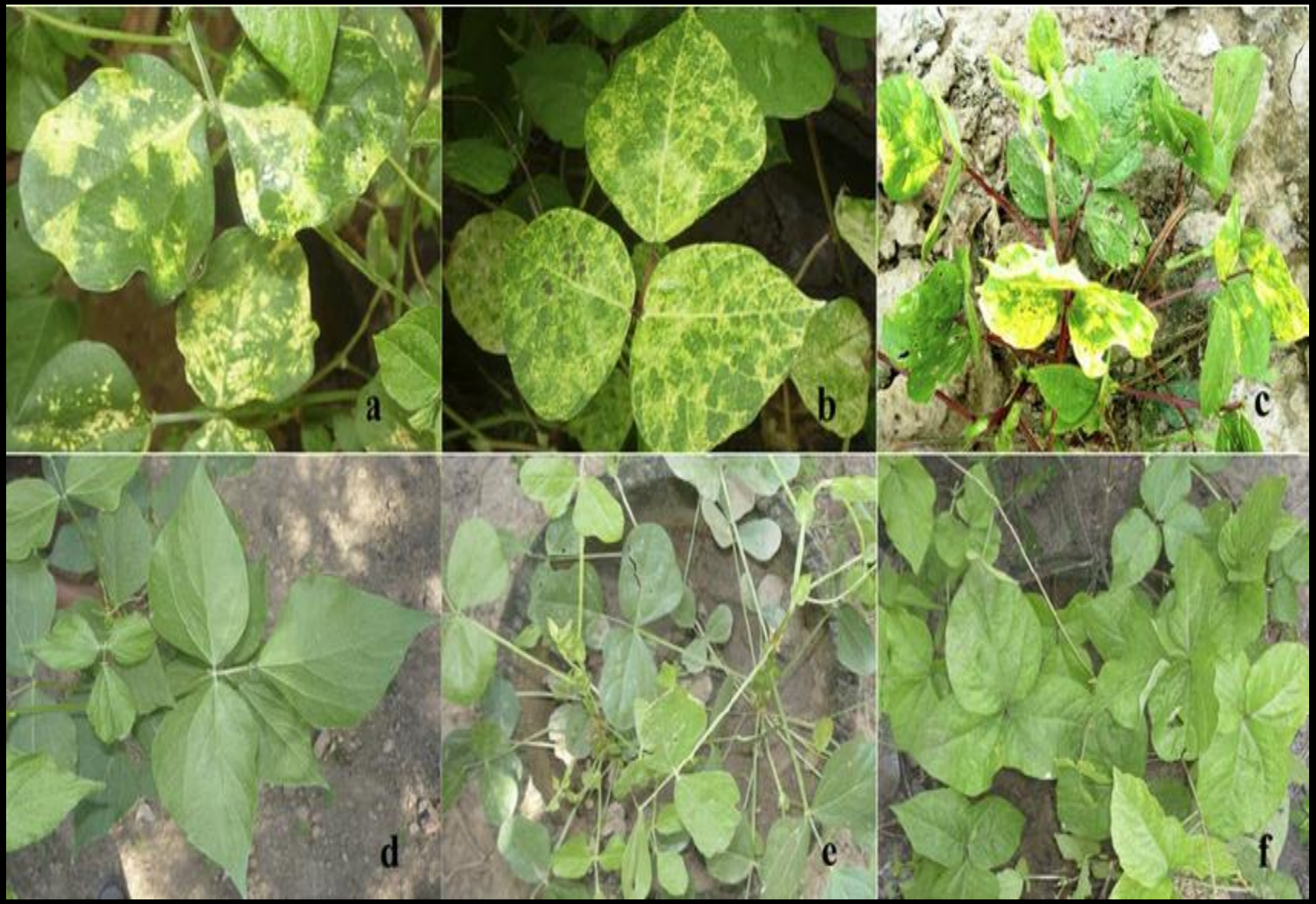
- The virus causes severe mosaic mottling with dark green vein – banding, leaf distortion, blistering, stunting and reduced leaf lamina.

- The virus is transmitted by aphid vectors, viz., *Aphis craccivora, A. gossypii, A. fabae and Myzus persicae*

Management:

- Rogue out infected plants up to 30 days.

- Spray twice on 15 and 30 days after sowing with Monocrotophos 500 ml or Methyldemeton 500 ml/ ha.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Root rot - *Rhizoctonia bataticola*
(Pycnidial stage - *Macrophomina phaseolina*)

Symptoms

- Occurs in patches in the field.
- Affected plants wilt and dry suddently.
- The disease starts with yellowing and dropping of leaves.
- Within a week wilting and drying occurs from top to bottom.
- Infected plants can be easily pulled out.
- On close examination, grayish black sunken lesion leading to bark shredding seen on lower stem and roots. Rotting of roots is commonly seen.
- When bark is removed. Dark brown sclerotial bodies are seen at ground level.
- Later the pathogen produce black minute pycnidia on stem.

Management

- **Seed treatment**

  Talc formulation of *T. viride* @ 4g or *P. fluorescens* @ 10 g/kg seed (or) Carbendazim or Thiram @ 2 g/kg Neem cake @ 150 Kg/ha

- **Soil application**

  ***P. fluorescens* or *T. viride*– 2.5 Kg / ha + 50 Kg of well decomposed FYM or sand at 30 days after sowing.**

- **Spot drench**

  Carbendazim – 1 gm/ litre

Rust - *Uromyces phaseoli typica*

Symptoms:

- **On lower surface of the leaves small, round reddish brown powdery pustules with uredospores are seen in abundance.**

- **Severe infection causes premature defoliation.**

Management

Two sprays of chlorothalanil 0.1% or one spray with 0.1% chlorothalanil followed by 3% Neem oil after the appearance of rust disease, effectively controls the disease.

Leaf spot - *Cercospora canescens*

Symptoms:

- **Well defined, reddish brown spots bounded by veins are seen with grey center.**
- **In some cases shot hole symptoms are also seen.**

Management:

Spray Carbendazim 250 g or Mancozeb 1000g/ha

Powdery mildew - *Erysiphe polygoni*

Symptoms

- **White powdery growth is seen in patches on the upper surface of the leaves.**
- **In severe cases the powdery growth spread to all other parts also.**
- **In advanced stages the powdery growth turns brown and the leaves drop off prematurely.**

Management

- **Spray**

  NSKE 5% or Neem oil 3% twice at 10 days interval from initial disease appearance.

- **Spray**

  Carbendazim 250 g or Wettable sulphur 2500g/ha.

SOYBEAN

Root rot: *Rhizoctonia bataticola*
(Pycnidial stage :*Macrophomina phaseolina*)

- Occurs in patches in the field.
- Affected plants wilt and dry suddenly.
- The disease starts with yellowing and dropping of leaves.
- Within a week wilting and drying occurs from top to bottom.
- Infected plants can be easily pulled out.
- On close examination, grayish black sunken lesion leading to bark shredding seen on lower stem and roots.
- Rotting of roots is commonly seen.
- When bark is removed. Dark brown sclerotial bodies are seen at ground level. Later the pathogen produce black minute pycnidia on stem.


Daren Mueller, Iowa State University, Bugwood.org

Management

- **Seed treatment**

  Talc formulation of *T. viride* @ 4g or *P. fluorescens* @ 10 g/kg seed (or) Carbendazim or Thiram @ 2 g/kg Neem cake @ 150 Kg/ha

- **Soil application**

  ***P. fluorescens* or *T. viride*– 2.5 Kg / ha + 50 Kg of well decomposed FYM or sand at 30 days after sowing.**

- **Spot drench**

  Carbendazim – 1 gm/ litre

Root rot

Yellow mosaic virus

Symptom

- The virus causes severe mosaic mottling with dark green vein – banding, leaf distortion, blistering, stunting and reduced leaf lamina.

- The virus is transmitted by aphid vectors, *viz., Bemisia tabasi*

Management

- Rogue out infected plants up to 30 days.

- Spray twice on 15 and 30 days after sowing with Monocrotophos 500 ml or Methyldemeton 500 ml/ ha.

GARDEN AND FIELD LAB LAB

Anthracnose : *Collectotrichum lindemuthianum*

Symptoms

- Small angular brown lesions appear in leaves mostly limited by the veins and the lesions latter exhibit reddish margin with grey centre.
- The prominent symptom is a characteristic spotting on the pods.
- Water soaked lesions appear first becoming brown and circular spots depressed with dark center.
- The infected spots have the acervuli and the seeds become discoloured

Management

Spray

Mancozeb 1000g or Carbendazim 250 g/ha soon after the appearance of the disease and if necessary, a fortnight later

Root rot: *Rhizoctonia bataticola*
(Pycnidial stage :*Macrophomina phaseolina)*

Symptoms

- **The plants show yellowing due to the bark shredding and rotting of roots.**

- **The infected roots and the collar region harbours the sclerotia of the pathogen and the disease is soil borne.pathogen produce black minute pycnidia on stem.**

Management

Seed treatment

Talc formulation of *T. viride* @ 4g or *P. fluorescens* @ 10 g/kg seed (or) Carbendazim or Thiram @ 2 g/kg Neem cake @ 150 Kg/ha

Soil application

P. fluorescens or *T. viride*– 2.5 Kg / ha + 50 Kg of well decomposed FYM or sand at 30 days after sowing

Spot drench

Carbendazim – 1 gm/ litre