

# Improving dry saline land with sand mulch at Buckleboo

## SNAPSHOT

**Farmer name:** Tristan Baldock

**Location:** Buckleboo, SA

**Farm size:** 10,000 ha

**Enterprise:** Cropping

**Rainfall:** 196 mm (average GSR), 194 mm (2022 GSR)

**Rotation:** Two wheat, barley, grain legume /pasture/vetch. Occasional canola if the opportunity arises, or increasingly, oats and vetch mix as a mulching crop for year round cover.

## Key messages

- Sand mulch is an effective way to improve crop growth and yields on dry saline land patches.
- At this site, the higher rate of sand gave a more consistent yield response across the varying salinity levels.
- The effect of sand mulch can last 10+ years but may dwindle as the sand becomes incorporated into the soil.
- Double sowing (using twice the normal seeding rate) can help improve biomass and groundcover. The improved surface cover, if maintained by limiting grazing and soil disturbance, could reduce evaporation and the capillary rise of salts to the surface, which could provide production benefits over multiple years.

## TREATMENTS



Sand mulch



Double sowing

## INTRODUCTION

The soils at Karinya Ag, Buckleboo, range from some sandy loams through to heavy red and grey calcareous soils. The calcareous soils cover about 30% of the farm and are prone to developing dry saline patches. Within these soils, about 5-10% of the total farm area has true dryland salinity issues.

"It varies from season to season," said owner Tristan Baldock. "A little bit of moisture can go a long way. In an average year we don't see a big impact, but in a dry year we see a big impact. They tend to move with the seasons."

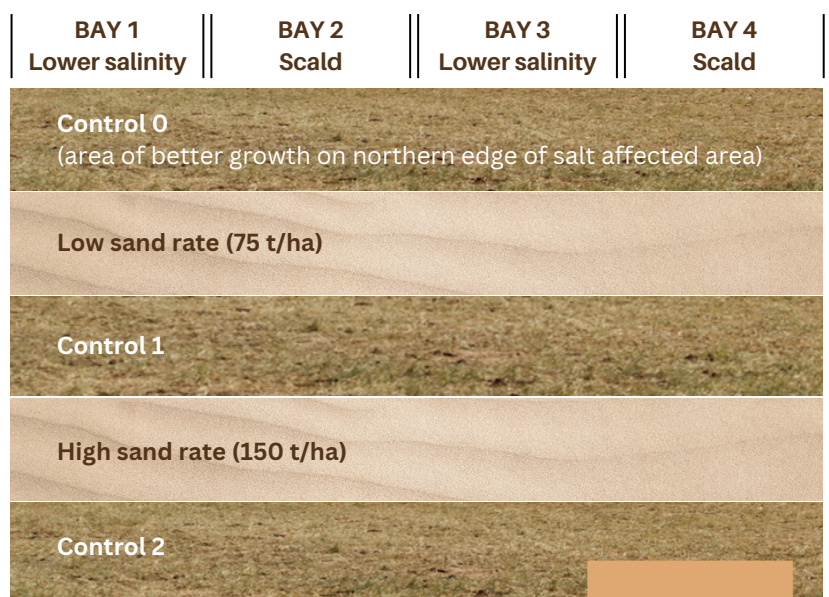


Figure 1. Trial layout.

## THE TRIAL



The 2022 trial compared two sand mulch rates:

- Low rate (150 t/ha)
- High rate (250 t/ha)

The sand demonstration strips were 5 m wide x 100 m long and crossed over two areas of better growth and two areas of salt scald. Bays 1 - 3 were also double sown in 2022. Bay 4 to the east was single sown (normal seeding rate) in 2022 and 2023.

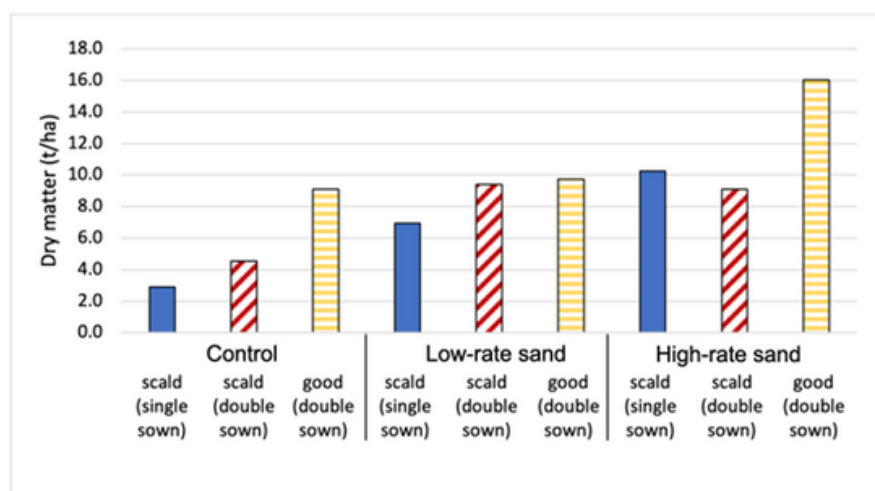


Figure 2. Peak dry matter biomass cuts in late September 2022.

The sand was sourced on-farm. Floods in early 2022 left sand across parts of paddocks that needed cleaning up. "While we were rebuilding after the floods last year, we brought a few scrapers full of sand and laid it out in strips," said Tristan.

Up to 250 mm of rain in 24 hours fell during the floods, which would have washed salts deeper into the profile, facilitating better crop establishment compared to years which have a dry start. In April 2022 the dry saline land patch was sown with oats (Yallara<sup>®</sup>) and vetch (Timok<sup>®</sup>). Sand mulch strips were spread in April 2022 using a land-plane scraper. They were applied after seeding to minimise disturbance of the sand. The patch was sown to wheat (Scepter<sup>®</sup>) in 2023.

### Mulch tried in the past

The Baldock's are not new to using sand mulch to treat dry saline land. Back in the early 2000's they used a red sand (red-orange Buckleboo sand) to treat bad scalds. At the time, clay spreading to treat water repellence was popular. "Dad was always looking for new ideas and decided to do it the opposite way [spreading sand over heavier soil]. This gave a great response but the impact has dwindled," said Tristan. "Over time the sand mulch has been incorporated into the soil, reducing its efficacy."

## RESULTS



The sand strips out-performed the rest of the scalded areas in both 2022 and 2023.

### Biomass

Dry conditions through June-July 2022 saw well-established plants in the untreated scald areas die off, but plants in the sand treatments survived. By September 2022, biomass was much higher on the sand mulch strips than the control areas (Figure 2). The untreated scalded areas averaged between 2.8 and 4.4 t/ha of dry matter and the adjacent areas of the sand treatments averaged 7.0 to 10.3 t/ha of dry matter.

Both double sowing and sand mulch improved production on the scald (Figure 2). Visually, the double sown areas seemed to improve surface cover compared to the single sown area, which should help limit salt accumulation in the topsoil.

## Yield

In 2023 there was a carry-over effect from the sand treatments that were evident throughout the season. “There are two noticeable strips in the paddock where plants are bigger, more advanced and have substantially more biomass. NDVI also indicated differences between untreated and treated areas,” said Tristan. Figure 3 is a photo of the low sand strip, taken in July 2023.

By harvest, both sand strips out-performed the control areas, with the higher sand rate strip giving better yield results (Table 1) than the lower sand rate strip.



Figure 3. Low sand strip, photo taken July 2023



Figure 4. Control (left) vs high sand rate (right) taken in August 2022

## Economics

The cost of treatment largely comes down to proximity to a source of sand. Tristan notes carting sand in costs about \$400-500/ha to \$5/t if the sand is close, but costs quickly escalate with distance.

Unfortunately, there isn't a large deposit of sand close to the saline patches. “Sand needs to be carted in and stockpiled then use a scraper to pick it up and spread it. Once the scraper has to travel more than one km round trip to get product, it eats into the viability of the operations,” Tristan said.

“We could bring in biomass but that's very expensive. If we could crack that access to sand, we could really shift the landscape.”

Table 1. Mean 2023 wheat yields in each treatment

Treatment	Bay 1 Lower salinity	Bay 2 Western scald	Bay Lower salinity
Control 0 (better production area)	0.52	0.2	0.40
150 t/ha sand	1.46	1.55	1.43
Control 1	0.75	0.74	0.73
250 t/ha sand	2.13	1.80	1.86
Control 2	0.75	0.57	0.67

Note: data not collected from Bay 4 in 2023. All bays were sown at the standard seeding rate in 2023, targeting 160 plants per metre square.



Despite this, his pain point is reasonably high. Tristan said, "There reaches a point where it's too expensive. But for these bad saline areas, it almost doesn't matter what it costs to fix it. If we can throw the kitchen sink at it and it costs \$1000/ha and it fixes the severe scald areas, I'm OK with that."

The approach is partly to do with the big gains that can come from treating the dry saline land. "It's where the biggest gains are. If you can address that 10% that is underperforming, it has a big whole-of-business impact. Plus it looks bad and it feels bad when you see the effects of dryland salinity," he said.

In dry years the impacts on yield are noticeable. Tristan says it can take a lot of good yielding crop to get the average yield up, but not much bad crop to get it down.

"Last year [2023] lots of rain flushed the system and we had a good crop. But this year the salt has been a problem. We've had big scalds in canola."

## NEXT STEPS



Tristan plans to keep treating the worst affected areas and areas with the closest sand sources.

"What we'll do is slowly chip away at those worse affected areas. Areas the sand is closest to and those you see more than others; those closest to home."

The aim is to get on the front foot and stop areas from getting worse.

"We know that when we have no cover, like during a drought, we start to spiral. If we can use the sand mulch and make some decent changes, maybe by the next drought we won't slip back so far."



*This project is being led by Mallee Sustainable Farming and has been funded through the Australian Government's Future Drought Fund, and is supported by the South Australian Drought Resilience Adoption and Innovation Hub. Project delivery partners are AIR-EP, Primary Industries and Regions South Australia (PIRSA), South Australian Research and Development Institute (SARDI), Trengove Consulting, Ag Consulting and Research, Northern Sustainable Soils, and Insight Extension for Agriculture. Case studies compiled by Alluvio Pty Ltd.*

## PROJECT INFORMATION



Trial run by PIRSA  
Thanks to Tristan Baldock for hosting the trial.

Building resilience to drought with landscape scale remediation of saline land.  
Activity ID - 4-H8FU6SC

Produced June 2024