

BGWA Demonstration Vineyards trials:

Under-vine mulch trials

- Rosenvale mulch trial preliminary results, 2021

- Duramulch trials results, 2015 2021
- Tarac compost trials results, 2018-2021

Vineyard trials workshop & BGWA grower activities update – What's happening in your midrow & undervine? Rosenvale Vineyards Cellar Door, 19th May 2021

Outline

Details of new undervine mulch trial setup at Rosenvale site

Given the first season at Rosenvale undervine mulch trial

Overview of undervine Duramulch & Tarac composts trials

□ Summary of key finds from undervine mulch trials

Design of new undervine mulch trials at Rosenvale site

Rosenvale undervine mulch treatments, 2020-2021

E. Undervine Straw Mulch

- 50 round bales/ha, spread 27 July 2020
- windrowed wheat straw
- volunteer grass midrow

F. Undervine Jeffries DuraMulch

- 104m³/ha, spread 31 July 2020
- volunteer grass midrow
- trial area also contains 2 rows with Jeffries Rustic Mulch observation only

D. Bare undervine (the 'Control' for this trial & the midrow trials*)

- standard undervine herbicide program winter & spring-summer, as required
- volunteer grass midrow*
- > Same inputs as mid-row trials and identical midrow treatment & irrigation
- Compares popular straw mulch with woody mulch (similar to a trial run in Clare Valley)
- Integrates midrow & undervine trials into one site with a high level of data collection
- Provides a 'one-stop' demonstration site for local field-days & workshops

Undervine mulch trials at Rosenvale, 10 August 2020



50 rounds/ha wheat straw



104m³/ha Jeffries Duramulch

Vine-row Soil moisture – Rosenvale undervine mulch comparison

VINE-ROW average soil moisture % for 10-80cm sensors for period 10 October 2020 to 10 March 2021

- much slower rate of drying with both mulches vs bare - as expected

61

56

- Straw held higher moisture at start and showed slower drying rate than Duramulch
 - moisture fell more rapidly and to lower deficits between each irrigation with Bare undervine
- depth graphs showed some 'sponge' effects (reduced irrigation penetration) with Dura vs Straw & Bare



Mid-row Soil moisture – Rosenvale undervine mulch comparison

MID-ROW average soil moisture % for 20-60cm sensors for period 10 October 2020 – 10 March 2021



Air temperature @ 1m cordon height

Air temperature at cordon height (1m) for different midrow treatments

Low temperature period:

7pm 26 September to 7am 27 September 2020





Lowest temperature on 27 September 2020 - EL12 (~10cm shoots)										
Treatment	Cereal cover cropped & cultivated midrow	Cereal cover cropped & low-mow & herbicided midrow	Cereal cover cropped & high-mow midrow Midrow		Straw mulch undervine (mown grass midrow)	Duramulch undervine (mown grass midrow)				
Time	6:00 AM	5:30 AM	5:30 AM	5:30 AM	5:30 AM	5:30 AM				
Temperature (°C)	0.03	-0.53	-0.21	-0.33	-1.04	-0.22				
Hours duration less than 2°C (+/- 30mins)	5.5	6.5	5.5	5.5	7.5	5.5				

Air temperature @ 1m cordon height

Air temperature at cordon height (1m) for different undervine treatments

HIGH temperature period:

8am 24 January to 8pm 24 January 2021



Under-vine Soil temperature - spring

Soil temperature at 20cms for period **15 September 2020 – 30 September 2020**



Under-vine Soil temperature - summer

Soil temperature at 20cms for period 1 January 2021 – 31 January 2021



- 13

33

- Lowest range and temperatures with Straw
- 5.9°C peak difference between Bare & Straw on 11 Jan 2021 (42°C max air temp)



Vine canopies, 4 March 2021 (1 day before harvest)



STRAW MULCH



DURAMULCH



BARE

Grape ripening



Yield data

		2021								
		Bunch	weight	Berry	weight	Harvest yield				
Vineyard & Trial ID	Harvest date	Bunch wt at harvest (g)	Diff vs Control (%)	Berry wt at harvest (g)	Diff vs Control (%)	Tonnes/ha	Diff vs Control (%)			
ROSENVALE - CONTROL (bare)		119		1.15		8.40				
ROSENVALE - STRAW MULCH	05-Mar	118	-1%	1.19	+3%	8.80	+5%			
ROSENVALE - DURAMULCH		131	+10%	1.20	+4%	9.54	+14%			

Whilst not measured, the data indicates lower bunch counts in Straw ... likely due to frost effects, but still higher harvest yield than Bare

Berry weight-loss dynamics play a major role in Shiraz yields at harvest ... water relations is a factor but not the only one ... complex physiological & climate factors involved

Grape composition

Vineyard & Trial ID	sample date	Standard analysis		Ripening rate		AW	RI grape a	analysis	5			
		Be'	рН	ТА	Avg Baume increase per week	"Sugar Loading " Rate (average ug/g/day)	Free anthocyanins (mg/g) - colour density	Total Phenolics (au/g)	Total tannin (mg/g)	YAN (mg/g)	Berry tasting comments (berry sensory assessmen by Chris Rogers)	
ROSENVALE - BARE		13.3	3.48	4.9	0.99	2.54	2.05	163	5.44	124	lower sugar but good flavour maturity & intensity	
ROSENVALE - STRAW MULCH	3-Mar	3-Mar	14.7	3.44	5.4	1.27	3.27	2.15	190	7.07	151	lower flavour maturity than bare, firmer berries
ROSENVALE - DURAMULCH		13.7	3.49	5.0	1.30	3.36	2.26	185	6.44	148	similar to straw but higher skin tannin & seed <i>maturity</i>	

- > Higher moisture deficit in Bare slowed Baume gain and 'sugar loading' vs mulches
- > Different ripeness levels at same pick timing influenced comparative phenolic & tannin levels
- > Berry sensory assessment showed greater flavour maturity in Bare, despite lower sugar
- > Moisture deficits often affect grape YAN levels, which may affect wine quality in some cases

BGWA demonstration vineyards mulch trial sites & treatments

Pindarie – Gomersal, red-brown earth, Shiraz

- undervine Duramulch @ 150m³/ha in 2015 & re-mulched @ 150m³/ha Nov 2018
- Reworked trunks & cordons in 2020 (V21 crop on news canes)
- 2015 2021 (current)

Dorrien - Krondorf, black cracking clay, Shiraz

- undervine Duramulch @ 150m³/ha in 2015 & re-mulched @ 145m³/ha Nov 2018
- High level of cordon decline & late-pruned in 2020
- Duramulch partly integrated by undervine 'knifing' in 2020
- 2015 2021 (now finished)

Falkenberg – Nuriootpa, sandy clay loam, Shiraz

- Tarac composted undervine mulches marc, straw, scalps, green-waste blends @ 200m³/ha
- 2018 2021 (current)
- Maywald Nuriootpa, red-brown earth, Shiraz
 - Tarac composted mulches marc, cow & chicken manures, scalps blends @ 35m³/ha
 - 2017 2020 (finished)
- Other Duramulch trials Rohrlach Light Pass, Binder Vine Vale, Schutz Ebenezer, Gibson Eden Valley
 - undervine Duramulch trials
 - 2015 2020 (finished)

2021 results from three trial sites – Yields

		2021								
		Bunch	weight	Berry v	veight	Harvest yield				
Vineyard & Trial ID	Harvest date	Bunch wt at harvest (g)	Diff vs Control (%)	Berry wt at harvest (g)	Diff vs Control (%)	Tonnes/ha	Diff vs Control (%)			
PINDARIE – CONTROL (bare)	02 Mar	108		0.93		8.40				
PINDARIE - MULCH	03-10181	121	+12%	1.05	+13%	11.20	+33%			
DORRIEN - CONTROL (bare)	11	58		0.72		n ot ro				
DORRIEN - MULCH		67	+16%	0.80	+11%	notre	ecoraea			
FALKENBERG - CONTROL (bare)	11 . Мот	57		0.59		5.97				
FALKENBERG - TARAC COMPOST 2	111-IVIar	63	+11%	0.62	+5%	7.08	+19%			

> Whilst not measured, budburst % & bunch numbers were visibly higher with mulch at Pindarie site

- > Thinner mulch layer, irrigation deficit regime & cordon decline at Dorrien site likely affected results
- > Irrigation deficit regime at Falkenberg site likely reduced berry weight differences vs control

2021 results from three trial sites – Grape composition

	sample date	Standards analysis			Ripeni	ing rate	AWRI grape analysis			
Vineyard & Trial ID		TSS (Be')	рН	ТА	Avg Baume increase per week	"Sugar Loading" Rate (average ug/g/day)	Free anthocyanins (mg/g) - colour density	Total Phenolics (au/g)	Total tannin (mg/g)	YAN (mg/g)
PINDARIE - CONTROL	24 Fab	13.9	3.46	5.4	0.93	2.40	1.89	167	5.87	123
PINDARIE - MULCH	24-Feb	13.1	3.47	4.9	0.93	2.40	1.63	160	5.90	114
DORRIEN - CONTROL	24 Fab	14.0	3.62	4.8	0.64	1.65	2.27	197	7.18	111
DORRIEN - MULCH	24-Feb	13.7	3.60	4.9	0.88	2.26	2.35	201	7.32	140
FALKENBERG - CONTROL (bare)		14.2	3.71	4.1	0.82	2.11	2.60	244	9.40	326
FALKENBERG - TARAC COMPOST	11-Mar	13.8	3.89	4.0	0.94	2.42	2.25	216	8.26	443

Grape composition differences at harvest in these trials are often a reflection of yield & harvest timing

- > Faster grape ripening rates with mulch ... probably largely due to vine water relations
- > Tarac compost significantly increased grape YAN ... much higher N% in Tarac compost than Duramulch
- Similar ripening rates and small differences in phenolics at Pindarie, despite the 33% yield difference

Summary of observations from all undervine mulch trials

- Soil moisture under Duramulch reached the same level as Bare 2-3 weeks later
- Fine undervine mulches can have a 'sponge' effect with reduced irrigation infiltration especially with short irrigations ... use 'pulse' regime with caution with fine mulches!
- > This 'sponge' effect has not been noticeable with Straw mulch in the Clare Valley trial
- The often-reported nitrogen 'draw-down' effect of low-N mulches (high C:N ratio) has been negligible or not noticed in Duramulch trials
- > The depth & width of undervine Duramulches has a large effect on moisture differences
- Duramulch has reduced peak soil temperatures by 7 to 10°C at 20cms
- > Undervine mulches & composts have shown significant improvements in vine P levels
- Undervine mulches present significant opportunities to reduce fertiliser inputs esp P
- > Duramulch has shown higher vine tissue (petiole) zinc & manganese levels at some sites
- Weed suppression from mulch has shown mixed results depends on several factors
- Soil organic carbon (OC) levels take many years to increase ...
- > Two Duramulch trials run over the last 5 years have shown OC increases of 17 to 25%
- > Duramulch has increased soil potassium (K) levels to varying extents
- > Vine tissue K levels have not shown the same % increases as soil K with mulches
- **Grape composition has shown very little or no change in pH with Duramulch & composts**
- > Duramulch has delivered yield gains of between 5 and 20% vs Bare undervine
- > Yield effects have varied from season to season with 'wetter' years showing lower gains
- Higher bud fruitfulness after frost damage was observed with one Duramulch trial

Summary of observations from all undervine mulch trials

- Reduced visual salt symptoms has been observed, even at low mulch/compost rates
- Significantly lower 'eutypa' incidence & severity was observed in one Duramulch trial
- > More uniform ripening patterns and less berry-weight loss near harvest often seen
- Impacts on grape composition have often been related to harvest maturity differences (later with mulch vs bare but trial limitations haven't allowed split pick timings)
- Grape marc when used in well-composted blends with other organic material has not led to significant changes in grape pH
- Tarac grape marc & cow manure compost blends showed high sodium & potassium
- Marc-chicken manure compost blends have shown increased vine N levels, but in these trials/sites have not led to excessive vine vigour issues ... rates & how its applied are key
- > Better leaf condition & heatwave resilience has been consistently observed with mulch
- > No pest problems (eg earwig damage) have been observed in any trials
- > Higher grape YAN often seen with undervine mulches & composts balance required!
- Apply gypsum (or lime in low pH soils) when using high-K composts to offset potential negative impacts of excessive soil K, especially on high sodium & low OC soils
- > Adjust fertiliser & irrigation inputs when introducing mulches
- > Know biosecurity risks & regulations when making own compost & importing materials
- Commercially sold composts must comply with AS4454-2012

PROJECT SPONSORS

- Wine Australia \triangleright
- BGWA
- Rosenvale Vineyards (James Rosenzweig) \succ
- Jeffries \geq
- Tarac Technologies \succ
- Farmer Johns
- LG Vineyard Services (Lincoln Grocke)
- Tractor Tread Vineyards (Steve Schiller)
- Dorrien Estate
- VineScout (Amanda Mader)
- > Vivelys
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- Stirling Vineyard Services

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vineyard services



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- > Wendy Allen & Tony Brooks, Pindarie
- Dorrien Estate
- Rob Gibson
- Kevin, Lyn & Adrian Rohrlach
- Stuart & Tammy Schutz
- Rolf & Christa Binder
- Roger Maywald
- Dan Falkenberg
- James Rosenzweig

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- David Woodard, PIRSA
- Lin Lin Low, Nigel Logos, Brenton Mengersen - Tarac Technologies
- Barry Hollitt, Landmark
- Australian Wine Research Institute
- Measurement Engineering Australia
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