



Major Diseases of Pulses and Their Management

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Pulses such as chickpea, pigeon pea, lentil, mung bean, urd bean, and field pea are integral to global agriculture and nutrition, especially in countries like India where they serve as primary protein sources and contribute to soil fertility through nitrogen fixation. These crops are cultivated across diverse agro-climatic zones, making them susceptible to a wide array of diseases that can significantly impact yield and quality.

The major diseases affecting pulses include fungal infections like Fusarium wilt, Ascochyta blight, rust, and powdery mildew; viral diseases such as Mungbean Yellow Mosaic Virus (MYMV); and bacterial blights. These diseases can lead to symptoms ranging from leaf spots and wilting to stunted growth and pod discoloration, ultimately resulting in substantial economic losses. For instance, Fusarium wilt, caused by *Fusarium oxysporum*, leads to yellowing and wilting of leaves, vascular discoloration, and plant death, particularly in chickpea and pigeon pea crops.

Effective management of these diseases necessitates an integrated approach combining cultural, biological, and chemical methods. Cultural practices such as crop rotation, timely sowing, and proper plant spacing can reduce disease incidence. Utilizing disease-resistant cultivars is a cornerstone strategy in disease management. Seed treatments with appropriate fungicides can prevent seed-borne infections. Biological control agents, including beneficial microbes like *Trichoderma* spp., have shown promise in suppressing soil-borne pathogens. Chemical controls, when used judiciously, can mitigate disease spread, especially when applied in conjunction with other methods.

Fusarium Wilt

- **Causal Agent:** *Fusarium oxysporum* f. sp. *ciceri* (chickpea), *F. udum* (pigeon pea)
- **Symptoms:** Yellowing and wilting of leaves, vascular discoloration, and plant death.
- **Favorable Conditions:** Warm soil temperatures and continuous cropping of susceptible hosts.
- **Management:**
 - ✓ Use resistant varieties.
 - ✓ Implement crop rotation with non-host crops.
 - ✓ Ensure proper field sanitation by removing infected plant debris.
 - ✓ Apply biological control agents like *Trichoderma* spp.

Ascochyta Blight

- **Causal Agents:** *Ascochyta rabiei* (chickpea), *A. pisi* (pea), *A. lentis* (lentil)
- **Symptoms:** Dark lesions on leaves, stems, and pods, leading to defoliation and pod damage.
- **Favorable Conditions:** Cool and humid weather.
- **Management:**
 - ✓ Grow resistant cultivars.
 - ✓ Use certified disease-free seeds.

- ✓ Apply fungicides like chlorothalonil or mancozeb during early infection stages.
- ✓ Practice crop rotation and avoid overhead irrigation.

Rust

- **Causal Agents:** *Uromyces viciae-fabae* (pea), *U. appendiculatus* (common bean)
- **Symptoms:** Reddish-brown pustules on leaves and stems, leading to premature leaf drop.
- **Favorable Conditions:** Moderate temperatures and high humidity.
- **Management:**
 - ✓ Cultivate resistant varieties.
 - ✓ Apply fungicides like propiconazole at the onset of symptoms.
 - ✓ Remove and destroy infected plant residues.

Powdery Mildew

- **Causal Agents:** *Erysiphe polygoni*, *Leveillula taurica*
- **Symptoms:** White powdery growth on leaf surfaces, leading to chlorosis and reduced photosynthesis.
- **Favorable Conditions:** Dry days with high humidity at night.
- **Management:**
 - ✓ Use resistant cultivars.
 - ✓ Apply sulfur-based fungicides or systemic fungicides like tebuconazole.
 - ✓ Ensure proper plant spacing for air circulation.

Mung Bean Yellow Mosaic Virus (MYMV)

- **Causal Agent:** Begomovirus transmitted by whiteflies (*Bemisia tabaci*)
- **Symptoms:** Yellow mosaic patterns on leaves, stunted growth, and reduced yield.
- **Favorable Conditions:** Warm temperatures and high whitefly populations.
- **Management:**
 - ✓ Grow resistant varieties.
 - ✓ Control whitefly populations using insecticides and cultural practices.
 - ✓ Remove and destroy infected plants promptly.

Dry Root Rot

- **Causal Agent:** *Macrophomina phaseolina*
- **Symptoms:** Sudden wilting, root discoloration, and plant death.
- **Favorable Conditions:** High soil temperatures and drought stress.
- **Management:**
 - ✓ Ensure proper irrigation to avoid drought stress.
 - ✓ Practice crop rotation with non-host crops.
 - ✓ Use resistant varieties where available.

Collar Rot

- **Causal Agent:** *Sclerotium rolfsii*
- **Symptoms:** Wilting, yellowing of leaves, and rotting at the base of the stem.
- **Favorable Conditions:** Warm and moist soil conditions.
- **Management:**
 - ✓ Use well-drained soils and avoid over-irrigation.
 - ✓ Apply organic amendments to improve soil health.
 - ✓ Use biological control agents like *Trichoderma* spp.

Stemphylium Blight

- **Causal Agent:** *Stemphylium botryosum*
- **Symptoms:** Dark brown lesions on leaves and stems, leading to defoliation.
- **Favorable Conditions:** High humidity and moderate temperatures.
- **Management:**
 - ✓ Grow resistant varieties.
 - ✓ Apply fungicides like mancozeb or chlorothalonil.

- ✓ Practice crop rotation and field sanitation.

Integrated Disease Management (IDM) Strategies

Effective disease management in pulses requires an integrated approach:

- **Cultural Practices:** Crop rotation, timely sowing, and proper plant spacing.
- **Resistant Varieties:** Utilize cultivars with resistance to prevalent diseases.
- **Seed Treatment:** Application of fungicides to seeds to prevent seed-borne infections.
- **Biological Control:** Employ beneficial microbes like *Trichoderma* spp. to suppress pathogens.
- **Chemical Control:** Apply fungicides and bactericides judiciously, based on disease forecasting and threshold levels.