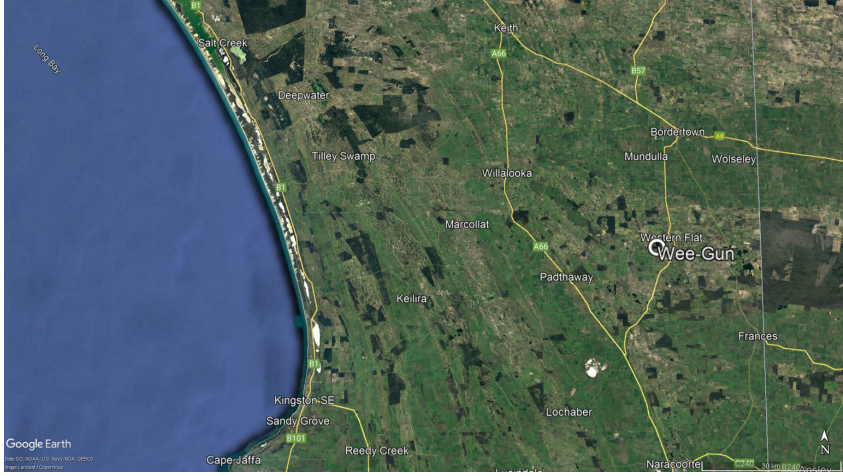
IMPROVED GRAZING PRODUCTION ON NON-WETTING SANDS

COMPOST RATE CASE STUDY



This case study explores how compost application affects soil fertility and biomass production after clay spreading.

AT A GLANCE

Challenges

Sandy soils are naturally low in organic carbon and are deficient in most essential plant nutrients.

Opportunities

Clay spreading can overcome multiple sandy soil constraints, but the process is very disruptive. It's important to support the soil to quickly recover its chemical, physical and biological function.

I knew this paddock would be low in nutrients and organic matter after clay spreading. I was keen to explore different ways to supply these, while also supporting soil microbes. This trial lets us test compost application rates and measure changes in soil biology and feed production over time.

Hamish Verco
Owner Manager, Wee-Gun Western Flat

BACKGROUND

A 17ha pasture paddock at Western Flat, SA, was selected to demonstrate strategies to restore soil function following clay application and incorporation. The paddock is characterised by jumbled dunes with deep sandy soils (Image 1) and sporadic heavier flats.

Soil sampling in 2021 confirmed the sand dunes to be severely water repellent and deficient in phosphorus and potassium, with organic carbon below 1%. It has low capacity for nutrient retention throughout (cation exchange capacity <1.0 cmol/kg below 10cm), but did not have high soil strength.

Clay spreading is common practice to alleviate water repellence and 250 t/ha of clay material was applied across the paddock in early 2022, before being incorporated with a disc plough in autumn (Image 2).

A survey with local farmers in 2021 showed 65% were interested in testing multispecies pastures and over 70% wanted to see organic amendments demonstrated in their environment.

In May 2022, compost treatments were applied on plots 1.1 ha in size to boost biological function and nutrient supply using a custom blended compost.

Four different compost rates are tested against a fertiliser control (Image 3).

The paddock was sown to a multispecies pasture on 15 May and will be monitored annually until 2025.

Image 1. Soil profile from the deep sand dune prior to clay and compost being applied.

TREATMENT DETAILS

1) Custom Fertiliser: a blend of mono-ammonium phosphate, sulfate of potash, copper and molybdenum ($1873/t ex Naracoorte; GST Incl.) was spread at 160 kg/ha to supply 11N, 24P, 20K, 9S, 1Cu and 0.04Mo kg/ha ($299 + $41/ha spreading cost).

2) Custom Compost: an organically certified humic compost was supplied locally from Mulbarton Compost at Padthaway at a cost of $174/t (GST Incl.) delivered and spread. 25 kg of Guano, an organic phosphorus fertiliser (12.6% P), was blended into each tonne of compost prior to application. Nutrient supply (kg/ha) for each compost rate (t/ha) is shown below.

Rate t/ha	N	P	K	S	Ca
1	11	3.6	10	1.6	44
2	22	7.2	20	3.3	88
4	44	14.4	40	6.6	176
8	88	29	80	13.2	352

Image 2. Aggregates of clay mixed into sand.

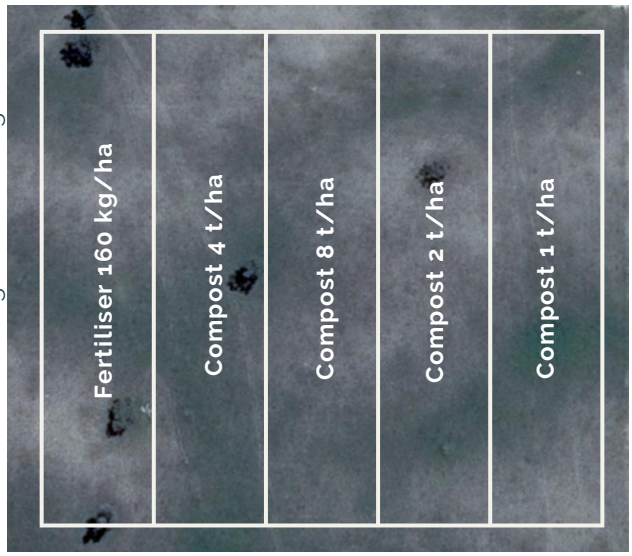


Image credit: Google Earth

Image 3. Trial map (5 treatments x 1.1ha).

1 t/ha

2 t/ha

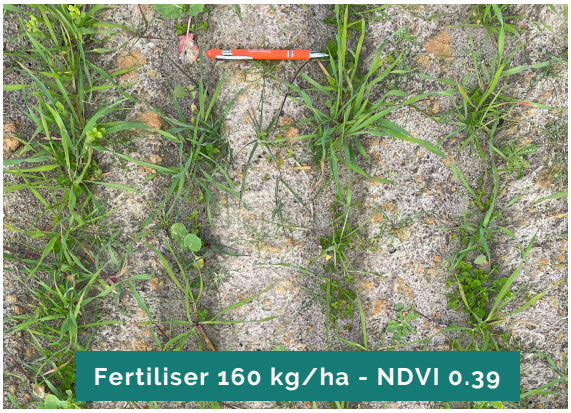
4 t/ha

8 t/ha

Sowing details: A mixed species pasture was sown on 15 May, comprised of Balansa, Arrowleaf, Rose and Crimson clovers, Paraggio medic, vetch, Blast ryegrass, Saia oats, ryecorn, triticale, fodder rape and tillage radish at a rate of 69 kg/ha ($108/ha).

The seed was sown with 130 kg/ha of SMS Guano (12% P) after being treated with a fluid bio-stimulant comprised of compost extract, worm extract, seaweed powder, milk powder, molasses, humic powder, fish hydolysate, wood vinegar, mycorrhizal fungi and N fixing bacteria. The brew was applied to the seed through an auger and allowed to dry prior to planting.

The paddock was sown following the hill contours to encourage water infiltration and reduce rill erosion.


Fertiliser 160 kg/ha - NDVI 0.39


Compost 1 t/ha - NDVI 0.30


Compost 8 t/ha - NDVI 0.28

RESULTS TO DATE

Normalised difference vegetation index (NDVI), measured with a Trimble Greenseeker, was recorded on 19 July, 7 weeks post emergent (see Images on left). An average of 10 measures across the dune crest in each plot showed NDVI:

1) Fertiliser 160 kg/ha = 0.39
2) Compost 1 t/ha = 0.30
3) Compost 2 t/ha = 0.27
4) Compost 4 t/ha = 0.29
5) Compost 8 t/ha = 0.28

WHERE TO NEXT?

- NDVI measurements will continue to be collected through late winter and spring.
- Pasture biomass yield will be measured in each treatment plot in late spring and soil samples will be collected to assess the soil microbial activity and abundance; data will be analysed for significance.
- The paddock will likely be sown to an annual fodder crop in 2023; monitoring will continue.

Acknowledgements: Many thanks to Hamish Verco for access to paddocks, equipment and resources to deliver this case study. Thanks also to the project Steering Committee and Mulbarton Compost for ongoing support.

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