

Long-Term Impact of Sand Mulch on Dry Saline Land at Manangatang

SNAPSHOT

Farmer name: Rick Plant

Location: Manangatang, Vic

Farm size: 6000 ha

Enterprise: Cropping, small livestock enterprise

Rainfall: 300-330 mm (GSR)

Rotation: Two cereals then a legume on lighter country. Cereal-break-cereal-break on heavy country.

TREATMENTS



Sand mulch



Straw mulch



Large paddock areas affected in 2022

Key messages

- Patches of dry saline land treated with 8-10 cm sand mulch 15 years ago are still producing well, showing long-lasting amelioration is possible.
- Covering bare patches with straw can significantly reduce topsoil salinity after one summer.
- The long-term economic benefits of dry saline land amelioration on large areas are worth it, despite the initial high cost and effort.

Rick Plant has been actively battling dry saline land since the early 2000's on his property south of Manangatang, Victoria. The property has a range of soil types including red loams and grey calcareous soil.

On Rick's property, dry saline land tends to appear on the heavy red sodic flats, as well as some calcareous soils and clay loams. In the landscape, the patches tend to appear when there's a small drop in elevation, which may be areas where topsoil has eroded.

Rick started spreading sand to treat the patches in 2007. "I had seen other farmers spreading sand and decided to give it ago," he said.

He spread the sand 5-25 cm thick by dragging it over the saline patches. Rick was not aiming to be precise, yet the results were nearly instantaneous, with productivity improving the next season.

Over 15 years later, the sand is still positively impacting crop growth (Figure 1). Rick says, "You can't see the sand itself as it has been incorporated a little over time by the sowing process. But now the sand patches still yield as well as the best parts of the paddock."

Rick's aim was to 'get something growing' and once it was established, keep the ground permanently covered. Rick said, "the patches just need mulch and it doesn't matter what it the mulch is. My theory is once you grow something, you're growing your own mulch."

SAND VS STRAW

In 2021, Rick trialled spreading straw, including old hay bales, as mulch to treat the patches.

The straw helped reduce evaporation and limit salts wicking to the surface over the hot, dry summer.

In late 2023, straight after harvest, Rick cut and spread new areas of straw on 8 ha of established scalds that were getting worse (Figure 3). Fresh barley straw was used as mulch as it was easier to work with. Rick said, "old straw is clumpy and harder to spread."

The fresh straw had the added benefit of importing seeds which germinated after the summer rain. The straw was approximately 10 cm thick when freshly spread, and settled down over time. Rick's expectation was that the straw would rot down over the 2023-24 summer and the patch would be sown with the rest of the paddock the following season.

Figures 4 and 5 illustrate how effective the straw mulch was. Bare areas over the summer became hard and crusty with salt crystals at the surface, while the soil under the straw remained friable. Soil tests showed a remarkable difference in topsoil salinity. In February 2024, after just 3 months, salinity in the bare area climbed to a highly toxic level of 12 dS/m (EC1:5) in the top 5 cm, and 6 dS/m to 10 cm depth, while the soil under the straw measured 0.84 dS/m and 1.2 dS/m respectively. While soil salinity under the mulch is still at toxic levels, it's possible these soils could support crop germination after a large rainfall event.

Figure 5 also shows that applying sand in 2022, which resulted in two seasons of excellent crop growth, also reduced salinity in the original scalded topsoil (now at 10-20 cm depth).



Figure 1. Dry saline land treated over 10 years ago on the right



Figure 2. 2023 crop growth from hay bale spread as mulch

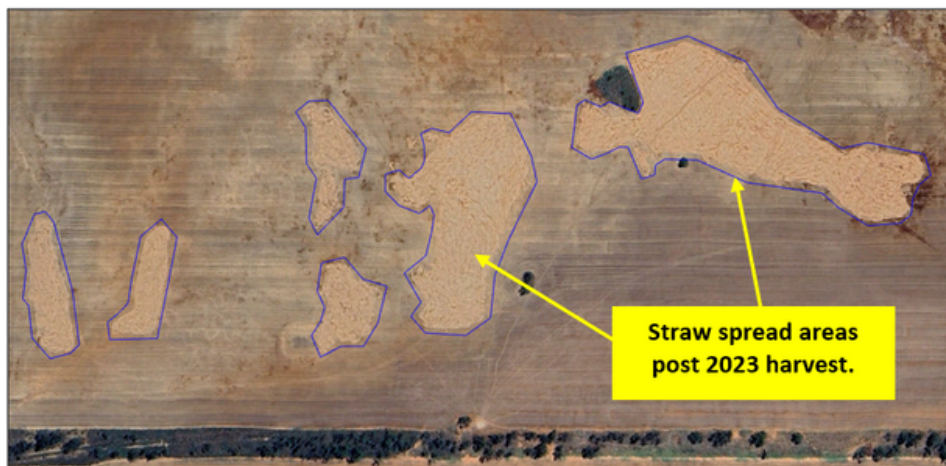


Figure 3. 8 ha of straw cut and spread after 2023 harvest (Google Earth image)

It is too early to tell the longer-term impacts of the barley straw, but from a logistics perspective, Rick prefers working with sand. He finds sand gives a better 'bang for buck' than straw. With on-farm sources of both sand and straw, the labour involved is the key difference. While sand needs carting or dragging, straw requires baling, stacking, carting, and spreading. For Rick it is more labour intensive and time consuming than using sand. He said, "sand is better than straw because you're building the topsoil. But straw is still getting rid of the bare patches so you can grow a crop."



Figure 4. Contrast in topsoil health after 3 months straw cover over summer 2023/24

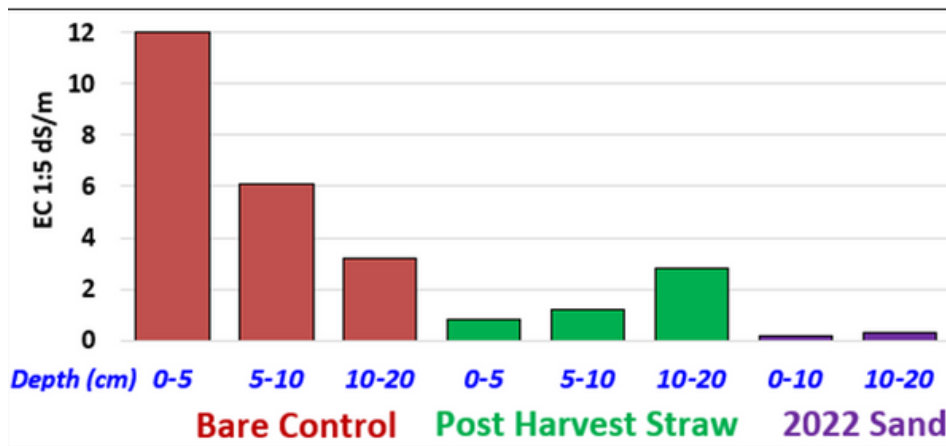


Figure 5. The soil salinity differences (Feb 2024) after straw and sand placement



Figure 6. Crops germinating through the barley straw

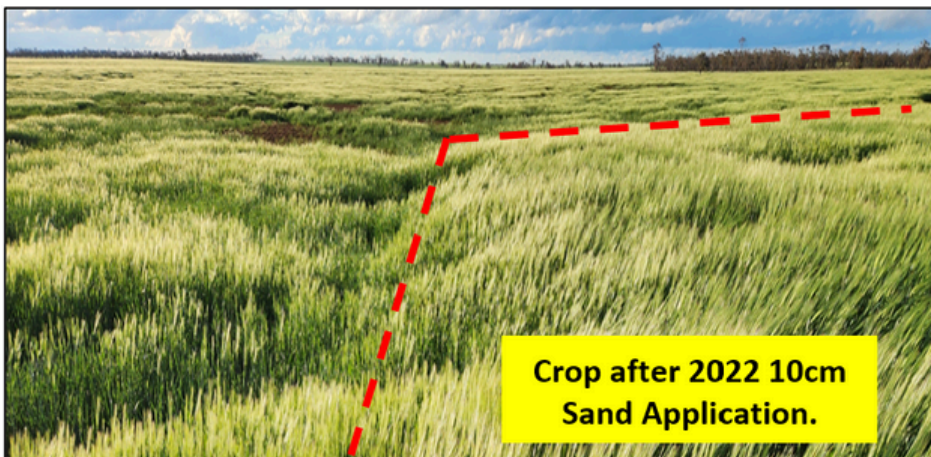


Figure 7. Crop growth on 2023 sand application



SAND SOURCE AND PROCESS



Both the sand and straw were sourced on the farm. "Some was drift sand from fence lines, some from sand hills. It's good for nothing anyway so I can't crop it and might as well use it," Rick said. The main issue is having enough sand nearby to spread on the large clay flat areas. Rick prefers to drag sand where he can as it is much faster, but if the sand has to travel a long way to the patch it is better to carry it. If using contractors, March/April is the idea time to treat the patches. If doing it himself, he spreads sand when he can find the time.

Economics

Rick says that the going is hard and it can feel like a waste of time when he is dragging sand around. However, when he gets a 4-5 t/ha crop on a treated patch, it's worth it. The other benefits are the paddock looks better and there isn't water run off, meaning fewer bogging issues next to the dry areas.

OTHER SALINE LAND ISSUES



The farm also has several historic regional groundwater saline scalds that Rick has fenced off and planted trees around. Mallee seeps have also formed more recently at the base of sand hills. They started appearing after the very wet 2010/2011 seasons, and while they can dry up somewhat, do not totally disappear.

Rick has tried ripping and spreading straw and sand on the seeps but any improvement is only temporary if the excess water problem is not addressed directly. Rick now limits summer weed spraying to keep vegetation growing. He plans to sow a strategic lucerne strip above the seep areas to lower the perched water tables and intercept the lateral flows of water coming out of the sand hills. The seeps are less of an issue than the large areas of dry saline land appearing across the heavy fertile flats.

NEXT STEPS



Rick will keep chipping away at treating the dry saline land patches.



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 Chis McDonough, Insight Extension for Agriculture.
Thanks to Rick Plant for hosting the trial.

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

Produced June 2024