



Limestone Coast Soil Stewardship Report

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1. Introduction

Luke Tocaciu, Anna Hooper and Nick Baverstock were selected to participate in the Soil Stewardship Program

One of our first objectives when we went off on our journey, was to gather a few perceptions from other vigneronas as to how they perceive our region. The reason we did this is that we all recognised that how we care for our vineyards impacts on our reputation. And here's an example of the type of feedback we were confronted with:

'Limestone Coast is a reliable region with many large scale producers. It has some good potential.... but it's not sexy or sophisticated.'

As part of the soil stewardship campaign, 'Down and Dirty' we set out to prove that notion wrong.

So what is being 'sexy and sophisticated' in vigneronas terms? If Barossa Valley's 'Be Consumed' TV commercial is anything to go by, a love of the dirt seems important, so we decided we'd start at grass roots level and embark on a mission to better understand soil in this region and become local ambassadors for soil health. The first question we asked ourselves was what exactly is a healthy soil? One that's high in organic Carbon and organic matter and full of microbial life? One that closely resembles a soil in its natural state? Or one that provides good financial returns in perpetuity/without degradation? After much discussion, we felt that there was very little consensus as to what indicators about our vineyard soils are most relevant when determining 'soil health'. So when we embarked on our Soil Stewardship Program, this question was at the forefront of our minds.

2. Trip Summary

We commenced the program by undertaking a caving adventure close to home in the Naracoorte Caves. This was an opportunity to deeply understand the geology that shapes the Limestone Coast and an opportunity for the stewards to get to know one another better.



We visited numerous vineyards through Margaret River (MR), Barossa, McLaren Vale (MLV), Langhorne Creek (LHC), Adelaide Hills (ADH) and the Limestone Coast (LSC) during the period May 2014 through to October 2014. Vineyards were chosen based on the following parameters:

- Different regions in Australia and therefore different soil types and climates
- Diversity in soil management practices
- Diversity in business models (large, small, organic, conventional etc)

We were involved in several workshops during this period, firstly the AWRI hosted “Climate Change and the SA Wine Industry” at the Waite. The workshop highlighted how climate change will impact on the sustainability of our wine business and what strategies are available to us to mitigate these impacts. Management of soil health will be critical in buffering the impact of climate change on our vineyard.

We attended a “Future Soils” workshop in Margaret River hosted by the Western Australian Natural Resource Management board. This workshop highlighted the importance of undertaking soil tests and observing your soils. These tools are critical in developing soil management programs.

We considered the key themes that emerged from the vineyard visits and workshops, we used this to put together a workshop that would generate thought, discussion and practical information about soil health in the region. This comprised case studies, technical presentations and a session working together as a group. We intentionally tried to balance the workshop between practical examples and science.

Why is soil health important?

Soil is a big contributing factor in wine style. The wealth of different wine styles available on the market today can be attributed to a number of obvious factors – grape variety, viticultural practices, winemaking techniques, and climate. But we all know anecdotally that even when all these factors remain constant, we still see huge variations in wine style and quality from batch to batch. We also occasionally come across winemaking problems such as stuck ferments and poor flavour development that we suspect might relate back to soil.

But the importance of soil is not just about wine. Keeping the soil in a state that is fit for the purpose of supporting agricultural production into the future impacts the long term prosperity of the region. Soil is a natural resource and maintaining its health is a key component of environmental care.

Findings from Vineyard Visits

There was a wide diversity of soil management practices being implemented across the vineyards and regions we visited. It wasn't just the diversity of practices that was interesting, it was the drivers behind these practices; the business models, belief systems and site specific microclimates which effectively drove the different soil management practices at each site. We realised that soil management needed to be viewed in a holistic sense (that is in relation to the business model, belief systems and microclimate), not just the soil.

The vineyards we visited could be categorised into two broad groups based on their soil management practices.

Group 1: Cullens Vineyard (MR), Henschke Vineyard (ADH), Temple Bruer (LHC), Bekkers Vineyard (MLV)



These vineyards used the biodynamic and/or organic approach which included no pesticide, use of compost and straw under vine, under vine cultivation or mowing if required, a diverse mix of midrow species and use of animals for grazing. Biodynamic preparations were applied in the case of all Group 1 except Temple Bruer.

This Group strongly believed that the soil management practices they used were improving their soils and the sustainability of the vineyard and their business. Some of the businesses were specifically marketing themselves as biodynamic or organic.

Group 2: AHA Viticulture (Vineyard management company in MR), Yalumba (Coonawarra), Wynns (Coonawarra).



These vineyards adopted a conventional low input approach to their soil management practices which included under vine herbicide, compost application if required, a diverse mix of mid row species, the use of synthetic fertilisers as required and the use of animals and grazing. There was a general practice to reduce the herbicide use.

This Group in general had large areas to manage and many vineyards were frost prone. Management programs needed to be cost effective in particular in regards to under vine management, frost was a high risk in the LSC which drove many soil management practices.

There was significant cost spent on compost in many of these vineyards. The wineries to which the fruit was going did not demand a particular soil management approach (ie: organic and biodynamic). The importance of having an aesthetically pleasing looking site was important in some instances.

Key learnings and advice

The more innovative producers, whether that be biodynamic, organic or conventional low input, illustrated the following traits:

- Had a deep interest in soil and sustainability and what was happening on their property
- Were all willing to look outside of their vineyard or region at different practices
- Were willing to trial new practices and most importantly they measured and observed the outcomes of these practices
- All believed organic carbon levels in the soil are critical to the long term sustainability of their vineyards (and that it needs to be measured annually and addressed if low).

3. Down and Dirty Workshop, held 2/6/2015

As part of our program, we put together a workshop for our wine industry peers, hoping to share some of our knowledge and start the conversations around soil health in the Limestone Coast. This was held in the depths of the Naracoorte Caves, beneath our soils and where our Soil Stewardship program began.



The workshop brought together three key elements that we had identified as being important to share with our peers. They were:

Case Studies

Presentations by local Vineyard Manager for Treasury Wine Estates, Tim Fletcher and McLaren Vale Vineyard Consultant and owner, Toby Bekkers, both demonstrated the practical solutions and results of vineyard management practices on specific soil issues. Tim shared his experience with managing vineyard on different soils within the Limestone Coast. The key elements of his presentation were:

- The primary vineyard management issues seen within the Limestone Coast are variable water holding capacity and nutrient content, low organic matter, variable vigour and compaction.
- Mulch and compost is effective in increasing water holding capacity and organic matter.
- Various cover crops can be used to target specific vineyard issues. I.e Lucerne to control early summer vigour.
- The use of bigger, multi-row machinery reduces soil compaction and saves time/money.
- The relationship between the nature and depth of topsoil and vine health is best understood by looking below the surface.

Toby Bekkers demonstrated his strategies on managing vineyards on specific soils with both business objectives and the owner's beliefs in mind. The key elements of his presentations were:

- Treat your vineyard as perennial plants, and not on an annual cycle. Sometimes radical measures are needed in the short term for longer term benefits.
- Define your objective with that vineyard and you plan how to get there.
- Be prepared to change your practices from block to block, season to season and within seasons if necessary.

Technical Presentations

Professor Robert White from the University of Melbourne, Mardi Longbottom from Australian Wine Research Institute (AWRI) and Brian Hughes from Primary Industries and Regions SA (PIRSA) Rural Solutions were chosen to bring a technical and scientific element to the workshop.

Professor Robert White shared his insights into soil health and scientifically proven practical measures you can use to improve soil health. Mardi Longbottom presented the work of Luke Johnson's PhD on biodynamic vs organic vs conventional viticulture. Brian Hughes brought his broad knowledge of soil and land management from both inside and outside the wine industry.

Key elements of these presentations were:

- Soil health should encompass the soil's chemical, physical and biological condition, and relates to a soil's fitness for purpose.
- The right combination of these factors can be achieved through soil amendments (lime, gypsum, fertilizers etc), the use of cover crops, composts, manures and mulches
- Benchmarking your vineyard against various determined limits/ranges is important, but a major issue is the variability between methods, labs and accuracy of tests.
- The debate on biodynamic vs organic vs conventional viticulture comes back to specific elements such as herbicide/fungicide use as having the most influence.
- There are extremes in all management practices and site specific solutions are needed, not a one stop shop when it comes to vineyards.

- If you can identify the key issues with your soil, there are specific treatments available for each issue.
- Look outside the wine industry to broader farming practices for solutions as many of the problems faced are the same.

Group Discussions

The workshop was split into groups and asked to answer questions around some critical issues surrounding soil health in the Limestone Coast.

Questions	Responses
What are your key issues surrounding soil health?	Decreasing soil organic matter, low water holding capacity, waterlogging, variability within vineyards, salinity and long term sustainability.
What practices might be putting our soils at risk?	Herbicide use, pressures to achieve an 'aesthetic' vineyard, bare earth policy for frost prevention, insufficient water, poor quality water and compaction
Identify any knowledge gaps and where further research is needed.	Practices that help herbicide breakdown and timeframe around it, setting standards for testing soil health, cover crops and under vine management options, and improved weed management and herbicide resistance options
What can our region do to support growers to improve environmental credentials and sustainable practices.	Continue to promote and educate local champions/leaders, best practice workshop within each region, establish soil health guidelines and goals, and encourage people to visit other regions to see how they do it.

4. Opportunities and what next?

Opportunities for growers

Whether the goal is simply to improve quality, reduce input costs or improve sustainability, all growers can benefit from taking steps to optimise their soil practices to suit their site. There are numerous opportunities to do this:

- Understand the variability in your vineyard indicated by soil type and vine vigour
- Dig a hole using a backhoe and explore the physical aspects of the soil around the vine roots in the zones of different soil type and vine vigour.
- Undertake standard soil tests, petiole tests and water quality tests annually in different soil types and vine vigour areas. Be wary of soil health (biological) testing due to inconsistencies in results and methods.

- Create a soil management plan using information gathered from the above two points.
- Understand what's happening in response to our practices and always question "why am I doing this?"
- Be open about sharing experiences with other growers within you region about soil management.
- Seek feedback from winemakers
- Get outside your patch and see what other people/regions are doing. You will learn something!

Opportunities for winemakers

There is always the risk that the relationship between growers and producers becomes an 'arms' length' one, at the expense of understanding the link between soil health, quality and business drivers. Where businesses are not vertically integrated from grape to glass, it's mutually beneficial for producers to take the effort to engage their growers, to understand the challenges they face and to provide feedback about what's important for the target wine style and quality (as opposed to what's not).

It's important that producers don't impose unnecessary burdens upon growers such as pressure to achieve an 'aesthetic' vineyard that could be at odds with maintaining an understory that supports soil health. Instead producers should focus on better understanding the tangible links between soil and wine, at the same time as respecting and rewarding sustainable viticulture.

Opportunities for further work

The following research/knowledge gaps were identified during the group discussions and are recommended for future investment:

Under-vine management – There is a diverse range of management techniques used for under vine management, all of which are driven by various rationale. Are there best practice under vine management regimes for different soil types and regions?

Solution: Onsite trials in a variety of soil types showing effectiveness of cover crops and under vine management regimes. Measures of effectiveness would include weed suppression, impact on macro and micro nutrients, soil organic matter, soil carbon and vine water status.

Vineyard variability – Many established vineyards exist on variable sites. Issues are excessive or low vigour which impact on fruit quality, disease and yields. Are there basic tools available to growers to manage variability?

Solution: On site trials in some typical problem soils. The aim would be to provide recommendations as to what management practices to implement to address the variability issues in different soil types.

Relationship of soil to wine - During the workshops there were questions from producers about the impacts of soil parameters, vine nutrient status and juice composition and its impact on wine (fermentation kinetics, wine style and residuals).

Solution: Extension of existing research via workshops or fact sheets. Improve communication between growers and winemakers.

Herbicide breakdown – There is concern about the varying breakdown times for different herbicides and the impact this has on soil health. Can we accelerate the breakdown and what herbicides take a long time to breakdown?

Solution: Extension of existing research via workshops or fact sheets.

Water availability and quality - Water is not only important for vines in the short term but given that vines are a perennial crop, water deficiency can cause issues over subsequent seasons.

Solution: There is a range of funding sources available for work around managing water availability risk in an uncertain climatic future. Our industry is already recognised as efficient users, however in future we may be faced with shortages or water quality issues that will force us to become even better. Better irrigation timing, advances in irrigation infrastructure and rootstocks are some examples of where we may need more regional research in future.

Establish best management practice - Many regions around Australia have best management practice guidelines, and one region (McLaren Vale) use third party audits to certify their growers as 'sustainable'. Their program McLaren Vale Sustainable Winegrowing Australia has recently been accepted by Australia's environmental assurance scheme, Entwine, meaning that they can market their achievements both domestically and internationally.

Solution: A starting point for Limestone Coast is a series of workshops aimed at sharing ideas and experiences specific to Best Management Practice in a range of soil types. We should investigate the appetite amongst consumers, producers and growers for a regionally based program that educates growers about best practice at the same time as providing some assurance to producers buying fruit. A mechanism for Limestone Coast producers to demonstrate environmental sustainability in the marketplace at the regional level would be a possible flow on from this type of work.

Enhance public perception of Limestone Coast - Limestone Coast has the issue of being seen as a bulk producer with many big vineyards. To outsiders, there is a sense of monotony (same clones, same pruning, same under vine management). This seems to be a key issue which detracts from our reputation amongst our peers and the 'sex appeal' of the region.

Solution: The region needs to work harder to demonstrate its deep interest in soil health and sustainability, and to better understand the diversity of viticultural practices appropriate for different situations. There are also opportunities to do more to highlight and promote local champions, to encourage continual improvement by providing the necessary resources to our growers to assist them to improve their practice and to educate our markets that we are a region who understands and cares about our earth.

Continue Networking – The soil stewardship program provided an opportunity for us to learn from other regions and share ideas in regards to soil health and sustainability. The program needs to continue in another form which allows us to continue networking with other regions and sharing our success stories while learning of their success stories.

5. Acknowledgements

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