Ripper gauge demonstration sites 2018-2020

Trial Hosts: Goad & Watterson Families

Key Messages

- **TENTERDEN: There were no statistical yield increases from any tillage treatments compared to the untreated control in 2020. The 2020 results are consistent with the 2019 grain yield data.**
- **KOJONEERUP: Significant wind erosion in 2018-19, motivated the Goad family to spread clay over the whole paddock to reduce non-wetting expression and wind erosion. Machinery re-compacted the soils through the claying process and removed the 2018 deep ripping benefits. After clay-spreading and incorporation in 2020, three 50m by 50m quadrants were deep ripped to 50cm using a Tilco ripper. Each quadrant represented a different duplex depth, classified as deep, medium or shallow-duplex. Deep ripping to 50cm averaged a 1.3t/ha yield advantage over the un-ripped soil in 2020.**
- **DARKAN: There were no significant improvements in grain yield from any tillage treatments compared to the nil treatment last year. The 2020 results were consistent with the 2019 grain yield data.**
- **BROOMEHILL: There were no significant improvements in grain yield from any tillage treatments compared to the nil treatment in 2020. Last year was the first time since the treatments were installed (2018) that there were no yield benefits from the soil amelioration over the untreated control.**

Background

This project implemented four deep ripping demonstration sites in the Albany port zone on four different soil types. The trial demonstrations included different ripping machines depending on the subsoil constraints that were prevalent at each site. The main soil constraint for the project was compaction, but others included non-wetting topsoils, waterlogging and acidity. The project ran over three years, with 2020 being the final year. Stirlings to Coast Farmers partnered with Southern Dirt who managed the Darkan and Broomehill sites for this project.

Results and Discussion

Kojaneerup

There was a significant increase in grain yield from deep ripping to 50cm using a Tilco deep ripper. The yield increase ranged from 1.1t/ha in the deep-duplex soil to 1.6t/ha in the medium-duplex soil.

Deep ripping assisted in retaining subsoil moisture from the August rainfall which would have allowed the plants greater access to moisture during grainfill, increasing yields.

The highest yield increase from the deep ripping was on the medium-duplex soil, a 1.6t/ha barley yield increase. Using an on-farm barley price of $270/t and deep ripping costs of $90/ha gave a profit of $342/ha.

In 2018, the treatment yields suffered wind-erosion affecting plants numbers and early growth. Before seeding in 2020, the whole paddock had 250t/ha of clay spread and incorporated into the top 20cm of soil. The yield improvement from ripping + clay compared to unripped + clay was significant. The minimum yield improvement was 1.1 t/ha of barley in 2020. An on-farm barley price of $270/t meant that the deep ripping was $297/ha better than the unripped + clay treatment. Deep-ripping costs have been calculated at $90/ha, which means there was a minimum $207/ha benefit in the first year after deep ripping. Spreading & incorporating clay at 250 t/ha is estimated to cost $1000 per hectare in the Kojaneerup region. Although highly expensive, the soil condition's improvement is permanent, allowing payback to occur over many years.

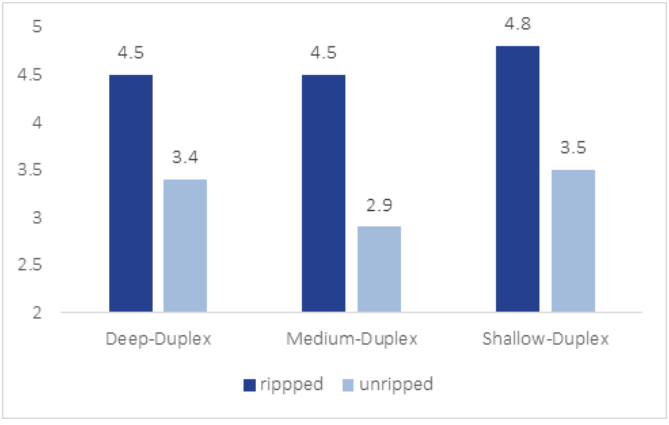

Figure 1. Ripper gauge site located at Kojaneerup, WA. Graph displays 2020 barley yields in (t/ha) comparing deep-ripped quadrants (50m by 50m) to the surrounding un-ripped soil.

Tenterden

There were no significant yield differences between treatments in 2020 at this site. Data from 2019 indicated that the Tenterden trial site was not responsive to deep tillage treatments because there is little soil compaction on gravel soils.

In February 2020, SCF staff tested the severity of the non-wetting soil at the Tenterden site. The topsoil non-wetting ratings, using the Molarity of Ethanol Droplet (MED) test, were low for the control, Horsch Tiger Ripper and Plozza Plough. The shallow disc treatment rated in the moderate range for MED testing. The four treatments' non-wetting severity was not a significant factor at this ripper gauge site based on the MED testing.

Normalized difference Vegetation Index (NDVI) readings were taken at four different times during the growing season. The Plozza Plough treatment had significantly lower biomass on the 20th June only (Data not shown). Every other treatment and timing showed no significant NDVI differences during the 2020 growing season.

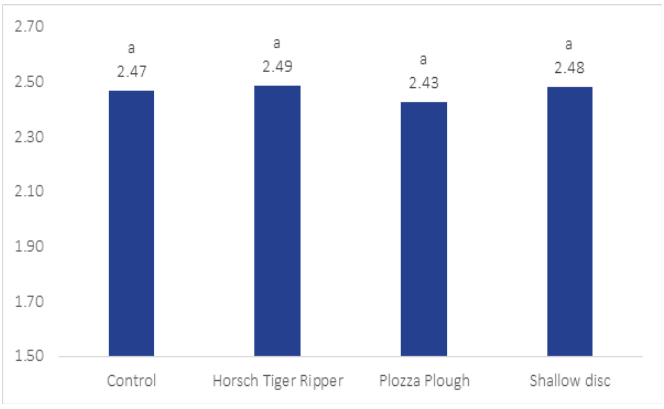

Figure 2: 2020 Canola yields (t/ha) at the Ripper gauge Tenterden site hosted by the Watterson family.

Broomehill

None of the four soil amelioration treatments yielded significantly different to the untreated control (UTC) in 2020.

In 2019, three of the four amelioration treatments yielded significantly higher than the untreated control. The deep rip treatment yielded 200kg more than the control but was not significantly different.

The 2020 winter growing season was the third crop grown at the Broomehill ripper gauge demonstration site. No significant differences in yields from the soil amelioration treatments may indicate the benefits only last for two years.

Growing season rainfall was marginally less (205mm) in 2020 than in the 2018 and 2019 seasons of 217mm and 226mm, respectively. All three years from 2018-20 received less growing season and total rainfall than average.

There were no statistical differences in the treatments for any of the NDVI data sets in 2020 (Data not shown).

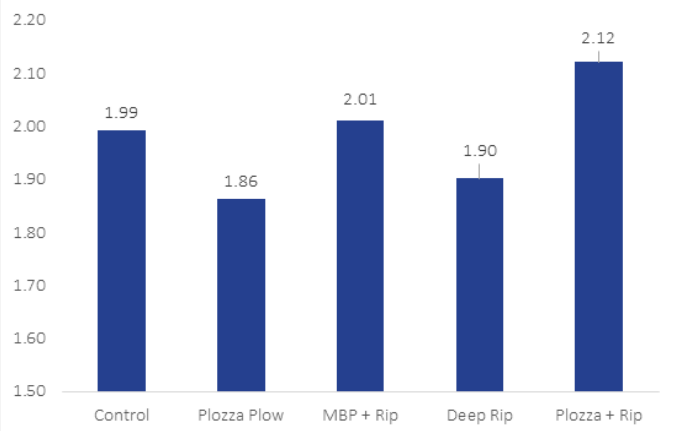

Figure 3. Ripper gauge site located on the Bignell's Farm in Broomehill, WA. This graph displays the average 2020 Canola yields in (t/ha).

Darkan

There were no significant yield differences in the canola crop grown in 2020.

In 2019, there were also no significant yield differences between the treatments at this trial site. However, all tillage treatments yielded less than the untreated control indicating that tillage treatments were detrimental to grain yields. The 2020 data set supports the hypothesis that the Darkan site is not responsive to deep tillage treatments.

NDVI data showed no significant differences between any of the trial treatments at three different growing season dates (Data not shown).

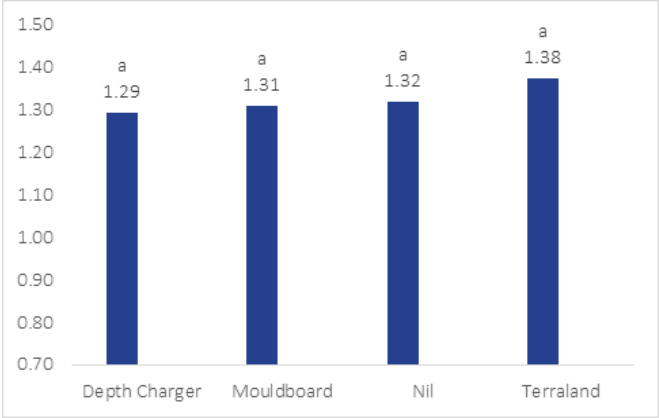

Figure 5: 2020 Canola yields (t/ha) at the Ripper gauge Darkan site hosted by the Duffield family.

SCF would like to thank GRDC for investing in this project and Southern Dirt for partnering with us.