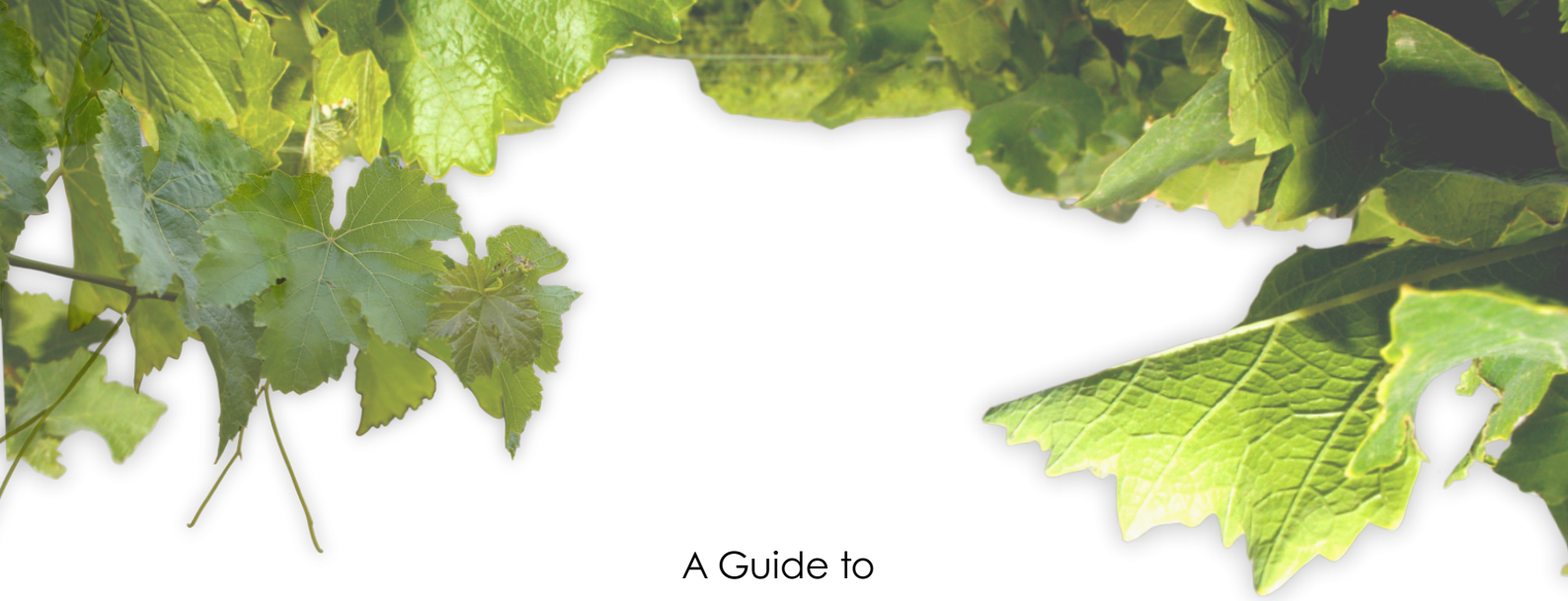




A Guide to

# Non-Botrytis Bunch Rots of Table Grapes

**This document highlights key information about non-Botrytis bunch rot diseases affecting table grapes and provides integrated management practices to minimise disease risk and maintain fruit quality.**

## INTRODUCTION TO NON-BOTRYTIS ROTS

When bunch rot appears in the packhouse or during export, the infection process has often started weeks or even months earlier in the vineyard. For this reason, successful bunch rot management begins long before harvest. Once table grapes have been harvested, the options for controlling disease are limited, making preventative vineyard management one of the most important tools available to growers. The aim is not simply to control pathogens, but to produce healthy fruit that can withstand storage, transport and marketing. The integrated management practices discussed in **Table 1** should therefore be viewed as a season-long strategy rather than a series of isolated interventions. In addition, vineyard sanitation should continue between seasons to reduce disease pressure and support healthy crop development in subsequent seasons.

Plant pathologists often refer to the “disease triangle” to explain why diseases occur. Three factors must come together: a susceptible host, a pathogen capable of causing disease, and environmental conditions that favour infection and development. In table grapes, moisture and temperature are two of the most important drivers of bunch rot development. However, disease risk is also influenced by vineyard factors such as dense canopies, poor air movement, excessive vine vigour, nutritional imbalances, prolonged bunch wetness and berry damage. When these conditions coincide, the likelihood of bunch rot increases significantly. Many of these risk factors are addressed through the cultural and environmental management practices summarised in **Table 1**.

While *Botrytis cinerea* (grey mould) remains the most recognised bunch rot pathogen, grape growers are increasingly encountering a range of other organisms capable of causing berry and bunch decay. Collectively, these are referred to as “non-Botrytis bunch rots” and include several pathogens, each with unique biology, risk factors and patterns of disease development. A summary of the most common pathogens, globally, associated with non-Botrytis bunch rots is provided in **Table 2**, while *Botrytis cinerea* is included as a reference point for comparison.

**Importantly, non-Botrytis bunch rots should not be viewed as a single disease group with identical behaviour.**

Many of these fungi survive in vineyard debris, mummified berries, infected wood or soil and are spread by wind, rainfall, insects or contaminated plant material. Some can remain on grape tissues without causing visible symptoms and only become active later under favourable conditions. Others rely on wounds caused by berry splitting, insect feeding, hail damage, sunburn or harvest injuries before infection can occur. Research conducted in South Africa has shown that certain pathogens, such as *Alternaria alternata*, may colonise grape bunches throughout their development without visible symptoms, with disease expression later influenced by factors such as fruit stress, handling practices and storage conditions. In addition, some fungi that may be encountered on grape tissues are not necessarily pathogens and may act as biological antagonists, as outlined in Table 3.

South African research and industry monitoring programmes have demonstrated that bunch rot risk is strongly linked to vineyard conditions. Dense canopies, excessive debris, poor air circulation, high humidity and berry injury all contribute to an environment favourable for disease development. Likewise, periods of rainfall close to harvest can dramatically increase risk by prolonging bunch wetness and creating opportunities for infection. Protracted rainfall within the optimum harvest period further increases the risk by delaying harvesting towards post-optimum maturity, when cell walls start to weaken in the most advanced berries in the bunches, due to senescence processes. Combinations of these factors reinforce the importance of viewing bunch rot management as an integrated system rather than relying solely on fungicide programmes.

Effective management therefore requires a combination of cultural, sanitation, canopy and crop protection practices. Good vineyard hygiene, balanced vine growth, careful moisture management, minimising berry injury, appropriate insect control, selective use of crop protection products and strict temperature management after harvest all contribute to reducing disease risk.

In many cases, these practices are as important as pathogen control itself because they reduce the conditions that allow bunch rots to establish and develop. The integrated management framework presented in **Table 1** brings together these key risk-reduction practices.

The sections that follow provide an overview of the most common non-Botrytis bunch rot pathogens associated with table grapes (**Table 2**) and fungi that may occur on grape tissues as biological antagonists (**Table 3**). For each disease, a practical summary of symptoms, favourable conditions and management principles is presented. Together with the integrated management actions summarised in **Table 1**, these summaries aim to support growers, exporters and technical specialists in understanding and managing the diverse bunch rot challenges that can affect grape quality from the vineyard through to the consumer.

**Table 1: Integrated management of non-Botrytis bunch rots in table grapes**

**Note:** Non-Botrytis bunch rots are best managed through an integrated disease risk reduction strategy. Many of these pathogens are opportunistic and become problematic when berry injury, prolonged moisture, dense canopies, elevated berry sugar levels (°Brix), favourable environmental conditions and postharvest stresses occur simultaneously. Disease management should therefore focus on reducing risk throughout the production and export chain rather than controlling individual pathogens in isolation.

| MANAGEMENT ACTION                                    | RECOMMENDED PRACTICES                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Cultivar selection &amp; Suitability</b>          | <ul style="list-style-type: none"> <li>• Select cultivars with looser bunch architecture where possible.</li> <li>• Select cultivars less prone to berry cracking, bunch compression and berry splitting.</li> <li>• Consider cultivar susceptibility to sunburn, bunch compactness and postharvest storage performance.</li> <li>• Recognise that cultivar characteristics influence disease risk throughout the season.</li> </ul> |
| <b>Site Selection</b>                                | <ul style="list-style-type: none"> <li>• Prefer well-drained sites with good natural airflow.</li> <li>• Avoid sites prone to prolonged humidity, poor air circulation and standing water.</li> <li>• Consider row orientation and prevailing winds when establishing vineyards.</li> <li>• Avoid sites with a history of severe bunch rot problems where practical.</li> </ul>                                                      |
| <b>Canopy Management</b>                             | <ul style="list-style-type: none"> <li>• Maintain an open and balanced canopy.</li> <li>• Leaf removal in the fruit zone where appropriate.</li> <li>• Shoot positioning and topping to improve airflow and bunch drying.</li> <li>• Avoid excessive vigour and dense canopies.</li> <li>• Minimise bunch contact with cordons, trunks, dead wood and canopy debris.</li> </ul>                                                      |
| <b>Crop Load &amp; Bunch Architecture Management</b> | <ul style="list-style-type: none"> <li>• Avoid excessive crop loads that delay ripening and increase bunch compactness.</li> <li>• Manage bunch compactness through bunch thinning or berry thinning where appropriate.</li> <li>• Reduce berry-to-berry pressure that contributes to cracking, splitting and decay development.</li> <li>• Pay particular attention to compact-cluster cultivars.</li> </ul>                        |
| <b>Nutrition Management</b>                          | <ul style="list-style-type: none"> <li>• Maintain balanced vine nutrition.</li> <li>• Avoid excessive nitrogen applications that promote dense canopies, soft berry tissue and excessive vigour.</li> <li>• Prevent nutritional imbalances that contribute to berry splitting or poor berry integrity</li> <li>• Base fertilisation programmes on soil and leaf analyses.</li> </ul>                                                 |
| <b>Moisture &amp; Irrigation Management</b>          | <ul style="list-style-type: none"> <li>• Promote rapid drying of bunches following rain, dew or irrigation.</li> <li>• Avoid irrigation practices that increase bunch-zone humidity during ripening.</li> <li>• Manage irrigation carefully to minimise berry splitting risk.</li> <li>• Maintain effective vineyard floor management to improve airflow and reduce humidity.</li> </ul>                                             |

| MANAGEMENT ACTION                                           | RECOMMENDED PRACTICES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Disease Monitoring &amp; Risk Assessment</b>             | <ul style="list-style-type: none"> <li>• Scout vineyards regularly during flowering, bunch closure, véraison and pre-harvest stages.</li> <li>• Increase monitoring following rainfall, hail events or prolonged humidity.</li> <li>• Identify high-risk blocks based on cultivar, canopy density, disease history and environmental conditions.</li> <li>• Remove heavily infected bunches before disease spreads.</li> </ul>                                                                                                                                                                                                                                                                |
| <b>Weather-based Risk Management</b>                        | <ul style="list-style-type: none"> <li>• Closely monitor rainfall and humidity forecasts during ripening and pre-harvest periods.</li> <li>• Increase disease surveillance following rain events.</li> <li>• Recognise that extended periods of berry wetness significantly increase bunch rot risk.</li> <li>• Adapt spray programmes and harvest planning according to disease risk.</li> </ul>                                                                                                                                                                                                                                                                                             |
| <b>Insect &amp; Vertebrate Management</b>                   | <ul style="list-style-type: none"> <li>• Manage insects that cause berry injury and create infection sites.</li> <li>• Control pests that contribute to berry splitting and juice leakage.</li> <li>• Reduce bird and vertebrate damage where practical.</li> <li>• Recognise that vinegar flies and other insects may contribute to sour rot development.</li> </ul>                                                                                                                                                                                                                                                                                                                         |
| <b>Berry Injury &amp; Sunburn Management</b>                | <ul style="list-style-type: none"> <li>• Minimise berry injury caused by hail, machinery, labour operations and harvest activities.</li> <li>• Reduce sunburn risk through appropriate canopy management.</li> <li>• Avoid sudden fruit exposure during hot periods.</li> <li>• Recognise that many non-Botrytis pathogens readily colonise wounded or stressed berries.</li> </ul>                                                                                                                                                                                                                                                                                                           |
| <b>Sanitation &amp; Trunk Disease Management</b>            | <ul style="list-style-type: none"> <li>• Remove mummified berries, diseased bunches and vineyard debris.</li> <li>• Remove infected canes, dead wood and pruning residues where practical.</li> <li>• Protect pruning wounds and manage trunk diseases.</li> <li>• Reduce carry-over inoculum between seasons.</li> <li>• Maintain vineyard hygiene throughout the season.</li> </ul>                                                                                                                                                                                                                                                                                                         |
| <b>Crop Protection Products &amp; Resistance Management</b> | <ul style="list-style-type: none"> <li>• Apply fungicides strategically as part of an integrated disease management programme.</li> <li>• Focus applications during susceptible crop stages and periods of elevated disease risk.</li> <li>• Rotate fungicide modes of action according to resistance management guidelines.</li> <li>• Integrate biological control products where appropriate.</li> <li>• Avoid reliance on fungicides as the sole disease management strategy.</li> </ul>                                                                                                                                                                                                  |
| <b>Ripening &amp; Harvest Timing (°Brix Management)</b>     | <ul style="list-style-type: none"> <li>• Monitor °Brix, berry maturity and berry condition throughout ripening.</li> <li>• Recognise that increasing °Brix is often associated with berry softening, increased susceptibility to splitting and greater vulnerability to opportunistic pathogens.</li> <li>• Avoid unnecessary delays in harvest once target maturity has been reached.</li> <li>• Consider disease pressure, berry condition and weather forecasts when making harvest timing decisions.</li> <li>• Prioritise harvesting high-risk blocks before forecast rainfall events.</li> <li>• Recognise that overripe fruit is generally more prone to decay development.</li> </ul> |

| MANAGEMENT ACTION               | RECOMMENDED PRACTICES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Harvest Management              | <ul style="list-style-type: none"> <li>• Harvest fruit at appropriate maturity and berry condition.</li> <li>• Harvest during cooler periods where practical.</li> <li>• Minimise bunch handling, compression and berry damage.</li> <li>• Train harvest teams to identify and remove diseased bunches.</li> <li>• Avoid harvesting wet fruit whenever possible.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Packhouse Hygiene & Handling    | <ul style="list-style-type: none"> <li>• Remove damaged, leaking or infected berries during sorting.</li> <li>• Maintain strict hygiene of harvest containers, scissors, equipment, conveyors and packing facilities.</li> <li>• Prevent contamination between healthy and infected fruit.</li> <li>• Minimise berry injury during packing and transport operations.</li> <li>• Monitor packhouse conditions that may favour disease development.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Cold Chain & Storage Management | <ul style="list-style-type: none"> <li>• Rapidly pre-cool fruit following harvest to between -0.5°C (international norm) and 1.0°C.</li> <li>• Minimise temperature fluctuations during and after loading, and after container off-loading.</li> <li>• Use pallet base configurations which optimise air circulation in the container</li> <li>• Maintain pulp temperatures between -0.5 (international norm) –1.0°C throughout storage and export.</li> <li>• Use SO<sub>2</sub> systems according to industry recommendations where applicable.</li> <li>• Choose a PPECB container booking code which optimises for low pulp temperature management prior to loading and during the export chain (engage with your exporter)</li> <li>• Avoid extended storage periods beyond recommended export windows.</li> <li>• Recognise that poor cold-chain management increases the likelihood of postharvest decay expression.</li> </ul> |

**Table 2: Common non-Botrytis bunch rots with *Botrytis cinerea* included as a reference**

| PATHOGEN SCIENTIFIC NAME                                                                     | DISEASE COMMON NAME(S)                    | CURRENT KNOWLEDGE LEVEL                                                                                                                                                                                                                                                                                                                                                                                  | PRIMARY DISEASE EXPRESSION                                     |
|----------------------------------------------------------------------------------------------|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|
| <i>Botrytis cinerea</i>                                                                      | Botrytis rot,<br>Grey mould               | <ul style="list-style-type: none"> <li>Major table grape pathogen and benchmark for bunch rot management.</li> <li>Can infect berries in the vineyard and continue development during storage.</li> <li>Favoured by moisture and high humidity.</li> </ul>                                                                                                                                               | Vineyard and postharvest                                       |
| <u><i>Alternaria</i> spp.</u>                                                                | Alternaria rot                            | <ul style="list-style-type: none"> <li><i>Alternaria</i> can colonise bunch tissues throughout development and remain symptomless until after harvest.</li> <li>Disease development is closely associated with berry injury, physiological stress and storage conditions.</li> <li>South African research indicates postharvest rot is not directly related to latent infection levels alone.</li> </ul> | Primarily postharvest expression from latent field infections  |
| <u><i>Aspergillus</i> spp.</u>                                                               | Black sooty mould, <i>Aspergillus</i> rot | <ul style="list-style-type: none"> <li>Associated with damaged, weakened or overmature berries.</li> <li>Infection often originates in the vineyard under warm conditions.</li> <li>Presence may indicate damaged fruit, inadequate sorting or temperature abuse during handling and storage.</li> </ul>                                                                                                 | Primarily vineyard origin with possible postharvest expression |
| <u><i>Aspergillus</i>, <i>Penicillium</i>, <i>Rhizopus</i> spp. plus yeasts and bacteria</u> | Sour rot                                  | <ul style="list-style-type: none"> <li>Complex disease involving fungi, yeasts, acetic acid bacteria and vinegar flies.</li> <li>Closely associated with berry cracking and leaking juice.</li> <li>Generally regarded as a vineyard disease rather than a storage disease.</li> </ul>                                                                                                                   | Primarily vineyard                                             |
| <u><i>Botryosphaeria</i> spp.</u>                                                            | Botryosphaeria rot                        | <ul style="list-style-type: none"> <li>Better known as grapevine trunk disease pathogens.</li> <li>Can be associated with bunch rot, particularly where bunches contact infected wood.</li> <li>More common in vineyards with trunk disease history.</li> </ul>                                                                                                                                          | Primarily vineyard                                             |
| <u><i>Cladosporium</i> spp.</u>                                                              | Cladosporium rot                          | <ul style="list-style-type: none"> <li>Can infect wounded and unwounded berries.</li> <li>Associated with rainfall close to harvest and latent infections.</li> <li>Symptoms may not be visible at harvest and may appear during storage.</li> </ul>                                                                                                                                                     | Vineyard infection with postharvest expression                 |
| <u><i>Colletotrichum</i> spp.</u>                                                            | Ripe rot                                  | <ul style="list-style-type: none"> <li>Favoured by warm, wet conditions during ripening.</li> <li>Typically associated with softened berries and loss of berry turgor.</li> <li><i>C. acutatum</i> and <i>C. gloeosporioides</i> complexes may differ in fungicide sensitivity.</li> </ul>                                                                                                               | Primarily vineyard                                             |

| PATHOGEN SCIENTIFIC NAME           | DISEASE COMMON NAME(S)         | CURRENT KNOWLEDGE LEVEL                                                                                                                                                                                                                                              | PRIMARY DISEASE EXPRESSION |
|------------------------------------|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| <u><i>Elsinoë ampelina</i></u>     | Anthrachnose,<br>Black spot    | <ul style="list-style-type: none"> <li>• Causes characteristic black lesions on young berries before véraison.</li> <li>• Primarily a quality and cosmetic defect rather than a storage decay.</li> </ul>                                                            | Vineyard                   |
| <u><i>Greeneria uvicola</i></u>    | Bitter rot                     | <ul style="list-style-type: none"> <li>• Associated with warm, wet conditions close to harvest.</li> <li>• Infected berries soften, decay and may subsequently mummify.</li> <li>• Generally considered a vineyard disease rather than a storage problem.</li> </ul> | Vineyard                   |
| <u><i>Guignardia bidwellii</i></u> | Black rot                      | <ul style="list-style-type: none"> <li>• Survives in mummified berries and infected debris.</li> <li>• Young berries are most susceptible.</li> <li>• Symptoms usually develop several days to weeks after infection.</li> </ul>                                     | Vineyard                   |
| <u><i>Penicillium spp.</i></u>     | Penicillium rot,<br>Blue mould | <ul style="list-style-type: none"> <li>• Wound pathogen commonly associated with damaged berries.</li> <li>• Can be spread through contaminated handling equipment.</li> <li>• Often expressed after harvest when wounded fruit enters storage.</li> </ul>           | Primarily postharvest      |
| <u><i>Phomopsis viticola</i></u>   | Phomopsis rot                  | <ul style="list-style-type: none"> <li>• Commonly associated with cane and leaf blight.</li> <li>• Can infect bunches under warm, wet conditions when berries are damaged.</li> </ul>                                                                                | Vineyard                   |
| <u><i>Rhizopus spp.</i></u>        | Rhizopus rot                   | <ul style="list-style-type: none"> <li>• Rapid soft rot of wounded berries.</li> <li>• Disease development is strongly associated with warm temperatures and berry injury.</li> <li>• Often indicates damaged fruit or temperature management failures.</li> </ul>   | Primarily postharvest      |

**Table 3: Non-Botrytis pathogens which may be present but act as biological antagonists**

| Pathogen Scientific Name | Common Name(s) | Role                  | Current Knowledge Level                                                                                                                                                                                                                                                                                                                                                                                                | Manifest in Vineyard? |
|--------------------------|----------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| <i>Epicoccum</i> spp.    | Epicoccum rot  | Biological antagonist | <ul style="list-style-type: none"> <li>Primarily of interest as a biological antagonist rather than a cause of bunch rot</li> <li>Some studies have reported antagonistic activity against grape pathogens.</li> <li>Occurs naturally on grapevine tissues and in vineyard environments.</li> <li>Limited information is available regarding its significance on table grapes.</li> </ul>                              | Yes                   |
| <i>Trichoderma</i> spp.  | Trichoderma    | Biological antagonist | <ul style="list-style-type: none"> <li>Widely used in biological control programmes worldwide.</li> <li>Commonly applied for the management of grapevine trunk diseases and other fungal pathogens.</li> <li>Reported to suppress pathogens associated with bunch and berry rots.</li> <li>Frequently occurs naturally in vineyard ecosystems and can remain present on vine tissues following application.</li> </ul> | Yes                   |

## Alternaria rot (*Alternaria* spp.)

For more information, click [HERE](#) and [HERE](#)



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### Key Symptoms

Early symptoms appear as tan to light-brown lesions on berry skin, which gradually darken to brown or black. As the disease progresses, infected berries may become discoloured and shrivel, while green-black fungal growth can develop on affected tissue under favourable conditions. Rot may extend from the pedicel into the cap stem, increasing the risk of berry shatter and bunch deterioration. Symptoms are often associated with damaged, stressed or physiologically weakened berries and may become more apparent during storage and marketing than at harvest. South African research has shown that *A. alternata* may colonise grape bunches throughout their development without obvious symptoms, meaning that apparently healthy bunches can harbour the fungus before symptom expression occurs.

### Conditions That Favour Disease Development

Unlike many traditional bunch rot pathogens, *A. alternata* can colonise grape bunches throughout their development and may remain present without causing visible symptoms. South African research demonstrated that mature bunches can harbour *Alternaria* despite appearing healthy, indicating that latent colonisation is common. Disease expression is therefore influenced not only by the presence of the fungus, but also by factors that predispose berries to decay.

Infection is commonly associated with mechanical injury, berry cracking, insect feeding damage, sunburn, hail injury and lesions around the cap stem and pedicel. Disease development is promoted by wet conditions, prolonged berry surface moisture, high relative humidity and dense canopies that restrict airflow. Vineyard factors such as excessive vine vigour, high nitrogen levels and poor air circulation can further increase disease risk.

Physiological stress factors, berry injury and postharvest conditions play a significant role in determining whether disease symptoms develop. Mechanical injury, handling damage and sulphur dioxide injury have all been identified as factors that may predispose berries to *Alternaria* decay.

## Disease Management

| Management Action                            | Recommended Practices                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cultivar Selection & Suitability             | <ul style="list-style-type: none"> <li>Select cultivars with looser bunch architecture and lower susceptibility to cracking and berry-to-berry compression.</li> <li>Avoid production systems that promote excessive bunch compactness.</li> </ul>                                                                                                                                                                               |
| Canopy Management                            | <ul style="list-style-type: none"> <li>Maintain an open canopy through leaf removal, shoot positioning and vigour management to improve airflow and reduce humidity around bunches</li> <li>Avoid excessive nitrogen fertilisation that promotes dense canopies and prolonged moisture retention</li> </ul>                                                                                                                      |
| Nutrition Management                         | <ul style="list-style-type: none"> <li>Maintain balanced vine nutrition.</li> <li>Avoid excessive nitrogen inputs that contribute to excessive vigour, dense canopies and softer berry tissue.</li> </ul>                                                                                                                                                                                                                        |
| Insect Management                            | <ul style="list-style-type: none"> <li>Implement effective insect control programmes to reduce berry injury and feeding damage.</li> <li>Limit bird and other pest damage that may provide infection sites.</li> </ul>                                                                                                                                                                                                           |
| Moisture Management                          | <ul style="list-style-type: none"> <li>Reduce periods of free moisture on berries by promoting rapid drying of bunches after rain or irrigation.</li> <li>Choose well-drained sites where possible and implement practices that improve air circulation within the vineyard, as wet conditions and high humidity favour disease development.</li> </ul>                                                                          |
| Sanitation                                   | <ul style="list-style-type: none"> <li>Remove mummified berries, dead bunch material and vineyard debris that may harbour inoculum.</li> <li>Good vineyard hygiene helps reduce pathogen carry-over between seasons.</li> </ul>                                                                                                                                                                                                  |
| Crop Protection Products                     | <ul style="list-style-type: none"> <li>Apply crop protection products strategically as part of an integrated disease management programme where required.</li> <li>Crop Protection programmes should be combined with cultural practices that minimise berry injury and disease-conducive conditions.</li> </ul>                                                                                                                 |
| Ripening & Harvest Timing (°Brix Management) | <ul style="list-style-type: none"> <li>Avoid unnecessary delays in harvest once target maturity has been reached. Recognise that increasing °Brix is often associated with berry softening and increased susceptibility to berry injury and opportunistic pathogens.</li> </ul>                                                                                                                                                  |
| Harvest Handling                             | <ul style="list-style-type: none"> <li>Minimise berry cracking and pedicel damage during harvest.</li> <li>Avoid harvesting wet fruit where possible.</li> <li>Remove visibly damaged bunches during harvest.</li> </ul>                                                                                                                                                                                                         |
| Packhouse Hygiene & Handling                 | <ul style="list-style-type: none"> <li>Minimise mechanical injury, berry cracking and damage to the stem cap during packing and transport.</li> <li>Remove damaged, leaking or decayed berries during sorting.</li> <li>Maintain good sanitation throughout the handling chain.</li> <li>Careful handling is essential because <i>Alternaria</i> primarily infects wounded tissue.</li> </ul>                                    |
| Cold Chain & Storage                         | <ul style="list-style-type: none"> <li>Rapidly cool fruit after harvest and maintain the cold chain.</li> <li>Because <i>Alternaria</i> can continue to develop during cold storage, strict temperature management is important to minimise post-harvest losses.</li> <li>Recognise that disease expression may occur postharvest where berries are stressed or injured, even when fruit appeared healthy at harvest.</li> </ul> |

## Key Message

*Alternaria* should be regarded primarily as an opportunistic pathogen and postharvest quality risk rather than simply a wound pathogen. The fungus can colonise bunches long before symptoms appear, but disease development is often driven by berry stress, injury, canopy conditions and postharvest handling practices. Consequently, effective management requires an integrated approach that combines canopy management, berry protection, sanitation, careful handling and strict cold chain management rather than relying solely on fungicide applications.

## Black sooty mould (*Aspergillus* spp.)

For more information, click [HERE](#)



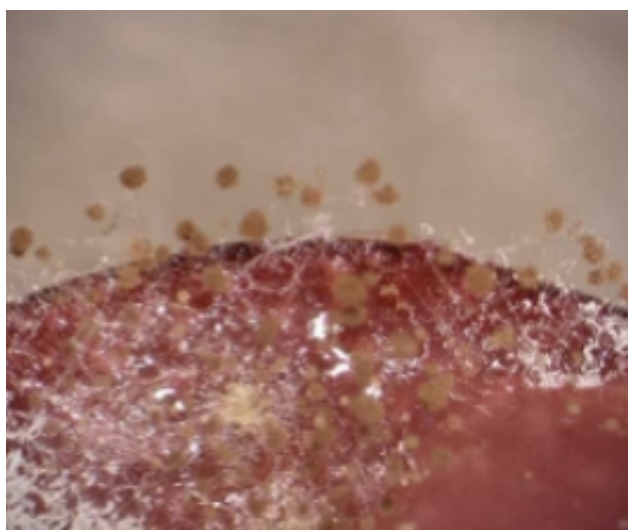
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### Key Symptoms

Characterised by the development of masses of black, sooty spores on infected berries, giving affected fruit a distinctive dark appearance. The disease typically infects damaged or weakened berries and may progress until the berry pulp breaks down into a soft, decayed mass. Infected berries may become shrivelled, discoloured and covered with black fungal growth, which can spread across the berry surface under favourable conditions. The presence of black sooty mould on bunches is often the most obvious diagnostic symptom. Individual berries are typically affected first, particularly where berry injury, berry splitting or sunburn has occurred.

### Conditions That Favour Disease Development

Black sooty rot caused by *Aspergillus* spp. favours warm conditions and is commonly associated with damaged or weakened or overripe berries. Berry cracking, insect feeding, sunburn, hail injury and other forms of physical damage create entry points that increase the likelihood of infection. The fungus can survive in soil and vineyard debris, providing a source of inoculum within the vineyard. *Aspergillus* spp. are also commonly present on grape surfaces and within vineyard ecosystems. Disease development is most commonly associated with infections that occur in the vineyard before harvest. The presence of black sooty rot on harvested fruit may indicate that infected berries were not removed during vineyard or packhouse sorting or that berry injury and fruit deterioration occurred during handling and storage



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## Disease Management

| Management Action                 | Recommended Practices                                                                                                                                                                                                                                                                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cultivar Selection & Suitability  | <ul style="list-style-type: none"> <li>Select varieties that are less prone to berry cracking and sunburn</li> </ul>                                                                                                                                                                                                                                      |
| Canopy Management                 | <ul style="list-style-type: none"> <li>Maintain a well-balanced canopy - appropriate leaf removal, shoot positioning and vigour management to improve air movement and reduce bunch-zone temperatures</li> <li>Avoid excessive nitrogen fertilisation that encourages dense canopies</li> </ul>                                                           |
| Insect Management                 | <ul style="list-style-type: none"> <li>Implement effective insect control programmes to minimise feeding damage and berry injury that can serve as infection sites</li> </ul>                                                                                                                                                                             |
| Berry Injury & Sunburn Management | <ul style="list-style-type: none"> <li>Minimise berry cracking, sunburn, hail damage and mechanical injury.</li> <li>Many <i>Aspergillus</i> infections are associated with damaged or physiologically stressed fruit.</li> </ul>                                                                                                                         |
| Moisture Management               | <ul style="list-style-type: none"> <li>Promote good drainage and air circulation within the vineyard - appropriate site selection, weed management and canopy management practices.</li> </ul>                                                                                                                                                            |
| Sanitation                        | <ul style="list-style-type: none"> <li>Remove mummified berries, diseased bunches and vineyard debris that may act as reservoirs of fungal inoculum.</li> <li>Good vineyard hygiene can help reduce pathogen carry-over between seasons.</li> </ul>                                                                                                       |
| Crop Protection Products          | <ul style="list-style-type: none"> <li>Apply crop protection products as part of an integrated disease management programme where required and in accordance with local recommendations.</li> <li>Combined with practices that reduce berry injury and inoculum levels.</li> </ul>                                                                        |
| Harvest Handling                  | <ul style="list-style-type: none"> <li>Minimise damage during harvesting, packaging and transport</li> <li>Sort and remove visibly infected bunches and berries before storage</li> <li>Avoid harvesting overripe fruit where possible.</li> </ul>                                                                                                        |
| Cold Chain & Storage              | <ul style="list-style-type: none"> <li>Rapidly cool fruit after harvest and maintain recommended storage temperatures through the supply chain.</li> <li>Good temperature management, combined with effective field and packhouse sorting reduces the likelihood of disease development and quality deterioration during storage and transport</li> </ul> |

## Key Message

*Aspergillus* spp. are primarily opportunistic pathogens that exploit damaged, stressed or overripe berries. Successful management depends on minimising berry injury, maintaining fruit quality, harvesting at the appropriate maturity, reducing inoculum sources and maintaining an effective cold chain from harvest through to export.



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## Sour rot (main fungal species: *Aspergillus*, *Penicillium*, *Rhizopus*)

For more information, click [HERE](#)

### Key Symptoms

Sour rot is characterised by the breakdown of berries into a soft, watery rot accompanied by a distinctive vinegar-like odour. The disease is associated with a complex of fungi, yeasts, acetic acid bacteria and vinegar flies, which collectively contribute to berry decay and fermentation. Affected berries lose their integrity, becoming soft and leaking juice, which can spread through the bunch and create favourable conditions for further microbial activity. In advanced stages, berries may collapse and disintegrate, resulting in extensive bunch deterioration and a characteristic sour, fermented smell.

### Conditions That Favour Disease Development

Sour rot typically occurs under conditions that result in berry injury and the leakage of berry juice, creating an environment that supports the growth of yeasts, acetic acid bacteria and other microorganisms associated with the disease. The disease is generally associated with warm conditions and is most likely to develop when damaged berries remain within the bunch. Vinegar flies play an important role in disease development by spreading microorganisms between berries and bunches. Dense canopies, poor air circulation and conditions that prolong the presence of damaged, leaking berries may further increase the likelihood of disease development. Sour rot is primarily regarded as a vineyard disease rather than a traditional cold-storage rot. Elevated berry sugar levels (°Brix), berry splitting and delayed harvest can further increase disease risk by encouraging juice leakage and microbial growth.



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## Disease Management

| Management Action                            | Recommended Practices                                                                                                                                                                                                                                                                                                 |
|----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cultivar Selection & Suitability             | <ul style="list-style-type: none"> <li>Select varieties that are less prone to berry cracking where possible</li> </ul>                                                                                                                                                                                               |
| Canopy Management                            | <ul style="list-style-type: none"> <li>Practices that reduce bunch compactness and improve bunch zone conditions may help limit berry damage and bunch deterioration.</li> <li>Maintain good airflow through appropriate leaf removal, shoot positioning and balanced vine growth.</li> </ul>                         |
| Insect Management                            | <ul style="list-style-type: none"> <li>Manage insects, particularly vinegar flies and other insects that can damage berries or contribute to the spread of microorganisms associated with sour rot</li> <li>Reduce bird and vertebrate damage that may create entry points for infection and fermentation.</li> </ul> |
| Berry Injury & Sunburn Management            | <ul style="list-style-type: none"> <li>Minimise berry cracking, sunburn, hail damage and mechanical injury.</li> <li>Sour rot is strongly associated with damaged berries that leak juice.</li> </ul>                                                                                                                 |
| Moisture Management                          | <ul style="list-style-type: none"> <li>Reduce conditions that increase berry splitting and prolong the presence of damaged, leaking berries.</li> <li>Promote rapid drying of bunches following rainfall, dew or irrigation events.</li> </ul>                                                                        |
| Sanitation                                   | <ul style="list-style-type: none"> <li>Remove damaged, leaking and infected berries and bunches.</li> <li>Reduces sources of decaying fruit that can harbour microorganisms and attract vinegar flies</li> </ul>                                                                                                      |
| Crop Protection Products                     | <ul style="list-style-type: none"> <li>Crop protection products should be used as part of an integrated disease management plan – combine with cultural practices</li> </ul>                                                                                                                                          |
| Ripening & Harvest Timing (°Brix Management) | <ul style="list-style-type: none"> <li>Monitor berry maturity and °Brix closely.</li> <li>Avoid unnecessary delays in harvest once target maturity has been reached.</li> <li>Recognise that overripe berries are generally more susceptible to splitting, juice leakage and sour rot development.</li> </ul>         |
| Harvest Handling                             | <ul style="list-style-type: none"> <li>Minimise berry damage during harvesting and packing</li> <li>It is critically important to remove damaged and visibly affected fruit during sorting</li> <li>Avoid harvesting wet fruit where practical.</li> </ul>                                                            |
| Packhouse Hygiene & Handling                 | <ul style="list-style-type: none"> <li>Remove leaking, broken or fermenting berries during sorting.</li> <li>Maintain clean harvest containers and packing equipment.</li> <li>Prevent contamination between healthy and affected fruit.</li> </ul>                                                                   |
| Cold Chain & Storage                         | <ul style="list-style-type: none"> <li>Not a traditional storage rot</li> <li>Emphasis should be on excluding affected fruit from storage and maintaining fruit quality through the supply chain</li> </ul>                                                                                                           |

## Key Message

Sour rot is primarily a disease of damaged, leaking berries rather than a disease of healthy fruit. Successful management depends on preventing berry injury, minimising berry splitting, managing vinegar flies and harvesting fruit before over-ripening and berry breakdown occur. Good bunch architecture, careful harvest practices, effective sorting and timely harvest are often more important than direct disease control measures.

## Botryosphaeria rot (*Botryosphaeria* spp.)

For more information, click [HERE](#)



[Click on the image to view its original source](#)

### Key Symptoms

Botryosphaeria rot, caused by *Botryosphaeria* spp., is primarily associated with mature berries and is often linked to grapevine trunk diseases. Bunch infections commonly occur when bunches come into contact with infected wood within the canopy. Affected berries develop a rot that may be localised within the bunch, particularly where direct contact with infected woody tissue occurs. The disease is typically observed in the vineyard rather than during storage and is most often associated with older vines. Because *Botryosphaeria* species are also important trunk disease pathogens, their presence in vineyards may be associated with symptoms of vine decline, including dead or diseased wood that serves as a source of infection. Berry symptoms alone may not be sufficient for definitive diagnosis. Berry symptoms may resemble those of other bunch rots and berry symptoms alone may not be sufficient for definitive diagnosis

### Conditions That Favour Disease Development

Botryosphaeria rot is most commonly associated with older vines and vineyards where grapevine trunk diseases are present. The disease occurs when *Botryosphaeria* spp. infect mature berries. Disease development is favoured by warm and wet conditions, particularly in vineyards where infected woody tissue is present. *Botryosphaeria* species produce fruiting bodies on infected wood and pruning debris. Under suitable temperature and humidity conditions, spores are released and dispersed by wind, rain, and arthropods, creating opportunities for new infections. The presence of infected dead wood, pruning debris, and trunk disease symptoms within vineyards can therefore increase the risk of disease development. Climatic conditions influence both the distribution of *Botryosphaeria* species and the expression of disease symptoms in grapevines. Bunch infections are generally considered secondary to the presence of trunk disease inoculum within the vineyard and are therefore often associated with vineyards containing established trunk disease symptoms and infected woody tissue.

## Disease Management

| Management Action                     | Recommended Practices                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cultivar Selection & Suitability      | <ul style="list-style-type: none"> <li>Avoid training systems that result in excessive bunch contact with cordons, spurs or permanent wood</li> </ul>                                                                                                                                                                                                                                                |
| Canopy Management                     | <ul style="list-style-type: none"> <li>Manage canopy architecture to minimise contact between bunches and infected woody tissue</li> <li>Maintain good bunch separation from cordons, spurs and dead wood in the canopy</li> </ul>                                                                                                                                                                   |
| Insect Management                     | <ul style="list-style-type: none"> <li>Implement sound insect management practices that may contribute to the spread of spores from infected tissue or increase opportunities for berry injury.</li> </ul>                                                                                                                                                                                           |
| Moisture Management                   | <ul style="list-style-type: none"> <li>Reduce conditions that favour prolonged humidity and wetness within the canopy</li> <li>Warm, wet conditions favour disease development and spore release from infected wood</li> </ul>                                                                                                                                                                       |
| Sanitation & Trunk Disease Management | <ul style="list-style-type: none"> <li>Remove and destroy infected wood, dead arms, canes, pruning debris and other sources of trunk disease inoculum</li> <li>Avoid leaving infected wood in the vineyard, as <i>Botryosphaeria</i> spp. produce fruiting bodies on dead wood and pruning residues</li> <li>Protect pruning wounds and minimise pruning-wound infections where possible.</li> </ul> |
| Crop Protection Products              | <ul style="list-style-type: none"> <li>Protect pruning wounds to reduce infection by trunk disease pathogens.</li> <li>Integrate crop protection products with sanitation and trunk disease management practices.</li> </ul>                                                                                                                                                                         |
| Harvest Handling                      | <ul style="list-style-type: none"> <li>Remove bunches showing symptoms of rot during harvest and packhouse sorting</li> <li>Avoid practices that bring bunches into contact with infected wood</li> </ul>                                                                                                                                                                                            |
| Cold Chain & Storage                  | <ul style="list-style-type: none"> <li>Not a traditional storage rot</li> <li>Primarily a vineyard disease</li> <li>Maintain cold chain to prevent proliferation of disease</li> </ul>                                                                                                                                                                                                               |

## Key Message

*Botryosphaeria* rot is most closely associated with vineyards affected by grapevine trunk diseases and should be viewed primarily as an extension of trunk disease management rather than a conventional bunch rot problem. Effective management depends on reducing inoculum sources through sanitation, removal of infected wood, pruning-wound protection and minimising contact between bunches and infected woody tissue. Prevention in the vineyard is substantially more important than postharvest management.



[Click on the image to view its original source](#)

## Cladosporium rot (*Cladosporium* spp.)

For more information, click [HERE](#)

### Key Symptoms

Cladosporium rot is typically observed as a postharvest disease that develops on grapes after periods of rain close to harvest. Infected berries initially develop small, superficial lesions that may enlarge as the disease progresses. The fungus often attacks older berries rather than causing decay of the entire bunch. Affected berries may become discoloured and develop dark olive-green to black fungal growth on the berry surface, giving them a mouldy appearance. Symptoms are often not visible at harvest and may only become apparent during storage or transit. Infections may remain latent at harvest, with symptom expression occurring later during storage and marketing

### Conditions That Favour Disease Development

Cladosporium rot is associated with wet and rainy conditions, particularly when rainfall occurs close to harvest. The disease has been reported on late-harvest fruit following rain events, indicating that prolonged periods of moisture favour infection and disease development. Unlike several other non-Botrytis bunch rot pathogens, *Cladosporium* spp. can infect both uninjured and wounded berries, allowing infections to develop even in the absence of visible berry damage. Infection is often not detectable at harvest, with symptoms becoming evident only later during storage or transit.

The pathogen may continue to develop during storage where latent infections are present, making postharvest conditions important in disease expression. Disease risk may therefore increase when latent infections established in the vineyard are carried through the storage and export chain. Disease risk is generally increased following rainfall close to harvest, prolonged berry wetness and delayed harvest of mature fruit.

## Disease Management

| Management Action                            | Recommended Practices                                                                                                                                                                                                                                                                      |
|----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cultivar Selection & Suitability             | <ul style="list-style-type: none"> <li>Where possible, select varieties with loose bunch architecture that dries more rapidly after rain</li> </ul>                                                                                                                                        |
| Canopy Management                            | <ul style="list-style-type: none"> <li>Maintain an open canopy through appropriate shoot positioning and leaf removal to improve airflow and reduce humidity within the bunch zone</li> </ul>                                                                                              |
| Crop Load & Bunch Architecture Management    | <ul style="list-style-type: none"> <li>Avoid excessive bunch compactness that delays bunch drying after rainfall.</li> <li>Promote bunch architecture that reduces prolonged berry-to-berry moisture retention.</li> </ul>                                                                 |
| Insect Management                            | <ul style="list-style-type: none"> <li>Maintain good insect management practices to minimise berry injury and maintain fruit quality.</li> </ul>                                                                                                                                           |
| Moisture Management                          | <ul style="list-style-type: none"> <li>Reduce prolonged berry wetness by promoting rapid drying after rainfall and maintaining good vineyard circulation</li> <li>Particular attention should be paid to vineyards experiencing rainfall close to harvest</li> </ul>                       |
| Sanitation                                   | <ul style="list-style-type: none"> <li>Remove diseased bunches and maintain vineyard hygiene to reduce potential sources of inoculum</li> </ul>                                                                                                                                            |
| Crop Protection Products                     | <ul style="list-style-type: none"> <li>Follow crop protection programmes recommended for bunch rot management where appropriate</li> <li>Generally managed by SO<sub>2</sub> treatments during storage and shipment</li> </ul>                                                             |
| Ripening & Harvest Timing (°Brix Management) | <ul style="list-style-type: none"> <li>Monitor berry maturity and °Brix closely.</li> <li>Avoid unnecessary delays in harvest following rainfall events where possible.</li> <li>Mature fruit exposed to prolonged wet conditions may be at greater risk of disease expression.</li> </ul> |
| Harvest Handling                             | <ul style="list-style-type: none"> <li>Exercise additional care when harvesting fruit after rain events</li> <li>Avoid harvesting wet fruit where practical.</li> <li>Remove bunches showing visible symptoms of decay during harvest and packhouse sorting</li> </ul>                     |
| Packhouse Hygiene & Handling                 | <ul style="list-style-type: none"> <li>Remove bunches showing visible symptoms of decay during sorting.</li> <li>Minimise berry damage during handling and packaging.</li> <li>Maintain good hygiene throughout packing operations.</li> </ul>                                             |
| Cold Chain & Storage                         | <ul style="list-style-type: none"> <li>Maintain effective cold chain management and use SO<sub>2</sub> treatments</li> </ul>                                                                                                                                                               |

## Key Message

Cladosporium rot is commonly associated with rainfall close to harvest and may remain undetected until fruit enters storage or transit. Effective management focuses on reducing berry wetness, promoting rapid bunch drying, harvesting fruit promptly after rainfall where possible, and maintaining an effective cold chain and SO<sub>2</sub> programme throughout storage and export.



[Click on the image to view its original source](#)

## Colletotrichum rot (*Colletotrichum* spp.)

For more information, click [HERE](#)

### Key Symptoms

Colletotrichum rot (ripe rot), caused by *Colletotrichum* spp., typically affects berries that have lost turgor and begun to soften. Infected berries develop a rot that progresses as berry condition deteriorates, resulting in shrivelled, decayed fruit within the bunch. The disease is most commonly observed under warm, wet conditions and may affect individual berries or groups of berries within a bunch. As infection advances, berries become increasingly soft and collapsed, leading to bunch deterioration and reduced fruit quality. Two species, *Colletotrichum acutatum* and *C. gloeosporioides*, are associated with ripe rot, although *C. acutatum* is reported as the predominant species found in vineyards. The disease is generally regarded as a vineyard disease rather than a traditional storage rot.

### Conditions That Favour Disease Development

Colletotrichum rot (ripe rot) occurs most frequently in subtropical climates characterised by warm, wet conditions. The disease is typically associated with berries that have lost turgor, indicating that physiologically stressed, softened or overripe berries are more susceptible to infection. As a non-Botrytis bunch rot, disease development is further favoured when susceptible fruit is exposed to prolonged periods of moisture and high humidity. Conditions that result in extended wetness of bunches can increase the likelihood of infection and berry decay. Two species, *Colletotrichum acutatum* and *C. gloeosporioides*, are associated with ripe rot, with *C. acutatum* reported as the predominant species in vineyards. The disease is regarded primarily as a vineyard disease rather than a storage rot, with infections developing under favourable field conditions before harvest. Delayed harvest, elevated berry sugar levels (°Brix), berry softening and prolonged wet conditions close to harvest may further increase disease risk.

## Disease Management

| Management Action                            | Recommended Practices                                                                                                                                                                                                                                                                                                                                                                         |
|----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cultivar Selection & Suitability             | <ul style="list-style-type: none"> <li>Select cultivars with looser bunch architecture and lower susceptibility to berry injury and deterioration where possible</li> </ul>                                                                                                                                                                                                                   |
| Canopy Management                            | <ul style="list-style-type: none"> <li>Maintain an open canopy through leaf removal, shoot positioning and vigour control to improve airflow and reduce humidity and moisture retention within the bunch zone</li> </ul>                                                                                                                                                                      |
| Insect Management                            | <ul style="list-style-type: none"> <li>Manage insects that may damage berries and contribute to berry deterioration</li> </ul>                                                                                                                                                                                                                                                                |
| Moisture Management                          | <ul style="list-style-type: none"> <li>Promote rapid drying of bunches after rainfall or irrigation through good air circulation and site selection</li> </ul>                                                                                                                                                                                                                                |
| Sanitation                                   | <ul style="list-style-type: none"> <li>Remove infected, shrivelled and decaying berries and bunches from the vineyard to reduce potential sources of inoculum</li> </ul>                                                                                                                                                                                                                      |
| Crop Protection Products                     | <ul style="list-style-type: none"> <li><i>C. acutatum</i> and <i>C. gloeosporioides</i> differ in fungicide sensitivity, highlighting the importance of selecting appropriate products.</li> <li>Follow crop protection recommendations appropriate for local disease pressure and resistance management requirements.</li> </ul>                                                             |
| Berry Injury & Sunburn Management            | <ul style="list-style-type: none"> <li>Minimise berry cracking, berry splitting, sunburn and mechanical injury.</li> <li>Reduce conditions that accelerate berry deterioration during ripening.</li> </ul>                                                                                                                                                                                    |
| Ripening & Harvest Timing (°Brix Management) | <ul style="list-style-type: none"> <li>Monitor berry maturity and °Brix closely.</li> <li>Avoid unnecessary delays in harvest once target maturity has been reached.</li> <li>Recognise that softened, overripe berries are generally more susceptible to ripe rot development.</li> <li>Consider disease pressure and forecast rainfall when scheduling harvest.</li> </ul>                  |
| Harvest Management                           | <ul style="list-style-type: none"> <li>Harvest fruit promptly and minimise berry damage during harvest and packing</li> <li>Remove affected bunches during sorting to prevent fruit quality deterioration</li> <li>Avoid harvesting wet fruit where practical.</li> </ul>                                                                                                                     |
| Packhouse Hygiene & Handling                 | <ul style="list-style-type: none"> <li>Remove visibly decayed berries and bunches during sorting.</li> <li>Maintain hygienic handling practices.</li> <li>Minimise berry injury during packing and transport.</li> </ul>                                                                                                                                                                      |
| Cold Storage & Management                    | <ul style="list-style-type: none"> <li>Considered primarily a vineyard disease</li> <li>Rapidly pre-cool fruit following harvest and maintain pulp temperatures throughout storage and export.</li> <li>Maintain an uninterrupted cold chain to preserve fruit quality.</li> <li>Emphasis should remain on preventing vineyard infection and excluding affected fruit from storage</li> </ul> |

## Key Message

Ripe rot (*Colletotrichum* spp.) is primarily a vineyard disease associated with warm, wet conditions, berry softening and advanced fruit maturity. Effective management depends on maintaining good bunch-zone airflow, minimising prolonged berry wetness, avoiding delays in harvest, and removing infected fruit before it enters the export chain. Particular attention should be paid to disease risk when elevated °Brix, berry softening and rainfall occur close to harvest.



[Click on the image to view its original source](#)

## Black spot or Anthracnose (*Elsinoë ampelina*)

For more information, click [HERE](#)

### Key Symptoms

*Elsinoë ampelina*, the causal agent of anthracnose (also referred to as black spot), primarily affects berries before véraison. Infected berries develop small, dark, sunken black spots that are characteristic of the disease. As berries mature, these lesions harden and persist as distinct marks on the berry surface. The disease is generally associated with cosmetic damage to the fruit rather than a soft rot. As a result, affected berries may reach maturity with the characteristic black, hardened lesions still visible, reducing the visual quality and marketability of the bunch. Symptoms are typically evident on berries before harvest and remain visible on mature fruit. Similar lesions may also occur on shoots, tendrils and leaves, particularly during early-season infections

### Conditions That Favour Disease Development

Anthracnose, caused by *Elsinoë ampelina*, primarily infects young, developing berries before véraison, when fruit is most susceptible. As berries mature, infections become less significant, although lesions that develop earlier in the season remain visible as hardened black spots on ripe fruit. The pathogen is favoured by warm, wet conditions, particularly when rainfall, prolonged berry wetness, or high humidity coincide with susceptible stages of berry development. These conditions promote infection and lesion development on young fruit. *Elsinoë ampelina* survives between seasons on infected vine tissue and serves as a source of inoculum for new infections. Disease risk therefore increases where infected plant material is present and periods of rain or splash dispersal occur during the early stages of shoot and berry development. Frequent rainfall during early-season shoot growth and fruit development can substantially increase disease pressure.

## Disease Management

| Management Action                | Recommended Practices                                                                                                                                                                                                                       |
|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cultivar Selection & Suitability | <ul style="list-style-type: none"><li>• Select cultivars with looser bunch architecture where possible</li></ul>                                                                                                                            |
| Canopy Management                | <ul style="list-style-type: none"><li>• Maintain an open canopy through appropriate leaf removal, shoot positioning and vigour management to improve air circulation and reduce humidity and prolonged wetness around the bunches</li></ul> |
| Moisture Management              | <ul style="list-style-type: none"><li>• Reduce periods of prolonged moisture on vines and bunches where possible</li></ul>                                                                                                                  |
| Sanitation                       | <ul style="list-style-type: none"><li>• Remove infected plant material and maintain good vineyard hygiene to reduce sources of inoculum that may survive between seasons</li></ul>                                                          |
| Crop Protection Products         | <ul style="list-style-type: none"><li>• Crop protection products should be used as part of an integrated disease management programme and combined with sanitation and canopy management practices.</li></ul>                               |
| Harvest Handling                 | <ul style="list-style-type: none"><li>• Remove affected bunches during harvest and sorting to maintain fruit quality and marketability</li></ul>                                                                                            |
| Packhouse Hygiene & Handling     | <ul style="list-style-type: none"><li>• Remove heavily affected bunches during sorting to maintain export quality standards.</li></ul>                                                                                                      |
| Cold Chain & Storage             | <ul style="list-style-type: none"><li>• Considered a vineyard disease</li><li>• Emphasis should remain on excluding affected fruit from storage rather than controlling disease after harvest.</li></ul>                                    |

## Key Message

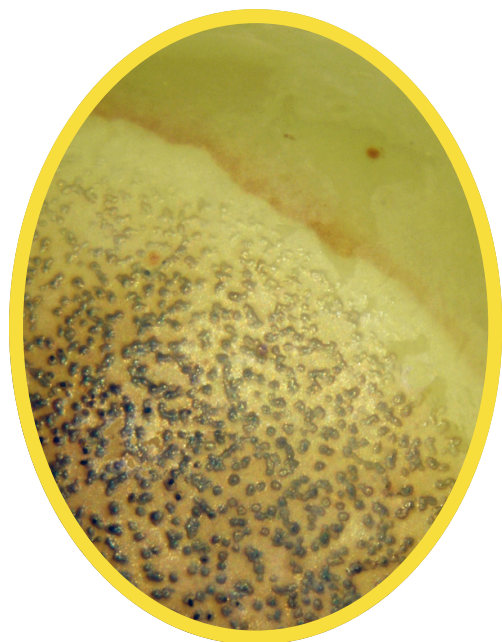
Anthrachnose (*Elsinoë ampelina*) is primarily a disease of young, developing tissues and is most damaging when warm, wet conditions coincide with early berry development. Effective management focuses on reducing inoculum sources, protecting susceptible tissues during early-season growth, promoting rapid drying of vines after rainfall and maintaining good vineyard sanitation. Because symptoms remain visible on mature berries, even low levels of disease can reduce bunch appearance and marketability.

## Bitter rot (*Greeneria uvicola*)

For more information, click [HERE](#)

### Key Symptoms

Bitter rot, caused by *Greeneria uvicola*, is primarily observed in the vineyard and is associated with warm, wet conditions close to harvest. Early symptoms typically appear on berries as small areas of discolouration that enlarge as the infection progresses. Affected berries become soft and decay, eventually shrivelling and collapsing. As disease severity increases, infected berries may remain attached to the bunch while becoming dry and mummified. Infected berries may occur individually or in clusters within the bunch, depending on disease severity and environmental conditions.



[Click on the image to view its original source](#)

### Conditions That Favour Disease Development

Bitter rot is most commonly associated with warm and wet conditions close to harvest. Disease risk increases when periods of rainfall, high humidity or prolonged moisture occur during the ripening period, creating favourable conditions for infection and disease development. As a non-*Botrytis* bunch rot pathogen, bitter rot is favoured by environmental conditions that prolong moisture on berries and within the bunch zone. Extended wetness periods during the later stages of berry development increase the likelihood of infection and symptom development. The pathogen survives between seasons on infected berries and vine debris, providing a source of inoculum for new infections. Disease pressure may therefore increase in vineyards where infected fruit remains in the canopy or on the vineyard floor. Bitter rot is primarily a vineyard disease rather than a storage rot, with infections developing in the field before harvest. Delayed harvest, elevated berry sugar levels (°Brix) and prolonged wet conditions during ripening may further increase disease risk.



[Click on the image to view its original source](#)

## Disease Management

| Management Action                            | Recommended Practices                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cultivar Selection & Suitability             | <ul style="list-style-type: none"> <li>Select cultivars with looser bunch architecture where possible</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Canopy Management                            | <ul style="list-style-type: none"> <li>Maintain an open canopy through appropriate leaf removal, shoot positioning and vigour management to improve air circulation and reduce humidity and prolonged wetness around the bunches</li> </ul>                                                                                                                                                                                                                                                                                                                                                    |
| Moisture Management                          | <ul style="list-style-type: none"> <li>Reduce prolonged periods of berry wetness by promoting rapid drying after rainfall and ensuring adequate air movement within the vineyard</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                    |
| Sanitation                                   | <ul style="list-style-type: none"> <li>Remove infected mummified and decayed berries from vines and the vineyard floor</li> <li>Good vineyard hygiene is an important component of disease management</li> </ul>                                                                                                                                                                                                                                                                                                                                                                               |
| Crop Protection Products                     | <ul style="list-style-type: none"> <li>Crop protection products should be used as part of an integrated disease management programme and combined with sanitation and canopy management practices.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                  |
| Sunburn Management                           | <ul style="list-style-type: none"> <li>Minimise berry exposure to excessive solar radiation through appropriate canopy management.</li> <li>Avoid excessive leaf removal that results in sudden exposure of bunches during hot periods.</li> <li>Manage vine water status to reduce berry stress during periods of high temperature.</li> <li>Recognise that sunburned berries are more susceptible to cracking, berry deterioration and opportunistic bunch rot pathogens.</li> <li>Prioritise harvesting heavily sunburned blocks where fruit quality deterioration is occurring.</li> </ul> |
| Ripening & Harvest Timing (°Brix Management) | <ul style="list-style-type: none"> <li>Monitor berry maturity and °Brix closely. Avoid unnecessary delays in harvest once target maturity has been reached.</li> <li>Recognise that mature berries exposed to prolonged wet conditions may be at greater risk of infection and disease development.</li> </ul>                                                                                                                                                                                                                                                                                 |
| Harvest Management                           | <ul style="list-style-type: none"> <li>Harvest fruit promptly when mature and remove infected bunches and berries during harvest and packhouse sorting</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Packhouse Hygiene & Handling                 | <ul style="list-style-type: none"> <li>Remove visibly infected berries and bunches during sorting.</li> <li>Maintain hygienic handling practices and minimise berry damage during packing and transport.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                            |
| Cold Chain & Storage                         | <ul style="list-style-type: none"> <li>Considered primarily a vineyard disease</li> <li>Rapidly pre-cool fruit following harvest and maintain pulp temperatures between -0.5 (considered optimum) and 1.0°C throughout storage and export.</li> <li>Emphasis should remain on preventing vineyard infection and excluding affected fruit from storage</li> </ul>                                                                                                                                                                                                                               |

## Key Message

Bitter rot (*Greeneria uvicola*) is primarily a vineyard disease associated with warm, wet conditions during ripening and close to harvest. Effective management depends on reducing inoculum sources, minimising prolonged berry wetness, maintaining good bunch-zone airflow and removing infected fruit before it enters the export chain. Particular attention should be paid to disease risk when rainfall, elevated °Brix and delayed harvest coincide during ripening.

## Black rot (*Guignardia bidwellii*)

For more information, click [HERE](#)



[Click on the image to view its original source](#)

### Key Symptoms

Black rot, caused by *Guignardia bidwellii*, primarily affects young berries, which are most susceptible to infection between flowering and bunch closure. Symptoms typically become visible 10–30 days after infection. Early berry symptoms appear as small, light brown circular lesions that enlarge and darken as the disease progresses. Infected berries gradually shrivel, become hard and eventually develop into characteristic dark, mummified berries that remain attached to the bunch. These mummified berries are a distinguishing feature of the disease. Black rot can also affect leaves and shoots, where lesions initially appear as small brown spots that enlarge and develop dark margins. Tiny black fruiting bodies may become visible within older lesions. On berries, disease progression from initial spotting to complete shrivelling and mummification is often the most characteristic symptom.

### Conditions That Favour Disease Development

Black rot survives primarily in mummified berries and infected vine debris, which serve as important sources of inoculum for new infections. Disease pressure is therefore increased in vineyards where infected berries or plant material remain from previous seasons. In spring, rainfall and warm temperatures trigger the release and spread of inoculum from these overwintering sources. The disease is favoured by wet, humid conditions and warm temperatures, which promote infection and disease

development. Young leaves and berries are the most susceptible tissues, with grape clusters being at greatest risk between flowering and bunch closure. Infections occurring during this period can result in berry symptoms becoming visible approximately 10–30 days later. Prolonged periods of rainfall, high relative humidity, and extended berry wetness increase the likelihood of infection. Disease development is most severe when these favourable environmental conditions coincide with susceptible stages of berry growth and the presence of inoculum in the vineyard. Disease risk is greatest during early berry development, when young berries are highly susceptible to infection.



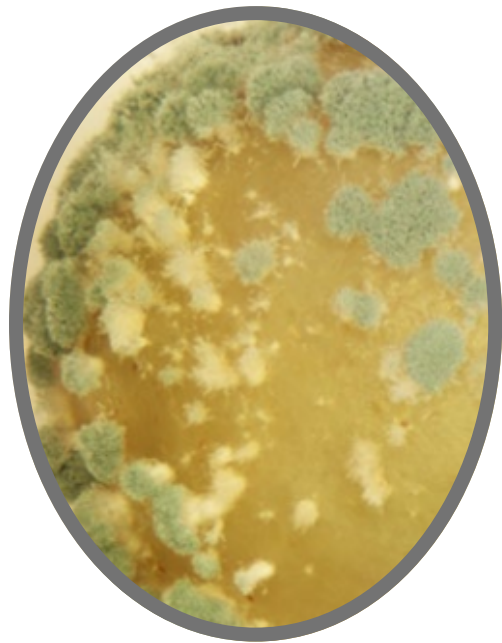
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## Disease Management

| Management Action                | Recommended Practices                                                                                                                                                                                                  |
|----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cultivar Selection & Suitability | <ul style="list-style-type: none"> <li>Select cultivars with looser bunch architecture where possible</li> </ul>                                                                                                       |
| Canopy Management                | <ul style="list-style-type: none"> <li>Maintain an open canopy through shoot positioning, leaf removal and vigour management to improve airflow and reduce humidity within the fruiting zone</li> </ul>                |
| Moisture Management              | <ul style="list-style-type: none"> <li>Reduce prolonged periods of berry and leaf wetness by promoting rapid drying after rainfall and ensuring adequate air movement within the vineyard</li> </ul>                   |
| Sanitation                       | <ul style="list-style-type: none"> <li>Remove and destroy mummified berries and infected vine debris – primary sources of inoculum</li> </ul>                                                                          |
| Crop Protection Products         | <ul style="list-style-type: none"> <li>Crop protection products should be used as part of an integrated disease management plan – combine with cultural practices</li> </ul>                                           |
| Ripening & Harvest Timing        | <ul style="list-style-type: none"> <li>Although infection occurs earlier in the season, timely harvest and removal of infected bunches assist in maintaining fruit quality and reducing carry-over inoculum</li> </ul> |
| Harvest Management               | <ul style="list-style-type: none"> <li>Remove infected bunches and mummified berries during harvest and packhouse sorting to reduce quality defects and prevent the carry-over of infected materials</li> </ul>        |
| Packhouse Hygiene & Handling     | <ul style="list-style-type: none"> <li>Remove visibly infected bunches and berries during sorting to maintain fruit quality standards</li> </ul>                                                                       |
| Cold Chain & Storage             | <ul style="list-style-type: none"> <li>Considered primarily a vineyard disease</li> <li>Emphasis should remain on preventing vineyard infection and excluding affected fruit from storage</li> </ul>                   |

## Key Message

Black rot (*Guignardia bidwellii*) is primarily a disease of young berries and developing tissues, with infection occurring most readily between flowering and bunch closure. Effective management depends on reducing inoculum through the removal of mummified berries and infected debris, promoting rapid drying of vines after rainfall, and protecting susceptible tissues during early-season disease-risk periods. Prevention in the vineyard is substantially more important than postharvest management.



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## Penicillium rot or Blue mould (*Penicillium* spp.)

For more information, click [HERE](#)

### Key Symptoms

Penicillium rot, caused by *Penicillium* spp., is a wound pathogen that infects berries through existing injuries or damaged tissue. Early symptoms appear as soft, water-soaked areas on infected berries, which rapidly progress as the disease develops. As infection advances, the fungus invades the entire berry, causing the flesh to break down into a soft, watery mass. Under favourable conditions, infected berries become covered with characteristic blue-green fungal growth, which gives the disease its common name. Infected berries often collapse rapidly and may serve as a source of inoculum for neighbouring wounded berries.

### Conditions That Favour Disease Development

Penicillium rot is a wound-mediated disease that infects berries through existing injuries. Infection is therefore favoured by any factor that causes berry damage including mechanical injury during harvesting and handling, berry splitting, insect damage, or other physical wounds. The pathogen can be spread through contaminated harvesting, packing and handling equipment, increasing the risk of infection where sanitation practices are inadequate. Penicillium rot is reported more frequently in cool-climate vineyards and can develop when wounded berries are exposed to favourable environmental conditions. The disease is most likely to become established when damaged berries are not removed during harvest or packing and when contaminated fruit enters storage. Because infection occurs through wounds, factors that increase berry cracking, splitting or mechanical injury substantially increase disease risk.

## Disease Management

| Management Action                | Recommended Practices                                                                                                                                                                                                                                                                                                                                                                               |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cultivar Selection & Suitability | <ul style="list-style-type: none"> <li>Select cultivars with looser bunch architecture and lower susceptibility to berry splitting where possible</li> </ul>                                                                                                                                                                                                                                        |
| Canopy Management                | <ul style="list-style-type: none"> <li>Maintain an open canopy to promote airflow and reduce humidity and prolonged moisture around bunches</li> <li>Practices that minimise berry splitting and bunch deterioration may help reduce opportunities for infection</li> </ul>                                                                                                                         |
| Insect Management                | <ul style="list-style-type: none"> <li>Manage insects that can cause berry injury, as wounds serve as infection sites for <i>Penicillium</i> spp.</li> <li>Effective insect management forms part of an integrated disease management strategy</li> </ul>                                                                                                                                           |
| Moisture Management              | <ul style="list-style-type: none"> <li>Reduce prolonged periods of berry wetness and high humidity by promoting rapid drying after rainfall or irrigation</li> <li>High moisture levels favour fungal growth on wounded berries</li> </ul>                                                                                                                                                          |
| Sanitation                       | <ul style="list-style-type: none"> <li>Maintain strict hygiene throughout the production and packing chain</li> <li>Regularly clean and disinfect equipment, as contaminated equipment can spread the pathogen</li> <li>Remove infected berries and bunches during sorting</li> </ul>                                                                                                               |
| Crop Protection Products         | <ul style="list-style-type: none"> <li>Crop protection products should be used as part of an integrated disease management programme and combined with cultural practices that minimise berry injury.</li> </ul>                                                                                                                                                                                    |
| Berry Injury Management          | <ul style="list-style-type: none"> <li>Minimise berry cracking, splitting, punctures and mechanical damage. Because <i>Penicillium</i> is a wound pathogen, preserving berry integrity is one of the most effective management practices.</li> </ul>                                                                                                                                                |
| Harvest Management               | <ul style="list-style-type: none"> <li>Minimise berry injury during harvesting, packing and transport</li> <li>Avoid crushing, puncturing and skin damage – infection occurs through wounds</li> <li>Remove damaged and infected fruit during packhouse and sorting</li> </ul>                                                                                                                      |
| Packhouse Hygiene & Handling     | <ul style="list-style-type: none"> <li>Maintain strict hygiene throughout packing operations.</li> <li>Clean harvest containers, equipment and packing lines regularly.</li> <li>Prevent contamination between healthy and infected fruit.</li> </ul>                                                                                                                                               |
| Cold Chain & Storage             | <ul style="list-style-type: none"> <li>Rapidly pre-cool fruit following harvest and maintain an uninterrupted cold chain</li> <li>Remove infected berries before storage and avoid storing damaged fruit</li> <li>Maintain pulp temperatures between -0.5 and 1.0°C throughout storage and export. Good temperature management helps slow disease development and maintain fruit quality</li> </ul> |

## Key Message

*Penicillium* rot is primarily a wound-mediated disease. Successful management depends on preventing berry injury, maintaining strict sanitation throughout harvesting and packing operations, removing infected fruit before storage, and maintaining an uninterrupted cold chain. Protecting berry integrity is often more important than direct disease control measures because infection occurs almost exclusively through damaged tissue.

## Phomopsis rot (*Phomopsis viticola*)

For more information, click [HERE](#)



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### Key Symptoms

Phomopsis rot, caused by *Phomopsis viticola*, is most commonly associated with a pathogen that causes cane and leaf blight but can also infect grape bunches when berries are damaged. Infected berries develop rot that results in the deterioration of affected fruit and reduced bunch quality. As infection progresses, affected berries become discoloured and decayed, with symptoms often confined to damaged portions of the bunch. Because *Phomopsis viticola* is also associated with infections of shoots, canes and leaves, bunch infections may occur in vineyards where symptoms of cane and leaf blight are present. The presence of cane, shoot and leaf symptoms may provide an indication that inoculum is present within the vineyard.

### Conditions That Favour Disease Development



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Phomopsis rot is favoured by warm, wet conditions, particularly when these conditions coincide with the presence of damaged berries. Berry damage caused by splitting, insect feeding, hail, sunburn or other physical injuries increases susceptibility to infection by providing entry points for the pathogen. Like many non-Botrytis bunch rot pathogens, disease development is promoted by high humidity, prolonged moisture and extended periods of berry wetness. Conditions that restrict airflow within the canopy and delay the drying of bunches may increase disease risk. The pathogen can survive on

infected vine tissues, providing a source of inoculum for new infections. Vineyards with a history of cane and leaf blight may experience increased disease pressure where infected tissues remain in the canopy.

## Disease Management

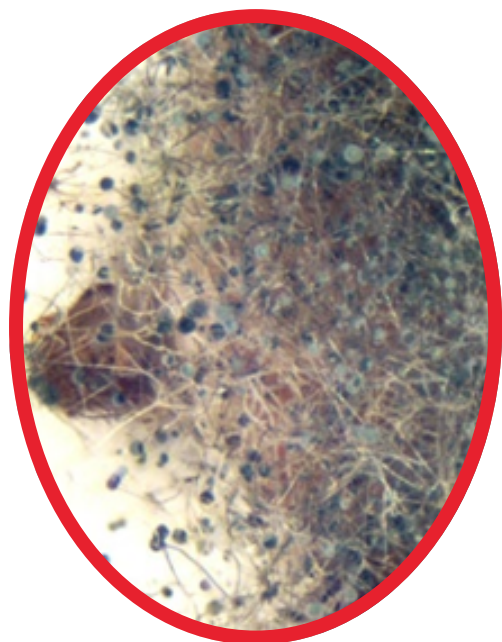
| Management Action                | Recommended Practices                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cultivar Selection & Suitability | <ul style="list-style-type: none"> <li>Select cultivars with looser bunch architecture where possible</li> </ul>                                                                                                                                                                                                                                                                                         |
| Canopy Management                | <ul style="list-style-type: none"> <li>Maintain an open canopy through appropriate shoot positioning, leaf removal and vigour management to improve airflow and reduce humidity</li> </ul>                                                                                                                                                                                                               |
| Insect Management                | <ul style="list-style-type: none"> <li>Manage insects that may cause berry damage</li> </ul>                                                                                                                                                                                                                                                                                                             |
| Moisture Management              | <ul style="list-style-type: none"> <li>Promote rapid drying of bunches after rainfall or irrigation by maintaining good airflow and avoiding excess canopy density</li> </ul>                                                                                                                                                                                                                            |
| Sanitation & Inoculum Management | <ul style="list-style-type: none"> <li>Remove infected canes, shoots, leaves and bunches where practical to reduce inoculum sources.</li> <li>Remove and destroy heavily infected vine material during pruning and vineyard sanitation operations.</li> <li>Remove infected berries and bunches where present.</li> </ul>                                                                                |
| Crop Protection Products         | <ul style="list-style-type: none"> <li>Crop protection products should be used as part of an integrated disease management programme and combined with cultural practices.</li> </ul>                                                                                                                                                                                                                    |
| Berry Injury Management          | <ul style="list-style-type: none"> <li>Minimise berry splitting, sunburn, hail damage and mechanical injury that may provide infection sites for the pathogen.</li> </ul>                                                                                                                                                                                                                                |
| Harvest Management               | <ul style="list-style-type: none"> <li>Minimise berry injury during harvesting, packing and transport</li> <li>Avoid crushing, puncturing and skin damage – infection occurs through wounds</li> <li>Remove damaged and infected fruit during packhouse and sorting</li> </ul>                                                                                                                           |
| Cold Chain & Storage             | <ul style="list-style-type: none"> <li>Rapidly pre-cool fruit after harvest and maintain an uninterrupted cold chain</li> <li>Remove infected berries before storage and avoid storing damaged fruit</li> <li>Maintain pulp temperatures between -0.5 and 1.0°C throughout storage and export.</li> <li>Good temperature management helps slow disease development and maintain fruit quality</li> </ul> |

## Key Message

*Phomopsis viticola* is best known as the cause of cane and leaf blight, but it can also contribute to bunch rot when berries are damaged. Effective management relies on reducing vineyard inoculum through the removal of infected vine tissues, promoting rapid drying of bunches, maintaining good canopy airflow and minimising berry injury. Disease prevention in the vineyard is far more important than postharvest management.

## Rhizopus rot (*Rhizopus* spp.)

For more information, click [HERE](#)



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### Key Symptoms

Rhizopus rot, caused by *Rhizopus* spp., is characterised by a rapid breakdown of infected berries into a soft, watery mass. In the early stages, infected berries may show few or no visible external symptoms. A distinguishing feature of the disease is that infected berries often burst and release a watery pulp when slight pressure is applied. As the disease progresses, berries lose their structural integrity and become soft, water-soaked and collapsed. Under favourable conditions, the fungus may produce a conspicuous cobweb-like network of white mycelium over infected berries and bunches. Numerous upright sporangiophores bearing small, spherical, dark sporangia may develop within this fungal growth. Disease progression is often rapid once infection becomes established in wounded berries.

### Conditions That Favour Disease Development

Rhizopus rot infects berries primarily through wounds and damaged tissue. Berry injury resulting from splitting, insect feeding, sunburn, hail, harvesting operations or other forms of mechanical damage creates entry points for infection. The disease is favoured by warm conditions, under which the pathogen can grow and spread rapidly through damaged fruit. Unlike some other bunch rot pathogens, *Rhizopus* proliferates quickly when temperatures are elevated, leading to rapid breakdown of infected berries and bunches. Rhizopus rot is frequently associated with damaged fruit entering storage or exposure of infected fruit to conditions that favour rapid fungal growth. Disease development may also be enhanced by conditions that prolong moisture and increase humidity around damaged berries.

## Disease Management

| Management Action                | Recommended Practices                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cultivar Selection & Suitability | <ul style="list-style-type: none"> <li>Select cultivars with looser bunch architecture and lower susceptibility to berry splitting where possible</li> </ul>                                                                                                                                                                                                                                                                                                 |
| Canopy Management                | <ul style="list-style-type: none"> <li>Maintain an open canopy through shoot positioning, leaf removal, and vigour management to improve airflow and reduce humidity within the bunch zone</li> </ul>                                                                                                                                                                                                                                                        |
| Insect Management                | <ul style="list-style-type: none"> <li>Manage insects that may cause berry damage – wounds serve as disease entry points</li> </ul>                                                                                                                                                                                                                                                                                                                          |
| Moisture Management              | <ul style="list-style-type: none"> <li>Promote rapid drying of bunches after rainfall or irrigation by maintaining good airflow and avoiding excess canopy density</li> </ul>                                                                                                                                                                                                                                                                                |
| Sanitation                       | <ul style="list-style-type: none"> <li>Remove infected, damaged, and decaying berries during vineyard, harvest, and packhouse operations</li> </ul>                                                                                                                                                                                                                                                                                                          |
| Crop Protection Products         | <ul style="list-style-type: none"> <li>Crop protection products should be used as part of an integrated disease management programme and combined with cultural practices.</li> </ul>                                                                                                                                                                                                                                                                        |
| Berry Injury Management          | <ul style="list-style-type: none"> <li>Minimise berry splitting, sunburn, hail damage, compression injury and mechanical damage. Because <i>Rhizopus</i> is a wound pathogen, preserving berry integrity is critical for disease management.</li> </ul>                                                                                                                                                                                                      |
| Harvest Management               | <ul style="list-style-type: none"> <li>Minimise berry injury during harvesting, packing, and transport.</li> <li>Avoid crushing, puncturing, and excessive pressure on fruit, as <i>Rhizopus</i> is a wound pathogen that rapidly colonises damaged berries.</li> <li>Remove affected bunches during sorting.</li> </ul>                                                                                                                                     |
| Packhouse Hygiene & Handling     | <ul style="list-style-type: none"> <li>Remove damaged, leaking or infected berries during sorting.</li> <li>Minimise berry injury during packing operations and prevent contamination between healthy and infected fruit.</li> </ul>                                                                                                                                                                                                                         |
| Cold Chain & Storage             | <ul style="list-style-type: none"> <li>Rapidly pre-cool fruit after harvest and maintain an uninterrupted cold chain.</li> <li><i>Rhizopus</i> rot is often associated with significant temperature mismanagement and proliferates rapidly under warm conditions.</li> <li>Maintain pulp temperatures between -0.5 (considered optimum) and 1.0°C throughout storage and export. Exclude infected fruit from storage and avoid temperature abuse.</li> </ul> |

## Key Message

*Rhizopus* rot is a rapidly developing wound-mediated disease that primarily affects damaged berries. Successful management depends on preventing berry injury, removing infected fruit before storage, maintaining strict handling standards, and preserving an uninterrupted cold chain. Because the pathogen develops rapidly under warm conditions, careful temperature management is essential to limit disease spread and maintain fruit quality.

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