

Improving nutrition on a calcareous grey sand

CASE STUDY 7

SNAPSHOT

Farmer name: Dion Williams
Location: Streaky Bay, SA
Farm Size: 4000 ha arable
Enterprise: Cropping & grazing
Average annual rainfall: 350 mm

KEY MESSAGES

- In 2022, none of the treatments significantly improved yield. Ripping did not improve yield.
- On this site, a cheaper mineral/C based fertiliser mix with lower levels of nitrogen could be used instead of manure without sacrificing crop performance.

INTRODUCTION

About 10–15% of the 4,000 arable hectares at Warringa Pastoral near Streaky Bay, have problematic deep sandy soils. The soils are water repellent with low fertility.

In 2021, farm owner Dion Williams tried ripping to increase the topsoil depth. His plan was to move topsoil deeper into the soil profile, encouraging soil microbes, and increasing the topsoil depth and fertility. In this instance it did not lead to an increase in biomass or yield.

“We have about 10 cm of topsoil that is nice and fertile, and I was trying to increase that (depth) to 15 or 20 cm to improve soil moisture holding capacity and ideally nutrient availability. After 10 cm there is a noticeable colour change, and all the goodies are in the top 10 cm”, says Dion.

Across the farm there are also small patches of poor crop growth, sometimes only 2–3 metres in diameter, on the sandy soils. In dry years, these bad patches yield about 75% less than the rest of the paddock. While the problem isn’t getting worse, the patches aren’t getting much better. Treating the patches is a challenge, as the areas are small but machinery is 15–30 m wide.

Dion believes the combination of poor nutrition and root disease are the main cause of poor performance. In the past, Dion has tried increasing fertiliser rates, particularly zinc, manganese and phosphorus to build up soil levels. This strategy has helped reduce the size of the patches, but has not removed them.

SANDY SOIL CONSTRAINTS



Water repellence



Low fertility

Area of land affected (ha): 500 | Area of land affected (%): 10-15

Trialled

- Ripping
- Mineral vs manure fertiliser
- Companion planting with a legume



Trial location, note trial strips are not evident.

THE TRIAL



The trial was set up in 2022 on a grey, highly calcareous loamy sand. It tested three different strategies to improve soil fertility:

1. Ripping with Yeomans plough and inclusion plates
2. Carbon-based nutrition:
 - Manure (100 kg/ha Neutrog Bounce Back®)
 - Manure (100 kg/ha Neutrog Bounce Back®) + Phosacid (40 L/ha)
3. Companion planting with vetch

All treatments except the Nil and Nil + Rip received 25 kg/ha of DAP fertiliser (18:20:0). The aim of ripping was to move topsoil deeper into the profile and encourage some microbial activity.

The site was sown to Razor CL^(D) wheat in 2022. Dion opted to sow a medic pasture in 2023 as there was too much ryegrass weed from 2022 to sow a cereal.

“Rhizoctonia and root diseases have been our biggest issue for a long time. Through no-till and better fertiliser rates we think we are reducing those visual patches from rhizoctonia. Generally, nutrition is helping the plant combat the root disease issue. It’s not solving the problem but is helping the plant deal with it, says Dion.”

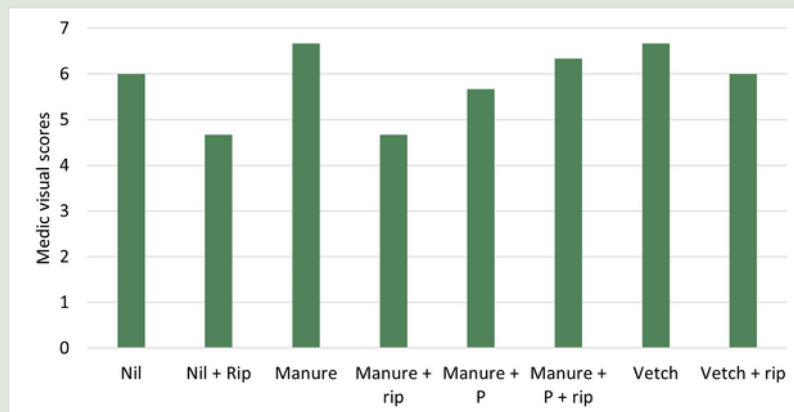


Figure 1 Medic growth visual scores at Streaky Bay, 15 September 2023.

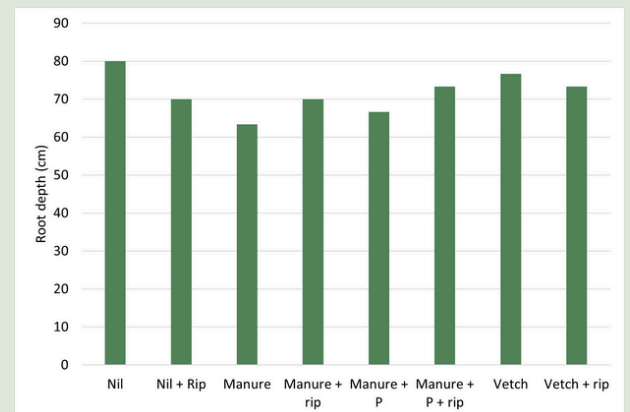


Figure 2 Average medic root depth at Streaky Bay, 27 November 2023.

RESULTS



In 2022, there was no difference in wheat growth throughout the season and no significant difference in grain yield. Ryegrass was an issue across the site. To address the ryegrass population, Dion went into a pasture phase in 2023 instead of sowing a cereal.

Rooting depth data and visual scores of pasture growth were collected (Figures 1 and 2). The results were highly variable and there was no detectable residual effect of the treatments. Limited difference between treatments was something Dion noticed throughout the season.

“I couldn’t see a difference in 2023, but we have had two above average seasons. We may see a benefit in poorer seasons,” said Dion.

Josh Telfer, SARDI Soils Senior Research Officer, noted that medic is adapted to the calcareous sand at Streaky Bay and it is extremely challenging to get a response on calcareous soils. Improving phosphorus availability on the site may help in future.

NEXT STEPS



Treatment areas are marked out and Dion will continue to watch the plots, to see if there is a difference in crop or pasture growth in the future. Dion notes that ripping has not provided a response on average to better years; only in dry years. As such, he is not planning on further ripping in the near future.



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RESOURCES



Agriknow: <https://www.agriknow.com.au/trial/39>

PROJECT INFORMATION

Trial run by SARDI Minnipa Agricultural Centre staff, Amanda Cook and Josh Telfer.

Trial established in 2022 as an Eyre Peninsula Landscape Board Regenerative Agriculture Project/Soils for Life 'Paddock labs' demonstration site.

Many thanks to Dion Williams for hosting the trial.

Building drought resilience by scaling out farming practices that will enhance the productive capacity of sandy soil landscapes.

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