Battling Botrytis: Understanding one of the most significant diseases in Rubus

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Botrytis (or grey mould) is one of the most economically important diseases in Rubus and can result in significant crop losses through impacts to yield and fruit quality.

What does Botrytis look like?

Botrytis fruit rot is caused by the fungal pathogen *Botrytis cinerea* and can cause blossom blight and fruit rot from harvest onwards. Infected flowers can turn dark and shrivel, and develop a covering of grey fungal growth. Initial infection of fruit can result in a watery rot on Rubus drupelets which then develops into the typical grey fuzzy mould, characterised by clusters of white spores on the fungal mass (called mycelium).

How does the disease cause infection?

Following the overwintering period in the cooler months, botrytis germinates in spring with rising temperatures and produces spores which are dispersed by wind throughout the environment.

Sources of spores include diseased and decaying plant structures such as flowers and fruit, overwintering structures called 'sclerotia', and alternative hosts such as weeds and nearby crops. Flowers are most susceptible to infection once they open, providing an entry point for the dispersing spores to land and cause disease.

The fungus can then infect the fruit or remain in a dormant state – *referred to as the latent period* – through the early stages of fruit development, until the tissues begin to break down closer to harvest and mould symptoms become visible. The germinating spores on fruit can quickly infect nearby berries through natural openings or wounds, particularly during favourable environmental conditions, including wet, mild and humid conditions. Given the nature of latent infection, it is very difficult to predict mould levels before post-harvest symptoms appear!

What conditions favour the disease?

Botrytis requires free water and extended periods of leaf wetness on plant tissues to germinate, which often occurs during high humidity conditions such as rain, dew or fog. Botrytis is a temperature driven disease, with an optimum temperature range of 18-21°C to favour infection and disease development. Despite this, the fungus is known to actively grow at temperatures as low as 0°C, which provides a challenge when managing fruit in storage and during transportation.

How does Botrytis survive the winter?

Botrytis is able to 'overwinter' as mycelium on dead organic material such as leaf and cane residues, mulch, and mummified fruit to survive the cold winter period. The fungus can then produce spores when conditions become more conducive, providing a source of infection in spring.

Botrytis can also produce long-term structures made up of black-coloured hardened masses of mycelium called 'sclerotia', which are able to survive extreme environmental conditions such as freezing temperatures and desiccation. These sclerotia remain dormant until appropriate conditions return for germination, and they can then become a primary source of infection to the crop.

It is important to note that these structures are also resistant to chemical control.

Figure 1. Clusters of white Botrytis spores on raspberry. Photo credit: Ella Roper

Figure 2. Botrytis on a ripe blackberry in the field. Photo credit: Gaius Leong

Management strategies

Cultural

Cultural control refers to physically managing the environment to reduce infection risk. Removing diseased fruit from the canopy and ground can help decrease sources of infection, although this can be time consuming and labour intensive.

Managing the environment through opening the canopy and promoting airflow helps to reduce humidity and longevity of leaf wetness and can be achieved through activities such as plant training, leaf removal or managing vents in tunnel systems.

Avoiding or limiting overhead irrigation also helps prevent infection as the disease relies on free water on plant surfaces to germinate.

Nutrition management also plays a role in managing Botrytis as excess nitrogen fertiliser applications can produce excessive vegetative canopy growth restricting airflow, and botrytis can more readily infect new, tender green growth.

Likewise, limiting physical wounding by pests or mechanical damage helps limit points of entry for the disease to take hold.

Picking early in the morning when temperatures are cooler and moving fruit into cold storage as quickly as possible after harvest is important as this slows the breakdown of tissues and prevents fruit from sitting in the optimal temperature range for mould development.

Biological

Biological control agents have become increasingly available in recent years; however efficacy can vary and be impacted by seasonality and agronomic factors. Biological control products work through different modes of action, including competing for nutrient resources and space, fungus parasitism, and induced resistance of the host plant.

Despite the potential drawbacks, biological control products provide additional control options to the limited chemistry available in Rubus, have a low impact on the environment, and generally have short withholding periods so can often be utilised through harvest.

Commercially available biological products include Botector® and Serenade® Opti.

Chemical

Fungicides for Botrytis are used widely in commercial berry production and provide effective control, particularly when utilised as part of a broader disease management strategy such as microclimate and canopy management.

As flowers are most susceptible to infection once they open, fungicides should be applied as part of a preventative program from early flowering onwards, particularly in wet and humid conditions that favour the disease.

A preventative program should also vary and rotate fungicide groups to limit fungicide resistance.

Visit the APVMA website at portal.apvma.gov.au/permits for the full list of approved chemicals for Botrytis/grey mould in Rubus or access the Plant Protection Guide available at the Resource Library on the industry website at berries.net.au/resource-library

Key points:

- Botrytis is one of the most significant fungal diseases in Rubus and is exacerbated by wet, mild and humid conditions.
- Cultural control methods such as modifying the microclimate, opening the canopy and managing nutrition helps improve airflow and drying time to prevent infection.
- Cool fruit as quickly as possible after harvest
- Biological control products are becoming more commercially available and can be considered as part of a wider botrytis management plan.
- Target preventative fungicides once flowers open, particularly in wet or humid conditions and rotate chemical modes of action to limit fungicide resistance.

References

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