Spreading Sand on Heavy Soils

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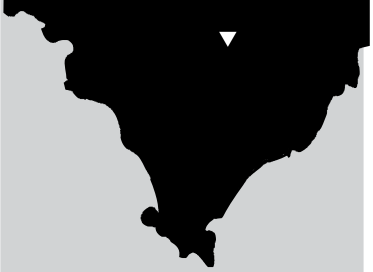
DEMO

Searching for answers



Location: Koongawa
Rainfall
Av. Annual: 320 mm
Av. GSR: 235 mm
2009 Total: 340 mm
2009 GSR: 265 mm
Yield
Potential: 3.1 t/ha (W)
Actual: 3.1 t/ha (W)
Paddock History
2008: Wheat
2007: Wheat
2006: Pasture
Soil Type
Red clay loam
Plot size
30 m x 4 m

Key message

- **Spreading sand on heavy flats resulted in a yield increase of up to 0.7 t/ha in 2009.**

Why do the trial?

Heavy soil types can be extremely frustrating in dry seasons, they store moisture very well, but too close to the surface, leaving it very susceptible to evaporation. Ray Willmott decided that the concept of spreading sand on transient salinity “magnesia” patches could be equally effective in improving the performance of heavy soils. Dean Willmott expected that the sand could have a mulching affect, reducing the evaporation off good water holding capacity heavy soil.

How was it done?

The trial was planned as a split plot design, with sand spread on one side of the controlled traffic lanes, with a nil control on the other side. EP clay spreaders used their scraper to spread three rates, 200, 300 and 600 tonnes per hectare of sand gathered from a nearby sand hill and replicated the process across a section of the paddock. The paddock was sown with Gladius wheat using a DBS no till seeder two days after the sand spreading was completed, on 3 May.

What happened?

The crop was visually healthier in the areas spread with sand throughout the season. The treatments spread with 600 t/ha did suffer from wind erosion which cut the emerging crop off, however with follow up rainfall, the crop recovered.

Growing season rainfall was well above average and the plots without sand yielded 2.34 t/ha. Over the 2006-2008 period, the heavy soil types have been the poorest yielding zones on the property.

All sand spreading rates increased grain yield over the nil treatment. The higher sand rates of 300 or 600 t/ha did not translate to a significant increase of yield over the lower rate (200 t/ha), however different seasons may highlight greater differences between the treatments.

The grain size (1000 grain weight) was higher for the 600 t/ha sand rate than any of the other treatments. The 200 and 300 t/ha rates did not improve grain size above the nil treatment.

What does this mean?

This is a perfect example of farmer innovation, which may offer a solution for growers who suffer the issues associated with heavy clay soils in low rainfall environments. The heavy soil types have excellent soil water holding capacity, however quite often fail to realise potential. It is not likely to be a broad scale solution to stabilising yield on the problematic heavy flats; however it is an extremely encouraging result.

This initial trial raises more questions than answers. What is the correct rate of sand to spread? Are all sands equal? Will water repellence become a problem? Will the sands have inherent nutritional problems? How far can you move the sand before it becomes uneconomic? How long does the effect last? Will zero till discs work better than knife points for leaving the sand on the surface? Does it matter if the sand is mixed in to the top soil? What changes have occurred to plant available water compared to the normal heavy soil?

The concept of spreading sand on heavy flats may be limited to areas where a deep sand lies next to some less productive heavy country. It needs testing to see how long the benefit will last and whether it is a concept which warrants wider application.

Acknowledgements

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Table 1 Grain yield and quality for soil spread with the sand at Koongawa, 2009

Sand Rate (t/ha)	Grain Yield (t/ha)	1000 Grain Weight (g)	Test Weight (kg/hL)	Protein (%)
nil	2.34	43.0	82.1	11.1
200	2.79	44.1	81.4	11.2
300	3.03	44.7	82.1	11.4
600	3.12	49.1	82.4	11.6
LSD (P≤0.05)	*0.39*	*2.4*	*ns*	*ns*