

## Identification Guide

	<p><b>Dry mould (Pestalotiopsis blight) - Dry flower</b></p> <p>Dry flower disease poses a threat to macadamia production. The disease was first observed in the Bundaberg production region in 2009, resulting in total crop failure. The disease now occurs in all macadamia producing regions in the Australia east coast.</p> <p><b>Cause:</b> <i>Pestalotiopsis macadamiae</i>; <i>Neopestalotiopsis macadamiae</i></p> <p><b>Symptoms:</b> Dry flower disease is characterised by the dry appearance of the raceme. Necrotic blight symptoms appear on infected flowers and sometimes on the rachis from early bloom to full anthesis. Immature buds or florets may become blighted, turning brown to dark brown and remain attached to the green rachis.</p> <p><b>Impact:</b> Dry mould reduces flowering and nut set.</p> <p><b>Diagnostics features:</b> Infections may occur at any stages of raceme development. <b>Diseased flowers easily dislodge from the rachises when shaken.</b> In certain cases, dried racemes persist in the tree canopy between seasons, and may serve as source of inoculum in the following season.</p> <p><b>Control:</b> Monitor flower development. TBA</p>
 <p>Photo: Leonardo Moryia</p>	<p><b>Grey mould (Botrytis blight)</b></p> <p>Botrytis blight is often sporadic. Disease development is favoured by cool (18-22°C) and wet conditions. Absence of Botrytis blight during cool and wet conditions may be attributed to heavy rains that wash off the senescence floral part from the raceme.</p> <p><b>Cause:</b> <i>Botrytis cinerea</i></p> <p><b>Symptoms:</b> Grey mould often affects mature flowers, causing necrotic symptoms. Fungal growth is common on senescence flower parts.</p> <p><b>Impact:</b> Associated with reduced yields in Hawaii.</p> <p><b>Diagnostics features:</b> Grey mould often affects mature flowers at stage 3, with signs of the fungus visible on the senescent flower parts as <b>grey mycelia that hold the collapsed flowers together on the rachis.</b></p> <p><b>Control:</b> In most cases, infection occurs near the end of polination period in wet conditions. Applications of control often ineffective.</p>
 <p>Photo: Leonardo Moryia</p>	<p><b>Green mould (Cladosporium blight)</b></p> <p><b>Cause:</b> <i>Cladosporium gloeosporioides</i></p> <p><b>Symptoms:</b> Green mould is characterised by small water-soaked specks on the flower that later become necrotic with the diseased racemes covered in olive grey patches of mycelia and conidia.</p> <p><b>Impact:</b> Severe raceme blight epidemic has been reported from South Africa. In Australia green mould is of minor importance.</p> <p><b>Diagnostics features:</b> <b>Olive grey patches of mycelia and conidia</b> on the diseased raceme.</p> <p><b>Control:</b> Not necessary. Occurs near the end of polination period in wet conditions.</p>



### Rachis tip dieback (Rat tail)

Rachis tip dieback is fungal infection from the tip of the developing rachis. Disease progression is truncated as the rachis matures.

**Cause:** *Cladosporium gloeosporioides*; *Pestalotiopsis macadamiae*; *Neopestalotiopsis macadamiae*

**Symptoms:** Necrotic dieback of the rachis at the distal end with advancing necrosis at the tip. Length of tip dieback depends on the time of infection.

**Impact:** Direct yield loss is negligible.

**Diagnostics features:** Shortened darkened rachis tip. Fungal structures may be visible on the dead tissue.

**Control:** Not necessary. Many flowers are unaffected after full raceme elongation.



### Husk spot

Husk spot is the most important disease affecting macadamia in Australia. It occurs in nearly all macadamia orchards on the Australian east coast.

**Cause:** *Pseudocercospora macadamiae*

**Symptoms:** Symptoms develop very slowly and first appear on full-sized nut on the green husk (pericarp) as chlorotic spots that later turn tan to dark brown.

**Impact:** Extensive premature nut drop that translates to direct yield losses of over 40%, if not controlled, high levels of immature kernel is downgraded, resulting in lower financial returns and impacts upon the saleable edible kernel. Current commercial varieties are susceptible and the impact increases with tree age.

**Diagnostics features:** Key characteristic feature of the spot is that it is harder than the surrounding tissue. The conidia are produced on the dark brown spots and appear as greyish velvet mat. Conidia are easily dispersed from the diseased husk by rain splash onto developing fruits.

**Control:** An integrated management approach is the best including a combination of control measures - spray applications of pesticides, cultural practices to reduce the source of inoculum and use of more tolerant varieties.



### Phomopsis husk rot

Phomopsis husk rot is sporadic, however, in the past few years, disease incidence has been more frequent and consistent.

**Cause:** *Phomopsis* species

**Symptoms:** Diffuse black lesions 5 to 10 mm in diameter on the green husk. Lesions may merge into a dark coloured greasy, soft spongy decay.

**Impact:** Significant yield losses (>30% total production) have been reported in affected varieties such as cv.344.

**Diagnostics features:** Key characteristic feature is that the black lesion is softer than the surrounding tissue. Damage or injury is visible where lesions develop.

**Control:** Treatment may be necessary when risks following extensive damage to the husk near kernel maturity stage.

	<p><b>Anthracnose husk rot</b></p> <p>Anthracnose husk rot is sporadic.</p> <p><b>Cause:</b> <i>Collectotrichum</i> species</p> <p><b>Symptoms:</b> Dark to black lesions about 5 to 10 mm in diameter that merge into a dark soft spongy decay area on the green husk. Lesions are distinguishable from Phomopsis husk rot by the presence of fungal structures on the black lesion.</p> <p><b>Impact:</b> Yield losses are limited.</p> <p><b>Diagnostics features:</b> Key characteristic feature is the <b>concentric rings of fungal structures from the centre of the lesion. Diseased tissue is softer than the green surrounding tissue.</b> Damage or injury is visible where lesions develop.</p> <p><b>Control:</b> Treatment may be necessary when risks following extensive damage to the husk near kernel maturity stage.</p>
	<p><b>Phytophthora canker</b></p> <p>The pathogens can infect trunks, branches and large roots. The pathogens initiate cankers on wounds, and grows vertically and horizontally from the cortex into the outer vascular system.</p> <p><b>Cause:</b> <i>Phytophthora</i> species</p> <p><b>Symptoms:</b> Symptoms are first characterized as bleeding of the trunk, cracking of the bark and in more advanced stages, areas of dead bark that extend from the soil line to several meters high. This often results in furrowed deep cankers on the trunk.</p> <p><b>Impact:</b> Infection results in loss of productivity and tree death.</p> <p><b>Diagnostics features:</b> <b>Cracking and bleeding of the trunk.</b></p> <p><b>Control:</b> Avoid wounding of stem. Integrated management systems approach including soil health management, cultural and orchard floor management and chemical applications with phosphonates and metalaxyl.</p>
	<p><b>Phytophthora slow tree decline</b></p> <p>The pathogens destroy feeder roots. The later stages of the disease are more evident following prolonged water-logging or drought conditions.</p> <p><b>Cause:</b> <i>Phytophthora</i> species</p> <p><b>Symptoms:</b> Slow tree decline is usually expressed as pale or yellow green leaves instead of dark green. Under conditions of moisture stress, in the advanced stages of infection, the leaves of infected trees rapidly wilt and readily abscise from the tree, giving rise to a sparse canopy appearance.</p> <p><b>Impact:</b> Significant losses in orchard productivity, yield losses and tree death.</p> <p><b>Diagnostics features:</b> <b>Sparse and yellowish tree canopy with dieback symptoms. Poor feeder roots using the 'Snapping roots' diagnostic tool.</b></p> <p><b>Control:</b> Integrated management systems approach including soil health management, cultural and orchard floor management and chemical applications with phosphonates and metalaxyl.</p>