

14. RED GRAM

Wilt - *Fusarium udum*

Symptoms

The disease may appear from early stages of plant growth (4-6 week old plant) up to flowering and podding. The disease appears as gradual withering and drying of plants. Yellowing of leaves and blackening of stem starting from collar to branches which gradually result in drooping and premature drying of leaves, stems, branches and finally death of plant. Vascular tissues exhibit brown discoloration. Often only one side of the stem and root system is affected resulting in partial wilting.

Pathogen

The fungus produces hyaline, septate mycelium. *Microconidia* are hyaline, small, elliptical or curved, single celled or two celled. *Macroconidia* are also hyaline, thin walled, linear, curved or fusoid, pointed at both ends with 3-4 septa. The fungus also produce thick walled, spherical or oval, terminal or intercalary *chlamydospores* singly or in chains of 2 to 3.

Favourable conditions

- Soil temperature of 17-25°C.
- Continuous cultivation of redgram in the same field.

Disease

cycle

The fungus survives in the infected stubbles in the field. The primary spread is by soil-borne chlamydospores and also by infected seed. Chlamydospores remain viable in soil for 8-20 years. The secondary spread in the field is through irrigation water and implements.

Management

- Treat the seeds with *Trichoderma viride* at 4 g/kg (106cfu/g).
- Avoid successive cultivation of red gram in the same field.
- Crop rotation with tobacco.
- Mixed cropping with sorghum in the field.
- Grow resistant cultivars like Sharad, Jawahar, Maruthi, Malviya Arhar-2, C-11, Pusa-9, Narendra Arhar-1 and Birsa Arhar-1

Dry root rot - *Macrophomina phaseolina* (Sclerotial stage: *Rhizoctonia bataticola*)

Symptoms

The disease occurs both in young seedlings and grown up plants. Infected seedlings can show reddish brown discoloration at collar region. The lower leaves show yellowing, drooping and premature defoliation. The discolored area later turns to black and sudden death of the plants occurs in patches. The bark near the collar region shows shredding. The plant can be easily pulled off leaving dark rotten root in the ground. Minute dark sclerotia are seen in the shredded bark and root tissues. Large number of brown dots seen on the stem portion represents the pycnidial stage of the fungus.

Pathogen

The fungus produces dark, brown, filamentous hyphae and constrictions are seen in hyphal branches at the junction with main hyphae. **Sclerotia** are jet black, smooth, hard, minute, globose and 110-130µm in diameter. The **pycnidia** are dark brown and ostiolated. **Conidiophores (phialides)** are hyaline, short, obpyriform to cylindrical, develop from the inner walls of the **pycnidium**. The **conidia (Pycnidiospores)** are hyaline, single celled and ellipsoid to ovoid.

Favourable Conditions

- Prolonged drought followed by irrigation.
- High temperature of 28-35°C.

Disease

cycle

The primary spread of the disease is by seed and soil. Secondary spread is by air-borne conidia. The pathogen survives as sclerotia in the soil as facultative parasite and in dead host debris.

Management

- Treat the seeds with carbendazim or thiram at 2g/kg or pellet the seeds with **Trichoderma viride** at 4 g/kg (106cfu/g).
- Apply heavy doses of farm yard manure or green leaf manure like **Gliricidia maculata** at 10 t/ha or apply Neemcake at 150 kg/ha.

Powdery mildew - **Leveillula taurica**

Symptoms

White powdery growth of the fungus can be seen on the lower surface of leaves. The corresponding areas in upper surface show pale yellow discoloration. The white powdery mass consists of conidiophores and conidia of the fungus. In severe cases, the white growth can be seen on the upper surface also. The severe infection of the fungus leads to premature shedding of leaves and plant remains barren.

Pathogen

The fungus is **intercellular** and absorbs nutrition through **haustoria**. The **conidiophores**, which arise through stomata, are hyaline, long, non septate, slender and rarely branched and bear single conidium at the tip. The **conidia** are hyaline, single celled and elliptical or clavate. The fungus also produces black, globose **cleistothecia** with simple myceloid **appendages**. They contain 9-20 cylindrical asci. Each **ascus** contains 3-5 **ascospores** which are also hyaline and **unicellular**.

Favourable Conditions

- Dry humid weather following rainfall.

Disease Cycle

The fungus survives in the soil through **cleistothecia** and **ascospores** from asci infect the first lower most leaves near the soil level. Secondary spread is by air-borne conidia.

Management

Spray **Carbendazim** 500g/ha or **Wettable sulphur** 2 kg/ha at the initiation of the disease and repeat after 15 days.

Stem blight - *Phytophthora drechsleri* fsp. *cajani*

Symptoms

Initially purple to dark brown necrotic lesions girdle the basal portion of the stem and later may occur on aerial parts. Initially lesions are small and smooth, later enlarging and slightly depressed. Infected tissues become soft and whole plant dies. In grown up plants, infection is mostly confined to basal portions of the stem. The infected bark becomes brown and the tissue softens causing the plant to collapse. In leaf, localized yellowing starts from the tip and margin and gradually extends towards the mid-rib. The centre of the spots later turn brown and hard. The spots increase in size and cover a major portion of the lamina, leading to drying.

Pathogen

Fungus produces hyaline, **coenocytic** mycelium. The **sporangiophores** are hyaline bearing ovate or pyriform, non-papillate **sporangia**. Each **sporangium** produces 8-20 **zoospores**. **Oospores** are globose, light brown, smooth and thick walled.

Favourable Conditions

- Soils with poor drainage,

- Low lying areas,
- Heavy rain during the months of July- September
- High temperature (28-30°C).

Disease

Cycle

The fungus survives in the soil and plant debris in the form of oospores. Primary infection is from oospores and secondary spread of the disease by zoospores from sporangia. Rain splash and irrigation water help for the movement of zoospores.

Management

- Treat the seeds with **Metalaxyl** at 6 g/kg.
- Spray Metalaxyl at 500 g/ha.
- Adjust the sowing time so that crop growth should not coincide with heavy rainfall.

Leaf spot - *Cercospora indica*

Symptoms

Small, light brown coloured spots appear on leaves. The spots later become dark brown and the infected portions drop off leaving shot hole symptoms. When several spots join together, irregular necrotic blotches develop and premature defoliation occurs. In severe cases, black lesions develop on petioles and stem.

Pathogen

The fungus produces large number of whip-like, hyaline, 7-9 septate conidia in groups on the conidiophores which are light to dark brown in colour.

Disease

cycle

The fungus survives in the infected plant tissues. The disease is spread by airborne conidia.

Management

- Remove the infected plant debris and destroy.
- Spray Mancozeb 2 kg or Carbendazim 500 g/ha soon after the appearance of symptom and repeat after a fortnight.

Sterility Mosaic Disease (SMD) - *Pigeonpea sterility mosaic virus* (PPSMV)

Symptoms

The Symptoms are characterized by bushy and pale green appearance of plants. The excessive vegetative growth, stunting, prominent mosaic on leaves and reduction in leaf size. Complete or partial cessation of flowering leads to sterility. Depending on genotype three types of symptoms are recognized. They are

- Severe mosaic and sterility
- Mild mosaic and partial sterility
- Chlorotic ringspot without any noticeable sterility.

Pathogen

It is caused by *Pigeonpea sterility mosaic virus* (PPSMV). The virions are slender highly **flexuous filamentous** virus like particles (VLPS) of 3-10 nm diameter, a major virus specific proteins of 32kDa and 5-7 major RNA species of 0.8-6.8kb.

Disease cycle

It is not transmitted by infectious sap. It is transmitted by an **eriophyid mite**, *Aceria cajani* in a semi persistent manner, mites retaining the virus 12-13 hours, eggs of mites do not transmit. The self grown redgram plants and perennial species act as source of virus inoculums.

Management

- Rogue out infected plants up to 40 days after sowing.
- Spray **Monocrotophos** at 500 ml/ha soon after appearance of the disease and if necessary, repeat after 15 days.
- Grow resistant genotypes/cultivars like ICP 7035, VR3, Purple 1, DA11, DA32, ICP 6997, Bahar, BSMR 235, ICP 7198, PR 5149, ICP 8861 and Bhavanisagar 1.

MAJOR DISEASE :: SEEDLING BLIGHT

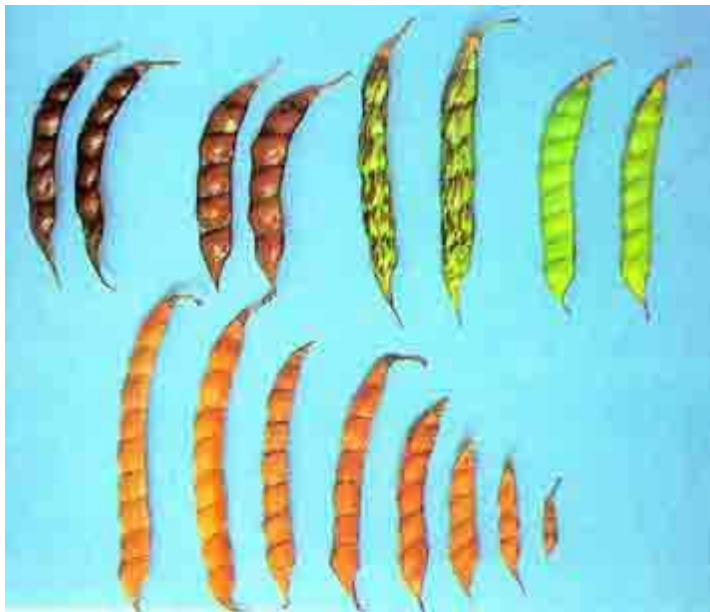
Seedling blight - *Sclerotium rolfsii*

Small brown water soaked dots appear near collar region, expands to irregular necrotic spots leading to girdling of stem and death of seedling.



Brown blotch - *Colletotrichum capsici*

Purple brown discolouration occurs mainly on pods but also on petioles, leaf veins, stems and peduncles. Pods become distorted and have black fruiting bodies.



Anthracnose - *Colletotrichum lindemuthianum* (*Glomerella cingulata*)

Black lesions develop on stem which spreads to leaf petiole and leaves. Black sunken lesions also develop on pod.



Stem rot - *Pythium aphanidermatum*

Seedlings of 2-3 weeks old are severely attacked at collar region and death occurs immediately. Greyish green water soaked lesions develop on adult plants, leading to girdling of stem.

Leaf spot - *Alternaria alternata*

Water soaked, circular to irregular spots occur. The centre of the spot is straw coloured with raised reddish brown margins.

Halo blight - *Pseudomonas phaseolicola*

Small brown spots appear on leaves and develop a chlorotic halo. The spots extend and form dried brown zone. Brown elongated streaks appear on petioles, stem and pods.

There are two other virus diseases reported on pigeon pea, mosaic and yellow mosaic transmitted by **aphids** and whiteflies which are of sporadic occurrence only.