Introduction
Monitoring for most pests and diseases is not just focused on detection of symptoms. This is especially so for bunch rots which often do not give good early warning symptoms. Monitoring needs to envelop symptoms, other pests and diseases, weather, susceptible varieties, stages of growth, nutrition, irrigation and canopy management to be successful in managing bunch rots.

Types of bunch rots
Primary rots
Primary rots can infect berries directly, but also invade after damage or warm and wet conditions.
- Alternaria - rot area tan/brown often near stem. Can infect through pedicel.
- Bitter rot, Greeneria - concentric rings, berry softening, berry drop, shiny appearance on skin at berry softening with black spores developing on skin surface.
- Botrytis - berries brown, brown/grey spores develop on splits or damage.

Secondary rots
Many of the rots noted are those which invade after significant damage has occurred in the bunch close to harvest. This can occur from rain causing splitting, bird or bee damage, or bunches being too tight causing internal berries to split. Typically the secondary rots in the Riverland/Sunraysia include:
- Sour rots – yeast/bacteria after bird or bee damage or rain. Sour or fermenting smells. Associated with vinegar flies.
- Rhizopus – beard or cobweb-like mycelium, greyish in colour. Berries soft and brown.
- Penicillium – masses of white/green/blue spores.

Field monitoring
Early season symptoms
Field monitoring for early symptoms of powdery mildew and downy mildew is an important tool in the decision-making process in the control of mildews. Bunch rots however are not always visible, or are difficult to detect. Early symptoms of Botrytis may sometimes be seen on leaves as a triangular area of necrotic tissue with a yellow margin, or soft rots on young stems. Therefore at present there are no reliable methods to monitor for these diseases in the field during the early part of the season.

After véraison symptoms
Symptoms are more obvious closer to harvest. If bunch rot symptoms are noted on maturing berries there may be an option of earlier harvest, or some late controls may be available to help stop infections from becoming severe. At this late stage a lot depends on weather conditions as to how serious the bunch rot will be.

M onitoring pests and disease
Bunch rots in general, and Botrytis specifically, need two conditions to become established:
- berry or tissue damage
- warm and wet environment.

M onitoring and control of LBA M, powdery mildew and downy mildew throughout the season is important, especially in high Botrytis risk areas, as they can provide damage sites for the invasion of rot organisms.

M onitoring weather
Bunch rots cannot occur without a warm and wet environment. In high risk areas or with more susceptible varieties, some preventative action may be able to be taken before a weather event, or directly after an event. This needs to be linked with a good understanding of conditions for disease development, latency testing, field symptoms and knowledge of which chemicals will work in your situation.

M onitoring susceptible varieties
All growers know which of their varieties are most susceptible to bunch rots and Botrytis. These should be included in ground field monitoring programs. In our district (Riverland and Sunraysia) Semillon and Grenache are varieties that can be badly infected, while Cabernet is least affected.

M onitoring stage of growth
Botrytis can invade at flowering through scars which are caused when flower caps are shed. This is one of the most important periods for chemical control. Monitoring the stage of flowering and length of bloom is important information for Botrytis management. Bunch closure and véraison are also important stages. Monitors can report this to the viticulturalist or manager.

Laboratory monitoring
Latent infection
Early season testing is available to determine the amount of latent Botrytis infection present. In high pressure districts this tool is valuable in determining the potential for risk of disease after bunch closure and véraison. If disease has infected the vine during flowering and has not been controlled, the test can help identify the need for eradicant and protective sprays at bunch closure and closer to harvest.

Resistance
Tests are also available for resistance to chemicals.
Monitoring for resistance is important in determining chemical selection for your spray program.

**Monitoring of vine growth**

The most important way to manage bunch rots in the Riverland/Sunraysia district is to have a good understanding of how and when disease invades, and the ability to grow a balanced vine canopy.

Monitoring of vine growth can supply valuable information in helping determine the risk of bunch rots.

Vine canopy attributes conducive to bunch rots:
- Dense and dark canopies, many layers of leaves and bunches, bunches heavily shaded, poor airflow.
- Big tight bunches, trapped foliage in bunches. Disease spreads quickly throughout whole bunch.
- Big berries, weak skins.
- Over-vigorous growth, lack of lignification at véraison leading to late harvest. Late maturity may extend season by 6–8 weeks, making it more likely to have some rain fall on the maturing crop.
- High incidence of lightbrown apple moth.
- Overwatering, overhead sprinklers.
- High nitrogen status.
- Wet, warm/milder temperature districts.

Therefore to help manage bunch rots we should aim for canopy conditions which will enhance ripening and are less conducive to bunch rots:
- Open canopy with better airflow allows some dappled light to get to berries within the canopy. This aids drying after rain or irrigation and aids colour development and ripening. Sunlight may influence spore viability.
- Smaller bunches or looser bunches dry more easily after rain. If individual berries are infected, the infection may not spread as quickly. The likelihood of trapping flower or leaf debris inside bunches is also reduced.
- Smaller berries with firmer skins are less likely to split, they ripen quicker and the bunch is kept more open.
- Regulated growth, which should have some lignification by véraison; this will indicate faster maturation potential. Early harvest reduces the potential for rainfall on a maturing crop during March/April.
- Careful management of the vines' nutritional status. Once vine training is completed and vine reaches cropping age there is no need to force feed. Consider the role of calcium in firming skins and cementing cell structures.
- Regulated deficit irrigation (RD1) during spring/early summer helps achieve growth goals—smaller berries, open bunches, reduced vigour etc. This is especially useful for red varieties. However once véraison is reached irrigation practices should be returned to normal. It is necessary to keep the vine healthy and fresh to ensure the crop matures quickly. Avoid water stress during véraison. Moist soils during ripening lessen the likelihood of splitting if rain does occur. Consider conversion of overhead sprinklers to undervine. If overhead sprinklers are required for frost then consider a dual system.
- Pests are often less numerous or hazardous in open canopies and tend to be easier to control if necessary.
- Districts with hot and dry climates are less conducive to rots. Temperatures over 35°C impact on disease development. Moisture is a requirement for infection. Therefore districts with lower rainfall incidence and high temperatures are better for the management of rots.

**Summary**

It has been suggested over the last few years that bunch rots are becoming more prevalent. In my opinion this has been because of seasonal conditions near harvest, and the rapid expansion of vine plantings.

Industry expansion has resulted in large areas of young vines coming into production. Young vines have been pushed hard with water and nutrition to encourage rapid growth and to yield early. Growers have focused on higher yields over the mid to late nineties, as wineries were happy to accept anything that looked like a grape. There has been a large increase in new growers, or managers, many of whom have little or no viticultural experience. These factors will contribute to bunch rot disease problems given conducive conditions.

Wineries are now placing more quality driven conditions upon growers. The things we need to focus upon to produce quality fruit correlate strongly with the type of canopies and bunch structures that are less conducive to bunch rots. Therefore as growers strive for quality, new vines mature, new growers understand viticulture and control measures better, I believe bunch rot incidence should reduce and be better managed.

There is a challenge to develop some better monitoring systems to determine bunch rot risks. There is another challenge for growers and winemakers to develop closer links so that both parties are more aware of each others' needs, and problems.