

Regenerative Agriculture Program acid soil demonstration case study: Turvey, Greenpatch

Key messages

- To treat acid soils it is often necessary to include strategic tillage to address sub-surface acidity (5-30 cm), which is hard to address with broadcast lime alone.
- The machinery used needs to be appropriate and set up correctly for the task required. In this case, mixing to only 35 cm was exactly what was needed.
- While addressing sub-surface acidity, it is possible to treat compaction as well. By treating these two soil issues, it is possible to raise the yield potential of the poorer parts of the paddock.
- By both mixing in lime, and increasing overall yield potential, extra investment in micronutrients might be necessary to convert the potential into actual yield. This is both a dilution effect, but also by changing the pH of the soil, it changes the availability of the micronutrients.

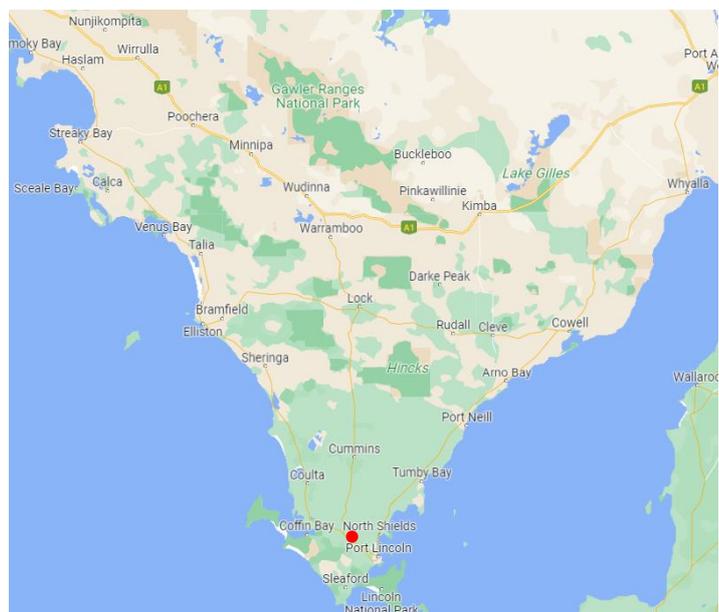
Rotation

Continuous cropping on 200 ha with wheat/canola rotation with 40 ha certified vetch production.

Soil type

Ironstone sandy loam with dispersive clay at varying depths (17 to >30 cm), shallow clay on paddock to <20 cm (focus for the demonstration site) and deeper on other paddocks (>30 cm).

Seeding and tillage system Flexicoil bar with split boot knifepoints and press wheels, 9 inch spacing. Starter fertiliser 100 kg/ha DAP, in-crop 100-120 kg/ha of urea or 70:30 urea/SOA. Turvey's generally start seeding around 16 April with canola, and typically wait for ryegrass germination before sowing wheat.



Simon Turvey's family farm is located at Greenpatch on lower Eyre Peninsula.

How it all began

In 2015, the Turvey's agronomist identified acidic surface soils on their property, and in response they spread 3 t/ha high quality lime sand. Follow-up investigations in 2021 identified that while the surface pH had improved, the sub-surface layers were still quite acidic.

While they spread an additional 3t/ah of lime in 2021, to investigate how to better incorporate his lime and to assist with treating soil compaction, Simon looked into what sort of machinery would be the best fit to perform this role, with the myriad of different set-ups on the market.

In one paddock Simon was keen to explore ripping with inclusion plates, but most of the topsoil was relatively shallow loamy sand over clays and was considered too shallow for an 'inclusion plate' type of machine. Brett Masters, PIRSA, highlighted that this would have carried the risk of bringing unwanted sodic clay to the surface. Therefore, in consultation with Brett and a local machinery dealer (Curtis's of Tumby Bay), Simon was able to use a Horsch Tiger 4 heavy offset disc which ploughs, levels and repacks to a depth of 35 cm. While a deeper working implement might be suitable in other situations, being able to restrict the working depth only 35 cm and to re-level and firm the surface for planting suited the Turvey's perfectly.

This plough-mixing occurred in autumn 2021, and Vixen wheat was successfully established following the treatment.

"It resulted in a lot more even crop. It reduced the area of poor yields of the paddock, and on the yield monitor, grew the area of high yielding crop from only a small area, to larger areas."

They did use some other machinery on land where the topsoil was deeper, but the Horsch was best suited to the shallower sand over sodic clay.

Treatment pros and cons

Pros:

- Mixing has incorporated lime deeper to address acidic subsurface layers more quickly.
- It has 'evened 'up yields in the paddock. There are less low-yielding areas, which brought the average yield up.
- Improved areas which have traditionally been susceptible to waterlogging.
- More even crop germination after the mixing in the wheat in 2021 and canola in 2022.
- Ripping has addressed the layer of high soil strength at 15 cm below the surface on paddock 2, and this shows up in the soil testing.





Cons:

- Very soft post treatment. Didn't want to drive on it too much when wet as machinery would sink in.
- Increased biomass, as well as the lime treatment seemed to increase copper deficiency symptoms in wheat crop.
- Unsure how long benefits from liming and rip-mixing will last.

Acknowledgements

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More information

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