# Citrus black spot

# Fact sheet

*Phyllosticta citricarpa*

Dale Bennett and Emily Pattison, QDPI, 2024

Table 1. Risk and monitoring period for citrus black spot.

| Flowering | Petal fall | Fruit set | Fruit drop | Golf ball | Colour break | Maturation |
|---|---|---|---|---|---|---|
| | | | | | | |

## Description

Citrus black spot, caused by *Phyllosticta citricarpa*, produces blemishes on fruit, leaves and stems. The disease is prevalent in Queensland and Northern NSW (Figure 1), particularly in summer rainfall regions.

Most citrus species and cultivars are susceptible, especially late-maturing varieties of mandarins, lemons and Valencia oranges. Fruit is vulnerable from fruit-set until approximately 6 months of development. Tahitian lime (*Citrus latifolia*) was once considered resistant, but recent detections suggest otherwise.

## Symptoms and damage

Citrus black spot can present as 6 symptom types (Figure 2) on fruit, however, the 4 most common are:

1. **Hard spot:** small, sunken, circular lesions with grey-tan centres and black-red margins, appearing on fruit as it matures, particularly if it is exposed to sun.
2. **Virulent spot:** irregular, sunken necrotic lesions that expand to cover large fruit areas, causing premature drop and post-harvest losses.
3. **Freckle spot** (early virulent spot): small, slightly depressed reddish–orange to brick-red lesions (1–3 mm), seen on mature fruit post-harvest.
4. **Speckled blotch** (false melanose): small, raised, dark brown to black lesions (<1 mm), giving the fruit a speckled appearance. This can develop into hard spot over time.

**Leaf symptoms**: primarily affects lemons, appearing as small, round, raised lesions with reddish-brown margins and yellow halos. Older lesions develop grey centres. Infected leaves contribute to disease spread.

Citrus black spot leads to significant fruit drop, especially in heavily infected orchards. It affects rind quality, reducing fresh market value, though fruit remains suitable for processing.


Figure 1. Distribution of citrus black spot in Australia.

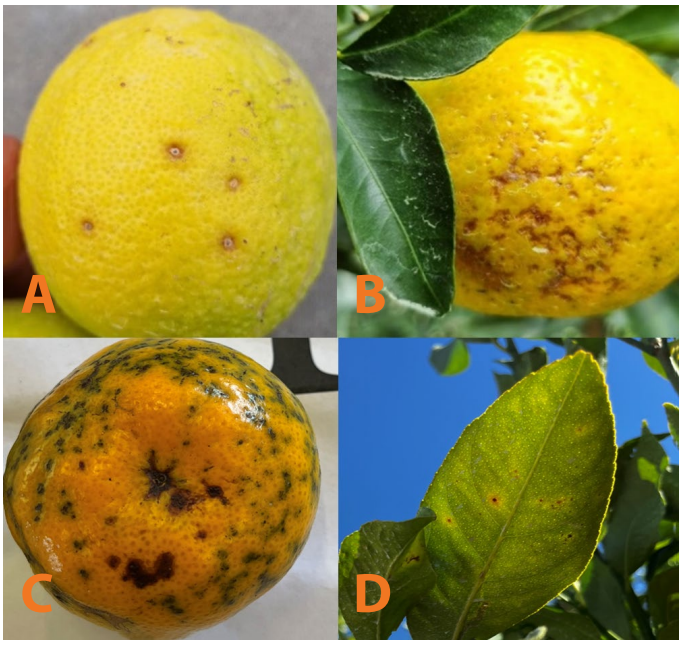


Figure 2. Clockwise from top left: (A) hard spot on lemon, (B) virulent spot on lemon, (C) a combination of hard spot and freckle spot on a post-harvest mandarin, and (D) citrus black spot symptoms on leaves. Photos: A and B, Emily Pattison; C and D, Tamil Thangavel (QDPI).



IPDM for the citrus industry Project CT19011

This project has been funded by Hort Innovation using the citrus research and development funds from the Australian Government. For more information on the fund and the strategic levy investment, visit horticulture.com.au

# Citrus black spot

# Fact sheet

*Phyllosticta citricarpa*

Dale Bennett and Emily Pattison, QDPI, 2024

## Similar conditions

Hard spot can be mistaken for California red scale (*Aonidiella aurantia*), while speckled blotch symptoms might resemble melanose or septoria spot.

## Life cycle

Citrus black spot has asexual (conidia) and sexual (ascospore) spore stages:

- **Asexual**: conidia spread via rain splash (within 800 mm) from infected fruit, twigs, and leaf litter. Requires 24–48 hours of moisture for infection, with symptoms appearing months later.
- **Sexual**: ascospores, released from fallen leaves in wet conditions, spread over long distances via wind.

Both spores need moisture for infection, occurring within 12–15 hours at 27 °C. Symptoms can remain latent until post-harvest, with environmental stress worsening expression.

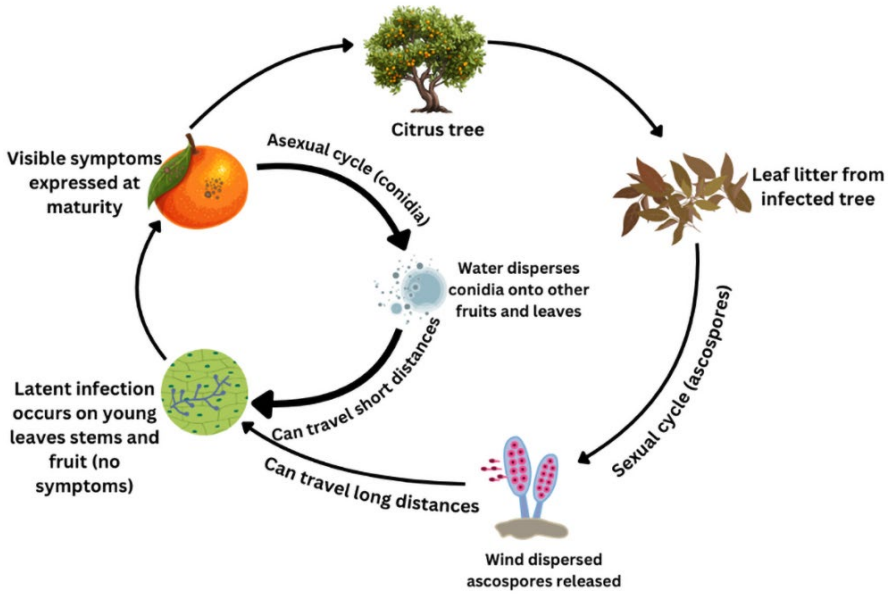


Figure 3. Infection cycle for citrus black spot.

## Monitoring

Fruit is most susceptible in the first 6 months (Table 1), but symptoms often appear at maturity. In heavily infected orchards, lesions might be visible on leaves. Preventative measures are the most effective.

Citrus black spot is not present in Western Australia (at May 2025); suspected cases must be reported for early detection and eradication.

## Management and control

**Biological**: no biocontrol agent has achieved the same level of effectiveness as fungicides in field conditions.

**Cultural**: several cultural control practices can help manage CBS by reducing inoculum sources and altering the orchard environment:

1. Apply mulch to reduce spore release from leaf litter and infection risk in the orchard. Suitable options include hay or side-throw slashing from the inter-row. Mulching should be completed before flowering.
2. Manage the canopy: prune and skirt trees to improve air circulation in the canopy, which will reduce humidity and leaf wetness. Removing dead wood and twigs from the canopy helps reduce the amount of inoculum.
3. Balance irrigation and nutrition: ensuring trees have optimal water and nutrient levels helps to maintain vigour, reducing stress and making them less susceptible to CBS.
4. Manage fruit sets: avoid overlapping fruit sets by timing harvesting optimally, which helps reduce inoculum from older fruit.

**Chemical**: apply fungicides regularly from petal fall in October to January–February (120–150 days) when fruit are most vulnerable to CBS. In humid, high-risk regions, start earlier and extend applications. A calendar spray program might be needed based on climate and variety. High spray volumes are essential, especially where CBS is prevalent. When properly applied, this approach can significantly reduce CBS. See Table 2 for registered chemicals.



IPDM for the citrus industry Project CT19011

This project has been funded by Hort Innovation using the citrus research and development funds from the Australian Government. For more information on the fund and the strategic levy investment, visit horticulture.com.au

Table 2. Chemicals registered for citrus black spot control. Current as of February 2025.

| Chemical name and group | Example trade name(s) | Notes |
|---|---|---|
| Azoxystrobin (11) | Amistar® 250 SC | - Apply as per the label instructions for resistance management.<br>- Do not start the fungicide program with an azoxystrobin application.<br>- Do not apply more than 2 sprays per season.<br>- Do not use curatively. |
| Copper-based fungicides (M1) copper hydroxide, copper oxychloride, copper oxide, copper ammonium acetate and tribasic copper | Blue Shield®, Kocide®, Nordox®, Vitra®, Champ, Oxydul® DF, Tribase Blue | - Be mindful of pH when mixing; neutral pH is preferable.<br>- Can have compatibility issues. |
| Fluopyram + tebuconazole | Luna® Experience | Apply a maximum of 1 spray per year. |
| Mancozeb | Dithane Rainshield Neo Tec®, Penncozeb® 750 DF | Allowable Australian MRL at 0.2 ppm. |
| Propineb (M3) | Antracol® 700 WG | – |
| Zineb (M3) | Barmac Zineb | – |

Post-harvest treatments can effectively control CBS and maintain fruit quality:

1. **Cold storage**: storing harvested fruit below 20 °C can help suppress symptom development.
2. **Standard packhouse treatments**: pre-packhouse drenching, dipping, brushing, and wax coating reduce CBS symptom expression by three- to seven-fold.

## More information

Dewdney MM, Walker C, Roberts PD and Peres NA (2023) 2023–2024 Florida citrus production guide: citrus black spot. In EDIS. University of Florida George A Smathers Libraries, https://doi.org/10.32473/edis-cg088-2023

Guarnaccia V, Gehrmann T, Silva-Junior GJ, Fourie PH, Haridas S, Vu D, Spatafora J, Martin FM, Robert V, Grigoriev IV and Groenewald JZ (2019) *Phyllosticta citricarpa* and sister species of global importance to citrus. *Molecular Plant Pathology*, 20(12): 1619–1635, https://doi.org/10.1111/mpp.12861

Miles AK, Smith MW, Tran NT, Shuey TA, Dewdney MM and Drenth A (2019) Identification of resistance to citrus black spot using a novel in-field inoculation assay. *HortScience*, 54 (10): 1673.



IPDM for the citrus industry Project CT19011

This project has been funded by Hort Innovation using the citrus research and development funds from the Australian Government. For more information on the fund and the strategic levy investment, visit horticulture.com.au