

Compost use in vineyards

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Compost use in vineyards

- Focus of this project was to examine soil health under vines
- Understand the impact of application of composts on vineyard soils
- What should we be looking for?
- How do we measure change?
- How do we translate that to better wines, reduced cost of production etc.?

Compost under vines

- Project running over three years
- Recognised soil health impacts of bare earth
- What could be done to improve soil function?
- What part can organic matter play?





Soil issues in vineyards

- Some chemical, some physical
- pH, EC, cations, nutrient needs
- Physical issues mostly relate to structure
- How can compost assist?
- Compost is both a soil conditioner and a fertiliser with low nitrogen, moderate phosphorus and high potassium

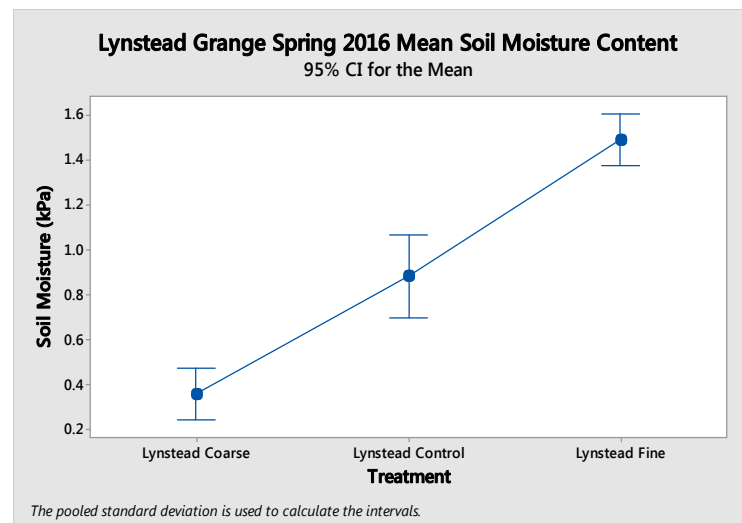
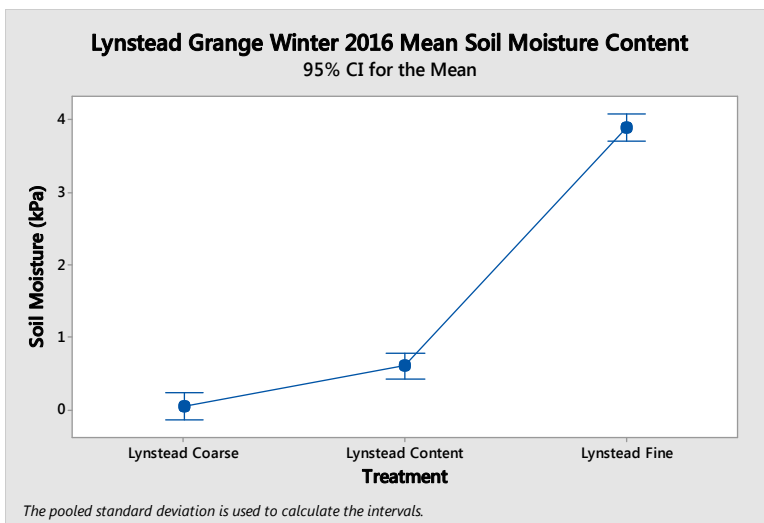
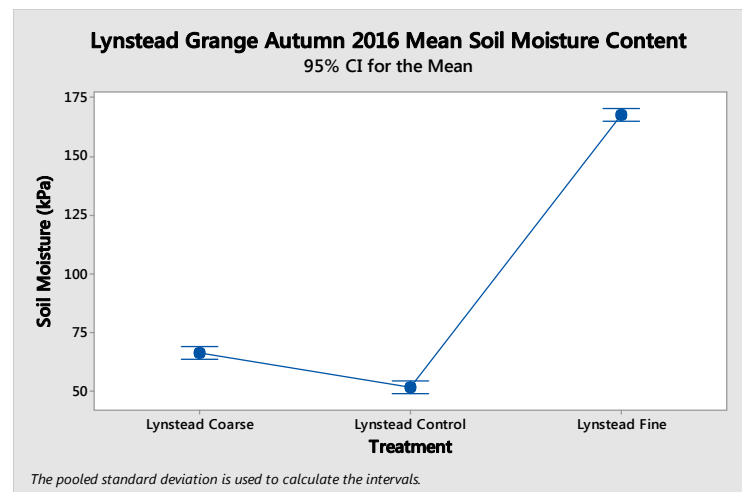
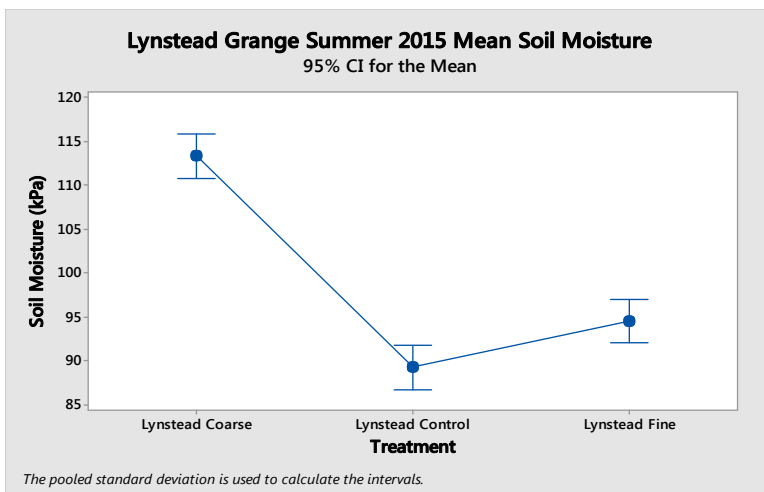
Compost under vines

- Lynstead Grange; Ten Minutes by Tractor; 100 Hunts Rd
- Three treatments on each vineyard
 - Control
 - Coarse mulch
 - Fine mulch / compost
- Soil properties monitored
 - Soil temperature
 - Soil moisture
 - Bulk density
 - Soil microbial diversity and
 - Water use efficiency

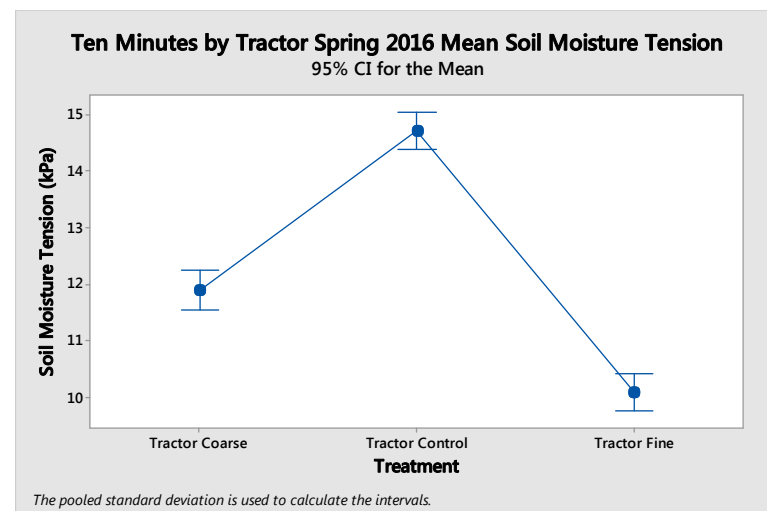
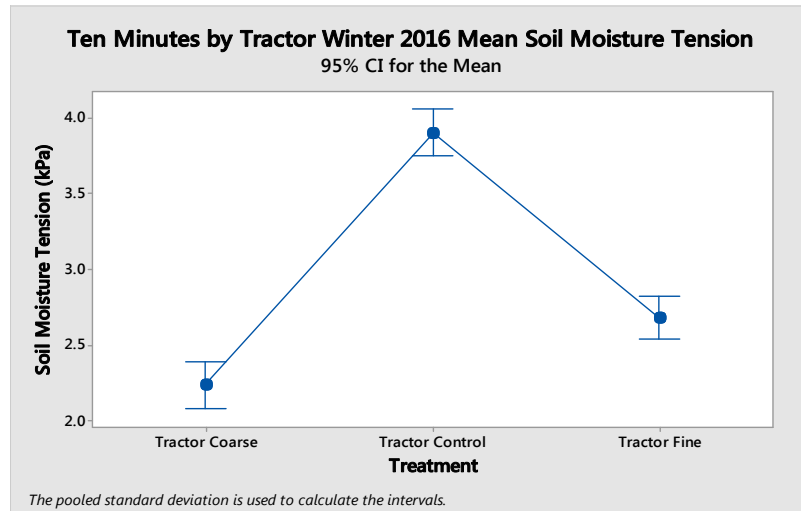
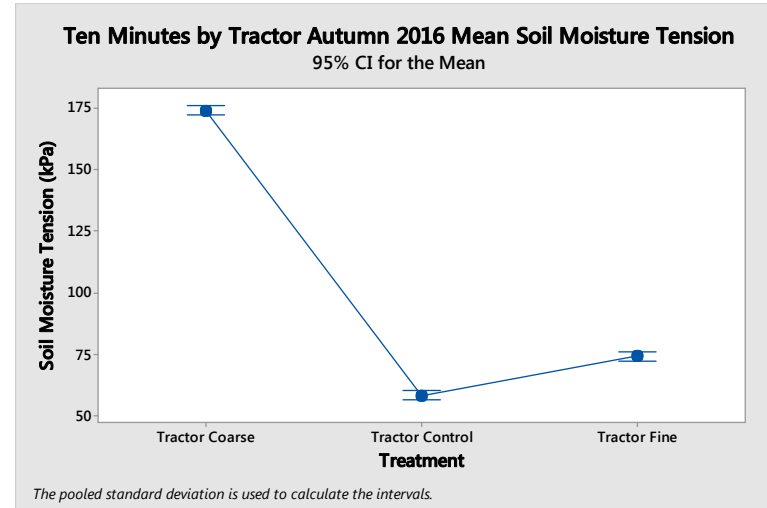
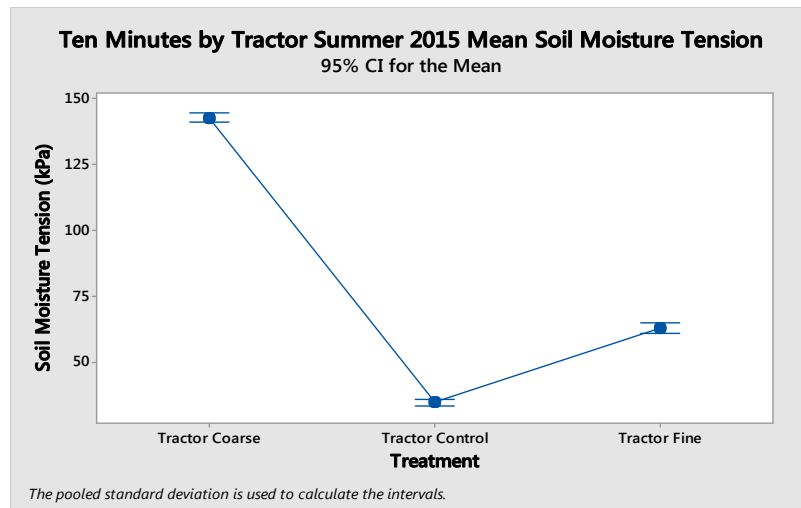
Compost under vines

- Compost was applied annually on all three vineyards;
- Application rate was 28m³/ac or 1m³ per 50m of row giving a cover of between 50-75mm over the beds;
- Project was beset by difficulties with sensor performance resulting in gaps in data;
- No soil data for Lynstead and 10 Minutes for 2017;

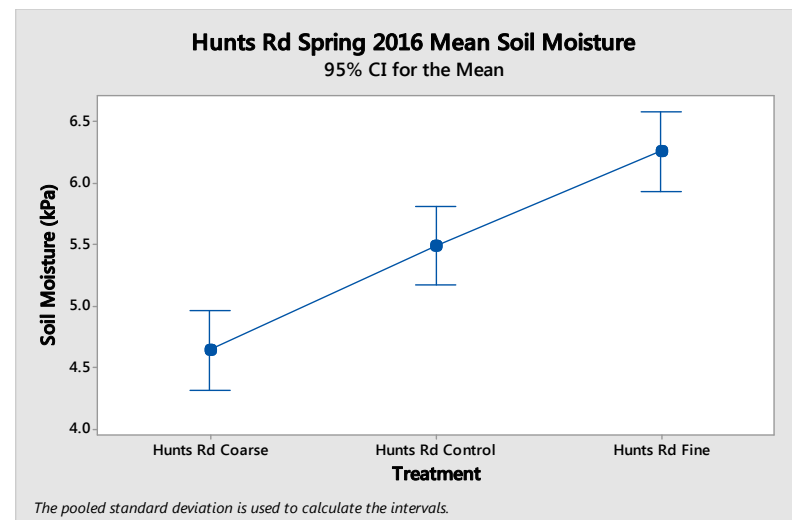
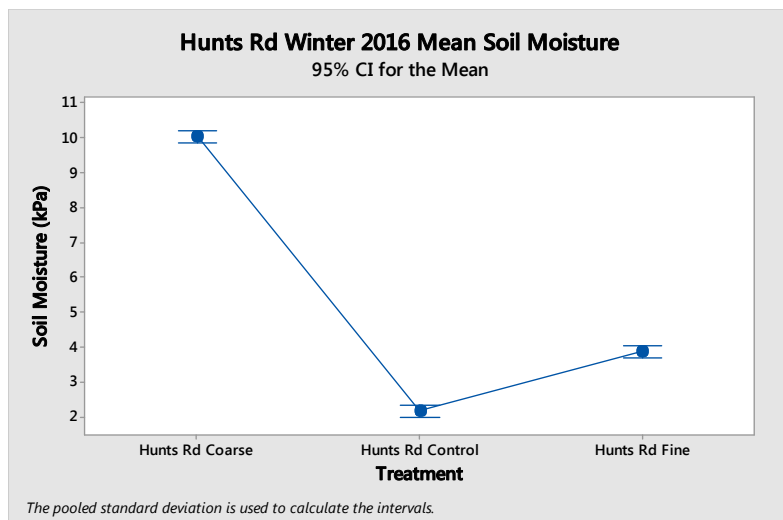
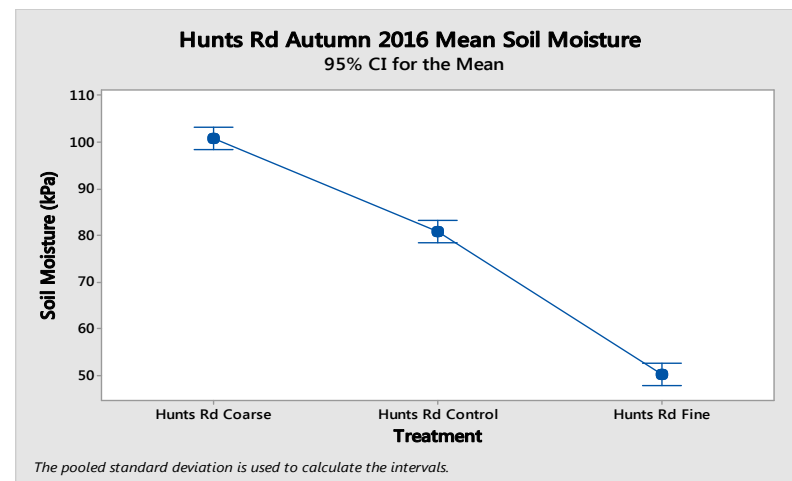
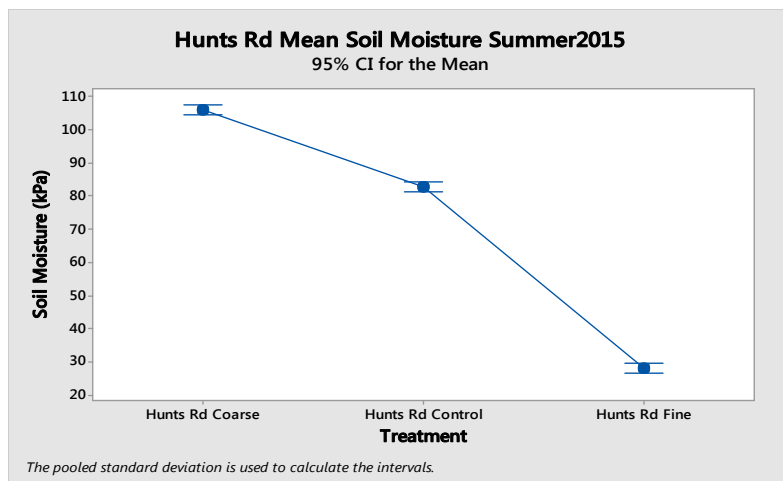
Lynstead Grange 2015-16 moisture



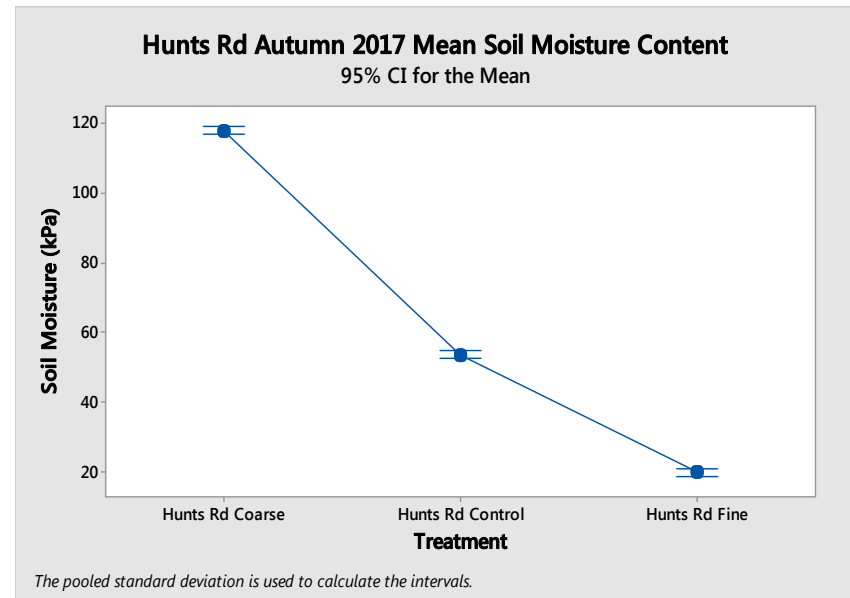
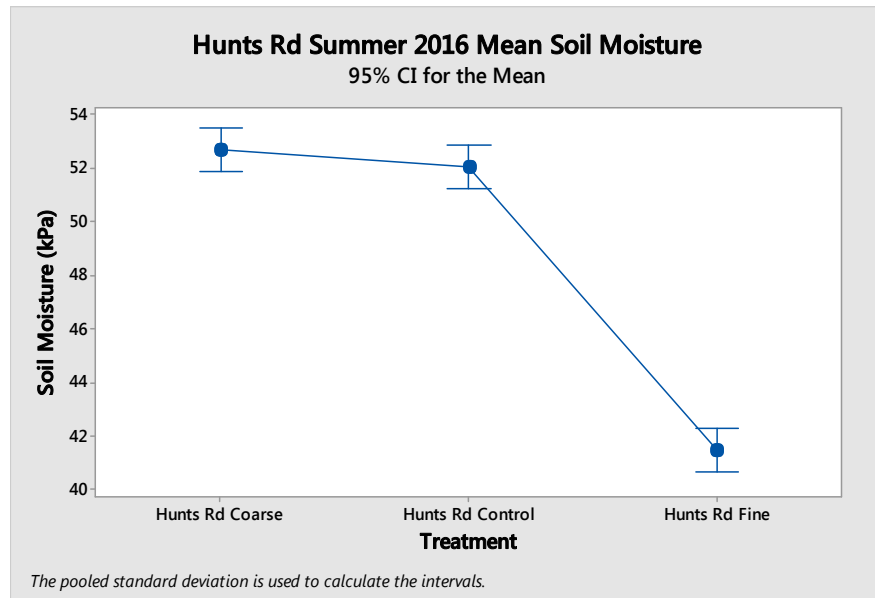
10 Minutes by Tractor 2015-16 moisture



10 Hunts Rd 2015-17 moisture

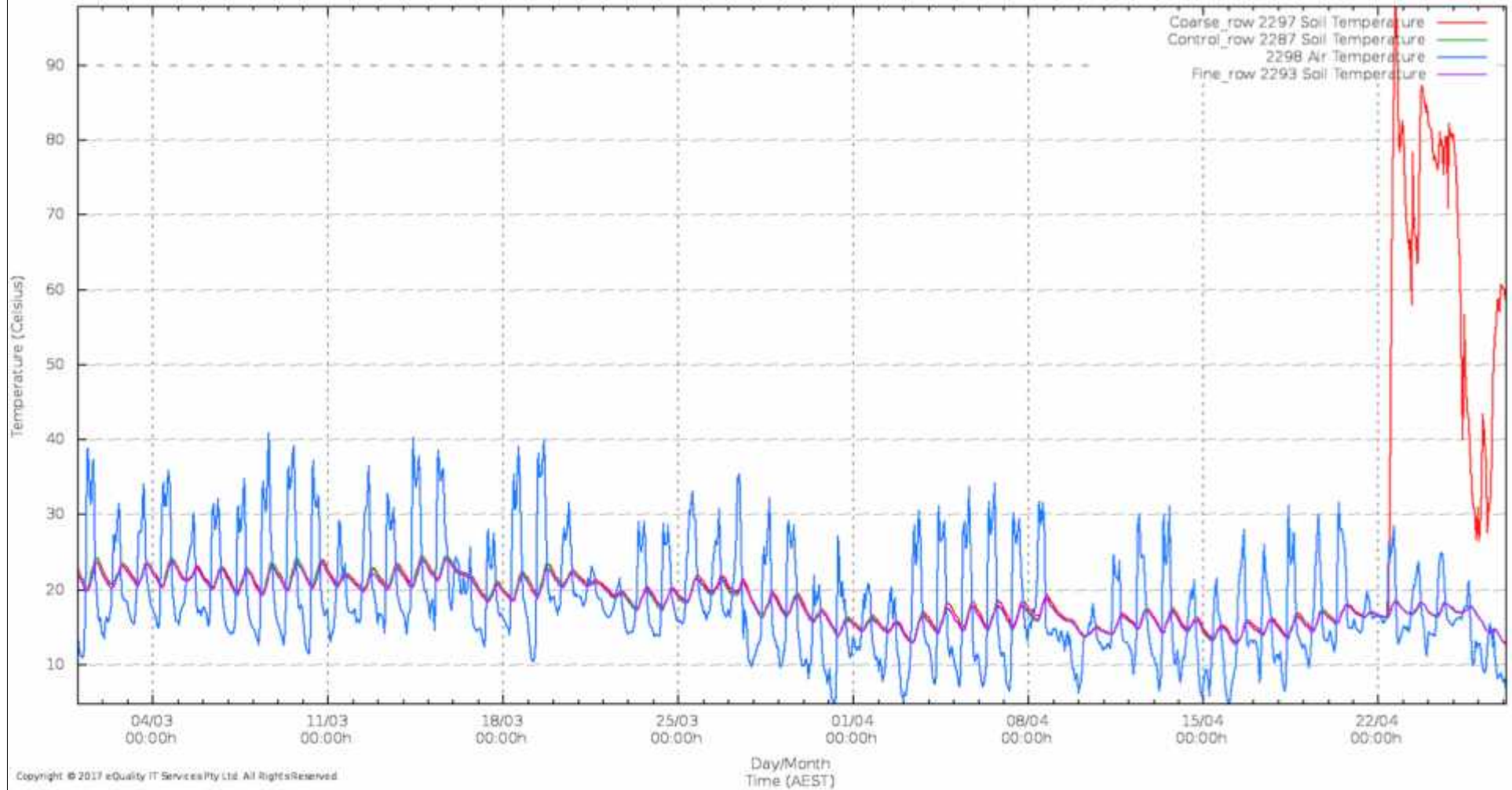


10 Hunts Rd 2015-17 moisture



100 Hunts Rd Autumn 2017 soil temp

Land Care
Autumn 2017
Hunts Rd Soil and Air Temperatur



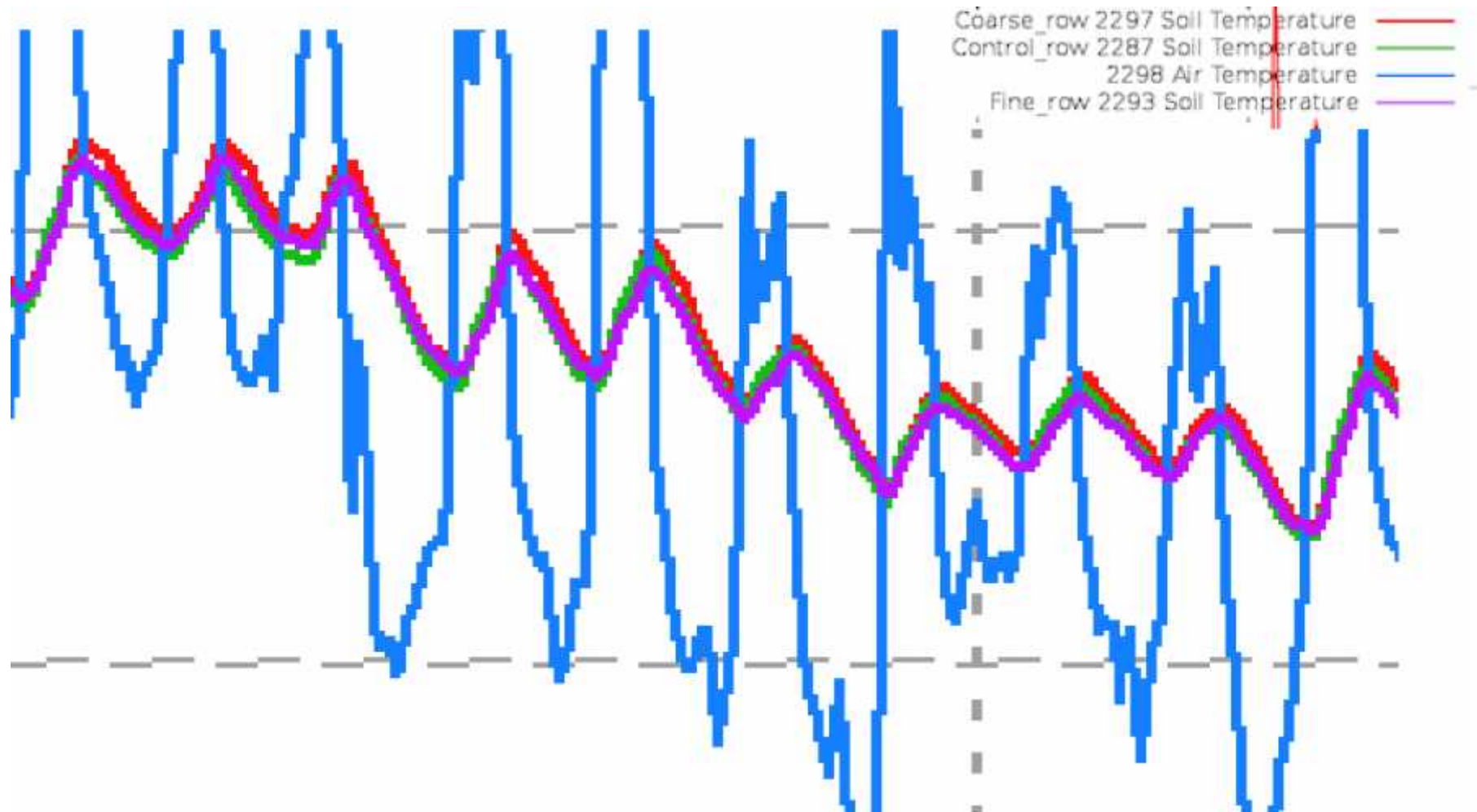
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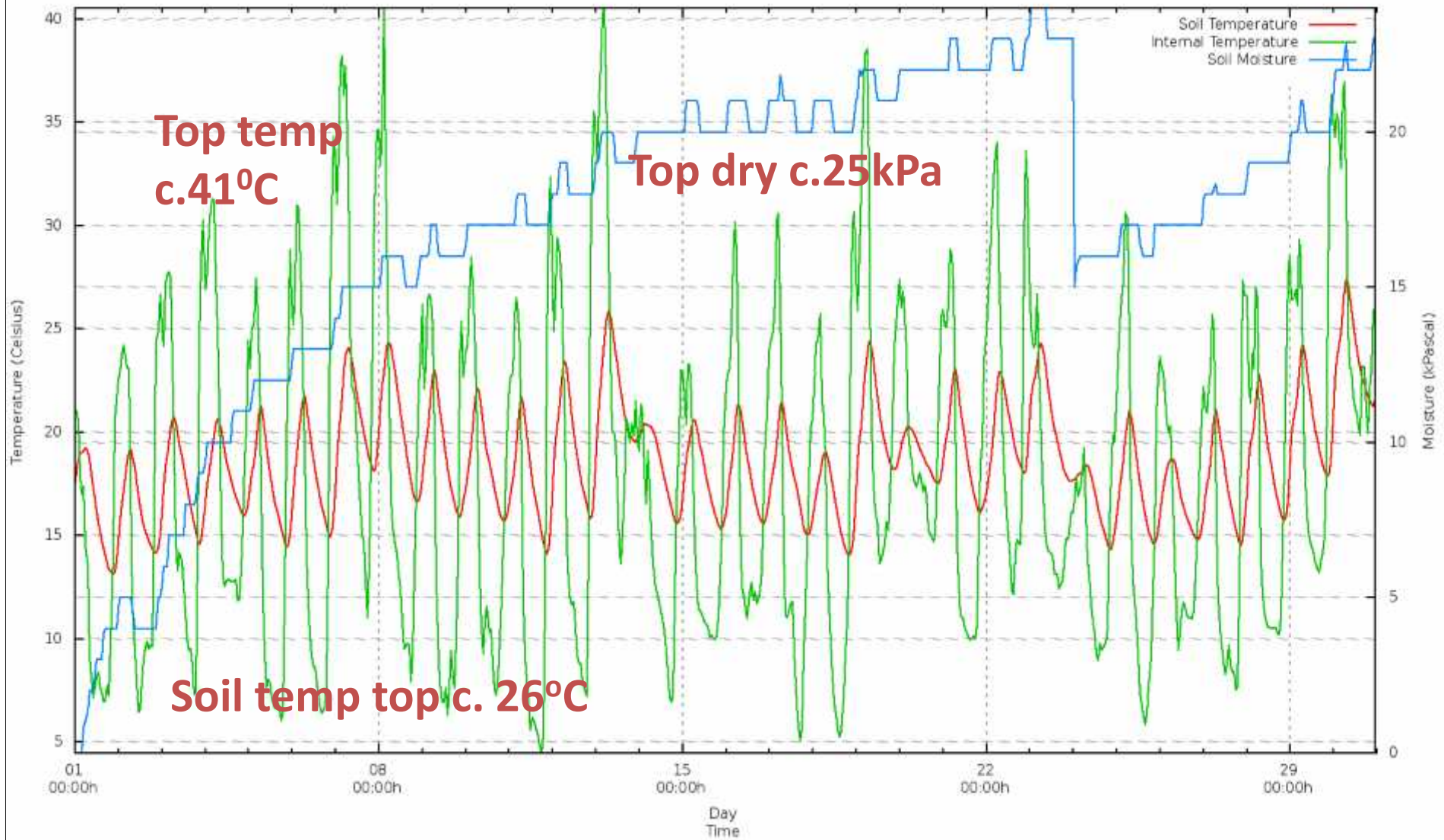


100 Hunts Rd Autumn 2017 soil temp



Nov 100Hunts Control

11 2014 soil measurements sensor 2287



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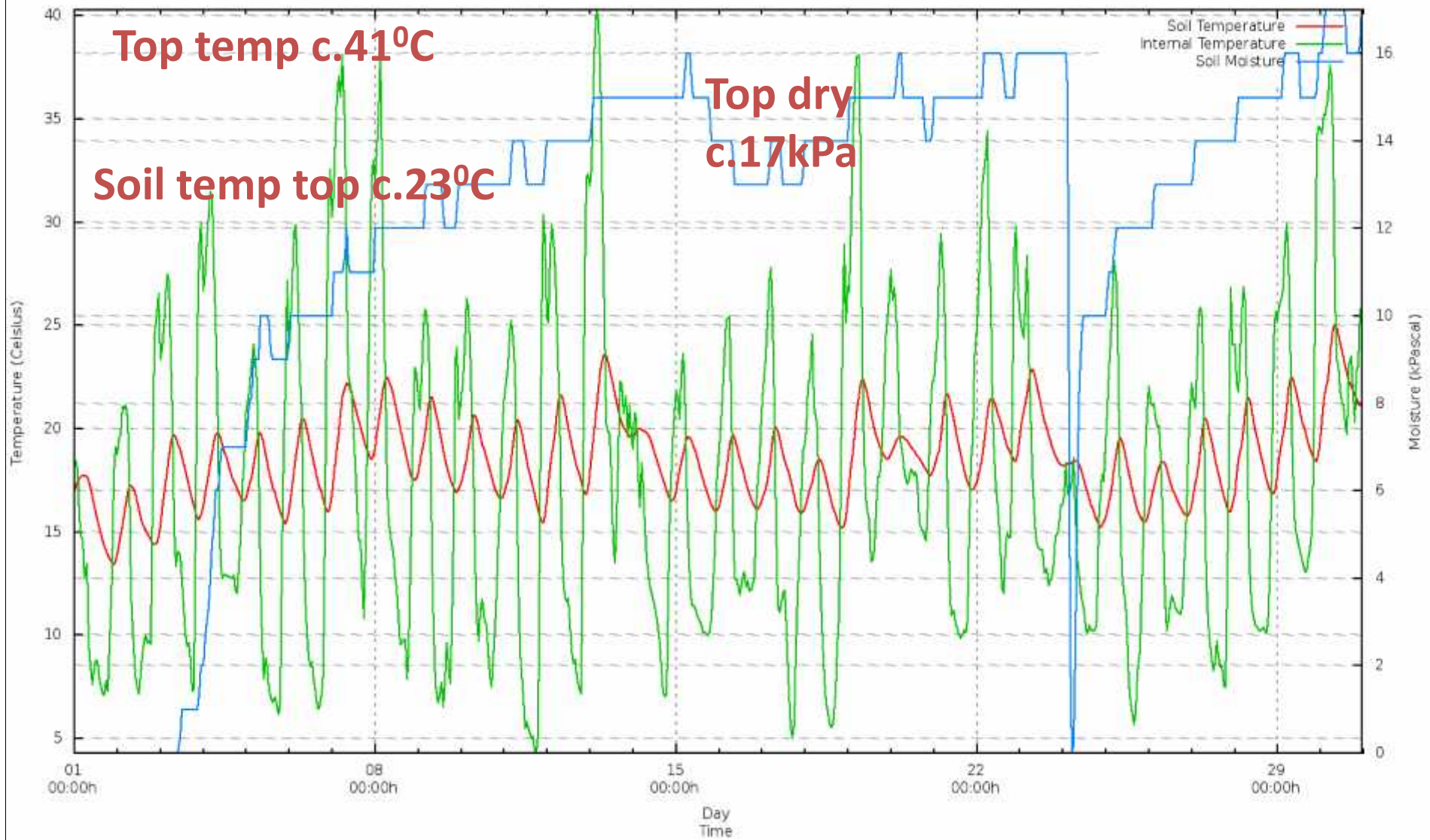
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Nov 100Hunts Coarse

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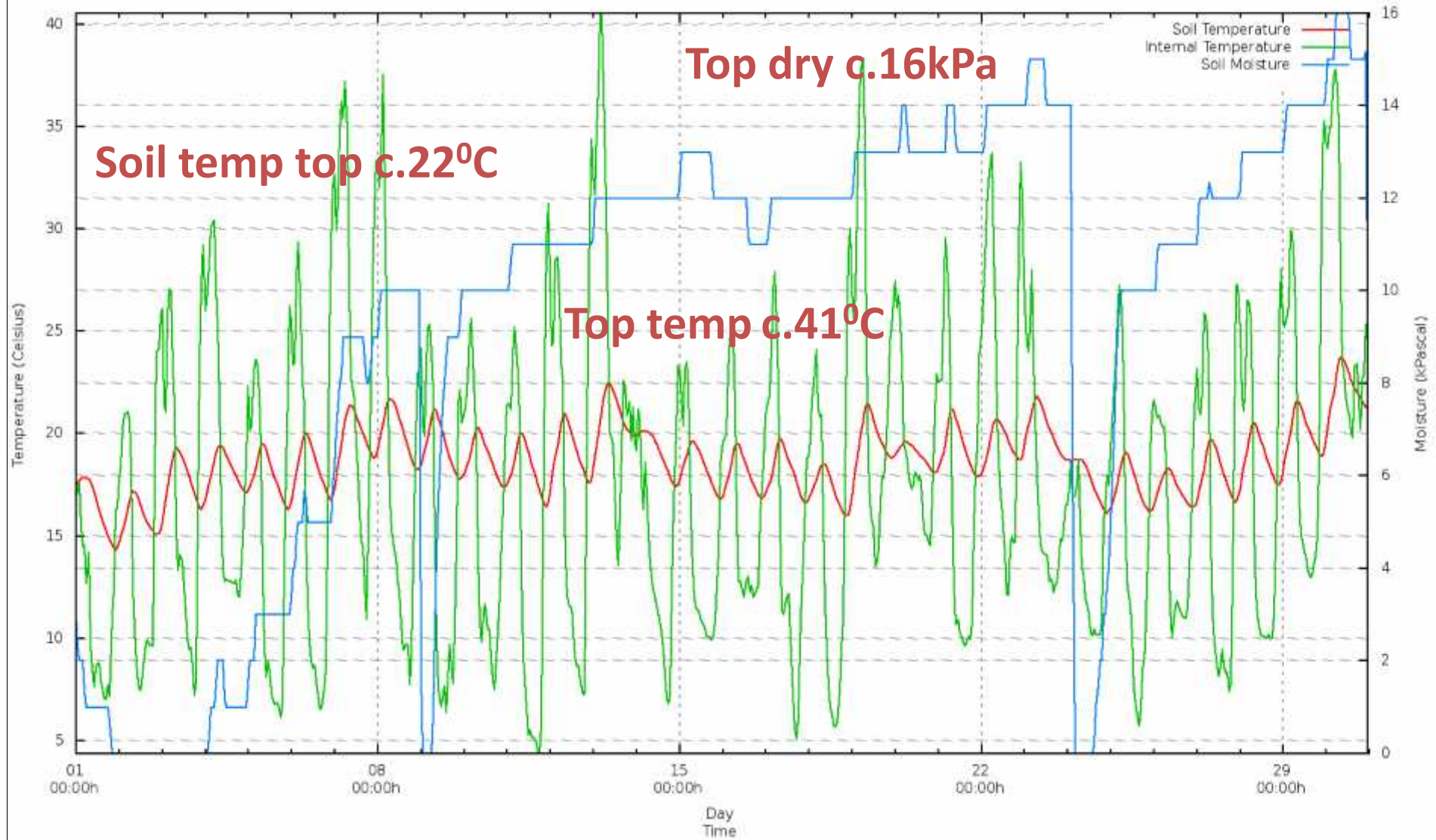
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Nov 100Hunts Fine

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Other measures of change

- Bulk density
- Microbial diversity
- Water use efficiency

Analysing soil data

- Bulk density

	2015	2016	2017
100 Hunts Coarse	1.02	1.10	0.99
100 Hunts Fine	1.03	1.02	1.04
100 Hunts Control	1.01	1.09	0.89
Ten x Tractor-Control	1.03	1.00	1.03
Ten x Tractor-Fine	1.03	1.03	1.05
Ten x Tractor-Coarse	1.05	1.00	1.03
Lynstead- Control	1.04	1.10	0.99
Lynstead- Fine	0.94	0.97	0.86
Lynstead- Coarse	0.95	1.00	0.81

Analysing soil data

- Soil microbial diversity

2014	mg/kg	ug/g	ug/g	ug/g	ug/g
10 mins	0.74	5.17	69.8	11.6	225
Lynstead	0.67	3.99	83.4	6.38	778
100 Hunts	0.73	4.04	63.1	4.51	314
2015					
100 Hunts	0.82	7.44	55.3	25.7	314
2017*	mg/kg		mg/kg		mg/kg
100 Hunts	61.4		6.87		47.5

* Method change from direct observation to plfa

Analysing soil data

Water use efficiency - observations Handpicked Wines

- Compost applied in Spring 2015
- 2016 Very hot dry year
 - Control block used 2 Mg/ha between Nov-March 2016
 - Compost block used 1.6 Mg/ha between Nov-March 2016
 - Water Savings 416,000 Litres/ha 20% 2016
- 2017 had more consistent rain periods during Dec, Jan & Feb at Capella Vineyard.
 - Control block used 1.3 Mg/ha between Dec-March 2017
 - Compost block used 1.1Mg/ha between Dec-March 2017
 - Water Savings 166,665 Litres/ha 12% 2017
- Found compost vines to have healthier canopies, less senescence during veraison & ripening & retained moisture for longer periods.
- More fibrous roots in the top 300mm of the soil profile
- After harvest, compost vine leaves held on longer compared to control blocks
- Findings similar to Helen Hills Winery in the Yarra Valley

Summary of statistical analyses

- While there were statistically significant differences between treatments, no strong trend emerged
- Challenges interpreting the data,
 - e.g. high soil moisture under fine mulch is good in summer but bad in winter;
 - soil temperatures are less important than temperature ranges

Summary of statistical analyses

- Last year clear trends emerged between treatments;
- This year those trends did not continue;
- Substantially varying results between treatments and across sites;

Treatments	Date	Internal temperature	Moisture	Soil temperature
Coarse & control	2014-Oct	0.99073	0.9995	0.95211
Coarse & fine	2014-Oct	0.9383	0.9589	0.98745
Control & fine	2014-Oct	0.98875	0.95898	0.92758
Coarse & control	2014-Dec	0.98357	0.86561	0.9716
Coarse & fine	2014-Dec	0.995	0.80956	0.98732
Control & fine	2014-Dec	0.97973	0.75786	0.93937
Coarse & control	2015-Feb	0.97513	0.98876	0.96156
Coarse & fine	2015-Feb	0.96834	-0.17933	-0.17339
Control & fine	2015-Feb	0.97055	0.16028	0.18028
Coarse & control	2015-Apr	0.98655	0.51321	0.98598
Coarse & fine	2015-Apr	0.99092	-0.15901	0.98949
Control & fine	2015-Apr	0.98553	0.11831	0.99019
Coarse & control	2015-Jul	0.98155	0.66943	0.99121
Coarse & fine	2015-Jul	0.99725	0.9016	0.98907
Control & fine	2015-Jul	0.97241	0.54183	0.98772
Coarse & control	2015-Sep	0.99004	0.58005	0.87007
Coarse & fine	2015-Sep	-0.71081	0.65719	0.97393
Control & fine	2015-Sep	-0.9131	0.89225	0.90557
Coarse & control	2015-Oct	0.99064	0.58005	0.87007
Coarse & fine	2015-Oct	-0.41084	0.68749	0.97393
Control & fine	2015-Oct	-0.4131	0.69225	0.90507
Coarse & control	2015-Nov	0.97105	0.87728	0.75871
Coarse & fine	2015-Nov	0.90118	0.90491	0.89176
Control & fine	2015-Nov	0.98452	0.86152	0.91726
Coarse & control	2015-Dec	0.94016	0.51674	0.89075
Coarse & fine	2015-Dec	0.6749	0.29872	0.87453
Control & fine	2015-Dec	0.71177	0.46627	0.88907
Coarse & control	2015-Dec	0.94916	0.91671	0.89075
Coarse & fine	2015-Dec	0.6749	0.29872	0.87453
Control & fine	2015-Dec	0.71177	0.46627	0.88907
Control & coarse	2015-Jan	0.90404	0.01555	0.98214
Control & fine	2015-Jan	0.98034	0.03245	0.97093
Coarse & fine	2015-Jan	0.98901	0.95216	0.98514

Observations

- Composts / mulches were applied once in 2014-15;
- On Lynstead Grange and 10 mins x tractor, much of the material has disappeared;
- Complementary management practices include side throw mowers;
- To what extent were other management practices modified?

Observations

- Decision made in 2016 to gather qualitative data to see if compost treatments reflected changes in yield / vine health / baume / pest and disease resistance etc.;
- Resulted in water monitoring on Handpicked Wines and Vine Assessment;
- Compost is no silver bullet;
- Fundamentals of soil management require soil to be covered and fed with organic matter.

Low soil function



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Structure under compost



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So what does it all mean?

- Steady state soil temperatures and soil moisture are conducive to biological function (soil organisms as well as plant roots)
- Provision of organic inputs drives biological function
- Improved biological function enhances soil function (decomposition and nutrient cycling) and soil condition (structure, aeration, infiltration, water holding capacity)
- Improvement in soil condition as shown by BD assessments and soil microbial measures;
- Improved soil condition improves plant health and reduces water stresses.

In summary

Three years of trial data returned inconclusive trends in soil responses under the three treatments. However, useful signposts include:

- Substantial improvement in BD on Lynstead, moderate improvement on 100 Hunts and no change on 10 minutes;
- Evenness of soil temperature
- Improvement in water use efficiency on Handpicked Wines
- Increase in soil microbial biomass

THANK YOU

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