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Major Diseases of Papaya and Their Management

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INTRODUCTION

Papaya (*Carica papaya*) is a highly valued tropical and subtropical fruit crop, prized globally for its rich nutritional profile, distinct flavor, and pharmaceutical applications, particularly through the enzyme papain. Despite its economic importance, papaya cultivation is severely constrained by a wide array of biotic stresses, among which viral and fungal diseases are the most destructive.

Pathogens like the Papaya Ringspot Virus, Papaya Mosaic Virus, Powdery Mildew, and Anthracnose present continuous challenges to farmers, often leading to total crop failure if left unchecked. Because these pathogens disrupt vital physiological processes such as photosynthesis and fruit development, understanding their mechanisms of transmission and symptom expression is fundamental.

This assignment explores the specific transmission pathways, diagnostic symptoms, and integrated management strategies required to safeguard papaya production from these major diseases.

1. Papaya Leaf Curl Virus (PLCV)

The virus is transmitted by the silverleaf whitefly *Bemisia tabaci*.

Symptoms: - Upward and downward curling of leaves. Crinkling, puckering, and distortion of leaves. Thickened veins and leathery texture. Reduced internode length and stunted growth. Reduced flowering and fruit set. Small, deformed fruits or complete yield loss.

Management: - Use of disease-free seedlings. Uprooting and destruction of infected plants. Avoid growing tomato and tobacco near papaya fields. Soil application of Carbofuran at planting. Repeated foliar sprays of systemic insecticides. Use of fly ash to reduce whitefly population.



2. Papaya Ringspot Virus (PRSV)

PRSV is the most devastating viral disease of papaya and can destroy entire plantations if not managed early.

Symptoms: - Severe mosaic and blistering on young leaves. Shoestring-like leaf deformation. Reduced plant growth within 30–40 days. Ring-shaped water-soaked lesions on fruits. Deformed, undersized fruits with poor market value.

Management: - Raising seedlings under insect-proof conditions. Use of resistant varieties such as *Carica cauliflora*. Rogueing and destruction of infected plants. Border cropping with maize, sorghum, or castor. Regular aphid control using insecticides or botanical oils. Balanced nutrition to reduce disease severity.



3. Papaya Mosaic Virus (PapMV)

Symptoms: - Mosaic patterns on young leaves. Reduced leaf size and upright growth habit. Shortened petioles along with Stunted plants. Elongated and deformed fruits with water-soaked lesions.

Management: - Strict field sanitation. Removal and destruction of diseased plants. Aphid control through soil and foliar insecticide application. Use of bio-agents such as *Verticillium lecanii* for vector control.



4. Powdery Mildew

This disease is transmitted through Fungal spores travel through the wind. Thrives in dry weather with high humidity. The primary causal organism responsible for powdery mildew of papaya is the fungus *Oidium caricae* (also classified as *Oidium caricae-papayae*).

Symptoms: - White powdery patches on lower leaf surfaces. Leaves turn yellow, dry up, and drop early. White fungal growth on young fruit surfaces.

Management: - Spraying of wettable sulfur on affected leaves. Ensure proper spacing for good air flow. Clear away fallen leaves after harvest.



5. Anthracnose

Symptoms: - Anthracnose (caused by the fungus *Colletotrichum gloeosporioides*) is a pervasive post-harvest and field disease that directly targets fruit quality.

The fungal spores spread dynamically via splashing rain and wind, gaining entry into the plant tissues through microscopic growth cracks, physical wounds, or directly penetrating the skin of ripening fruit. The disease manifests as round, sunken, water-soaked dark spots on ripening fruit. Under humid conditions, pinkish or orange spore masses ooze from the center of these lesions, causing the internal fruit flesh to rot and turn bitter.

Management: - Managing anthracnose requires a combination of pre-harvest and post-harvest care. Farmers should apply protective fungicides during the rainy season when spore movement is highest. Post-harvest loss is reduced by harvesting fruit at the mature green stage and subjecting the yield to a hot water dip treatment (around 48°C for 20 minutes) to eliminate latent fungal structures before packing.



CONCLUSION

The successful cultivation of papaya hinges on the proactive identification and control of major viral and fungal diseases. While viruses like PRSV and Papaya Mosaic Virus exploit insect vectors and mechanical contact to spread, fungal pathogens like Powdery Mildew and Anthracnose rely heavily on wind and moisture to devastate fields and post-harvest yields. Relying on a single control method is rarely effective; instead, a sustainable approach must combine genetic resistance, strict field sanitation, cultural practices like proper plant spacing, and the judicious use of chemical controls. By implementing these integrated pest and disease management strategies, growers can effectively minimize crop losses, protect fruit quality, and secure the economic viability of papaya farming.