

The use of compost and mulch in vineyards

A case study from Torbreck Vintners, Barossa Valley



South Australia's Barossa has a long history of winemaking that dates back to 1842. The Barossa region incorporates both the Barossa and Eden valleys.

There are more than 40 grape varieties planted in Barossa however, the majority of vineyard area is planted with these 10: Shiraz, Cabernet Sauvignon, Riesling, Grenache, Chardonnay, Merlot, Semillon, Mataro, Sauvignon Blanc and Viognier.

Torbreck has been making wine from grapes grown in the Barossa Valley since 1994. It has a focus on Rhone varieties such as Shiraz, Grenache and Mataro.

Torbreck uses sustainable vineyard management practices and is committed to getting the best out of each vineyard site whether it be a company vineyard or one belonging to its grower partners.

It endeavours to understand how each site reacts to the seasons, and how the soil, climate and farming practices combine to create each site's unique character.

"We use the minimum amount of inputs to achieve the maximum results."

Nigel Blieschke, Torbreck Viticulturist

Why compost and mulch?

The vineyards were developed on cropping land where land clearing and traditional farming practices had depleted levels of organic matter in the soil.

This meant that the soils were poorly structured, highly variable and had low water holding capacity and compaction issues. Subsequently the vineyards were highly variable, and had reduced vigour and poor leaf health.

Traditional grape growing practices, including annual crop cover and cultivation, combined with regular gypsum

applications and small additions of organic matter, did little to improve the soils.

However, it was noticed that a small area on the Descendant Vineyard was performing better than the rest of the vineyard.

Further investigation revealed that more than 25 years ago, the area neighboured a pig farm and received regular manure and straw applications.

Torbreck Viticulturist, Nigel Blieschke, says that the vines in this area were the healthiest on the property, produced the highest yields and required the least amount of water and fertilisers.

In 2007, following this discovery, Nigel started trialling different sources of organic matter including wood based mulches, partially composted grape marc, straw mulch and various commercial composts.

They found partially composted grape marc to be too rich in potassium for their soils and settled on a combination of commercial compost and wood based mulch.

In 2015, Nigel attended the Secret Life of Soils Microscope workshop funded by the Regional Landcare Facilitator, Adelaide and Mount Lofty Ranges Natural Resources Management region in collaboration with the Australian Organics Recycling Association (AORA).

After viewing his soils under the microscope Nigel discovered a profound difference in the soils that had received organic matter inputs and those that hadn't.

The soils rich in organic matter were teeming with life.



Mulch vs compost

Mulch is organic or inorganic material placed on the soil surface as a protective cover.

Compost is organic material that has undergone controlled biological and chemical decomposition. It is either applied on the soil surface or incorporated into the subsoil as a conditioner.

The benefits of mulch

Reduced irrigation inputs

Lower solar radiation and wind speed at soil surface reduces the loss of water through evaporation.

Increased organic matter levels improve soil structure which increases soil water holding capacity, water infiltration, aeration and drainage.

Reduced herbicide inputs

Suppression of weeds.

Reduced vine stress and heat damage

Lower solar radiation at soil surface and buffering of topsoil from temperature changes.

Reduced fertiliser inputs

Protection of topsoil from direct impact of rain and wind reduces erosion and land degradation.

The benefits of compost

Reduced irrigation inputs

Increased organic matter levels improve soil structure which increases soil water holding capacity, water infiltration, aeration and drainage.

Reduced fertiliser inputs

Increased organic matter levels improves nutrient holding capacity.

Release of inorganic nutrients (readily available) and organic nutrients (slow release).

Increased soil biological activity increases nutrient availability through increased organic nutrient decomposition.

Reduced chemical inputs and less risk of crop loss

Increased activity of beneficial soil organisms reduces pathogen growth and may also increase vine resistance to diseases.



At the Secret Life of Soils Microscope workshop

"You know a soil is healthy when you look under a microscope and see that it has activity and life."

Biological activity including fungal hyphae and mycorrhizal spores were clearly visible.

Nigel says that the workshop reinforced his beliefs in using organic matter to improve soil health, and gave him the confidence to expand the practice across all of the vineyards.

The success of the workshop also saw Nigel work with AORA and the Regional Landcare Facilitator to run a seminar and site visit on site earlier in 2018 to present his results to other viticulturists.

The company is also very mindful of climate change and the impact it will have on growing grapes in the Barossa Valley.

It believes that improving soil and vine health, through organic matter inputs, is key to future proofing its vineyards from the likelihood of extreme heat and drought.

"It is important that we look after our vineyards so that we leave them in a better condition for future generations."

Aims of composting and mulching:

- improve soil health (structure and biology)
- reduce soil and vine variability
- enhance soil water holding capacity
- increase water availability to plant roots
- reduce evapotranspiration
- improve overall vine balance.





Old Grenache vine planted in 1850, Hillside Vineyard

Compost and mulch applications

Since 2015, Torbreck has taken a structured approach to its composting and mulching program.

This involved gaining a thorough understanding of the variability of its vineyards through the use of aerial surveillance.

Digital multi-spectral imagery (DMSI) was used to map the vineyards into vigour zones at a resolution of 0.5 m.

This was then cross-checked through vineyard inspections and observing soil structure, along with conducting soil nutrient and biological analysis, and plant nutrient analysis.

This information helped identify blocks for total replanting or remedial action of weak areas.

Replanting program

Pre-planting:

- compost mixed with 12.5 kg/m³ of gypsum applied a rate of 40 m³ per hectare to the vine row
- deep ripping of the vine row.

Post-planting:

- compost applied at a rate of 40 m³ to the vine row every 3 years
- woody mulch applied at a rate of 160 m³ to the vine row every 7 years.

Remedial program

- mid row deep ripping of every second row
- compost mixed with 12.5 kg/m³ of gypsum applied at a rate of 40 m³ per hectare to the mid row rip line
- compost applied at a rate of 40 m³ to the vine row every 3 years
- woody mulch applied at a rate of 160 m³ to the vine row every 7 years.



Key outcomes

Benefits of the compost and mulch program were seen within the first year.

Nigel commented that after 12 months, despite receiving 48 per cent less rainfall than the previous year, he saw a reduction in vineyard variability.

He also noticed an improvement in leaf condition, and a significant improvement in water use efficiency (30-40 per cent). He attributes this to an increase in soil water holding capacity and reduced water loss from evaporation.

Nigel also measured consistent yield improvements (70-100 per cent in whites and 30-70 per cent in reds) as well as significant improvements in soil health.

The biological activity of the soils increased with a higher number of earthworms found at depth.

Root penetration and water infiltration to depth also increased, as did the ability to leach salt from the rootzone.

Torbreck has not used any synthetic fertilisers since starting the compost and mulch program.

It found that since compost application began, soil nutrient availability has increased.

This is attributed to increased biological activity of the soil and the resulting increase in organic nutrient decomposition.

The compost and mulch program delivered significant cost savings through yield improvements, reduced fertiliser inputs and improvements in wine quality.

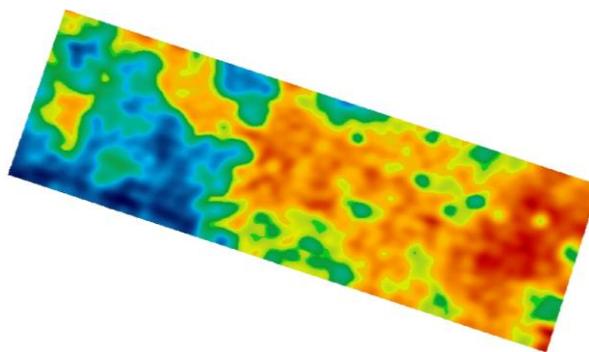
It has proved to be a very cost-effective management tool and will have long-term positive effects on their soils.

Future plans

Torbreck plans to expand the compost and mulch program to encompass the entire vineyard area, not just the weakest areas.

Reference

Perth Region NRM, 2013, Sustainable Agriculture Factsheet No 2: *The use of mulch and compost in vineyards*, www.perthnrm.com/wp-content/uploads/2017/06/Perth-NRM-SA-Factsheet-2-13_HR.pdf



DMSI vigour map of Descendant Vineyard South Block

“Compost and mulch applications seem expensive but you will see improvements that last 7-8 years. You get bang for your buck!”

The bottom line

Remedial compost and mulch applications
= \$1380 per hectare per year^a

Value add from increased quality
= \$132,000 per hectare per year^b

Value add from increased yield
= \$6250 per hectare per year^c

^aBased on purchase and application price of mulch (averaged over 7 years) and compost (averaged over 3 years)

^bBased on a 232% increase in bottle value

^cBased on fruit value of \$2500/tonne (Barossa Valley Shiraz).



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Government of South Australia



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