



Major Soybean Diseases: Identification Diagnosis and Management

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INTRODUCTION

Soybean crops are susceptible to a variety of diseases caused by fungi, bacteria, viruses, and nematodes, which adversely affect both yield and quality. It is estimated that these diseases result in an average annual loss of about 12% of total production, with fungal diseases alone accounting for approximately 6-8% of this loss. Over 100 different diseases can affect soybean plants and their parts, though not all are economically significant everywhere. The incidence and severity of these diseases depend on local conditions and weather patterns. Most soybean diseases thrive under high humidity and temperatures between 26-30°C.

Here is an overview of significant soybean diseases in India, including their identification and management strategies:

1. Charcoal Rot

Pathogen: *Macrophomina phaseolina*

Optimal Conditions: Low moisture and temperatures of 25-30°C.

Geographical Distribution: Primarily found in M.P, Rajasthan, and Delhi.

Impact: Can cause up to 77% yield loss.



Symptoms: Characterized by root rot and wilt. Affected seedlings are weak and die. The stem portion near the soil becomes reddish-brown. Leaves turn yellow, and the plant appears wilted. Removal of the outer layer of affected stems and roots reveals numerous small black sclerotia.

Management: Practices include crop rotation, intercropping with cotton and cereals, appropriate fertilization, maintaining soil moisture, and pre-sowing seed treatment with 3-4 grams of Thiram per kilogram of seed or 4-5 grams of *Trichoderma harzianum* or *Trichoderma viride* per kilogram of seed.

2. Collar Rot

Pathogen: *Sclerotium rolfsii*

Optimal Conditions: Warm temperatures and high moisture.

Impact: Can reduce yield by 30-40%.

Symptoms: Brown patches on the lower stem, covered with a white fungal mycelium and mustard-seed-sized reddish-brown sclerotia. The infected stem portion decays, causing the plant to wilt and collapse. **Management:** Deep ploughing in summer, maintaining field cleanliness, practicing crop rotation with maize and sorghum, using disease-resistant varieties such as NRC-37, and treating seeds with Carbendazim and Thiram (1:2) or 4-5 grams of *Trichoderma viride* per kilogram of seed.



3. Anthracnose and Pod Blight

Pathogen: *Colletotrichum truncatum*

Optimal Conditions: High temperatures and moisture.

Impact: Can cause 16-25% yield loss, occasionally up to 100%.

Symptoms: Red to dark brown spots on stems, leaves, and pods. The spots are covered with

black fungal structures and may lead to pod and seed rot.

Management: Use clean, healthy seeds; destroy plant debris, and employ resistant varieties such as PK 472, JS 80-21. Seed treatment with 0.3% Thiram and spraying infected crops with 0.2% Zineb or Mancozeb are also effective.



4. Rust

Pathogen: *Phakopsora pachyrhizi*

Optimal Conditions: High humidity (around 80%) and temperatures between 18-28°C. Prolonged rainfall and dew increase disease severity.

Impact: Can lead to significant yield reduction due to early leaf drop.

Symptoms: Small, needle-like reddish-brown pustules on leaves, which later turn dark brown to black.

Management: Avoid soybean cultivation in winter and summer, remove self-seeding soybean plants, practice crop rotation with maize, sorghum, pigeon pea, or cotton.

Rust-resistant varieties like PK 1029, PK 1024, JS 80-21. Apply Hexaconazole, Propiconazole, or Oxycarboxin for early infection control.



5. Purple Seed Stain

Pathogen: *Cercospora kikuchi*

Optimal Conditions: Warm, humid environments.

Impact: Can cause up to 70% yield loss.

Symptoms: Purple or reddish-brown angular or irregular spots on seeds and leaves. Plants may show stunted growth and premature leaf drop.

Management: Use clean seeds, plant resistant varieties such as JS 80-21 treat seeds with 0.3% Thiram, and spray crops with Benom



6. Myrothecium leaf spot

Pathogen: *Myrothecium roridum*

Optimal Conditions: Warm, humid environments.

Impact: Can cause 20-40% yield loss.

Symptoms: Small, dark brown to purple spots with concentric rings on leaves. The spots may coalesce, leading to leaf drop.

Management: Use certified seeds and resistant varieties- JS 71-05, JS 93-05. Seed treatment with Thiram and Carbendazim or spraying with Carbendazim can be effective.



7. *Alternaria* Leaf Spot and Blight

Pathogen: *Alternaria* spp.

Optimal Conditions: Warm, humid environments.

Impact: Affects both pods and seeds, causing yield loss.

Symptoms: Brown-yellow spots with concentric rings on leaves, which eventually

lead to leaf drop. Pods and seeds may also be affected.

Management: Plant resistant varieties such as VLS 58, Himso 1573, and PK 327. Treat seeds with Thiram and Bavistin or spray with systemic fungicides like Zineb or Dithane M-45.



8. *Rhizoctonia* Root Rot and Aerial Blight

Pathogen: *Rhizoctonia solani*

Optimal Conditions: Persistent rainfall and high humidity.

Impact: Can cause up to 35% yield loss.

Symptoms: Root and stem rot, reddish-brown spots on lower stems, and aerial blight on leaves.

Management: Use resistant varieties like PK 416, PK 472, PK 1042. Maintain proper plant density and treat seeds with Thiram and Carbendazim or spray with systemic fungicides.



9. Bacterial Bligh

Pathogen: *Xanthomonas campestris* pv. *glycines*

Optimal Conditions: Light rainfall, warm temperatures.

Impact: Affects up to 30% of the crop.

Symptoms: Small, round, light green spots on leaves, with dark centers. Leaves may become ragged and fall off.

Management: Use resistant varieties such as Indira Soy 9, PK 416, PK 472. Practice crop rotation and treat seeds with Streptomycin or Copper oxychloride.



10. Yellow Mosaic

Pathogen: *Soybean Yellow Mosaic Virus*

Optimal Conditions: 20-25 days after planting, with increased severity at flowering.

Impact: Can cause up to 70% loss.

Symptoms: Yellow-green mosaic patterns on leaves, leaf curling, reduced pod and seed production.

Management: Pre-planting soil treatment with Phorate, use resistant varieties like PK 416, PK 564, and control whiteflies with Thiamethoxam.



11. Green or Soybean Mosaic

Pathogen: *Soybean Mosaic Virus*

Optimal Conditions: 20-25 days after planting, with increased severity at higher temperatures.

Impact: Can cause up to 25% yield loss.

Symptoms: Mottled, crinkled leaves with stunted growth and reduced pod production.

Management: Use clean, healthy seeds, resistant varieties like JS 7105, Punjab 1. Treat seeds with Thiamethoxam and control aphid vectors with systemic insecticides.



12. Abnormal Pod Development

Symptoms: Pod malformation, excessive budding, and immature seed germination in pods.

Management: Ensure proper plant spacing and avoid excess moisture.

CONCLUSION

Effective management of soybean diseases requires an integrated approach, combining resistant varieties, appropriate cultural practices, and timely application of fungicides and insecticides. Regular monitoring and prompt intervention can significantly reduce disease impact and enhance soybean production.