Commercially run biodynamic vineyards, management of the vineyard and budget

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Introduction: Context

Whilst the title of this presentation refers specifically to biodynamic viticulture, I view this particular method of farming as simply a subset of organic farming in general. Thus most comments made here may apply equally to any organic or ‘sustainable’ farming system.

Adoption of ‘sustainable’ agricultural systems is increasing worldwide. Viticulture is no exception and this shift in practice is driven by a number of motivators including a desire to improve land use sustainability, product quality and, just as importantly, a shift in expectations with regard to what retailers believe their consumers want from suppliers. In a worldwide context the rate of adoption in Australia has, for example, been slower than that of Europe, which could have significant implications for market access into the future. Waldin (2010) estimates the Australian organic vineyard area to be around 1% as compared to Italy (5%), Spain (5%), France (3.3%) and Germany (2.8%).

There are many motivations for adoption of these practices. The weight of any one motivator is different for each business and as such often defines not only the way practitioners farm, but also how they choose to present themselves in the marketplace.

Motivators

There are many motivators that drive adoption. Traditionally, organic farmers have been smaller producers who view these agricultural systems as a lifestyle choice or believe that chemical inputs are detrimental to human health. Whilst in the past these producers dominated, most producers (and particularly those operating on a commercial scale) now cite the following three points as the main motivations for a shift toward ‘sustainable’ practice.

Quality

Most organic producers believe that healthy vineyard systems provide the potential for superior quality fruit. Most producers cite quality as the major motivator, with sustainability a close second. This is very obvious in Europe where I recently visited numerous ‘top tier’ producers in Burgundy, Bordeaux, Bandol, Languedoc, Provence and Chianti. Some of these producers are certified organic or biodynamic, some are practising but not certified and a few discount full-on organics as a system altogether. The common thread was that not one was using herbicide for weed control. There is a widespread and strong belief that there is a connection between healthy, biologically active soils and the potential to maximise fruit flavour and wine quality.

Natural Resource/Environmental Conservation

Almost without exception, the desire to build a healthy farm and contribute to reducing environmental impact drives adoption. However, the most successful are those that place product quality and business success on an equal footing. Organic systems can only be successful in the long term if they are profitable. Issues such as nutrient reuse through green waste recycling and herbicide resistance will, I believe become more important decision making factors in the future.

Market Access

I believe that market access will require evidence of positive environmental credentials into the future. Examples like UK retailer Marks and Spencer’s ‘Plan A’ sustainability road map are a clear indication that retailers are making choices for consumers when wielding their significant buying power, particularly for food products (Figure 1). Revenues from organic food and drink products doubled in value from $25 billion USD in 2003 to 50.9 billion USD in 2008 and the key markets of North America and Europe comprised 97% of these revenues (Willer and Kilcher 2010). Double-digit growth in revenues from organic products has been occurring in North America for over a decade. Whilst it is accepted that demand for organic food is greater than that for organic wine, the global area of organic grapes still increased by 21 percent to 150,000 hectares between 2007 and 2008, mainly in Italy, Spain and France (Willer and Kilcher 2010). I see no reason why this trend will not continue to expand its effect within the wine sector.

Australian wine producers would do well to consider what they would do if their buyers make more pressing demands of them. Producers in other countries would be able to service the ‘sustainable’ wine segment and I believe this is one of the reasons many businesses are starting to at least test organic or sustainable systems. They don’t
expect to gain market share or improve margin in the short term, but they do hope it will maintain their access to markets into the highly competitive future. In Australia, the recent unilateral move by Coles to ban growth hormone in beef is a good example of a rapid shift in buyer requirements effecting producers.

**Below-ground management in organic viticulture systems**

Adopting an organic viticulture system requires a change of practice. However, before discussing examples of these changes, it is important to define the outcomes sought. Interestingly, these outcomes are those that appear in any good soil science textbook (e.g. White 2003) as examples of good soil management or land stewardship. Biological activity, enhancing soil organic matter, structural stability, porosity and infiltration, and water holding capacity, are all clear objectives of most organic farmers and soil scientists alike. Organic producers would do well to recognise that the important cornerstones of soil management are common to both conventional and ‘alternative’ agriculture. Further, organic systems are often very effective in meeting those objectives. The flow on benefits sought from more careful soil management may include improved wine quality, a reduction in chemical inputs and movement toward a more sustainable system.

**Three practical challenges**

**Nutrition**

In the absence of high analysis fertiliser the challenge in terms of vine nutrition is to transition to an alternative without compromising the long-term production capability of the land. Organic systems tend to concentrate on encouraging natural nutrient cycling in the presence of active soil biology. However, it must be remembered that ‘perpetual motion’ does not exist and that what is exported from the farm must be replaced at some point. This does not mean that vast quantities of nutrient need to be imported but rather, careful monitoring should be undertaken to track changes in soil and plant nutrient status. Organic inputs tend to be more expensive and responses are slower than high analysis fertiliser, thus the importance of monitoring.

Compost is the medium of choice for most organic practitioners and whilst it provides nutrient, it also contributes soil-conditioning benefits through the provision of carbon and microbial activity (Figure 2). Much work could be done to improve understanding in this area, particularly around the balance of nutrients and the availability of nutrient over time within a viticulture system. Additionally, it is often observed that organically managed vineyards operate effectively well below the nutrient benchmarks set for high analysis management, possibly the result of complex biological interactions affecting availability. In practical terms organic farmers should aim to understand trends in soil measures, track changes and adjust management techniques accordingly.

**Weeds**

Weed control is almost universally cited as the most difficult management challenge on organic farms and finding cost effective alternatives to chemical weed control is seen as somewhat of a holy grail amongst organic grape growers. In the absence of herbicide expectations of vineyard appearance, management intensity and cost require adjustment. However, there are a number of potential benefits to balance the equation and make these techniques a tangible option for organic and conventional growers alike.

There is a perception amongst organic farmers that consistent herbicide use damages soil biology, nutrient availability and soil structure. Whether there is a direct chemical effect is much debated, but by observation I propose that under vine herbicide strips are often bare, hard, compacted and sealed. Infiltration of air and water is consequently poor, mainly due to the absence of plant (weed) root activity. Thus physical degradation may prove to be more important than direct chemical effects on nutrient chelation and microbial activity. Many alternatives offer opportunities to better exploit this significant volume of valuable soil.

The most common weed control alternatives include cultivation, grazing, mowing, mulching, thermal and the possibility of manipulating under vine plant populations. Under vine weeding by cultivation is the most common form of control and it is generally slower and more expensive than herbicide (Figure 3). Depending on the type of soil, stage of conversion to organic and machinery type the cost of under vine mechanical weeding can be up to 250% greater than chemical control. Opportunities exist to reduce this differential (e.g. cutting under vine area).
double-sided machinery) and skilled farmers find the cost increase to be reduced to an acceptable level over time. Given the disproportionate contribution of weed control in increasing costs under an organic regime, concentrating one's efforts in generating efficiencies in this area would seem to me to be a useful strategy.

**Soil 'health'**

The goal of promoting soil health cannot be achieved without some understanding of soil science. For example, key principals (including the following) must be understood:

- Aeration/Infiltration
- Chemical/structural stability
- Water holding capacity
- Nutrition
- Biological activity

Only then can sensible management decisions be made. Good organic farmers are generally good planners who integrate these principles into their farming. Blind faith alone is not a management strategy and puts the sustainability of a farm at risk. There has been too much energy invested in understanding soil science for organic practitioners to ignore, the successful will integrate these principles into their farming systems. Organic farming methods with a focus on building soil carbon and soil biology typically work very well in enhancing measures of soil capability such as those listed above.

**The Budget – costs**

Undoubtedly vineyard costs rise in the early stages of a change in practice. However, a myriad of techniques, regions, objectives, soil types etc. make generalisations difficult. It is safe to say however that weed control and soil management contribute disproportionately to the increase in costs associated with organic production, particularly in the early stages of conversion. The main contributors in increased cost are time (mechanical weed control is slow), attention to detail required in the absence of a quick fix and the development of skills required to farm effectively. However, soil condition and weed populations change over time and can effectively moderate management cost. Additionally, many producers report a decrease in canopy management, irrigation and disease management costs that partially offset the increase in soil management costs.

As previously highlighted, definitive statements about the increase in cost associated with organic management are difficult due to variation between properties, soils, regions and objectives. Santiago (2010) attempted to quantify these cost increases and caution:

“The total increase in operations between conventional and biodynamic vineyards was 11%, but this should be regarded with extreme caution, since this varies enormously depending on whether the analysis is carried out according to economies of scale or BD development stage. The percentage difference in total costs between conventional and BD vineyards presents a wide variation, ranging from –13% (only large/fully BD) to 63% (medium/all BD stages) corroborating the need for an analysis that considers these variables (size and stage)” (Figure 4).

Further, she found that all vineyards she analysed experienced an increase in soil management costs and a reduction in canopy management costs. Only 33% of vineyards reported any reduction in yield. My own experience suggests that an overall cost increase in the order of 20% is a generally accepted figure amongst those who have converted to organic viticulture. I also believe that there are opportunities to reduce this figure over time, largely dependent on the skill of the land manager.

**Conclusions**

In conclusion I offer three key points for consideration by the Australian industry, growers and researchers.

Market and community expectations can change and will continue to change. It is contingent upon all participants of the industry to heed these changes and make decisions with these changes in mind.

In terms of soil management ‘alternative’ and ‘conventional’ farming share many objectives. In addition to this, the key measures of soil ‘health’ are to be found in any soil science text book. The successful organic farmer of the future will integrate these principles into their management, not rely on faith alone.

Changes in soil management contribute disproportionately to increased cost in organic systems; however it also likely contributes to positive results. Producers looking to improve business efficiency in organic systems would do well to focus on improving the efficiency of weed control in particular.

**References**


