

Organic Viticulture

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Background

Since 1997, I have been running an organic vineyard at Canowindra with my parents Richard and Florence Statham. In 1995 they sold the farm at Barraba and began searching for a suitable vineyard development site all over southeast Australia, and the farm which is now called Rivers Road Organic Farms was chosen for its good red clay soils and dual water supply from River and bore. Having farmed for nearly two decades up north, Richard worked on some vineyards to get some basic experience, did some short courses, and got help from Peter Hedberg at Orange Ag College. At the time I was overseas at university and working on biodynamic farms in New Zealand, but once I saw what they were doing I decided to join the family business. In 1997 we planted the first of the current 21 hectares of vines at Rosnay, which was completed in 2000. We also planted 10 hectares of olives. In 2001 we began planting another 16 hectares under contract management for another grower at Rivers Road Organic Farms. All of these plantings were managed using organic principles and we gained BFA certification in 1998.

We were doing it the hard way, compared to converting a conventionally grown vineyard to organic. Our driving philosophy was that **if we rebuilt the soil then the vines would be more resistant to disease and need less propping up with artificial inputs**. We were prepared to use them if we had to, but soon enough we saw that there was no going back from organic. The idea that working with nature rather than against it, had stuck a note with us, particularly when Richard and Florence did a study trip to Europe looking at the market for organic wine. Operating organically had opened a lot of doors with wineries who wanted our fruit.

In this talk I am going to outline the basic methods that we use at Rosnay, and some of the lessons we have learnt to get where we are today. My key takehome messages are "Feed the soil and the soil feeds the plants", "do less and achieve more", "enjoy what you do and keep observing and testing your soil", "keep it simple and don't be like a bull at a gate with inputs", and "don't risk disease or bad wine".

Soil balance and vine nutrition

The main focus of our management program is to create a healthy soil by bringing nutrients, biology and structure into optimum balance. In this environment the vines are in the best position to access their needs. With a healthy balanced soil, there is less need to "spoon-feed" the crop based on "crop removal" figures.

Over the last decade, we have gone from a “shot gun” spoon-feeding approach to a minimalist “soil balance” program. Here are some mistakes that we made with somewhat of a “bull at the gate” approach to soil management during the establishment phase:

- In some blocks we actually applied too much rock phosphate (up to 500kg/ha), and as it became available over the next six years it began to restrict the availability of micro nutrients such as zinc. Only now, 10 years later, are levels back in the “optimum” to “adequate” zone in our soil tests.
- We applied up to 7t/ha composted feedlot manure during vine establishment but found that we got excessive levels of potassium from it which then reduced the base saturation of calcium and possibly caused problems of high potassium in our wine.
- We applied up to 2t/ha of dolomite based on soil tests prior to planting but found that the magnesium increased proportionally much more than the calcium base saturation. Excess Magnesium disperses soil particles and makes soil sticky when wet and hard when dry.

The lesson from these mistakes was that a good management program may not correct deficiencies or imbalances in one season. Rather, it aims to build soil fertility and balance slowly without causing toxicity or detrimental interactions in soil. We learnt that decisions on additions to the soil must be guided by expert advice and regular soil testing, generally every two years for different blocks and soil types, observing the slow changes in the soil balance resulting from low rate additions. We learnt that Calcium is the key mineral to look at in the soil tests, as it suffered most from the mistakes we made but is essential for good soil structure, root development, nutrient release, and resistance to pests and disease. However, we are still careful with lime, because an excess of Ca may also reduce Sulfur availability and reduce "just adequate " Phosphorous to deficient levels.

Of course, as the vines got bigger, we made other mistakes. When the soil was obviously not supplying sufficient nutrients to the vines, we resorted to organic foliar feeding. Aiming to increase canopy and yield potential, we applied foliar fertilisers such as quick release fish fertiliser, plus stimulants such as seaweed, or worm juice, during the spring vegetative growth phase. The result was increased mildew. The lush, sappy, soft growth which is stimulated in this way looked great, but it was really an artificially induced growth just like what conventional growers get using water soluble fertilisers. When we stopped doing this, the growth was less impressive, but it was also tougher and more resistant to mildew. We have not had mid-season mildew for many years since we stopped foliar feeding, though we still need to manage mildew with various other inputs, which I will explain later.

Biological activity, groundcover, “weeds” and mulch

Our focus is now on inputs and practices that increase soil biological activity, such as lower rates of compost (broadcast), biodynamic preparation 500, and slow-release BD fish emulsion during winter months, rather than mineral amendments. Biological activity is the most important tool in creating a soil which is loose and aerated enough for the plant roots to grow and forage effectively. The greatest enemies of biological activity are bare ground, waterlogging, cultivation, and compaction. Therefore we are very careful to maintain ground cover, and this is now the focus of the soil management program.

Obviously then, we do not cultivate to control weeds. Instead, starting as soon as possible after leaf fall, high stocking densities of sheep (250-400 ewes / ha) are used to “clean up” the summer weeds

through trampling and grazing, allowing a dense germination of winter grasses and clovers. We want plenty of poo and wee, plenty of trampling and chewing, and in as little time as possible and if possible not after rain, to minimise compaction. Winter growing ryegrass and clover, and even pattersons curse, are encouraged to grow with BD fish fertiliser, and well as BD soil sprays (preparation 500), then allowed to get a little bit rank before being hit again with a high stocking density. This fertile cycle can hopefully be repeated a few times over winter to encourage a very high plant density with minimum spaces and bare soil, whilst returning as much manure to the soil as possible. After budburst when the sheep can no longer be used it is a matter of balance between mowing to keep the frost risk down and letting the winter grass go rank and fall over naturally by late spring, which is the ultimate in soil cover and *in situ* mulch.

At this point, I'd like to point out that our views on weeds have changed over the years, to the point now where only a couple of species are of concern to us. Weeds like cape weed, pattersons curse, paddy melon, cat heads, and even saffron thistle, are there to either bring nutrients up with their taproots or to simply cover the soil. Some weeds are annoying, like catheads in your thongs or saffrons if they are tall enough to cause physical damage to the grape bunches! But they aren't worth losing sleep over because over the years if the soil is brought back into balance you will see them disappear, more or less. We have next to no capeweed and pattersons curse any more, saffrons are scattered and not thick, and the paddymelons are gone completely. Cat heads have made a resurgence with the drought, but again, they are going what they evolved to do, which is to fill gaps in groundcover.

Our biggest weed problems are phalaris clumps, which are widespread in some blocks, and Johnsons grass, of which there are a few troublesome areas. The phalaris is fairly shallow rooted, and is not spreading, with the old clumps dying in the crown from old age now. If we cultivated them out, though, we would certainly get young plants germinating. So we do nothing about them except try to wear them down with grazing while we can. The Johnsons Grass is more difficult, as it spreads by rhizome and by seed, and loves wet Novembers like we had last year. We have had to resort to woven plastic weed mulch, with horticultural vinegar spray on the edges, but even this is not 100% effective. If you have Johnny's, get rid of it before you go organic, or it will haunt you forever.

This year, we have dramatically increased our additions of bulk carbon to certain blocks. During establishment, the main input was straw and lucerne, at rates of 7-10 tonnes per hectare, but now we are using green waste from Cowra council, at the rate of 70 tonnes per hectare. This may seem like a very heavy rate but in poor yielding areas it gives a better return on investment than lower rates, despite the cost (about \$16 per tonne delivered, plus spreading). This was a key finding of the recent NSW DPI Composted Mulch Trial which was run over 2005-2007 in several inland vineyards including Rosnay. In the poorest areas this resulted in a yield increase of 50%, whilst the improvement in soil structure is likely to extend this yield improvement for many years to come.

We spread the mulch using a Wallaby chain-floor compost and lime lime spreader with the side delivery chain on it, but we had to go in bottom gear in order to get the mulch on heavy enough. Contract rates for spreading mulch are about \$7 per cubic metre, or \$14 per tonne, but having done it ourselves we can see why. It's a big job, and we were delayed by breakdowns and equipment modification, and also we never drive heavy machinery in the vineyard after rain, so it took about 2 months to spread 350 tonnes. So just quickly on the maths on mulch, if it costs \$30 per tonne to buy, deliver and spread green mulch, at 70 tonnes per hectare, that's about \$2000 per hectare. However, we expect to see yield increases of about 1 tonne per hectare for the next three years, and a smaller

increase for even longer than that, plus the benefits of improved wine quality, water savings and increased soil carbon and nutrients.

Plant health

As I said at the beginning, we expected plant health to simply fall into place once we had rebalanced the soil. Well, rebalancing the soil was not as easy as we thought, and neither was plant health. I will cut straight to the point – powdery mildew cost us over half of our Chardonnay crop in 2002, and we haven't forgotten that stressful year, selective hand picking with the winemaker looking over our shoulders, nostrils flaring, not wanting any "smelly" fruit to be picked for him.

Any grapegrower knows what it looks like... grey-white powdery spots on the leaves of the vines, and then on the shoots and eventually on the berries. If you rub the powdery fungus off there are black markings underneath. If uncontrolled, powdery mildew severely reduces crop quality, and yield, due to the berries splitting when trying to grow beyond the size of a mouldy pea.

Traditionally, the only control known was sulphur, which has been used for hundreds of years.

It was in about 2001 that there were the first rumours of sulphur perhaps being cut out of organic farming as a control for fungal disease. Using my 20-20 hindsight vision, I was naïve to think that our investment in the soil, plus the use of some alternative carbonate sprays, would be enough to drop the use of sulphur. Today, I would not recommend any grower in this region attempt to grow susceptible varieties such as chardonnay without at least three applications of sulphur 2, 4 and 6 weeks after budburst, if not longer, as a good rate of say 3kg per hectare. With my 20-20 hindsight, I can see that there is nothing wrong with sulphur, being the sixth most abundant element in the universe, being applied in huge quantities as fertiliser (eg in Gypsum or as prilled product), and acting in a benign manner through simple vaporisation from the leaf surface to inhibit the spread of powdery mildew.

Honestly, you can try using carbonates, compost tea, seaweed, and vegetable oils later in the season but don't risk abandoning sulphur early in the season when the shoots are most susceptible. You might get away with it for a few years during a drought, but it will come back with the weather.

Of course, we have tried the alternatives and believe there are only a couple that really work. One is milk. We've seen milk work magic on severe leaf infestation of powdery mildew. Overnight, the leaf surface fungi which was in contact with the milk was killed, leaving only the dark markings underneath and a thick, dark green and waxy leaf the following morning. All you do is mix 10% milk in water, direct in the spray tank, and apply it to runoff point on the leaves. Obviously, penetration of the canopy is essential, so you need the right gear. Of course, every salesman has then best machine for you, but with milk the high volume and high turbulence is essential to get it right into the bunches if necessary.

Maybe it's the fat, the proteins, the bacteria, or the pH of the milk, but we have seen it work and therefore recommend it. Maybe don't use it too close to harvest as it does smell a little bit. But alternating with sulphur if we have initial leaf infection it is the only thing we use, apart from 501.

Biodynamic 501 should be used with caution, as we have seen it burn and defoliate vines, and we aren't the only ones. 501 is potentised quartz crystal, which sounds like magic but is not. Silica has been shown to help control fungal disease, and its mode of action could be that it assists the worst enemy of the fungus, which is sunlight. But to use biodynamic 501 is different. The total amount of

silica being applied is only a few grams per hectare! However, the silica is potentiated in water. By rhythmically stirring finely ground silica in water, the water actually takes on the pattern of the silica. Water is an amazing substance, and scientific tests have shown it's property of memory. Anyway, I quickly get out of my depth, as I always use my get out jail card with biodynamics. I don't understand it, but I have seen it work. You have to change your ways of thinking if you are going to get it to work for you.

501 is applied at times when you want the atmosphere to "dry out". Times like full moon, when the shoots of the vines grow fastest and lushest, are when the watery forces such as the tides are strongest. Fungus thrives on this watery, humid atmosphere. By spraying 501, at dawn around the full moon, you are helping to dry out that atmosphere, so that the vines can gain some cell wall strength and more rigid form that resists fungus. The more you look into it, the more factors you will find, such as the extra influence when you have a full or close moon (perigee) in opposition to a large planet like Saturn. That time in November is actually the most important time to apply 501.

Later in the season you can use it to help speed up ripening if you think the canopy has done its dash. We have seen amazing increases in baume from the use of 501, but you have to be careful with it. Spraying it in the afternoon can actually lead to leaf burn and leaf loss. There is a softer, safer alternative to 501 in casuarina tea, which is high in silica but acts more as a soft tonic for the vines. I know growers who simply let it rot over months in a barrel, with the biodynamic herbal compost preparations and maybe some seaweed, and use it as a general soil and plant tonic. Others use it like a fresh tea, soaking it in water overnight only for using the spray tank the next day along with whatever else they are spraying.

Casuarina tea is one of those beautiful organic products which can be used safely, and which will always be of some benefit, and which costs nothing.

There are other diseases of vines, such as downy mildew, which we don't have a lot of experience with. Downy is more of a problem in the north and east, in the Hunter Valley. But because copper is a heavy metal it truly is in the firing line of the organic standards. I won't go into this for long but I know that a lot of organic grape growers are really frustrated at the BFA's lack of support for a product known as Liquicop, which is a copper nitrate formulation which is more effective than the permitted copper hydroxide but which has only one quarter the amount of actual copper. Even though the nitrate is equivalent to about a cow pat per hectare, the word nitrate is taboo to the hard liners as it suggests it is a chemical fertiliser. I hope that the BFA can lobby for Liquicop to be permitted in the national standard as soon as possible. Downy Mildew can then be safely and effectively controlled in those regions and they can reduce the absolute rates of copper used to levels that will only be a positive contribution to the soil nutrient balance.

As for diseases like eutypa dieback, and the wood rots being found in new places, they can be avoided by hand pruning and general vine care, something that has been lost in the big conventional vineyards where everything is mechanised and individual vines are not looked after.

Pest management

I don't have much to say on pests except that lightbrown apple moth must be controlled as it contributes to late season fungal infections. Bt does a fine job of controlling it. But we haven't had an outbreak of it for 6 years and we believe that doing nothing about pests is always the best option. We

will always keep an eye on them, and have some Bt on hand or locally available, but we tend to find more cadavres of caterpillars than living ones. This tells us that there are plenty of gruesome predatory insects out there doing their job.

Perhaps the main pest is leaf blister mite, which certainly looks bad when its bad, but which they say does not really affect the vines ability to photosynthesise. Few growers in the Cowra area do anything about leaf blister mite.

Wine making

Our grapes are made into wine just a few kilometres down the road at Windowrie Estate. I am very happy to say that they are able to make good quality wine without having to change much at all in their systems. Certification was easy due to their computerised wine management system (Ezywine) and normal winery QA for an operation of that size (4000 tonne). I would recommend them to you.

In terms of issues faced, low Yeast Available Nitrogen is the main one. Due to the naturally low nitrogen status of organic vineyards in the drier regions of Australia, organic growers always face problems of low nitrogen to feed the yeast and get a good fermentation going. If you don't have enough YAN you can get a sluggish ferment with all the associated problems of hydrogen sulphide, or rotten egg gas in your wine. Its probably less of a problem in the higher rainfall, more fertile areas, but in the hotter regions you are generally seen as a gambler trying to ferment low nitrogen wine without a small nutrient addition, of about 30ppm of DAP. Di-ammonium phosphate has been an allowed input for wine for many years, as it's a pure and instantly effective form of N that is fully metabolised in the wine and is used throughout the wine industry, including the organic wine industry in Europe.

But last year the National Standards committee decided that we don't need it. I guess they were talking to their local vineyards in the Yarra Valley, but for us as warm to hot region winemakers, it's a real affront to our ability to make good wine. I am honestly very disappointed in the BFA's lack of numbers to vote against this move by what I call the "Yarra Valley Standards Setters", because the BFA represents the largest number of vineyards, and most of the vineyards north of Victoria, but only has one vote out of seven on the committee. We are now faced with the prospect of using untested alternatives to DAP which are a bit like vegemite, and which might work. But they are the hulls of yeast which was probably itself grown using DAP! And you can still use DAP as a yeast improver for bread! You would expect to get a few years of leeway to trial these other nutrient products before changing. Unless vigneron get vocal on this problem, the consumer can look out for some pretty ordinary organic wine from low rainfall areas or seasons.

Or, like quite a few organic vineyards who have decided not to bother with the whole certification thing, you might find smaller producers not even bothering with winery certification, and preferring to simply say their wine is made from organic grapes.

Briefly on the sulphur issue, organic wine is permitted to use sulphur but at half the rate of normal wine. There are organic vineyards that produce preservative free wines but their owners generally don't like to drink their own wines, which is of course a good indicator that the quality is low. We don't try to make preservative free wine. Imagine losing 2000 cases of wine, turning to vinegar! I am thankful that the Yarra brigade haven't tried to stop us from using sulphur.

Marketing

Briefly, if we weren't producing organic wine, we would have had no hope of launching a new wine brand into the saturated Australian and global wine market. Since 2001 we have gone from 600 cases per annum to about 8000 cases, mostly in the domestic market. We would rather export the surplus wine than sell it to the supermarkets, although I know the supermarkets have been buying bulk wine and cleanskins to make their own home brands. My neighbour was driven off his farm by the supermarkets about five years ago and I'll never forget how hard he worked for nothing at all. I have no sympathy for the supermarkets and I can't believe the ACCC said they are competitive. Our customers, who are small independent and locally owned bottle shops, are better off buying the big brands at Dan Murphy's, than they are from Fosters. This says to me that the supermarkets are forcing even the big boys like Fosters to sell wine at below cost. The flow-on effect of this is that Fosters wine division is not profitable and like other big wineries they are now reducing their intake of grapes, which had been grown by other neighbours of mine.

Sure, we are insulated because we are organic, but not for long... Like in the US, soon we could be controlled by the supermarkets just like our conventional neighbours. So my advice is not to chase the supermarkets – build your band as non-supermarket, and independents-only. It's the last hope for independent retail in this country. And its good for your brand and for the local community. You can tell trade and mail order customers that they will never see it cheaper in Dan Murphy's.

I hope that BFA can hold out against them too in the battle of the logos. I am sure they are twisting BFA's arm to get the use of the logo for their home brands without paying the 1% levy that we small producers pay, and have been paying for the last 15 years to make the BFA bud what it is today.

I wont go on any longer about marketing, except to say you need to get the organic message out loud and clear, and in detail. Our customers are educated and sophisticated. Don't hit them with lairy and comic labels, be serious about what you are doing. Be a serious brand, and of course, make good wine. It will take time, but if you provide good service, and have good logistics and backend systems to avoid stuffups, your customers will sell the wine for you.

Just go organic, and hang in there.

Conclusion –take home messages

- “Feed the soil and the soil feeds the plants”
- Do less and achieve more
- Enjoy what you do and keep observing and testing your soil
- Keep it simple and don't be like a bull at a gate with inputs
- Don't risk disease or bad wine
- Lobby our industry to keep DAP and not restrict us from making good wine.