

Foot Rot Disease of Papaya: Causes, Symptoms and Management

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Papaya (*Carica papaya* L.) is a widely cultivated fruit crop in tropical and subtropical regions. It is valued for its rich nutritional composition, high economic importance and medicinal value. However, its cultivation is constrained by several fungal, bacterial, and viral diseases. Among these, foot rot is one of the most devastating diseases, resulting in significant yield losses and complete crop failure. Effective disease management relies on early detection and the adoption of integrated management practices, including cultural, biological, and chemical control measures. Therefore, a thorough understanding of the disease, its symptoms, and appropriate management strategies is essential for maintaining healthy orchards and ensuring sustainable papaya production.



Causal Organism

- Foot rot is **most commonly caused by the soil-borne fungal pathogens like *Phytophthora palmivora*, *Pythium aphanidermatum***. The pathogen survives in infected plant debris and soil and spreads rapidly under warm and humid conditions.

Symptomatology

- **Initial Symptoms:** Foot rot usually appears during the rainy season, especially in orchards with poor drainage and waterlogged soils. The disease starts at the collar region (base of the stem) near the soil surface, where small water-soaked patches develop. These lesions enlarge rapidly and girdle the stem, causing the affected tissues to rot.
- **Stem and Collar Damage:** As the disease progresses, the infected bark becomes soft and decayed. When the bark is peeled off, the internal tissues appear dry with a characteristic honeycomb-like appearance. The rotting gradually spreads upward and downward from the collar region, weakening the plant.
- **Root Infection:** Under poorly drained conditions, the pathogen invades the lateral roots and later spreads to the taproot. The entire root system becomes brown, soft, and shredded, often producing a foul smell. Severe root damage reduces the plant's ability to absorb water and nutrients.
- **Leaf and Fruit Symptoms:** Affected plants show yellowing of leaves followed by wilting. The leaves droop around the stem, leaving only a few small leaves at the top. Premature fruit drop is common, and developing fruits may also become infected under highly favourable conditions.
- **Advanced Stage:** The infected plants become stunted, lose their vigour, and eventually collapse due to stem girdling. Weakened plants are easily uprooted or blown over by strong winds, leading to complete plant death and severe economic losses.



Favorable Conditions

- The disease is commonly observed during the rainy season. High soil moisture, poor drainage, water stagnation, high humidity, and temperatures ranging between 28°C and 32°C create ideal conditions for disease development. Orchards established in low-lying areas are particularly vulnerable.

Management

Cultural Practices

1. Select well-drained fields for planting.
2. Avoid water stagnation around the plant base.
3. Maintain proper spacing to improve air circulation.
4. Remove and destroy severely infected plants.
5. Ensure proper drainage, especially during the rainy season.
6. Avoid injuries to the stem and root system during intercultural operations.

Biological Management

- Application of **Trichoderma & Bacillus species**, enriched in **farmyard manure (FYM)** is an effective and eco-friendly method to suppress the foot rot pathogen in the soil. Mix **2.5 kg of Trichoderma formulation (minimum 2×10^6 cfu/g)** with **100 kg of well-decomposed FYM** and incubate the mixture under shade for **7–10 days**, maintaining adequate moisture. Apply **2–5 kg of the enriched FYM per papaya plant** around the root zone at planting and repeat **2–3 times annually** at **3–4 month intervals**. This practice enhances beneficial microbial activity, suppresses the pathogen, improves root health, and significantly reduces disease incidence.

Chemical Management

1. **Soil drenching:** Drench the soil around the base of the plant with **0.2% Metalaxyl + Mancozeb (2 g/L of water)** at the rate of **2-5 L solution per plant**.
2. **Repeat soil drenching 2–3 times** at **15–20 day intervals**, especially during the rainy season.
3. **Alternative fungicide:** Drench the root zone with **0.3% Copper oxychloride (3 g/L of water)**.
4. **Bordeaux mixture:** Apply **1% Bordeaux mixture** as a soil drench around the collar region in disease-prone fields.
5. **Collar treatment:** Scrape the infected bark gently and apply a **10% Copper oxychloride paste** (10 g Copper oxychloride in 100 ml water) on the affected area.
6. **Preventive application:** Carry out fungicidal soil drenching **before the onset of the monsoon** and repeat during prolonged wet weather.

Integrated Disease Management

1. **Choose a well-drained site** and avoid water stagnation, as excess moisture favors the development of foot rot.
2. **Plant healthy, disease-free seedlings** obtained from reliable nurseries.
3. **Maintain field sanitation** by removing and destroying infected plants and crop debris to prevent disease spread.
4. **Avoid injuries to the stem base** during intercultural operations, as wounds serve as entry points for the pathogen.
5. **Apply Trichoderma spp. enriched farmyard manure (FYM)** around the root zone at planting and at regular intervals to suppress the soil-borne pathogen.
6. **Drench the soil with 0.2% Metalaxyl + Mancozeb (2 g/L of water)** around the collar region, particularly before and during the rainy season.
7. **Combine Trichoderma with Metalaxyl + Mancozeb**, as the fungicide is compatible with the bioagent and provides effective disease suppression.
8. **Regularly monitor the orchard** for early symptoms and adopt timely management measures.

9. **Integrate cultural, biological, and chemical methods** for sustainable and long-term control of papaya foot rot, ensuring healthy plants and higher fruit yield.

Conclusion

Foot rot is a major threat to profitable papaya cultivation, but it can be effectively managed through timely detection and integrated disease management practices. Adopting proper cultural practices, *Trichoderma* species based biological control, and compatible fungicides such as **Metalaxyl + Mancozeb** helps minimize disease incidence and sustain healthy orchards. An integrated approach not only improves yield but also ensures eco-friendly and sustainable papaya production.

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