Brown spot

Corynespora cassiicola

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Introduction

Brown spot, caused by the fungus Corynespora cassiicola, is a significant disease affecting North Queensland papaya. The disease is more prevalent on the Wet Tropics coast particularly in the wet season and times of high humidity. Brown spot impacts the leaves, stems, and fruits, leading to yield losses and reduced fruit quality.

Symptoms

The symptoms of brown spot vary depending on the plant part affected. The fungus primarily targets leaves and fruits, with occasional stem infections.

Leaf symptoms

Infected leaves develop small, water-soaked lesions that turn brown to dark brown over time. These lesions may enlarge, becoming irregularly shaped and surrounded by a yellow halo. The disease can cause premature leaf drop, reducing photosynthetic capacity and reducing overall yield.



Brown spot on a papaya leaf



Advanced brown spot lesions on papaya fruit

Fruit symptoms

Brown to black circular lesions appear on the fruit surface, often beginning as small, water-soaked spots. These lesions can expand, sometimes developing concentric rings. Severe infections can cause cracks on the fruit skin, increasing susceptibility to secondary infections and reducing marketability.

Stem symptoms

Long elliptical lesions may form on leaf stalks. While less common, brown lesions may form on stems. This is particularly an issue in young plants and can lead stem girdling. This can cause stunted growth and reduced overall plant vigour.



Brown spot lesions on a stem of a mature plant

Disease cycle

Corynespora cassiicola can affect a wide range of host plants including cucumber, soybean and tomato. The fungus thrives in warm, humid environments typical of coastal regions. The conditions which favour the disease are: warm temperatures (25°C to 30°C), high relative humidity (>80%), extended periods of leaf wetness, especially after rain.

Spore production and dispersal

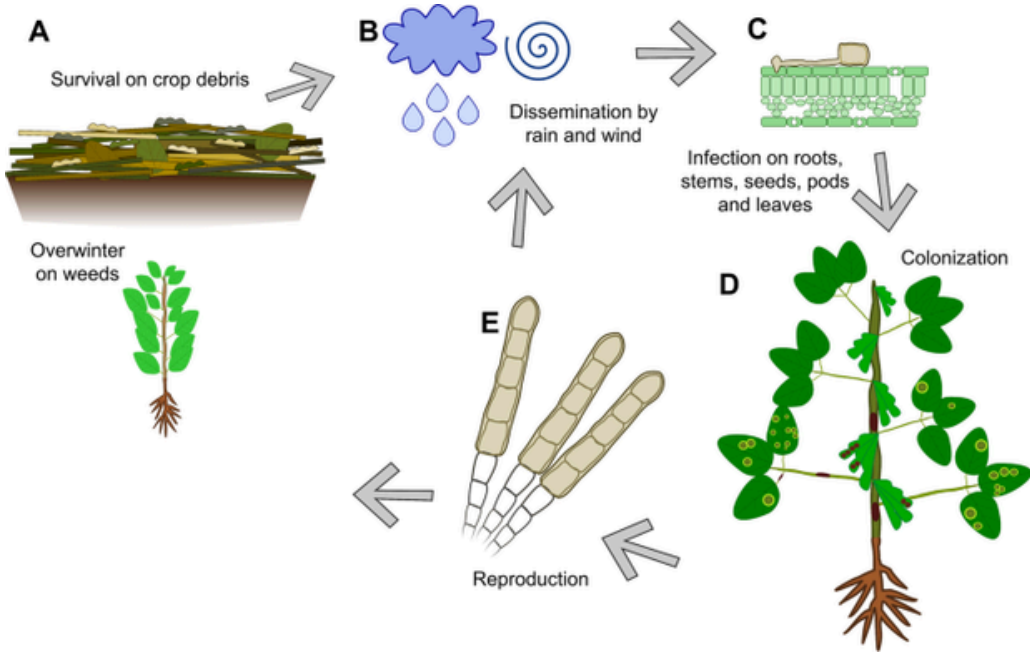
The pathogen produces conidia (asexual spores) on infected plant material. These spores are easily dispersed by wind, rain splash, and contaminated tools or equipment. High humidity and leaf wetness promote spore germination and infection.

Infection process

Spores germinate on the leaf or fruit surface and penetrate the plant tissue through natural openings or wounds. Once inside, the fungus colonises the tissue, causing necrosis and lesion formation. Lesions can spread rapidly under favourable conditions, particularly during periods of prolonged rainfall.

Spore survival

The fungus survives between growing seasons on plant debris, fallen leaves, or in the soil. Infected plant material acts as a reservoir for new infections.



Brown spot (Corynespora cassiicola) disease cycle demonstrated on soybeans (Source: Edwards Molina et al., Soybean target spot caused by Corynespora cassiicola)

Management strategies

Cultural practices

- **Reduced planting density**: avoid overcrowding to improve airflow between plants, which helps reduce humidity and leaf wetness, limiting the spread of the pathogen.
- **Crop rotation**: Rotate papaya with non-host crops to break the disease cycle. This is particularly effective in reducing soilborne inoculum.
- **Crop hygiene**: Deleafing can help to reduce the inoculum load in paddocks. Remove and destroy infected plant material (e.g., fallen leaves, fruits).

Chemical control

- **Registered or permitted products:** Chlorothalonil (bravo, cheers), copper hydroxide (vitra, champ), difenoconazole (score, digger) and fluopyram/trifloxystrobin (luna sensation)
- **Preventative calendar spray program:** Fungicides should be applied preventatively or at the first sign of disease and rotated to avoid the development of fungicide resistance. A weekly calendar spray programme alternating chlorothalonil and copper hydroxide is recommended for high-risk periods.
- **Additional fungicides to assist control:** When the disease potential is high apply two consecutive sprays of difenoconazole at 14–21-day intervals without another protectant in between is recommended. Difenoconazole cannot be used for more than two consecutive applications and no more than six applications per crop per season. Luna Sensation is registered for use on Brown spot. Application should begin as soon as conditions are conducive to disease development. No more than three applications of Luna can be used per year.

- **Sprayer calibration**: Ensure sprayer is properly calibrated to provide thorough coverage of the leaves and fruit including the crown on the plant. Coverage of fungicides is a key factor in ensuring effective control of the



Using UV dye to check the coverage on the leaves is an important consideration in Brown Spot control

Monitoring and Early Detection

Regular field monitoring is essential for early detection and successful management of brown spot. Scouting should focus on the lower leaves, where symptoms often appear first. If lesions are detected, immediate action should be taken to prevent further spread.

Conclusion

Brown spot caused by Corynespora cassiicola is a serious disease affecting papaya production in tropical and subtropical regions. Implementing an integrated management strategy that combines sanitation, cultural practices, fungicides, and resistant varieties is essential for controlling the disease and minimizing economic losses. Regular monitoring and early intervention are key to maintaining healthy papaya crops and ensuring sustainable production.

References

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