Case Study: Precision for Drought-Ready Vineyards

TEKFARM – Supporting Producers Adopting Technology | **2025**

OVERVIEW

Tim Bartsch and Schuberts Vineyard, Adelaide Hills SA

Schuberts Vineyard, managed by viticulture duo Tim Bartsch and Shaun McBeath produce premium wine grapes for both Tim's own label Emmalene and winery partners across the region. Facing increasingly variable seasons in the Adelaide Hills, the business sought a better way to manage productivity in years with less rainfall, without overspending on inputs.

Figure 1. Edward Scott and field-day attendee in a soil pit dug for the Landscape SA Hills & Fleurieu Soil health field-day at Schuberts Vineyard Lobethal, South Australia. Image is of the Ridge soil pit, a low plant-vigour area.

The Challenge: Variable Soils, Variable Performance

Grower observations followed by agronomic soil testing by local agronomy team DJ's Growers Services revealed significant spatial variability of soil, including areas affected by sodicity, restricting root development and water uptake. Symptoms that become more visible in dry years. In 2024 shoot length ranged from as short as 50cm up to 140cm (trimmed) in one block of Sauvignon Blanc.

In collaboration with Landscapes SA Hills and Fleurieu local soil scientist Amanda Schapel classified two soil pits dug for in-field demonstration purposes out of the block of Sauvignon Blanc. The results showcased the extremities of soil variability within the block that was traditionally managed uniformly and demonstrated the importance of **ground-truthing before you manage.**

Soil constraints identified in the **ridge** soil pit compared to the **lower** soil pit:

- **Ridge**: Vertosol, sandy clay loam to heavy clay and weathered rock at 90cm. Weak sward growth, very few roots, cracking clay.
- **Lower:** Chromosol, fine sandy loam to medium clay then weathered rock at 85cm. Strong sward growth and vine roots into weathered rock.
- Highly variable **sodicity**, with 20cm-30cm samples of soil ranging in sodium levels of 39mg/kg Na to 638mg/kg Na in Lower and Ridge pits respectively.
- Actual Root Zone (ARZ) **Readily Available Water** (RAW) ranging from **40mm (lower)** to **19mm (ridge)**

This created a challenge:
Where should investments go? Can we fix it?
And where might investments be wasted?

Variability in **shoot length, canopy density and pest & disease pressure** were also linked to these soil constraints, identifying further opportunities for input savings.

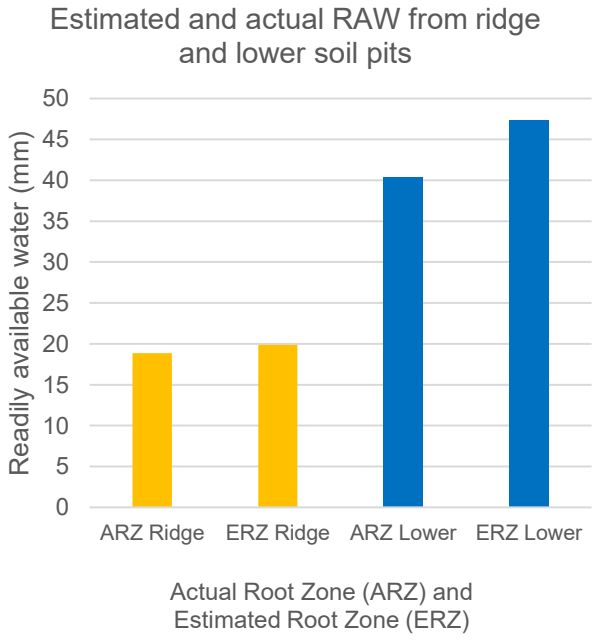

Figure 2. The Estimated and Actual readily available water calculated for soil pits in a block of Sauvignon Blanc at Schuberts Vineyard, Adelaide Hills.

Australian Government | Future Drought Fund

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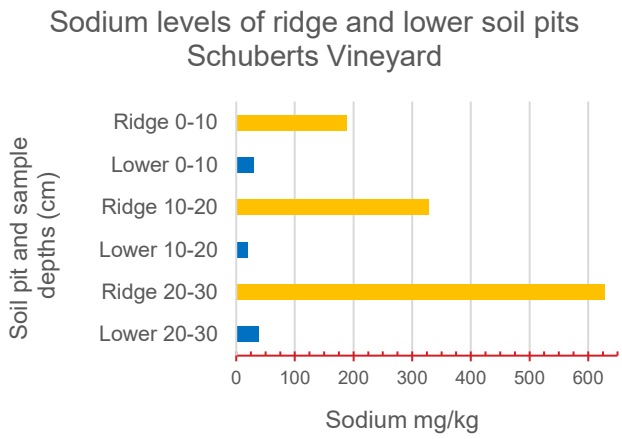

Figure 3. The Estimated and Actual readily available water calculated for soil pits in Sauvignon Blanc block at Schuberts Vineyard, Adelaide Hills.

The F2F TEKFARM Opportunity

Tim and Shaun through engagement with Elders/TEKFARM advisor Tom Jefferies, adopted digital tools to **map variation** and guide more precise resource-use across the vineyard.

Technologies considered included satellite imagery, GIS mapping platforms and QGIS for PAT by CSIRO scientist Rob Bramley (1), and various spreader upgrades from different suppliers.

The growers' "Must-haves" included:

- Retrofittable Variable-Rate (VR) upgrade for an existing fertiliser and compost spreader
- **Simple**, farmer-friendly mapping & zone editing for quick outputs into VR equipment,
- Minimal to nil skills in technical Geospatial Information Systems (GIS) and analysis required
- **Low cost** and easy integration with existing equipment
- **Rapidly** convert maps into **actionable** spreading operations

The Solution

Schuberts Vineyard adopted:

- DataFarming **high-resolution imagery, EM38** (2) (RapidEM™) & zone-mapping tool (3)
- Precision Agronomics Australia **i4M Spreader Controller** (4) retrofitted to an existing spreader

TEKFARM advisor Tom Jefferies supported onboarding, ground-truthing, dashboard setup and agronomics while Tim and the team at Schuberts Vineyard completed the spreader installation independently with an in-house mechanic.

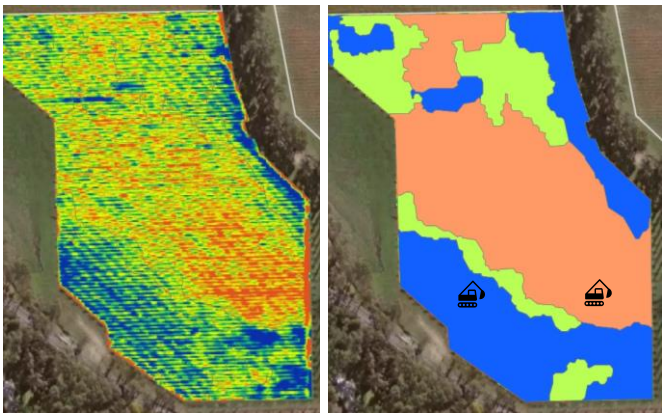

Figure 4. *DataFarming High-resolution satellite imagery (left) and automated zone map (right), the small excavator icons are the locations for the soil pits; Ridge soil pit (orange zone) Lower soil pit (Blue zone).*

Outcomes & Impact

Transforming Knowledge into Action

DataFarming imagery from the drier than average 2024–25 Adelaide Hills summer clearly revealed vigour variation without substantial mid-row or headland noise, helping pinpoint where ground-truthing, soil testing, and management improvements should focus.

Ground-truthing was conducted with strategic EM 38 data with rental of DataFarmings' RapidEM™ and soil testing.

These insights led to the running of a local field day coordinated by Landscape SA Hills and Fleurieu of SA, digging soil pits and validating the data with local soil experts Amanda Schapel, Edward Scott and Bonnie Armour strengthening community learning and the importance of measuring before you manage.

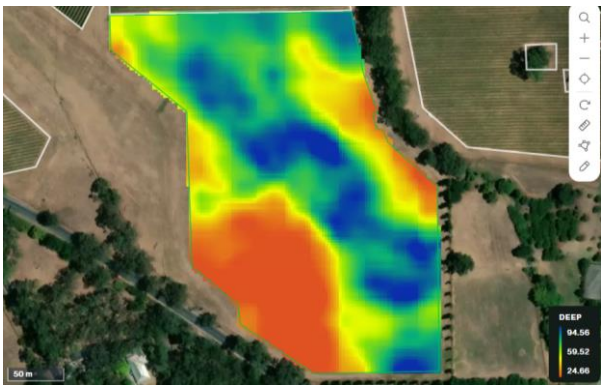

Figure 5. Deep EM 38, data presented as an interpolated map. Mapped with DataFarmings' RAPID EM device now available for rental.

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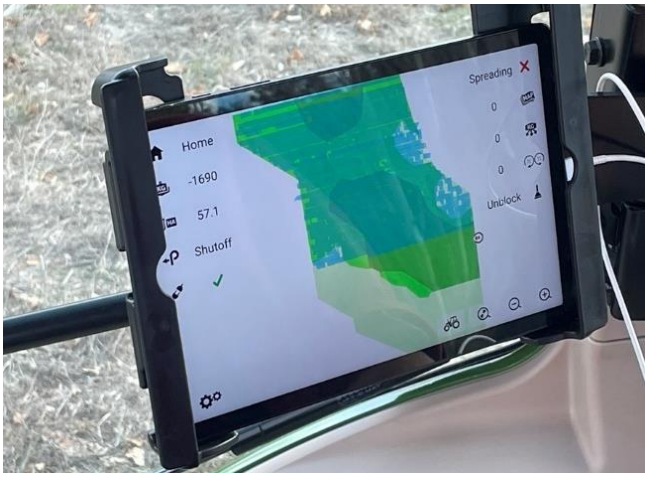

Figure 6. In-cab view of the I4M Spreader Controller and a three-zone map showing three rates (Shaded light, moderate and dark green) of ameliorant. Application is tracked (shaded light blue) tracking where the operator is up-to.

Smarter Use of Inputs in Dry Years

With variable-rate spreading now automated:

- Compost & mulch budgets go further
- Inputs can be targeted to high-ROI zones
- Ameliorants targeted to zones with specific soil constraints to improve uniformity and total yield
- Marginal areas receive **lower cost** maintenance strategies or increased fertiliser to increase uniformity and potentially quality.

This can directly improve drought resilience by:

- Boosting soil carbon and water-holding capacity where it matters most
- Reducing soil evaporation by mulching on lighter or shallower soils with lower RAW e.g. top vs mid vs bottom of slope.
- Moisture losses can be reduced by 10-30% with mulch applied under-vine (5).
- Avoid overspending on vines with low yield potential
- Long-term management plans for highly sodic parcels, including considerations of vine removal
- Mapping and avoiding the harvesting of undesired grapes in drier years of high vine stress.

Return on Investment – Faster Than Expected

Operators reported spreading is now **simpler**, not more complex:

- No need to manually switch rates at row ends
- Automated belt control maintains accuracy

> *"Initially we assumed it would take a long time to achieve a return…*
> ***It now appears likely to pay for itself within the next season."*** *– Tim Bartsch*

Figure 7. Tim Bartsch starting his prescription map via the I4M tablet mounted in the tractor cabin.

Drought-Resilient Winegrowing

By coupling **data visibility** with **variable-rate capability**, Schuberts Vineyard has:

- A clearer understanding of its productive capacity
- Practical tools to address variability efficiently
- Confidence heading into the next dry year

> *"With longer and more intense heatwaves predicted, accurately mapped performance and soil data combined with the ability to rapidly tailor inputs spatially,* ***make Schuberts Vineyard far better equipped for drought."***
> Tom Jefferies, Elders, Extension Agronomist

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Key Takeaways for Winegrape Producers

Challenge	Solution	Outcome
Soil & canopy and yield variability & increased risk in dry seasons	High-res imagery and or EM38 data + zoning tool	Targeted soil improvement where benefit is highest
Uniform inputs across uneven landscapes	Variable-rate: - compost - mulch - fertiliser - ameliorant	Improved water-holding & nutrient efficiency, reduced toxicity
Tight budgets in premium wine	Smarter input spend	Faster ROI; reduce waste

What's Next?

Tim and Shaun plan to continue refining zones with new imagery, incorporating yield and proximal soil sensing data with DataFarmings' RapidEM™ combined with ground-truthing through further soil testing to measure and inform decisions for sustainable agriculture outcomes. They are also looking at adopting varied rate fungicide spray equipment to address varied disease pressure and potentially reduce and optimize inputs even further.

Find Out More

For precision viticulture soil sodicity amelioration advice and agronomic services:

Adelaide Hills and Fleurieu: DJ's Growers Services

Barossa and Northern Hills: Elders Roseworthy

For information on this case study:

Tom Jefferies

Extension Agronomist

Thomas Elder Sustainable Agriculture (TESA)

Contact email:

tom.jefferies@elders.com.au

Figure 8. Daniel of Precision Agronomics Australia, I4M (left) and Elders Extension Agronomist Tom Jefferies (right)

KEY RESOURCES

1. **Bramley, Rob, et al.** *Simple Tools for spatial analysis – key enabling technologies for Precision and Digital Viticulture.* Wine Australia. Australia : CSIRO, 2019.

2. **Arris Pty Ltd and SA Central.** *Salinity Management Interpretation Guide.* Adelaide : Grape and Wine Research and Development Corporation, 2011. (prepared for Wine Australia SA Central Regional Program).

3. **DataFarming.** Digital agronomy without the hassle™. *DataFarming.* [Online] https://www.datafarming.com/.

4. **Precision Agronomics Australia.** I4M Cutting Edge Tools For Precision Agriculture. [Online] https://i4m.net.au/i4m-fertiliser-spreader-controller-2/.

5. **Proffitt, T and Campbell-Clause, J.** *Water management for wine grapes in a drying environment.* Department of Water, Grape and Wine Research and Development Corporation. s.l. : Wine Industry of Western Australia, (n.d.).

Acknowledgements

Elders and Farmers 2 Founders would like to acknowledge Tim Bartsch, Shaun McBeath and the team at Schuberts Vineyard for facilitating this case study, digging soil pits and hosting the demonstration day.

We also would like to acknowledge the effort of Landscapes SA, Hills & Fleurieu's Bonnie Armour in facilitating the soil health demonstration day. As well as soil scientists/consultants Amanda Schapel and Edward Scott for testing, analysing and demonstrating soil pit findings and sample results.

Case study written by Tom Jefferies, Thomas Elder Sustainable Agriculture (TESA) a division of Elders rural services and edited by Elizabeth Gunner, Program Manager, TESA.

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