Managing foliar and fruit diseases in strawberries

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This fact sheet summarises the information you'll need to get started on the sustainable management of some foliar and fruit disease threats to your crops. Many growers have implemented this Integrated Crop Protection (ICP) approach and achieved success in the management of these pests by using cultural control strategies that consider weather, irrigation timing, plant varieties and spacing and the use of biological control products. The most common foliar and fruit diseases of strawberry are fungi.

ICP considers the production system as a whole, including all pests (diseases, insects and weeds), the crops and soil health. Many growers have found that a useful starting point is working with a trusted and experienced ICP consultant or researcher. Good management will also be assisted by:

- A commitment to farm sanitation and biosecurity
- Monitoring – crop stage, disease symptoms and their distribution, weather (especially temperature, humidity and leaf wetness)
- The ability to detect early disease symptoms on your crops
- Use of resistant and tolerant varieties and appropriate crop rotation sequences
- Appropriate use of fungicides (including rotation of chemical groups).

What is the nature of these fungi?

There are many different fungi affecting strawberries, each having different life cycles and preferred climatic conditions. Foliar and fruit disease management requires a good understanding of:

- The fungi involved
- The periods during which the crops are most susceptible
- The environmental conditions that favour the pathogens.

ICP tips for managing foliar diseases

- **Read the pest management chapter in the Australian Good Practice Guide for Strawberries available here.**
- **Use resistant or tolerant varieties.**
- **Use certified runners.**
- **Implement high-level farm sanitation.**
- **Understand the influence of plant spacing and air circulation.**
- **Minimise free moisture and high humidity periods.**
- **Understand the implications of irrigation timing.**
- **Monitor crops regularly.**
- **Understand fungicide resistance and rotation of chemical groups.**
- **Maintain the efficiency of spray technology.**

There is a range of chemicals registered for controlling foliar and fruit diseases. Growers and nursery operators have variable success with chemical treatments because spray coverage and spray timing affect the level of control achieved, especially by non-systemic products.

Powdery Mildew (*Podosphaera aphanis*)

These fungi are very common in strawberry crops especially those grown under protective systems (cloches, greenhouses and/or tunnels). The fungi grow best at 20-25°C and the first symptoms appear in spring (for summer fruit production) or in autumn (for winter fruit production). Powdery mildew produces white patches of web-like growth that develop on both the lower and upper leaf surface. The edges of the leaves may curl upwards. Immature fruit may fail to ripen, become hard, crack and turn a reddish colour with raised seeds. Powdery mildew is favoured by warm, dry conditions

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followed by moisture on leaves from overnight dew or rainfall. Spores can be spread by wind and can over-winter in plant residue from the previous and current crops. To manage this disease:

- Remove and destroy plant residue at the end of the season
- Use plant runners from accredited runner nurseries
- Apply fungicides when conditions favour the disease.

Fungicides have been the most common method used to control powdery mildew. Apply fungicides at the first sign of disease (leaf distortion and discoloration). Always follow the instructions on the label. When disease pressure is high, rotate fungicide groups to avoid the pathogen developing resistance to the fungicides. Products registered for use in strawberries to manage powdery mildew can be found on the Australian Pesticides and Vetinary Medicines Authority (APVMA) chemical database (https://portal.apvma.gov.au/pubcris) and permit database (https://portal.apvma.gov.au/permits). Always read the label and observe withholding periods.

Under high tunnels, targeted, intermittent brief applications of overhead irrigation may help prevent the spread of this disease but need to be weighed up against the risk of increasing the incidence of grey mould. In general, avoid overhead irrigation and excessive use of nitrogen fertiliser.

Fruit affected with powdery mildew (right) with normal fruit for comparison (photo courtesy of Queensland Government Department of Primary Industries and Fisheries)

Leaf blotch and Stem-end rot (*Gnomoniopsis fructicola*)

Leaf blotch and stem-end rot diseases occur between flowering and harvest. The fungus first infects the calyx and then spreads into the fruit as a rot. Both green and ripe fruit may be infected. Infected fruit ripens early and turns pale red to brown and remains firm.

The fungus is spread by water (from rain or irrigation). Infected plant residues from previous and current strawberry crops left in the soil provide sources of infection. Leaf blotch and stem-end rot can be difficult to control and is favoured by cool, wet weather. To manage this disease, remove affected leaves and fruit during the season and do not leave infected plant and fruit material in the inter-rows where they can serve as sources of infection. There are no fungicides registered for fruit grown in the field, although the fungicides used to manage grey mould may assist in reducing the incidence of diseases caused by this pathogen.

Grey mould disease showing masses of grey spores of the fungus on the diseased area (photo courtesy of Queensland Government Department of Primary Industries and Fisheries)

Grey mould (*Botrytis cinerea*)

Grey mould produces fruit rot that can start at any time from early fruit development to after harvest. Fruit turns brown at the calyx end and the fungus produces a grey cotton-like growth on the surface. Grey mould is favoured by high humidity, mild temperatures and frequent rain. It can also attack flowers, stalks, leaves and flower buds. To manage this disease:

- Avoid fruit contact with soil
- Remove and destroy affected fruit and leaves

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- Improve air movement around plants
- Prevent excess shading of the fruit due to thick foliage
- Avoid using overhead irrigation
- Apply fungicides when conditions favour the disease using a resistance management strategy.

How can I protect my strawberries from these diseases?

Get started by:

1. Ensuring runners are from accredited runner sources.
2. Cleaning up your production site and maintaining the highest level of sanitation in and around all blocks all year round. Ensure area is free of plant debris, and remove alternate host, including weeds that may harbour disease spores and serve as source of infection.
3. Modifying your irrigation practices to discourage disease spread.
4. Knowing the disease, monitoring and applying a program of protectant and systemic fungicides program as required.

Avoiding chemical resistance

Losing control over diseases due to excessive use of specific fungicides or fungicide groups may result in high crop losses and the need to use expensive alternative control products and methods. Using integrated management strategies such as those discussed above will reduce the development of resistance and also contribute towards the quality of the environment. When applying fungicides delay resistance development by rotating different active ingredient groups and restrict their use to certain periods of the year. If disease pressure is low, apply non-chemical fungicides that are registered for strawberry such as ecocarb for powdery mildew and Serenade® Opti for grey mould. Labels of some products place a limit on the number of times they can be applied. Adhere to these restrictions. Also avoid using mixtures of fungicides. For the fungicide resistance management strategy for managing powdery mildew and grey mould in strawberries go to: https://www.croplife.org.au/resources/programs/resistance-management/2017-strawberry-grey-mould-botrytis/

A selection of helpful resources

Available resources include:

1. Strawberry Problem Solver and Bug Identifier (2005) Neil Greer, Don Hutton, Noel Vock, Geoff Waite. Queensland Government Department of Primary Industries and Fisheries
2. Common insect pests of strawberries (2009) Primefacts. L. Ullio. NSW Department of Primary Industries https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0017/306314/Common-insect-pests-of-strawberries.pdf
3. Information on integrated practices for effective disease management in greenhouses. http://www.dpi.nsw.gov.au/agriculture/horticulture/greenhouse/pest-disease/general/idm
4. Powdery mildew of strawberries (2015) Aileen Reid. Department of Primary Industries and Regional Development https://www.agric.wa.gov.au/strawberries/powdery-mildew-strawberries

SOURCES

Mega Pest fact sheets (2012) developed by Scholefield Robinson Horticultural Services Pty Ltd and Dr Chrys Akem, Agri-Science Queensland, DEEDI for the InnoVeg project

Apollo Gomez (2018) Research Scientist. Queensland Government Department of Agriculture and Fisheries

Powdery mildew of strawberries (2015) Aileen Reid. Department of Primary Industries and Regional Development

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