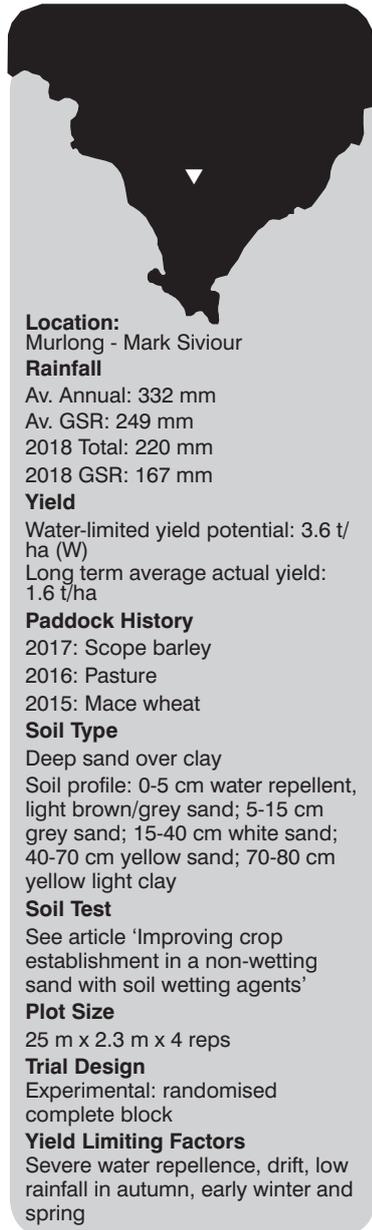


# Ameliorating a deep repellent sand at Murlong increased wheat performance substantially in 2018

RESEARCH

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## Key messages

- **Water repellence resulted in low plant numbers on the control plots. Ripping with inclusion plates substantially increased crop establishment which were further increased by spading, with the greatest plant density on spaded**

plots with lucerne pellets added.

- **Physical intervention increased wheat yields on a deep water repellent sand. The controls using best practice agronomy on unmodified sands, yielded 0.5 t/ha. Ripping with inclusion plates to 30 cm doubled yield, ripping deeper to 41 cm delivered an additional 0.4 t/ha and spading to 30 cm delivered a further yield increase of 0.5 t/ha, or 1.4 t/ha better than the control.**
- **The addition of 5 t/ha of lucerne pellets or high rates of fertiliser increased wheat yields when incorporated by ripping to 41 cm or spading, and delivered the highest yields of 3.1 t/ha.**

## Why do the trial?

Previous research has shown that physical intervention on compacted sandy soils can deliver significant yield increases. However, deep incorporation can be expensive and can increase erosion risk. The development of inclusion plates attached to deep ripping tynes allows for deep mixing of surface applied nutrients at a relatively low cost and with less risk of soil erosion than spading or mouldboard ploughs. This trial aimed to:

- Determine if physical intervention and soil mixing improved grain yield on a sandy soil on eastern EP.
- Compare deep ripping with inclusion plates to spading.

- Determine if deeper ripping improved results.
- Identify if the addition of fertilisers or organic material (OM) provide additional benefits.

## How was it done?

The site is located on a broad sand dune running WNW-ESE at Murlong on eastern Eyre Peninsula. The trial comprises 11 treatments x 4 replicates and compares an unmodified control to spading or ripping with inclusion plates (IP) to two depths (30 cm and 41 cm) with and without the addition of high rates of mineral fertiliser or lucerne pellets (Table 1).

Measurements taken include pre-seeding soil water and mineral nitrogen, crop establishment, biomass at flowering, "tea bag" index, yield, yield components and grain quality, and post-harvest soil water.

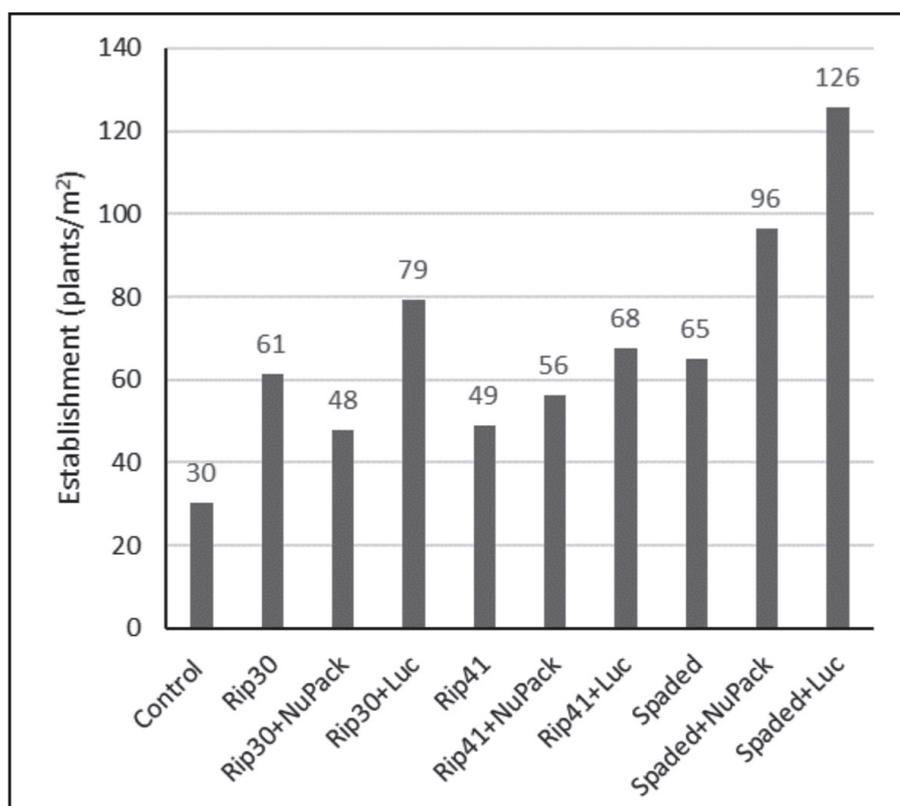
## What happened?

Severe water repellence resulted in low plant numbers where there was no soil disturbance. Deep ripping improved crop establishment with spading delivering the best results. The addition of nutrients and, in particular lucerne pellets, further improved crop establishment (Figure 1).

Strong wind events resulted in some drift and infill of seeding rows. Although this appeared to have the greatest visual impact on spaded treatments it was not reflected in plant numbers or plant vigour.

**Table 1 Trial establishment and cropping details at Murlong 2018**

19 April	OM and nutrient package	<ul style="list-style-type: none"> <li>OM: Lucerne pellets @ 5 t/ha</li> <li>Nutrient Package: nutrients applied to match lucerne N 167, P 14, K 105, S 12, Cu 0.03, Zn 17, Mn 0.18 kg/ha. NPKS applied as granular and trace elements as fluids</li> </ul> <p>Treatments applied evenly across the surface on spaded plots or in bands to correspond with ripper tyne spacings, immediately prior to spading and ripping.</p>
	Soil treatments	<ul style="list-style-type: none"> <li>Spading to 30 cm @ 5 km/hr</li> <li>Ripped: 4 tynes @ 64 cm spacings with inclusion plates, positioned 10 cm below the soil surface @ 5 km/hr</li> <li>Shallow ripped (corresponding to the depth of spading) to 30 cm with 20 cm inclusion plates</li> <li>Deep ripped to 41 cm with 30 cm inclusion plates</li> </ul>
20 June	Sowing	60 kg/ha Razor CL at 25.4 cm row spacing + DAP @ 60 kg/ha (all treatments) + banded Urea @ 81 kg/ha (on non OM and nutrient package treatments only). RainDrover wetter with the seed @ 2 L/ha.
	Herbicide	Triflurex @ 1.5 L/ha, Roundup Weedmaster (540 g ai) @ 2.5 L/ha, Nail @ 80 ml/ha, LI700 @ 300 ml/ha
12 August		AgriTyrne 750 @ 1.5 L/ha, Zn 2 L, Cu @ 1 L and Mn @ 3 L/ha
3 December	Harvest	



**Figure 1 Plant numbers at Murlong, July 2018 (LSD, 5%=24)**

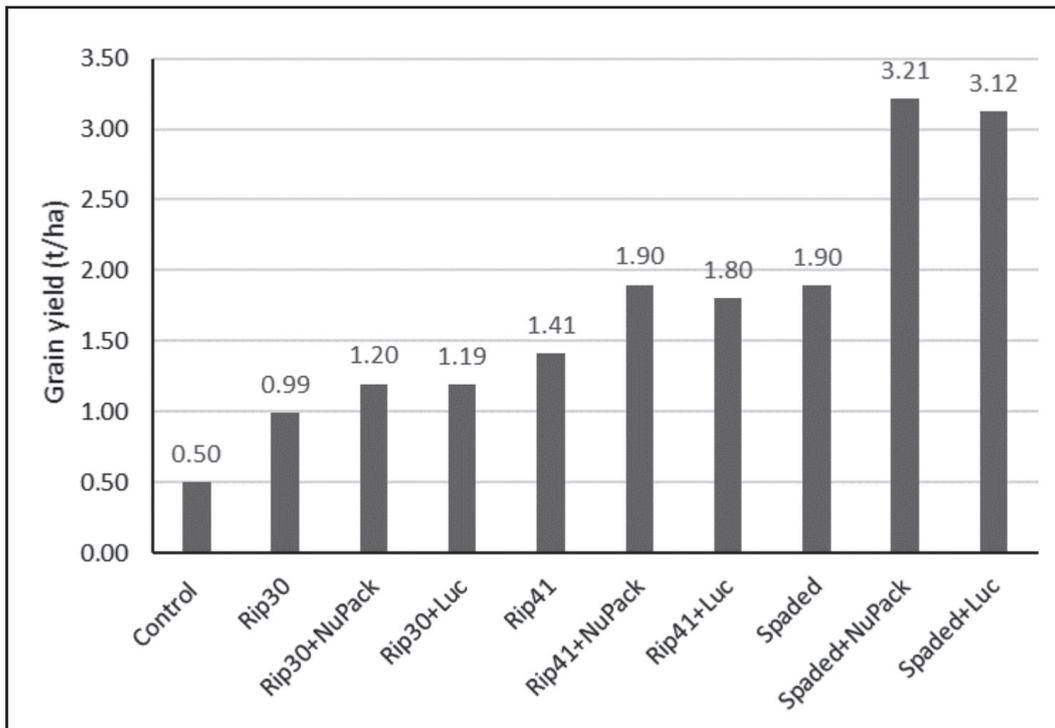


Figure 2 Grain yield (t/ha) at Murlong 2018 (LSD, 5%=0.24)

Plant growth on the spaded and ripped treatments was visibly stronger than the control. The nutrient and lucerne treatments delivered additional growth with the best treatment (spaded + luc) delivering six times the biomass of the controls at flowering (data not shown here).

Differences in crop establishment and biomass were reflected in grain yield with the Rip41 treatments outperforming the Rip30 treatments. Spading yielded more than either ripping treatment with the addition of nutrients or lucerne further increasing yield (Figure 2).

### What does this mean?

- Spading and ripping with inclusion plates delivered large economic responses to wheat in 2018.

- The greater levels of soil mixing and physical intervention from spading delivered better results than ripping with inclusion plates in the first year of the trial.
- Consistent with research conducted elsewhere, deeper ripping has delivered better results than shallow ripping.
- The incorporation of organic matter or fertiliser by ripping or spading increased yields above those achieved with soil disturbance alone.
- To confirm the full economic value of these practices, continued monitoring of this site in 2019 and 2020 will be undertaken.

### Acknowledgements

Farmer Co-operator: Mark Siviour and family. Spader: University of South Australia, Roger Grocock. This work is funded under the GRDC project “Increasing production on Sandy Soils in low and medium rainfall areas of the Southern region” (CSP00203); a collaboration between the CSIRO, the University of South Australia, the SA state government through Primary Industries and Regions SA, Mallee Sustainable Farming Inc. and AgGrow Agronomy.

