DISEASES OF RED GRAM/PIGEON PEA (*Cajanus cajan*)
## Major Diseases of Red Gram

*(Cajanus cajan)*

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WILT

ECONOMIC IMPORTANCE

• The annual losses due to wilt have been estimated at US $ 71 million in India.
• It is prevalent in A.P., Maharashtra, M.P., U.P and Bihar. In A.P.

SYMPTOMS

• The diseases may appear from early stages of plant growth (4-6 week old plant) up to flowering and podding.
• The leaves of affected plants turn yellow droop prematurely and within 3-4 days the plant wilt.
• In 6-week all the ages of plant wilt, the disease spread in concentric circle to near by plant.
• In sever condition death of more than 50% plant occur.
• Black lesions of varying size but mostly linear with irregular margin seen on the stem and tap root.
• **Vascular tissues exhibit brown to black** discolouration.
• Partial wilting of the plant is a definite indication of *Fusarium wilt and distinguishes from Phytophthora blight that kills the* whole plant.
• Partial wilt is associated with lateral root infection, while total wilt is due to tap root infection.
WILT SYMPTOM IN PIGEON PEA

- Wilt infected plant in field
- Blackening of vascular bundle
PATHOGEN: *Fusarium oxysporum f. sp. Udum*  
[Subdivision-Deuteromycotina,order-Moniliales,Family-Tuberculariaceae]

- 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 produces thick walled, spherical or oval, terminal or intercalary chlamydospores singly or in chains of 2 to 3.

FAVOURABLE CONDITIONS

- Long and medium duration types suffer more wilt than short duration types.
- Monocropping and ratooning pre-disposes the plant to wilt.
- Disease incidence is more severe in Vertisols than in Alfisols.
- Early sowing, good weed management and good crop growth encourage wilt development.
- Soil temperatures of 17 to 250C favour the pathogen development.
PATHOGEN

MACROCONIDIUM

MICROCONIDIA
MODE OF SPREAD AND SURVIVAL
• The disease is seed and soil borne.
• The fungus survives in the infected stubbles in the field for about 3 years.
• The primary spread is by soil-borne chlamydospores and also by seed contaminant.
• Chlamydospores remain viable in soil for 8-20 years.
• The secondary spread in the field is through irrigation water and implements.

MANAGEMENT

CULTURAL:
• Follow long crop rotation with tobacco, sorghum or castor.
• Avoid successive cultivation of redgram in the same field.
• Adopt mixed cropping of sorghum in the field.
• Soil solarization in summer to reduce the inoculum of pathogen.
• Collect and destroy the diseased stubbles.

HPR:
• Grow resistant / tolerant varieties like Asha (ICPL 87119), Maruti (ICP 8863), Lakshmi (ICPL 85063), Durga (ICPL 84031), PRG 100, PRG 158, Muktha, Prabhat and Sharada.

CHEMICAL:
• Seed treatment with Thiram @0.3% or Carbendazim @0.2%

BIO-CONTROL:
• Treat the seeds with Trichoderma viride at 4 g/kg.
• Multiply 2 Kg T. viride formulation in 50 kg of Farm Yard Manure and apply to soil.
PHYTOPHTHORA BLIGHT / STEM BLIGHT

ECONOMIC IMPORTANCE
• A devastating disease that kills young (1 to 7 week old) plants, leaving large gaps in plant stands.
• Yield losses are usually higher in short duration pigeonpeas than in medium and long duration types.

SYMPTOMS
• Phytophthora blight resembles damping off in that it causes seedlings to die suddenly.
• Infected plants have water soaked lesions on their leaves and brown to black, slightly sunken lesions on their stems and petioles.
• Infected leaves loose turgidity, and become desiccated.
• Lesions girdle the affected main stems or branches which break at this point and foliage above the lesion dries up.
• When conditions favour the pathogen, it is common for many plants to die.
• Pigeonpea plants that are infected by blight, but not killed often produce large galls on their stems especially at the edges of the lesions.
• The pathogen infects the foliage and stems but not the root system.
PHYTOPHTHORA BLIGHT
SYMPTOM
PATHOGEN: *Phytophthora drechsleri f. sp. cajani*

- Fungus produces hyaline, coenocytic mycelium.
- The sporangiophores are hypha-like with a swelling on the tip bearing hyaline, ovate or pyriform, non-papillate sporangia.
- Each sporangium produces 8-20 zoospores. Oospores are globose, light brown, smooth and thick walled.

FAVOURABLE CONDITIONS

- Cloudy weather and drizzling rain with temperatures around 250°C favour infection.
- It requires continuous leaf wetness for 8 hours to occur.
- Warm and humid weather following infection results in rapid disease development and plant death.
- Soils with **poor drainage**, low lying areas, heavy rain during the months of July-September favours the disease.
- Pigeonpeas are usually not infected after they are 60 days old.
DISEASE CYCLE
- The fungus survives in the soil and plant debris in the form of oospores, and dormant mycelium.
- Primary infection is from oospores and secondary spread by zoospores from sporangia.
- Rain splash and irrigation water help for the movement of zoospores.
- *Cajanus scarabaeoides var. scarabaeoides, a wild relative of pigeonpea is also a host of the blight* pathogen.

MANAGEMENT
- Avoid sowing redgram in fields with low-lying patches that are prone to water logging.
- Adjust the sowing time so that crop growth should not coincide with heavy rainfall.
- Grow resistant varieties like BDN 1, ICPL 150, ICPL 288, ICPL 304, KPBR 80-1-4.
- Seed treatment with 4g *Trichoderma viride formulation* + 6g *metalaxyl (Apron 35SD)* per kg of seed.
- Spray Metalaxyl (Ridomyl MZ) at 0.2%.
STERILITY MOSAIC

ECONOMIC IMPORTANCE
• A serious problem in India and Nepal where it is estimated to cause annual pigeonpea grain losses worth US $ 282 million.

SYMPTOMS
• The disease attack can be seen in all stages of crop growth.
• In the field, the diseased plants appear as **bushy, pale green plants without flowers or pods.**
• **Leaves of these** plants are small and show typical light and dark green mosaic pattern.
• Symptoms initially appear as vein-clearing on young leaves.
• In severe cases, leaves become smaller and **cluster near tip because of shortened internodes and stimulation of auxillary buds.**
• **The** plants are generally stunted and do not produce pod.
• Plants infected at early stages (upto 45 days) of crop growth show near complete sterility and yield loss upto 95 per cent.
• As plants become older (after 45 days), their susceptibility to the disease decreases and such plants show partial sterility.
• If pods develop, the seeds may be small, shrivelled and immature. Some pigeonpea varieties exhibit ring spot leaf symptoms.
• **Ring spot leaf symptoms** indicate localized sites of infection of the pathogen, and such plants produce normal flowers and pods.
STERILITY MOSAIC SYMPTOM
STERILITY MOSAIC SYMPTOM
PATHOGEN: *Pigeon pea Sterility mosaic virus (PPSMV)*
The causal agent of the disease is PPSMV, a virus with a segmented, negative-sense, single-stranded RNA genome, transmitted in a semi-persistent manner by an eriophyid mite *Aceria cajani*.

**Disease Cycle**
- The disease is transmitted by an Eriophyid mite *Aceria cajani*.
- *The self-sown redgram* plants, perennial types of redgram (*Cajanus scarabaeoides* var. *scarabaeoides*) *and the* rationed growth of harvested plants serve as sources of infection.

**Favourable Conditions**
- Disease incidence is high when pigeonpeas are inter- or mixed cropped with sorghum or millets.
- Shade and humidity encourage mite multiplication, especially in hot summer weather.

**Management**
- Rogue out infected plants in early stages of disease development.
- Grow tolerant genotypes like ICPL 87119 (Asha), ICPL 227, Jagruti and Bahar.
- Spray Dicofol 3ml or Sulphur 3g in one liter of water to control mite vector in early stages of disease development.