Practical management of bunch rots in high risk environments

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Introduction

'It's raining again .....'

The Hunter Valley is approximately two hours north of Sydney, NSW, nestled in from the coast. It is a fertile valley stretching from Cessnock in the south, and beyond Denman to the North. There are deep alluvial river soils, grey sandy creek flats and deep red brown terra rosa's in the mix of soils around the valley. It is an area which traditionally has moist springs and wet summers, although these have been less common in the last ten years, with a drier period having been experienced.

The Hunter was established as a grape growing area quite early in the settlement of NSW, with the pioneering families of Lindemans, Tyrrell's, Drayton and Tulloch being amongst the early settlers in the area.The area was selected for viticulture and agriculture in general due to the deep alluvial soils and reliable rainfall, as well as it's proximity to Sydney, and it is these features which continue to keep the Hunter in operation today. The flagship varieties for the Hunter are Semillon, Chardonnay, Verdelho and Shiraz.

Back in the mid 1800s grapegrowing was on a much smaller and more labour intensive scale than it is these days in the Hunter. The physical and technological tools available to the grapegrower then were both less plentiful and less sophisticated than the tools at our disposable today. But the weather was not all that different.

Many talk about climate change and more frequent extremes of weather, and whilst I agree that this is a valid concern, we are living in and discussing a small window of time – a 150–200 year period. The pioneers of viticulture in the Valley faced the same challenges we do now – floods and droughts and pouring rains always at the wrong time.

In my time in the Hunter, just over 11 years – which is a long or short time, depending on how you look at it – it has been a relatively easy time for grapegrowing. We have had some challenges and these have primarily related to water. Either too little or too much, and it is the too much which I will get onto in a minute.

The Hunter Valley has essentially had a drier than normal period for the last 10 years and irrigation has been a normal part of vineyard operations. Rainfall has been reduced during the growing season and much less rainfall has been falling during the pre-harvest and harvest period.The drier conditions have resulted in there being low to moderate disease pressure and few problems with harvest due to rain...until this year (harvest 2008).

2008 vintage

In moving on I don't wish this paper to be seen as critisising the Hunter, rather presenting you with and open and honest account of our experiences in a high risk region.

Season 2007/08 has been a whole new ball game, especially coming off the 2006/07 season, where we were in severe drought with very limited supplies of water at the commencement of the season. The 2006 calendar year saw Cessnock receive approx 350 mm of rainfall, while the 2007 calendar year saw it reach 1000 mm. Of this 1000 mm, 300 mm fell on the June long weekend (9–11 June 2007) and another 500 mm fell in period from September to December. This was followed by a further 280 mm in the first 6 weeks of this year. So it was pretty wet.

The outcome of all this rain in broad terms was that approximately 90% of the white crop and less than 10% of the red crop was harvested across the Hunter Valley. The whites were generally harvested at lower baumes than normal with harvest decisions being made with a number of factors being taken into account – these were obviously baume (the level and how sugar ripening was progressing or holding), flavour, disease incidence, severity and progress, the weather forecast – for the next 24–48 hours, as well as the next 7–10 days. The ability to access the site with a harvester and/or availability of hand crew, as well as getting a winery intake slot was also part of the equation.

Essentially 11 baume became the new 12 baume, or in the case of Semillon 9 baume became the new 10 baume. The 10 percent of reds that were picked was an interesting point, with limited Shiraz being harvested. The 10 percent does include some Shiraz – mainly for Rose, but also includes quite a bit of Tempranillo – for dry red and some Bordeaux varieties.

The outcome of this season is one where we have had a 'sound' white year and essentially a non-existent red vintage. It is interesting when you look back over the years at harvest reports and assessments, there are often seasons where the whites or reds do better (or worst) due to the weather either just prior to or during harvest.

Practical management

So in a high risk environment, such as the Hunter Valley, how do we practically manage bunch rots and other pests and diseases?

To provide some background these are the main disease issues the Hunter Valley have include:

- Powdery mildew – usually well controlled but was a problem this season.
- Downy mildew – has been less of a problem in the dryer seasons, but this year the aim became suppression rather than control.
- Botrytis – has not been a significant problem for the last few years. A major problem this season, particularly in reds.
- Bitter rot – *Greenaria*
- Ripe rot – *Colletotricum*
- Sour rot – acetic breakdown
- Others – *Rhizophus, Aspergillus, Penicillium* etc....

There are also other emerging pest issues which may play a role in disease incidence such as Queensland fruit fly. I will discuss Queensland fly again later in this paper as vineyard floor management and humidity appear to be playing a role in this pest's presence in the vineyard. Mealy bug and scale are also pests we saw more of this season than in previous seasons and we will wait and see what happens this season.

Practical management requires a two-pronged approach to practically manage bunch rots and disease. The first is at the pre-vineyard development stage, where decisions can be made to mitigate risk and exposure to these conditions by careful site and propagation material selection.

Pre-vineyard development

Site selection

A wet year certainly shows up problems in relation to site selection. As with most regions there are great sites, good sites and poor sites. The 2008 vintage was not a year to be on a poor site. The poor sites were generally those with poor drainage, heavy slippery clays or those with poor air flow. These sites tended to be wetter for longer – which restricted machinery access – so additional fungiciding was delayed, the ability to get in and harvest was delayed , fruit ripening tended to be stalled, water was held and humidity was higher in canopies. There were a few blocks were you could have 'bogged a duck' so to speak.

Therefore, if you are in a known high risk area it is vital to plant on sites where the soils are free draining and air flow is good. If your site lacks these attributes then you are already starting with one hand behind your back and you need to be aware that there are seasons where you will not harvest your fruit at optimal quality or potentially at all.

Having said this there are some very good sites locally that did not pick any of their fruit this season, but other factors can contribute, including:

- Trellis and row width, and row orientation.
- The ability to manipulate canopies e.g. VSP/ Ballerina rather than sprawling.
- Narrow rows – bad idea – becomes closed up and lower airflow.
- Row orientation needs to take advantage of breezes if possible.

Propagation material

The selection of varieties, rootstocks and clones also comes into play in the pre-vineyard development stage. Again like site, this is something you have control over at the beginning of the development process and once a decision is made it is essentially fixed, although this is something you can change later albeit at great expense.

When selecting varieties there are some considerations for high pressure sites, these include :

- Ripening time – is it early, is it late – when is your disease pressure highest?
- Bunch architecture – is the bunch loose or tight? Wings or not? e.g. Verdelho versus Chardonnay. Also, clonal selection is an important consideration here around bunch architecture.
- Berry size – large and plump or little and loose?
- Skin thickness – there are degrees of this e.g. Shiraz versus Cabernet/Merlot in terms of skin thickness and susceptibility to splitting.
- Disease susceptibility – e.g. hybrids such as Chambourcin

The flagship varieties for the Hunter Valley were mentioned in my introduction – three of these are whites varieties – Semillon, Chardonnay and Verdelho, and only one was red – Shiraz. The dominance of whites is no accident. These varieties each perform well in thre Hunter for different reasons and two out of three perform well under pressure: Semillon and Verdelho.

Semillon – the Hunter Semillon styles are predominately lean and mean, packed full of acid and with tight, crisp citrus flavours. This style is an early picked style with harvest baumes tending to be in the range of 10–11 in most years. There is method in our madness as this sees some fruit off very early, with less exposure to the summer rain. Semillon is an insurance policy of sorts. Having said all that it can still have problems and some sites did not perform this season.

Verdelho – was traditionally a fortified variety in the Hunter, but has more recently become a fresh and fruity dry white wine. Whilst it is susceptible to powdery mildew it has a loose bunch with small berries. These attributes keep the bunch open and true bunch closure does not tend to occur – this is extremely advantageous for drying out fruit and minimising disease pressure.

Chardonnay – I did say only two out of three perform well under pressure. Chardonnay does perform well in most years up here, but it does have a few issues in years like this. The tighter bunch structure coupled with the desire for richer flavours and a higher baumes, make it a big ask under ongoing wet conditions.

Reds – presently the Hunter only has one flagship red, the famous Hunter Shiraz. Again this variety performs well in most seasons, particularly on the great sites. However there are years where it struggles to be fit for purpose. In researching this presentation I looked for historical vintage reviews and a comment on the Langton's website by Andrew Calliard sums up the performance of Shiraz in a difficult season. This was the comment for the 1997 vintage for Shiraz:

> *'An almost perfect growing season hampered by intermittent rain during vintage and extreme heat. Although many growers experienced Botrytis in the vineyard, those who picked selectively were able to make extremely good wines with naturally high acidity and good flavours. A variable and difficult vintage.'*

The 10% of reds that were picked were mainly picked at the direction of 'managers' or other non-winemaking people. Small parcels were harvested to see if anything could be done with under ripe, green or fruit that was breaking down. Most didn't go back for more. However, there were a few surprise parcels. The standout was Tempranillo. There are only a few blocks around the Hunter Valley and it ripens about the same time as Chardonnay. While that can be a logistical nightmare it proved to be a saving grace this season. The only red wines or juices (from the Hunter) I saw on lab benches this year with any deep colour and vibrance were Tempranillo. I think it is early days, but it may be appropriate to consider varieties such as this as an additional red variety for the Hunter region.Some people dabble with Pinot, Cabernet and Merlot, so why not dabble with Tempranillo?

The 2008 vintage was obviously more a difficult vintage than 1997, and by all reports it is comparable with 1971 vintage. Jay Tulloch has made the comment that they picked in 1971, but they shouldn't have. Most of the 1971 reds were pumped out and discarded prior to the 1972 vintage.As a district we have the benefit of hindsight and wisdom that the more experienced members of our community have. They were very useful people to have around this season to console us all that it has happened before, and to reassure us that we had done all that we could.

Operational management tools and strategies employed during 2008 vintage

Managing the weather – the tools

In late February 2007 the Hunter was already in the post-harvest period due to the drought and a fast and furious vintage. Post-harvest and dormant season planning was underway.

Looking ahead at long term weather forecasts and models it appeared that El Niño was fading away and that there would be a return to normal conditions. Therefore this being the Hunter that meant a moist spring and wet summer. This information whilst being a forecast not a certainty gave us some confidence to head down a different path with our planning for the 07/08 season, than the path we had taken in the previous few season, which was dry.

The arrival of the internet has provided us with far greater access to weather information. Not only can we access forecasts for the short, medium and long term we can watch radars and pick up storms approaching, see what direction the wind is going to blow

in and at what time.While we can't change the weather, we can be better prepared for what it brings and adjust our management plans accordingly and often if required.

Managing the vineyard floor

Having just been through a period of dry years where there was minimal rainfall and restricted water allocations and the related drop in tonnages and income, growers have understandably been reluctant to sow cover crops. Why spend the money on sowing a crop when it is unlikely to grow? However, with the prospect of rain, we suggested to growers two benefits of sowing; 1)there should be enough rain to get the crop to grow (and they would then get all the known benefits of covercrops e.g. organic matter, improved soil health etc.), and 2) if it is wet in the later part of the year, we are going to need the ground to be cropped (rather than cultivated) to facilitate access to vineyards. As luck would have it, the forecast was right and the drought conditions were broken in a big way, with the 300 mm we received around the June long weekend. The rain continued to come and the year ended with 1000 mm. The vineyard floors which had either cover crops or volunteer growth were at a considerable advantage from the beginning of the growing season, as owners/operators were able to access the vineyards for spraying, herbiciding and slashing.

Slashing the midrows and keeping the undervine area low were vitally important this season. The grassed midrows were important not only for access, but also as water suckers. The crops, weeds and grasses all helped to extract water from the ground which obviously helped with access, but also removed water from the vines. An issue we observed this season was that our canopies didn't really stop growing due to the volumes of free soil moisture. The midrow growth while useful and important did still need to be managed to ensure that there was good airflow below the cordon.

Managing the undervine area was just as important as managing the midrow as we needed to ensure any breeze or wind could get through to push away the humidity and help with drying out foliage and fruit to reduce disease pressure. Blocks which had poor undervine weed management also had the greatest problems with Queensland Fruit Fly, a problem which we have not experienced on a significant scale in recent times.

Fungiciding

Fungiciding is a key part of the management of disease in a high risk environment. But fungicide selection and a spray program is only part of the equation.

TIMING and TECHNIQUE are equally important.

Timing – spray intervals were a very important part of this season with routine intervals of 14 days being the maximum interval possible. 7–10 day intervals were generally more appropriate to ensure that good protectant cover was maintain throughout the period of ongoing growth i.e. growing out of cover, and ongoing rain which affected product longevity and vineyard access. Growers who used 2–3 week intervals succumbed early e.g. just after set, generally to powdery mildew and had to execute tricky cleaning up programs at great expense, with varying levels of success. The short spray intervals were also necessary in many instances to ensure a spray was applied before the weather caused unsuitable spraying conditions, e.g. wet or windy conditions or limited access. It was a case of go early and often rather than miss the window of opportunity.

Technique – sprayer set up and calibration. While not rocket science,but people still don't do it. Three out of four people with moderate to severe disease issues had problems due to poor sprayer set up and calibration. The 'sins' included :

- Not turning all the nozzles or fingers on;
- Having the unit too high;
- No calibration at the beginning of the season (and on an ongoing basis during the season);
- Not questioning having half a tank left over at the end of the job...and so on.

Product selection

I'll touch on product selection as the seasonal conditions come into play here.

The spray programs we use in the Hunter are generally of a protectant nature due to our climate – wet and windy and with limitations to accessing some sites after rain. We also don't have many curative or eradicant products at our disposal.

The loss of phosphorus acid and concerns about using Metalaxyl due to confirmed resistance to this chemical in the Hunter add to the difficulties. We tend to use a range of activity groups during the season to ensure that we minimise the opportunity for fungicide resistance to occur. When you then work in the withholding periods the spray programme falls into place for each growth stage, with you tending to use products as late as the withholding period permits.

Downy products are included in all sprays, as this is our biggest problem, particularly in conditions like this season. Copper was generally used with there being a decline in the use of mancozeb/dithane due to concerns regarding rust mite. Some dithane may be used where there manganese deficiencies, either as a result of vine symptoms or low values in petiole tests. This is generally used early in the season. Delan is used occasionally where there are phomopsis issues and Chlorothalonil may be used as a second or thirds spray as it provides some botrytis protection as well.

For powdery mildew, sulphur is still used quite widely as it is cheap and effective. Daytime temperatures at the beginning of the season are usually warm enough that there are no concerns about activity. Products such as Flint or Cabrio are tending to be used at flowering but we tend to find that we need to back them up with additional copper or sulphur to achieve good control of the disease they are less active on e.g. if using Flint which provides good control of powdery then additional copper is required, likewise if Cabrio is used then additional sulphur is usually added. So there are no 'savings' in using these products, rather they add a different activity group to the program. DMI's such as Bayfidan or Topas are used at pre-bunch closure. Where powdery has 'escaped' various approaches were employed, and usually involved applying a number of treatments, which may have included Flint, Bayfidan and/or high rates of sulphur. In some cases spray patterns were reversed to change leaf movement and a different sprayer to normal may have been used e.g. a Croplands instead of a Turbomiser.

Botrytis products are generally incorporated at flowering and at pre-bunch closure with a range of products being used, but generally not Rovral which is 'saved' to the end of the season due to it's short withholding period. For the last few season that has meant many growers have not applied any Rovral's. However this season many growers applied two Rovral's and may have also applied Peratec. The decision to apply sprays at the end of the season was questionable in some cases. Bunches were very tight in many Chardonnay, Semillon and Shiraz crops and in many cases the berries were being pushed off the rachis and leaking juice into the centre of the bunch. Sprays were not going to get into the middle of the bunch so there was a strong argument to save the money of the chemical and the tractor pass, but some people sprayed anyway to be able to say that they had done all that they could. It was one of those times where common sense seemed to have disappeared out the window. Peratec was also

used quite widely this season and it's performance appeared to be variable. It was interesting to note that the label indicates that this product is intended to provide suppression rather than control/ eradication and I think that many people may have been expecting too much. The weather conditions were bleak with ongoing drizzle, low temperatures and grey skies, so the products had no warm wind or heat to optimise their performance. Splitting at the end of the season was a problem in some vineyards and the lack of heat, sun and wind again meant that botrytis was there literally the next day, in some cases despite a spray having gone on 12–24 hours earlier.

The region was expecting a lot from agrochemical products this season and growers expectations varied. Many were disappointed about what they spent and the results they got, others were more philosophical. Personally I was happy with downy suppression over control. For the last few weeks of the season the conditions were against us on a daily basis, and to expect control was unrealistic.

One issue some growers also had was product supply. It was important to be in touch with resellers about requirements. Some resellers were more 'honorable' than others in terms of anticipating needs and ensuring their product was on hand. Others seemed to be pushing alternative products which they presumably made better margins on.Some resellers went far beyond the call of duty to ensure that people got what they needed when they needed it. Service really made some blokes stand out this season. So choose your reseller wisely, it is not just about price, it is also about the ability to deliver.

This season really sorted out the men from the boys. The sites which had the best disease control and or suppression were those who got all parts of the equation right.

This season was not one where you could set and forget. It was vital to keep REVIEWING the conditions and forecast, i.e. look at the growth stage, look at the pest and disease incidence and pressure, REASSESS the options e.g. spray interval and product selection, and REACT accordingly.

Canopy management

Lifting canopies up on time was important to facilitate trimming or tipping and to keep the fruit zone such that it had good airflow and spray coverage. We were also experiencing very overcast weather and the opening up of the canopy was important to get a bit more light in, which is not normally a problem. Timing and Technique with lifting and trimming were also very important. The aim was to lift canopies prior to the shoots falling over too much and then trim them lightly to encourage the vigor into the laterals at the top of the shoots. The main shoot would then have lignified and be rigid before the new growth became too heavy. This foliage could then be trimmed again if need be.

This worked well in most cases and would have been better if the vines had stopped growing. There were a few problems with lifting foliage increasing our downy mildew problems. In some blocks there was downy mildew on the newer foliage just prior to lifting. This occurred post-set when the berries were approx 2 mm in size. The canopies were lifted and then it rained. As downy is spread by water the rain then pushed the spores down into the middle of the canopy (which was fine as this foliage already had 3–4 sprays on it) and also onto, and then into the bunches. We then began seeing downy in small berries and rachis's. In high pressure sites this resulted in the berries having a secondary infection, dying and then getting botrytis, as early as mid-November. What was more common was seeing the rachis and/or berry stems being infected, dying and the berry withering. These 'dead berries' generally dried up and dropped off, so were only an issue if the berry became trapped in the middle of the bunch. Where they were trapped in the middle of the bunch and the bunch was tight or it became very wet the berries either got botrytis or began to breakdown. In some cases the loss of berries was desirable bunch thinning.

Thinning

Crop thinning was the 64 dollar question this season and one which came up quite often, particularly when winemakers did field visits. Thinning is something which is carried out on an occasional and selected vineyard basis in the Hunter. I certainly would not consider it a routine practice, however it has a role in some sites and some years. 2008 was not one of the years where you were going to get an advantage due to thinning other than if the thinning was really just the practice of 'dropping' dirty fruit immediately prior to harvest. An observation many of us made this year was that berries did not stop expanding at or just after veraison as per normal. With the ongoing rain they just seemed to get bigger and bigger. This lead to berries pushing off the rachis and juice then leaking out into the middle of the bunch which subsequently led to rot starting and fruit breaking down. Given that the rain kept coming and we couldn't stop the water uptake the general thought was that if you thinned the crop then there was even less fruit for the water and energy to go into, so you potentially risked accelerating the collapse of the crop.

So thinning was not a useful tool, especially given the cost of carrying it out.

However, pre-harvest cleaning up was useful, but often there was so much disease it was better to hand harvest the clean fruit rather than to drop and machine.

Nutrition

I'm not a nutritional expert so I will only touch lightly on this topic. We were coming off a drought and many people did fertilise to try to get their vines re-invigorated. Again timing, technique and product type were all important here and had an impact on disease pressure.

There were vineyards with lots of growth due to moderate to high fertiliser inputs early to mid-season and yes this contributed to canopies that needed additional management and preventative disease control. In a few cases, the high nitrogen inputs and resultant high vigour and crop loads contributed to the blocks not being harvested or being harvested at low baume with high levels of rot, split, etc. Essentially the blocks with the high crop loads started to rot at low sugars and were unable to ripen sufficiently.

Selective fertiliser inputs were needed in many vineyards this year as there was widespread symptoms of 'spring fever', i.e. potassium deficiency, due to the wet and cold soils. Generally foliar applications of potassium sulphate were used or other commercial potassium preparations without nitrogen. In a few cases potassium nitrate was used where a nitrogen application was planned.

Later in the season foliar applications of nitrogen e.g. Wuxal were widely used to lift and maintain canopy condition rather than to promote growth. This was very effective at keeping canopies going. The vineyards which held the most foliage post-harvest tended to be those which had these Wuxal applications.

Communication and inspection of vineyards

This is a vital tool. Communication with winemakers, intake co-ordinators, growers, resellers, harvester crews etc. is essential to make the season work. This season was one where you set out each morning with a plan of what needed to be sampled, inspected and scheduled for harvest. Diseases progress rapidly and the usual plan of once or maybe twice weekly visits to vineyards were replaced with visits on once or twice daily basis. Most days the plan was shot by morning tea and more often than not you were taking samples into

the winery or taking the winemaker out to the vineyard. This was how we optimised the fruit to get it in the best condition it could be.

It also meant viticulturists and winemakers had to be more flexible about picking and batching. Sometimes parts of blocks were left behind and sometimes there were multiple picks. Communication about the rejection of fruit, ideally pre-harvest, needed to be quick and succinct to enable growers to attempt to resell the fruit. There were definitely different thresholds for rots and moulds with different winemakers/wineries. It is important that you all have the same aim, which is to make the best wine you can from the block.

Sumary

Pre-vineyard development – think about the vineyard project thoroughly before you begin. The choices you make at this stage are either hard or expensive to change.

Site – climate, air flow, drainage, trellis etc., again, consider these points as changing the vineyard once it is established is difficult.

Variety – timing of ripening, bunch tightness etc., select wisely for the best outcomes.

Operationally use all the tools at your disposal and use them properly.

The take home message is that the right TIMING, with the right TECHNIQUE and product make it work, but only if you remain on the ball and take the time to REVIEW, REASSESS and REACT to the changing environment. On going communication with all the other players is vitally important as is getting winemakers and grower liaison personnel out into the vineyard.

So like the pioneer growers we still lost part of our crops this season. But we did get that bit closer to keeping them and I'm sure we got more fruit off than we would have if we were farming 150 years ago. But at the end of the season you can't beat mother nature.

During vintage this year (just after we had rejected another 30 tonnes of Shiraz) I was asked by a local winemaker 'If you could do the season again knowing what you know now, what would you do differently?' My answer was 'not much'. However we go into the 2008–09 season knowing we have a high disease carry over and a forecast for a similar season to the one we have just had. That is quite scary but unlike growers 150 years ago we are armed with more tools and information to help us make decisions. Not only do we have tools such as the weather models, we also have far better understandings about how diseases work and how we should be managing them to reduce their impact. We are very fortunate to have had such great work come out of our research and development institutions in Australia such as SARDI, DPI Victoria, NSW DPI, CSIRO and the CRCV and to have 'living national treasures' such as Peter Magery, Bob Emmett, Trevor Wicks and their teams who have not only done the R&D but have also done the extension.

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