Department of Primary Industries
Department of Regional NSW

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Blossom blight and brown rot

Monilinia species

Blossom blight and brown rot are common diseases found in Australian cherry orchards. The causal fungi are the related pathogens *Monilinia fructicola*, *M. fructigena* and *M. laxa*, which can affect blossoms and fruit. Blossom blight reduces the number of viable flowers and damages fruiting shoots, reducing crop yield. Brown rot makes fruit unsaleable, and late-season infections can lead to fruit breakdown during postharvest storage, handling and marketing.

Some literature, including chemical product labels, use *Sclerotinia* synonymously with *Monilinia*, i.e. *Sclerotinia fructicola* or *Sclerotinia laxa*.

Disease identification

Blossom blight can be identified by the presence of shrivelled, dead flowers and some dieback of the associated shoot growth. It can also present as yellow and wilting leaves on branches or twigs. Brown rot infection appears as a soft, brown decay of the developing fruit, which shows as brown–grey spores over the surface of the infection as it matures (Figure 1).

Infected fruit will sometimes shrivel and hang on the tree. These are known as 'mummified' (or mummy) fruit (Figure 2). These are a major source of carryover spores for the next season. It is important to keep monitoring for these during winter and remove them from the tree to reduce the number of overwintering spores.

Figure 1. Mummified fruit. Photo: Clemson University, USDA Cooperative Extension Slide Series, Bugwood.org.

Figure 2. Brown rot on cherries.

Life cycle

The first blossoms on cherry trees are the first susceptible tissue for infection at the start of the growing season (Figure 3). Conidia (spores produced asexually by various fungi) inoculum from mummified fruit, infected peduncles (the stalk bearing a flower or fruit) and cankers can be disseminated by splashing or wind-blown rain early in the season (Dowling et al. 2019).

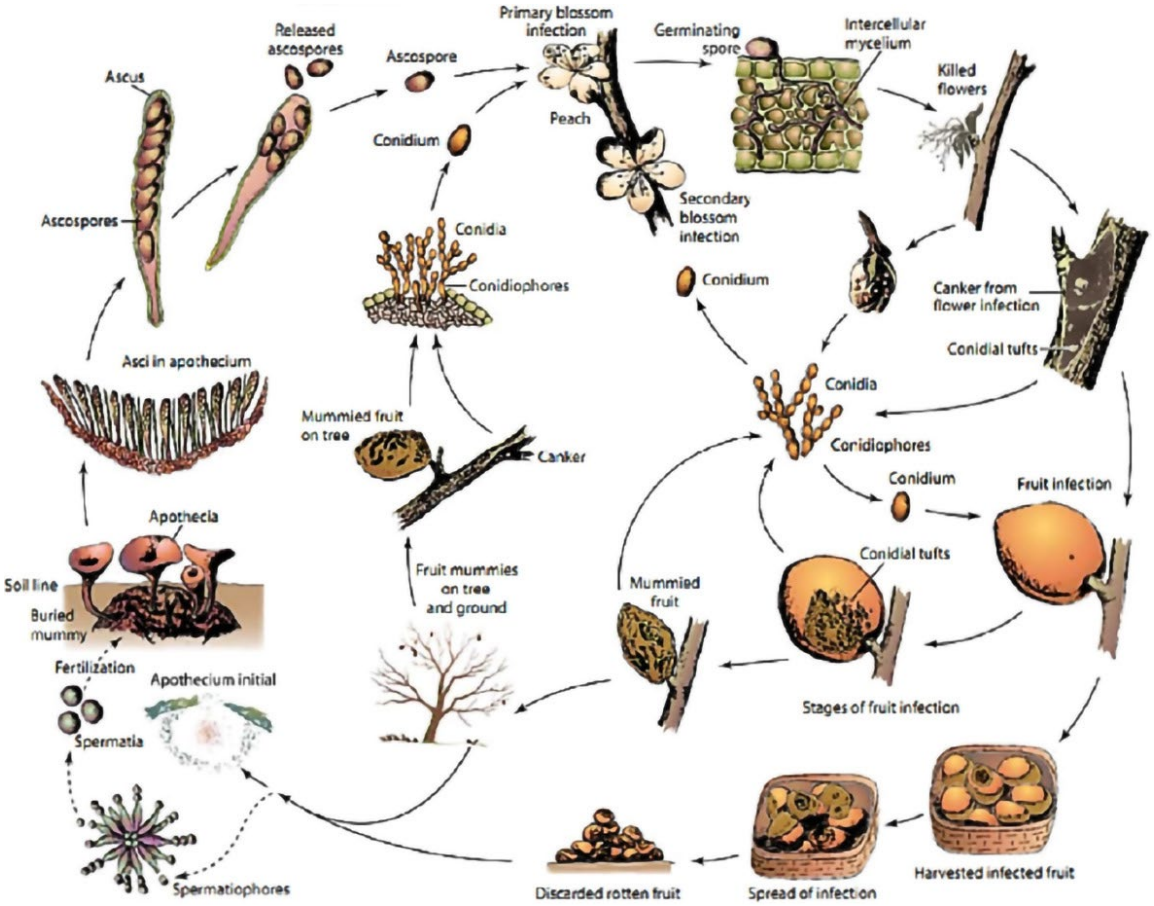

Figure 3. Life cycle of *Monilinia* species. Reprinted with permission from Plant Pathology. Copyright 2005 Elsevier Limited.

Monitoring

Blossom blight infection is highly dependent on the amount of inoculum (spores) carried on overwintering fruit from the previous season and the duration of wetness for the pathogen spores to germinate. Warmer conditions increase the infection rate. For example, at 10 °C, 18 hours of wetness are required for the disease spores to germinate, but if the temperature is 24 °C, only 5 hours are necessary (Villalta et al. 2015). Infection can occur on flowers and fruit after 3–5 hours of wetness at 20 °C; with 24 hours of wetness, severe infection can occur irrespective of temperature. Brown rot poses the greatest risk for crop loss in seasons with very wet conditions at flowering or during the final stages of cell expansion, after straw.

> The optimum conditions for infection are wet and humid weather, with a temperature between 20 °C and 25 °C, making growing regions with these conditions at high risk for infection.

Due to the high potential for crop losses, particularly in warm, wet seasons, continue monitoring for blossom blight and brown rot regularly throughout the growing season. Infected blossoms can be hidden as new leaf growth begins, making them difficult to see before the infection progresses. Growers should check flowers, shoots and developing fruit for signs of rot at least weekly, particularly following favourable weather conditions. Using disease models calibrated to your orchard might also be useful for knowing when to look for the disease and prevent unnecessary spraying.

Management

Cultural and physical

To prevent the spread of the disease between trees, remove infected shoots by pruning and destroy mummified fruit as soon as they are noticed. Doing this early in the season will reduce the potential for the infection to spread to healthy fruit later in the season. Winter pruning is a good time to remove all mummified fruit and infected shoots before the start of the new season, but active infections will not be present at this time. Pruning trees to ensure maximum airflow will help the tree dry after rain.

Biological

While there has been some research into the effects of antagonistic yeasts as a potential biocontrol for Monilinia species in stone fruits, there are not many commercially available. A current permit to use Serenade® Opti Biofungicide (PER88559, expires 31.8.24) is available in all states and territories except Victoria. The plant protein-based biological fungicide Problad Plus® has label registration for suppressing brown rot and blossom blight in stone fruit in all states.

Chemical

An effective spray program for blossom blight and brown rot will include a combined approach of protective cover sprays and curative fungicides as needed from bud burst through flowering and to harvest, depending on weather conditions and disease pressure. Agricultural chemical product users must always read the label and any permit before using the product and strictly comply with the directions on the label and the conditions of any permit.

Table 1. Chemical control options for blossom blight and brown rot in cherries.

Active constituent (example trade name)	Fungicide group(s)	WHP[1] (days)	Effect on beneficials	States registered	Registered for use in[2]*...
Bacillus amyloliquefaciens (Serenade® Opti Biofungicide, PER88559, expires 31.8.24)	BM02	Not required when used as directed.	Low	NSW, Qld, SA, Tas, WA	Cherries; suppression only
BLAD (ProBlad®)	BM01	Not required when used as directed.	Low	All states	Stone fruit; suppression only
Captan (Captan®)	M4	7	Low	All states	Stone fruit except apricots
Copper oxychloride (Coppox®)	M1	1	Low	NSW, Vic, Tas, SA, WA	Stone fruit
Dithianon (Dragon®)	M9	21	Low	NSW, Qld, SA, Tas, Vic	Apricots, cherries, nectarines, peaches, plums, prunes
Fludioxonil (Fludy®)	12	Not required when used as directed.	Low	All states	Stone fruit
Fluopyram + trifloxystrobin (Luna® Sensation)	7 + 11	1	Low	All states	Stone fruit
Iprodione 250 g/L (Rovral Liquid®)	2	0	Low	NSW, Qld, SA, Tas, Vic, WA	Stone fruit
Mancozeb (Dithane® Rainshield® NeoTec®)	M3	14	Medium	All states	Stone fruit
Mandestrobin (Intuity™)	11	7	Low	All states	Stone fruit
Penthiopyrad (Fontelis®)	7	Not required when used as directed.	Low	All states	Stone fruit

Active constituent (example trade name)	Fungicide group(s)	WHP[1] (days)	Effect on beneficials	States registered	Registered for use in[2]*...
Procymidone (Sumisclex® 500)	2	9	Low	NSW, Qld, SA, Tas	Stone fruit
Pyraclostrobin + fluxapyroxad (Merivon®)	7 + 11	2	Low	All states	Cherries
Thiram (Thiragranz®)	M3	7	Low	All states	Stone fruit
Ziram (Ziram®)	M3	7	Low	All states	Cherries, nectarines, peaches

[1] WHP = withholding period.

[2] Always read the label before using any product.

Sources: InfoPest (http://infopest.com.au) and APVMA Pubcris (https://portal.apvma.gov.au/pubcris).

Other factors influencing blossom blight and brown rot incidence

It is important to note that other factors such as pests, diseases, and fruit damage, can increase the chances of blossom blight and brown rot. These are listed below.

- Oriental fruit moth/Queensland fruit fly – damage from these pests provides a site for rot to start.
- Carpophilus beetle – a known vector for spore spread. Growers should constantly monitor for carpophilus beetles and control them as necessary.
- Split fruit – should be removed where possible as the split forms an entry site to the fruit for infection to set in.
- Poorly thinned fruit – makes good spray coverage difficult and slows drying time.
- Late harvesting – overly mature and late-picked fruit is at increased risk of infection.

References and further reading

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