

Macadamia Husk Spot



Introduction

Husk spot is a fungal disease that infects Macadamia husks, but not the kernel. It is caused by *Pseudocercospora macadamiae*. Husk spot impacts Macadamia yield and quality.

Infection can occur anytime the husk is green, and conditions are conducive to the disease. Infection from matchhead to pea size causes premature nut drop. This premature drop and reduced oil accumulation increases immaturity and commercial grade nuts.

Infected husks develop yellow flecks about four months after infection. These spots develop into tan-brown lesions as the disease progresses (Figure 1). The brown lesions are harder than the surrounding tissue and are difficult to push your thumbnail into, making this a good diagnostic technique for this disease. Infected nuts and husk can also remain on the tree resulting in stick-tights.



Figure 1.
Infected husk (NSW DPI)

How does husk spot infection occur?

The three main factors that favour husk spot infection are sticktights, husk stomatal density and climatic conditions.

1. Sticktights

Sticktights are old husks and nuts that don't fall naturally and remain attached to the tree after harvest (Figure 2). Varieties that are more prone to sticktights include A16, 816 and Daddow.

Stick-tights are the source of husk spot in the orchard. Husk spot infection only occurs on green husk, however, dead husk in the tree can harbour the fungus and produce spores for at least 2.5 years. Stick tights may be an indicator of poor tree health.



Figure 2. Stick-tights in a macadamia tree (K Griffin)

2. Husk stomatal density

Stomata are tiny pores that allow the plant to breathe or exchange carbon dioxide and oxygen, for photosynthesis and respiration. Stomata also allow transpiration, the process that draws water and minerals from the roots to the rest of the plant.

Stomata on the husk provide entry points for husk spot infection. The fungal threads, or mycelium, from germinating spores grow through these pores. Infection occurs within 20 hours of a spore landing on the green husk.

Husk stomatal density differs between cultivars and changes as the nut develops. Varieties with higher stomatal density are more likely to be infected by the husk spot fungus as the greater number of stomata increases possible infection sites.



Figure 3. Young nuts between match head (L) or pea size (R) are most susceptible to husk spot infection (NSW DPI)

Macadamia husks can be infected with Husk spot any time conditions suit infection. Young nuts from matchhead and pea-size stage (Figure 3), with a high stomatal density, are most susceptible to infections that cause premature nut drop and reduce yield. Nuts exposed to husk spot prior to matchhead and after pea size are less likely to be infected.

3. Climate Conditions

Spores are spread from sticktight husks through rain splash or free water moving across the infected husks onto fresh green husks. The optimal conditions for husk spot spores to infect are high relative humidity, free water on the husk surface, from rainfall or dew, and temperatures around 26°C. Multiple and consecutive rainy days during early nut development increase infection rates.

Husk spot does not grow at temperatures below 10°C and above 30°C. These temperatures do not kill the pathogen, they make it dormant.

Variety susceptibility

Macadamia varieties differ in their susceptibility to Husk spot, which may be reduced or exacerbated by nut drop pattern. Earlier dropping varieties are considered less susceptible. The most susceptible varieties are Own Venture, H2, A16, A38, A268, 816, 842, 849.

Managing husk spot

Effective husk spot management combines cultural and chemical control measures.

Cultural management of husk spot

Husk spot lesions can produce spores for several seasons. Reducing this through cultural control practices will help reduce disease spread. These include:

- Tree shaking significantly reduces stick-tights left in trees between seasons.
- Thorough orchard floor clean-up of infected nuts that drop during nut development.
- Compost husk to destroy spores before spreading it in your orchard.
- Increase air movement and light in the orchard, through canopy management, to reduce infection periods.

Chemical management of husk spot

Always check the APVMA website (<https://portal.apvma.gov.au/pubcris>) for registered and permitted chemicals before you apply any chemicals.

If you have a husk spot risk, you may require fungicide applications. Apply your first fungicide treatment in spring/summer when nuts are match-head size, especially if conditions are warm and wet. Fungicide application before or during flowering does not improve disease control compared to applications at match-head stage.

Rotating fungicide groups is important to reduce the chance of the husk spot fungus developing resistance. Do not apply more than two consecutive applications of any fungicide and do not apply more than the recommended maximum number of sprays for that fungicide or fungicide group pre-season. Merivon and Custodia are co-formulations that contain two chemical groups, a group 11 plus another fungicide group, so take this into account when choosing fungicides and maximum numbers of applications of each fungicide group per year (Table 1.).

Good spray coverage is the key to successful diseases control. Orchard sprayers should be calibrated for high-volume spraying and ensure that the entire tree canopy is covered.

Pea-size nuts are less likely to be infected, so only spray after nuts reach this size if weather conditions favour infection. Consult the Marquis Grower Liaison team or your local agronomist for further advice if you are unsure.

Fungicide	Fungicide group/s	Maximum per season	Maximum consecutive
Spin Flo®	1	2	2
Digger®	3	2	2
Belanty®	3	3	2
Fontelis®	7	3	2
Custodia®	3 + 11	2	2
Cabrio®	11	2	2
Merivon®	7 + 11	3	2

Table 1. Fungicide groups and maximum recommended and consecutive applications per season

Maturity testing

Marquis Macadamias (MM) offers free, rapid maturity monitoring for suppliers to determine the maturity of early drop nuts. MM accepts consignments with a minimum 18% Saleable Kernel Recovery (SKR), which includes premium and commercial grade kernel. Husk spot susceptible varieties with high kernel recoveries would need very high reject levels before a consignment is unacceptable. Submitting a sample of early drop nuts for maturity will help you determine if you should harvest or mulch these nuts.

References

1. Drenth A., Akinsanmi O.A. and Miles A.K., 2007. Final Report Integrated management of husk spot disease (*Pseudocercospora macadamiae*) in Macadamias, Horticulture Australia Ltd Project MC03007.
2. Miles A.K., Akinsanmi O.A., Sutherland P.W., Aitken E.A.B. and Drenth A., 2009. Infection, colonisation and sporulation by *Pseudocercospora macadamiae* on macadamia fruit, Australasian Plant Pathology vol. 38 pp. 36-43.
3. Miles A.K., Akinsanmi O.A., Aitken E.A.B. and Drenth A., 2010. Timing of infection of macadamia fruit by *Pseudocercospora macadamiae* and climatic effects on growth and spore germination, Australasian Plant Pathology vol. 39 pp. 453-462.

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