

# Citrus diseases

## Anthracnose

**Cause:** *Colletotrichum gloeosporioides*

Fungal spores on dead wood are spread by rain splash. Spores invade the fruit rind but typically only cause decay when the rind is damaged by other factors (e.g. cold or sunburn). Mid and late-season navel oranges are more susceptible than early-season varieties.

**Symptoms:** affected fruit will have firm brown to black spots or a tear-staining pattern on the fruit rind. It can develop in the orchard or post-harvest.



Tear-staining on fruit rind.



Fungal spores on dead wood.



## Black core rot

**Cause:** *Alternaria* spp.

Fungal spores enter the fruit during early development or through wounds or imperfections, mostly on oranges and mandarins.

**Symptoms:** fruit rind at the stem or stylar end might develop a light brown to black discolouration, colour prematurely and drop. Internal damage will show as black decay.



Internal damage to fruit.



Black core rot on fruit stylar end.



## Citrus black spot

**Cause:** *Phyllosticta citricarpa*

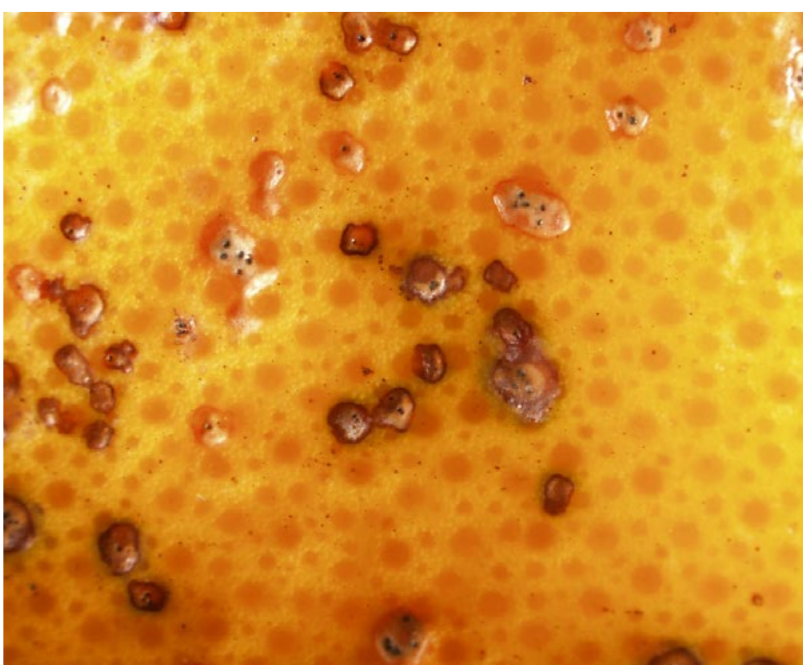
Fungal spores are released from leaf litter under trees, fruit lesions, leaves and dead twigs in the tree canopy, causing new infections in moist conditions.

**Symptoms on leaves:** brown 1–2 mm circular areas of dead tissue, with a grey centre and brown ring. There will be more lesions on lemon leaves than orange leaves.

**Symptoms on fruit:** rind lesions start as rust–red depressions about 1–2 mm in diameter, which develop into lesions with white-grey centres and black margins (up to 3 mm). Continued infections can lead to large, brown–black irregularly shaped sunken areas.



Citrus black spot lesions on leaves and fruit.



Citrus black spot lesions on fruit.



## Emperor brown spot

**Cause:** *Alternaria alternata*

Fungal spores are produced on attached or recently fallen mature leaves and dead twigs and spread by wind. The condition mainly occurs on mandarins, tangelos and tangors.

**Symptoms on leaves:** infected leaves will have small brown–black circular spots surrounded by a yellow halo. Necrosis extends along the leaf veins and defoliation results.

**Symptoms on fruit:** brown to black circular spots surrounded by a yellow halo, which can develop into corky eruptions that can fall out and form ‘pockmarks’. Fruit infected soon after petal fall will drop immediately.

**Symptoms on trees:** brown to black circular spots appear and small brownish pits might develop, causing shoot dieback and blight.



Emperor brown spot on mandarins.



Emperor brown spot on immature fruit.

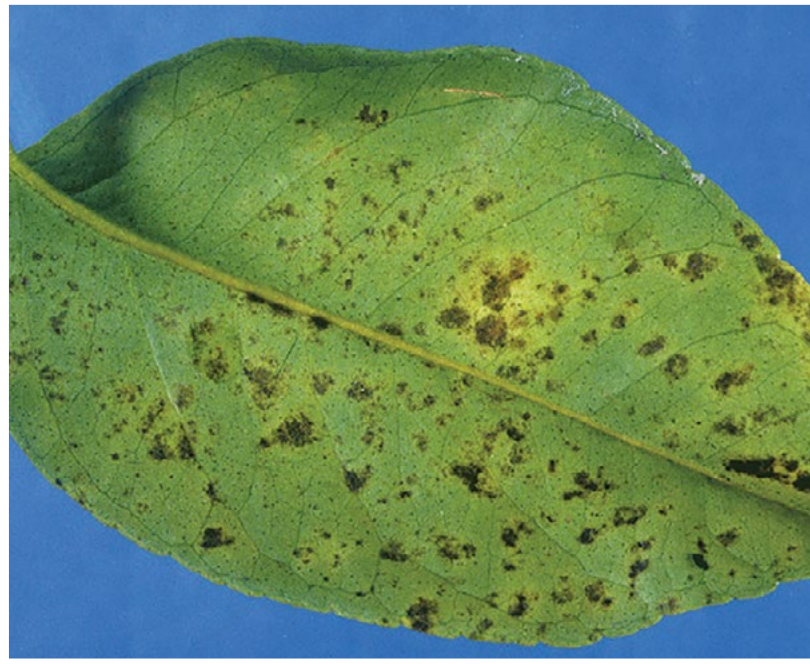


## Greasy spot

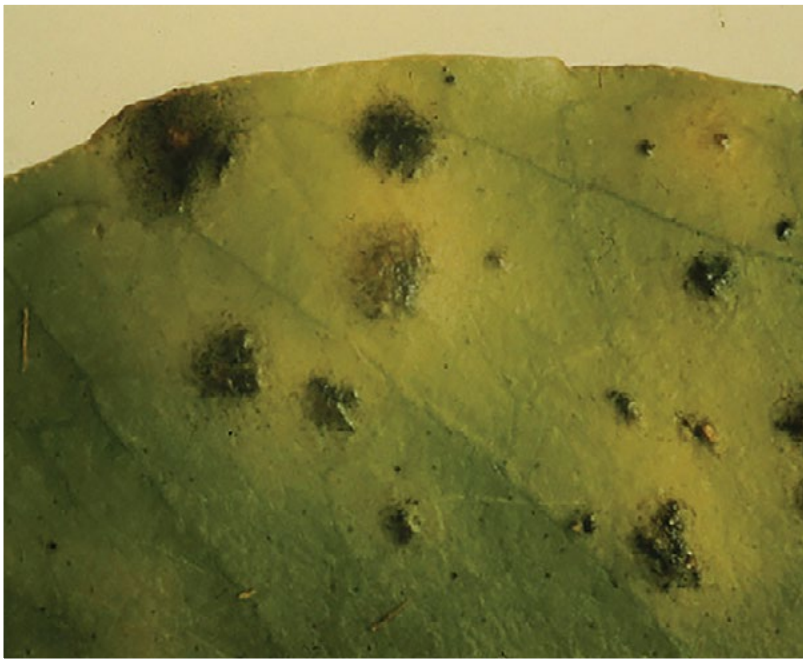
**Cause:** *Mycosphaerella* spp.

Fungal spores are produced in leaf litter in summer and early autumn. Spores are released during rain and infection occurs through stomata under moist conditions (rain or dew). All citrus varieties are susceptible, but it is common on grapefruit, lemon and early-maturing orange varieties.

**Symptoms on leaves:** yellow spots appear 2–3 months after infection on the upper surface with matching slightly raised, pale brown blisters on the undersides. Lesions darken over time and become ‘greasy’. In stressed trees, defoliation might occur.



Greasy spot symptoms.



Blisters on the underside of the leaf.



## Melanose

**Cause:** *Diaporthe citri*

Fungal spores are produced on dead twigs during wet periods and spread to young leaves and fruit by rain.

**Symptoms on leaves:** small, raised, dark brown–black spots about 1 mm in diameter. If severe, leaves are distorted and defoliation results.

**Symptoms on fruit:** spots arranged in streaks or tear stains. Early and severe infections result in masses of brown spots and rinds covered with brown gum masses. As the fruit grows, cracks form in the brown masses (mud-cake melanose).

**Symptoms on trees:** spores can invade bark injuries and pruning cuts, causing twig dieback and wood rot in stressed trees. This can be serious in older trees with more dead wood.



Melanose lesions on citrus leaves.



Masses of brown spots on fruit rind.



## Phytophthora root rot

**Cause:** *Phytophthora* spp.

Spores cause root decay in waterlogged, poorly drained soil, which creates ideal conditions. The spores are only active in wet conditions.

**Symptoms on leaves:** leaf yellowing, leaf drop and canopy top thinning.

**Symptoms on trees:** feeder roots die more quickly than they are replaced. The depleted root system cannot support the canopy, resulting in twig dieback. New growth will be weak.



Citrus seedlings with dead feeder roots (left) and healthy roots (right).



Leaf defoliation and twig dieback of citrus tree.



## Brown rot

**Cause:** *Phytophthora* spp.

Spores splash onto leaves and fruit in soil and water.

**Symptoms on leaves:** dark brown spreading blotches.

**Symptoms on fruit:** develops a rapidly spreading brown rind discolouration, but the rind stays firm, and fruit drop occurs.



Leaves with dark brown spreading blotches.



Brown fruit rind discolouration.



## Collar rot

**Cause:** *Phytophthora* spp.

Spores are splashed onto the trunk in soil and water. Ants carry soil with spores inside tree guards to their nests.

**Symptoms on trees:** the base of the trunk exudes gum. The bark discolours (brown–black) and is initially soft and wet. Over time, the wood dries, re-hardens and cracks. Ring-barking and death can result.



Ant nests within tree guards can cause collar rot.



Tree death caused by *Phytophthora* spp.



## Septoria spot

**Cause:** *Septoria citri*

The fungus survives on infected twigs and leaves. Spores are produced on leaf litter and spread to fresh tissue by rain, with several days of moisture needed for infection. Navels and grapefruit are most affected, but all commercial varieties are susceptible.

**Symptoms on leaves:** small, raised, blister-like black lesions with a yellow halo.

**Symptoms on fruit:** small light brown depressions on the rind (1–2 mm) enlarging, merging and darkening as the fruit ripens. Advanced stages form small black fruiting bodies in the sunken lesions.



Early-stage small depressions on fruit rind.



Advanced septoria spot symptoms.



# Exotic diseases\*

## Citrus canker

**Cause:** *Xanthomonas citri* subsp. *citri*

Bacteria are spread by wind-driven rain and can survive for months in lesions and plant debris.

**Symptoms on leaves:** lesions start as tan pinpoint spots, changing to brown–grey, and raised on both leaf surfaces. Lesions become corky with raised margins and sunken centres. They will have a water-soaked margin surrounded by a yellow halo.

**Symptoms on fruit:** lesions resemble those on leaves but the halo disappears as the rind colours.

**Symptoms on trees:** lesions resemble those on other plant parts and can persist on woody stems.



Lesions with a yellow halo on leaves.



Lesions without a halo on ripe fruit.



## Huanglongbing (HLB)

**Cause:** *Candidatus Liberibacter asiaticus*, *Ca. L. africanus*

Bacteria are spread by grafting and insects (Asian citrus psyllid and African citrus psyllid).

**Symptoms on leaves:** a ‘blotchy mottle’ yellow and green pattern differing on each side of the midrib, or nutrient deficiency with a symmetrical pattern, thickened midribs.

**Symptoms on fruit:** small, hard, lop-sided, bitter tasting, dark or aborted seeds.

**Symptoms on trees:** leaf and fruit drop, branch dieback, poor root growth and death.



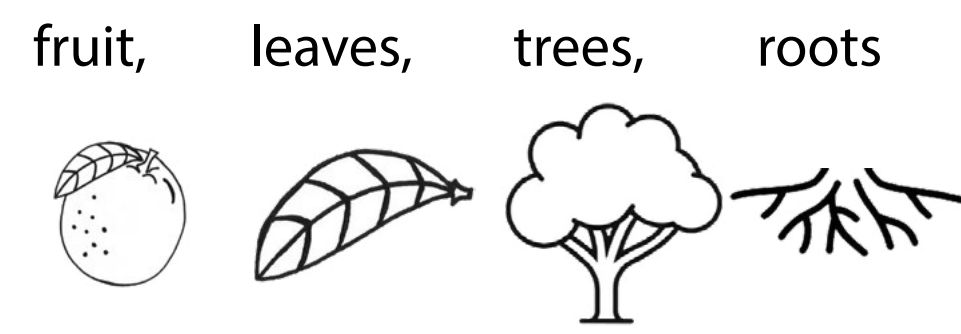
Blotchy asymmetrical mottling pattern on leaves.



Fruit skin colour remains partially green.



Icons indicate damage to:



### References

Barkley P (2004) *Citrus diseases and disorders*, second edition. NSW Agriculture, Camden NSW.  
Creek A, Donovan N, Falivene S, Golding J, Kare M, Khurshid T, Mo J and Monks D (2023) *Citrus plant protection guide 2023–24*, NSW Department of Primary Industries, [https://www.dpi.nsw.gov.au/\\_data/assets/pdf\\_file/0008/1482785/Citrus-plant-protection-guide-2023-web.pdf](https://www.dpi.nsw.gov.au/_data/assets/pdf_file/0008/1482785/Citrus-plant-protection-guide-2023-web.pdf)

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\*September 2024.



## IPDM for the citrus industry

This project has been funded by Hort Innovation, using the citrus research and development levy, contributions from the Australian Government and co-investment from New South Wales Department of Primary Industries, Queensland Department of Agriculture and Fisheries and the Agricultural Produce Commission. Hort Innovation is the grower-owned, not-for-profit research and development corporation for Australian horticulture.

