Smarter Nitrogen Management Through Satellite Insights: Building Resilience with OneSoil

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

OVERVIEW

Across the Mallee and Upper Southeast of South Australia, patchy seasons and rising fertiliser prices have made efficient nitrogen use more critical than ever. For many mixed-farming enterprises, identifying which parts of a paddock need an increase or decrease of nitrogen inputs can make the difference between maintaining profitability and over-spending.

Murray-Mallee grains producers

To help tackle this challenge, two Murray Mallee grains producers the Webers and the Gordons worked with Farmers 2 Founders (F2F) TEKFARM Advisor Angus Brissenden, a Broadacre Agronomist from Elders Murray Bridge to trial OneSoil, a satellite-based variable rate (VR) mapping tool. The aim was to explore how accessible, low-cost digital tools could improve nutrient efficiency and build drought resilience.

Jeff Weber met with Angus to discuss challenges, revealing that increasingly variable seasonal conditions make it hard to align fertiliser inputs with yield potential creating significant financial and production risks.

Reviewing past seasons with adequate rainfall showed uneven performance across the farm, with some areas failing to reach full potential, pointing to inefficiencies in input management or soil health.

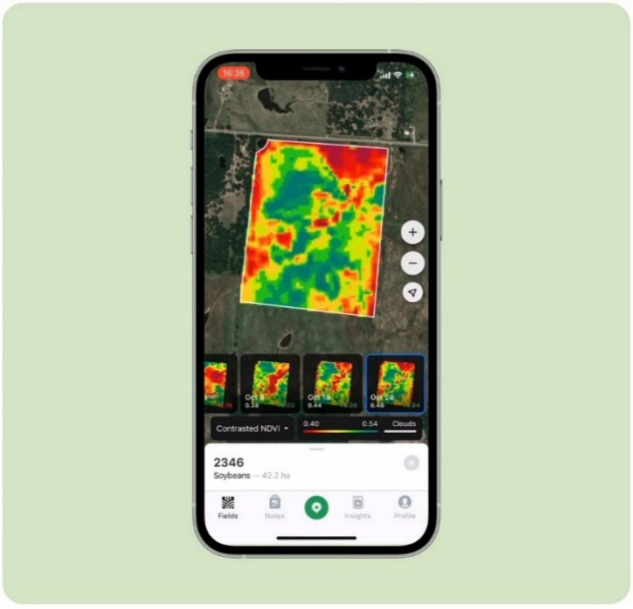
Having farmed through previous dry periods, Jeff recognised the need to optimise fertiliser use to reduce risk. Angus explored the client's experience with paddock zoning and their readiness for adopting new practices in the coming season.

Similarly, Mark and Hannah Gordon shared frustrations about the financial impact of over-applying inputs in low-potential zones while missing yield opportunities in high-productivity areas.

"We looked at a number of options, and ultimately recommended OneSoil as it's a simple, low-cost way for growers to take their first step into variable-rate fertilizer management," said Angus Brissenden.

Using Satellite Data to Guide Smarter Inputs

The **OneSoil** platform uses satellite imagery such as NDVI and NDRE, along with optional topography and soil-colour layers, to automatically generate **paddock productivity zones**. In this trial, three management zones were chosen and validated against grower experience before soil sampling.



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By targeting soil tests within each zone, the team identified clear differences in nitrogen levels and yield potential:

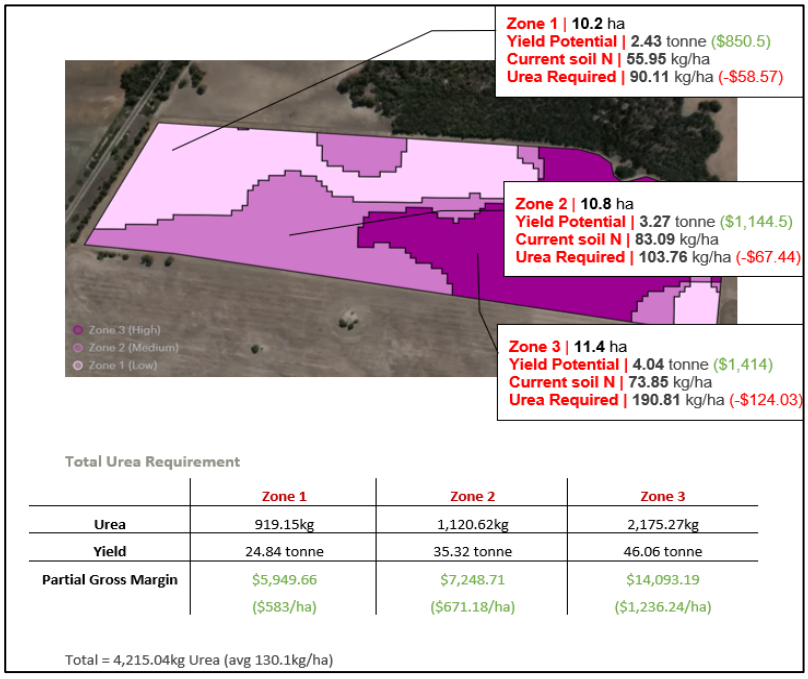
- Lower-performing sandhill zones held **more stored nitrogen** from historical over-application.
- High-performing clay flats were **nitrogen-deficient**, years of under-feeding from flat-rate broadcasting coupled with higher nutrient removal (e.g. crop removal of N as protein)
- If OneSoil recommendations were utilised at spreading, nitrogen rates could have been optimised from 105 kg/ha (flat rate) to an average of 72 kg/ha under the variable-rate scenario, saving input costs while improving yield potential.

Real-World Challenges and Learnings

While generating the maps was straightforward, implementing them proved trickier. In one case, the GPS unit wasn't installed until shortly before spreading, preventing the system from recognising the files. In another, a variable-rate spreading contractor's wheel tracks didn't align with existing tramlines, forcing a switch back to producers own equipment and a flat-rate application.
These lessons underscored the importance of ensuring machinery and software systems are compatible and investigations into what skills-gaps of both advisor and producers are, well before application. Consideration of the entire implementation process for new technologies, and the impact it will have for both growers and their contractors to get it right is critically important. Growers using John Deere Operations Centre or Case IH AFS Connect platforms can wirelessly upload OneSoil maps, streamlining the process and avoiding such delays. This process has been successful with Angus's clients outside of the F2F TEKFARM program.

Insights Beyond Application

Even without variable-rate spreading, the project delivered valuable insights. Soil testing and Satellite NDRE imagery later confirmed that paddock performance patterns closely matched OneSoil's productivity zones. This gave growers confidence that the program's algorithm accurately represented real field variability and could be relied upon for future VR planning.
Gaining full confidence in data and insights is a critical stage in the adoption of new technologies, Angus works with his clients over multiple seasons to monitor the recommendations and results.



Total Urea Requirement

	Zone 1	Zone 2	Zone 3
Urea	919.15kg	1,120.62kg	2,175.27kg
Yield	24.84 tonne	35.32 tonne	46.06 tonne
Partial Gross Margin	$5,949.66 ($583/ha)	$7,248.71 ($671.18/ha)	$14,093.19 ($1,236.24/ha)

Total = 4,215.04kg Urea (avg 130.1kg/ha)

Figure 1. An exported productivity zone-map from a OneSoil F2F TEKFARM deployment with ground-truthing and yield potential analysis conducted by Elders Murray Bridge Agronomist Angus Brissenden.

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Understanding how each zone responds to inputs helps producers plan more effectively, improving input efficiency, supporting soil-carbon retention, and ultimately strengthening resilience to dry or high-cost seasons.

“It helped us see the paddock differently. You start understanding where the yield potential really sits, not just where it looks good from the ute or combine.”

Building Future Drought Resilience

By improving nitrogen use efficiency, growers can:

- **Reduce** unnecessary **input costs** on lower-potential soils
- **Maximise returns** from higher-potential zones
- **Maintain soil-carbon** levels by matching nutrient supply with crop demand

Together, these benefits support more sustainable nutrient management and help producers remain adaptable during dry or volatile seasons.

Where to From Here?

With Angus’s guidance, both growers plan to continue using satellite-based VR mapping and to integrate yield monitors and soil sensors to further refine nitrogen management. Learnings from this project have also shaped how future OneSoil deployments will be supported both under the F2F TEKFARM program and Elders Rural Services. More strategic focus will include:

- **Training precision agriculture advisors** and producers in key areas such as machine compatibility, controller setup, and map uploads.
- **Building regional capability** through **collaboration** with local **PA contractors**, ensuring spreaders and controllers are ready to accept variable-rate files.
- **Developing data management skills**, including understanding file types, formats, and transfer processes used by different platforms (e.g. John Deere, Case IH, Topcon).

By strengthening local skills and technical readiness, we all aim to make VR adoption smoother, more reliable, and more impactful. This ensures that technologies like OneSoil deliver practical, measurable value for producers across the region.

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