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Deep Ripping on deep white sands

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Key messages

- Rip to below your compacted layer
- Ripping to 60cm reduced soil strength, and this effect continued into the second year after ripping
- Wheat yield response to the 60cm rip treatment paid for deep ripping in the first year
- Important to understand potential yield benefits of ripping before you rip

Background

Compaction of deep sands can be alleviated by deep ripping but it is not fully known how long the ripping effect lasts in south coast soils. Shallow ripping has been proven to have limited improvements on soil strength and grain yield in previous trials so ripping deeper on appropriate soils is essential. There are questions remaining about how long the ripping effect lasts for in a CTF system and when to repeat the deep ripping.

Methods

A trial at East Gibson is investigating the longevity of deep ripping in deep sands in a controlled traffic paddock. Trial treatments were ripped with an Agroplow in March 2018 with treatment of a nil rip, 40cm rip, 60cm rip and a secondary 40cm rip to be re-ripped to 60cm in years to come. Plots are 1.7km long and 9.14m wide. Scepter wheat was grown in 2018 and GT-53 canola in 2019. The soil profile at the site is white sand over gravel and clay at 30 – 90cm depth.

In season data collection included taking establishment counts at crop emergence in 2019 in each plot along 6x 1mx2 rows. Penetrometer readings were taken across the same transect in August 2018 and September 2019. Harvest yield data was collected from the grower and interpreted using SMS.

Results and discussion

Yield results

Yield from 2018 harvest yield maps showed that ripping to 60cm significantly increased wheat yields by 0.8 t/ha compared to both the 40cm and nil ripped plots (Figure 1a). Average grain yield in 60cm ripped plots was 5.1 t/ha. There was no difference in grain yield between plots ripped to 40cm and nil ripped plots, here average grain yield was 4.3 t/ha. The ripping cost of $100 was covered by this increase in grain yield where worth was calculated to be approximately $160 in the first year.

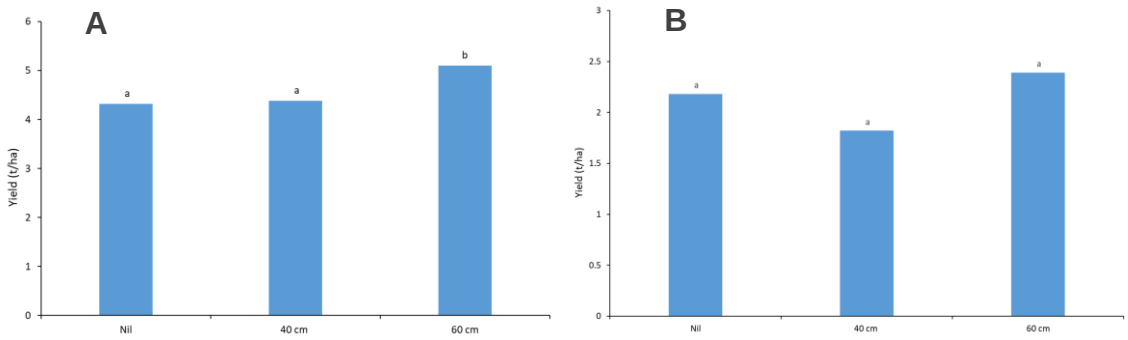

Figure 1- Average grain yield of Scepter wheat (A) sown in 2018 and GT-53 canola (B) sown in 2019. Different letters on the bars show a significant difference between treatments at P≤0.05.

In 2019 when the site was sown to GT-53 canola there were no significant grain yield differences among the treatments with an average site yield of 2.1 t/ha (Figure 1b). A potential yield of 2.07 t/ha was calculated at this site for canola using a modified French and Schultz method; therefore all treatments are near potential yield for the 2019 season regardless of deep ripping treatments.

Soil strength results

Penetrometer readings were taken in August 2018 and September 2019 to assess changes in soil strength for the ripping depth treatments. 2018 penetrometer results show a significant reduction in soil strength when deep ripped to 60cm compared to the 40cm and nil ripped plots. There was no difference between the nil rip and the 40cm deep ripped plots. Severe soil compaction, of 2.5 MPa, occurs at 40cm depth at this site indicating that the 40cm ripped treatment was not deep enough to shatter the layer of compaction (Figure 3).

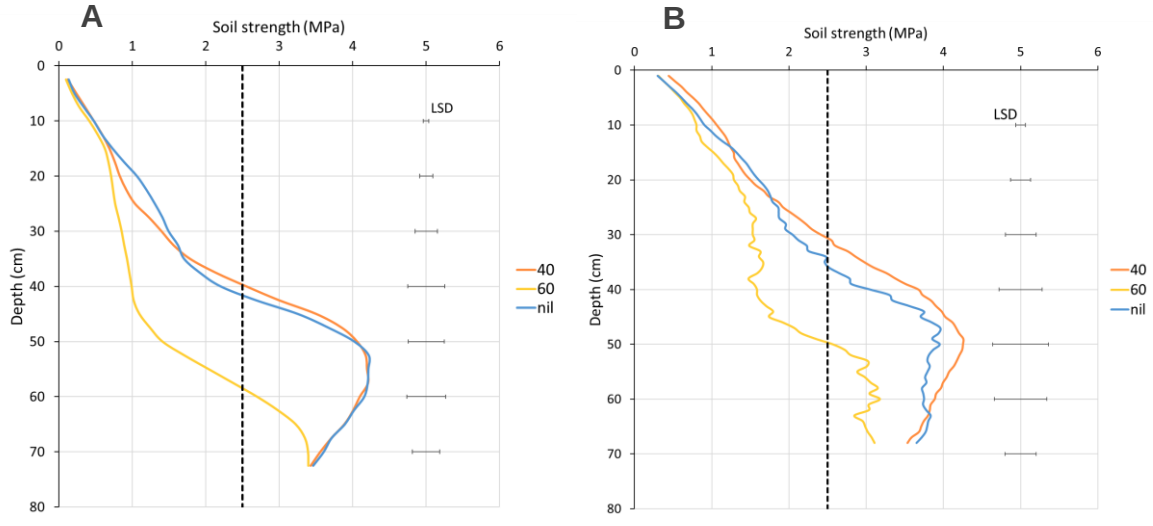

Figure 2 – Soil strength profiles from penetrometer readings taken in August 2018 (A) and September 2019 (B). The dotted line at 2.5MPa highlights severe compaction. LSDs are for soil strength at 10cm intervals down the profile at P≤0.05.

Penetrometer results in 2019 indicate a sustained reduction in soil strength in plots ripped to 60cm when compared to the nil and 40cm ripped plots (Figure 4). There is some natural re-compaction occurring at depths 50 – 60cm. This is indicated in figure 4 where there is no longer a significant difference in soil strength among treatments below about 55cm depth.

Conclusion

Results from both 2018 and 2019 indicate that deep ripping to a depth of 60 cm is economically worthwhile on deep white sands in the Esperance port zone. Although there was a sustained reduction in soil strength in the second year after ripping this was not reflected in yield, with no change across treatments in canola yield in 2019.It is important to understand where the depth of compaction is to better understand to what depth ripping should occur.

This site will be sown to barley in 2020. Penetrometer readings and grain yield data will be taken again to assess the longevity and impact that deep ripping has into the third year after ripping. The secondary 40cm deep ripped plot will be re-ripped in 2022 to 60cm. This will be allowing for better understanding of the longevity of deep ripping.

Acknowledgments

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Important disclaimer