

Nil disturbance seeding systems trial - Kendenup 2019

KEY MESSAGES

- Over the full 4 years of the crop rotation the NDS (disc-seeder) and the Tyne No-Till based system have performed equally well, although both systems have shown different advantages in different crops and seasons.
- In 2019 the full Tillage system incorporated maximum tillage to 40cm soil depth using the Horsch Tiger Deep Ripper. The yield response was significant in 2019 with deep ripping achieving 1.01t/ha more than the disc seeding.
- SCF researchers are interested in measuring the longevity of the deep ripping treatment under controlled traffic farming (CTF)

Purpose

To test alternative seeding systems on non-wetting forest gravel soils. This trial has been ongoing for four seasons between 2016-19.

Treatment 1: Disc-seeder (Slot)

Treatment 2: Tyne Seeder

Treatment 3: Full disturbance prior to tyne seeding.

For 2016-18 the full disturbance treatment was completed with a scarifier. Prior to seeding in 2019, a Horsch Tiger Deep ripper was utilised which ripped and mixed the soil to 40cm.

The Nil disturbance system vs maximum disturbance

Deep ripping compared to slot seeding measures the maximum difference between seeding systems. The aim is to test the impact on soil wettability from damaging soil bio-pores based on the research from Margaret Roper's and Doc Featherstonhaugh study at Munglinup.

The tyne seeder vs disc seeder

Comparisons with farm-scale equipment are difficult because of the inevitable difference in machine set up. In this trial there are row spacing and seed placement differences. Previous studies showed an average yield advantage in narrowing the row spacing was approximately 1% per cm of row narrowing. This means an almost 15% discount alone for the wider spaced disc seeder used in this comparison. The different row spacings can be accounted for when assessing yields but other variables could have similar impacts.

The summary of the NDS trial results to date confirm that there is not an ongoing net 15% discount in yield using the wider spaced disc seeder vs the narrow tyne seeder.

Unpacking the various components of each treatment's yield however is difficult without more measurements.

Results

The 2019 Harvest results showed:

a. The average yields for the NDS Disc seeded plots and the Tyne seeded were not significantly different.

b. The "Maximum-Tillage" plots (Deep Ripped to 40cm with Horsch Tiger) gave a significant response of 1.01 t/ha of Rosalind Barley.

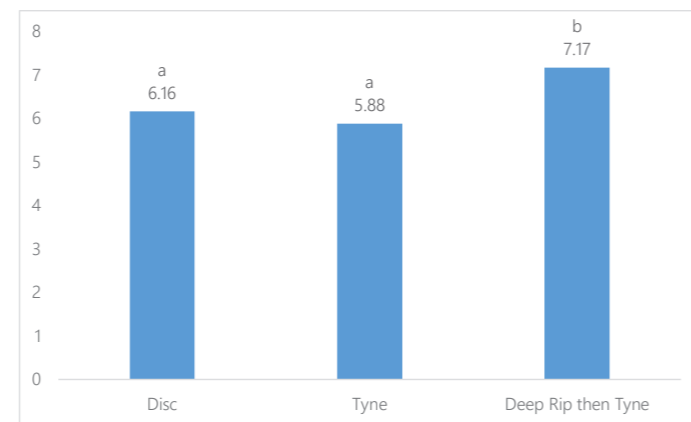


FIGURE 1. Barley grain yields in 2019 at the Wood family Nil disturbance seeding systems trial at Kendenup. Means followed by the same letter or symbol do not significantly differ (P=0.5, LSD)

Crop observations

- 2016: Canola- In a Decile 10 wet season more tillage gave transient waterlogging in topsoil but no significant difference in grain yields.
- 2017: Field Peas- The dry start gave full expression of the non-wetting issue with the extra tillage exacerbating the non-wetting. There was a significant response in plant establishment and biomass with

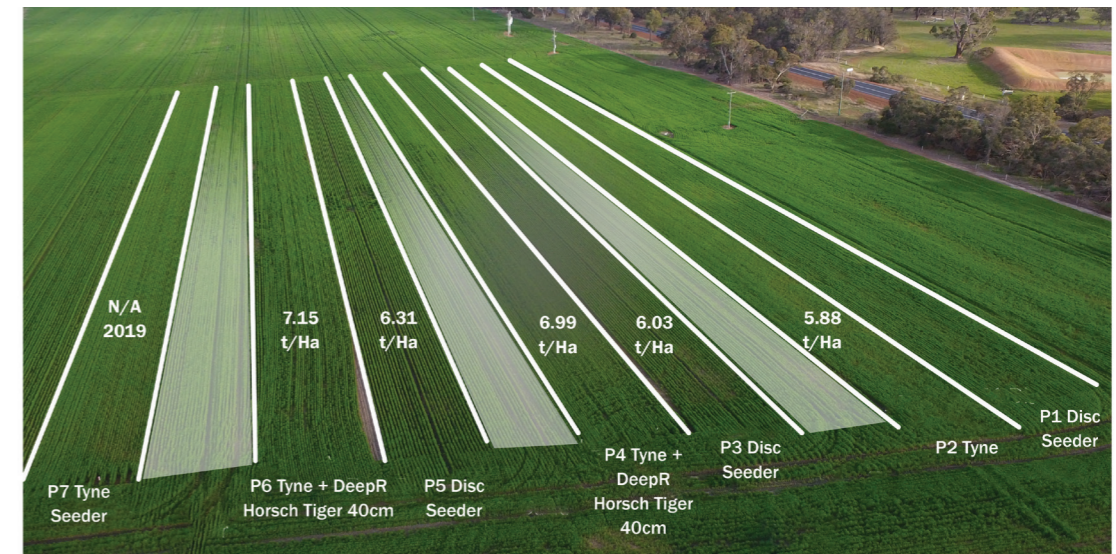


FIGURE 2. Grain yields from 2019 overlaid on a drone image of the Nil Disturbance Systems demonstration site in Kendenup taken August 2019. The Western reps (closest to Albany Highway) are shown in this image.

the nil disturbance system (not shown). Although the disc-seeder had a higher yield the difference was not statistically significant.

- 2018: Wheat- In both the wheat and the barley phase there was no significant difference in crop establishment rates and plant densities. The winter of 2018 had a lower radiation sum resulting in canopy cover being significant in relative growth rates. The tyne seeder with narrow row spacing had a higher biomass at the start of Spring, but grain yield was not significantly different.
- 2019: Barley- In 2019, the "maximum tillage" treatment was deep ripped in March to 40cm using the Horsch Tiger ripper.

Conclusions

Over the four years of the crop rotation, the Nil Disturbance System (NDS) and the Tyne No-Till based system have performed equally well, although both systems have shown different advantages in different crops.

In 2019 the full Tillage system incorporated maximum tillage to 40cm soil depth generating a significant response in the first year. The research question extending from this result is how long will the deep tillage effect last under CTF?

Industry is currently divided on the best systems for mitigating non-wetting forest gravel soils in the high rainfall zone (HRZ). Multiple options are available depending on actual soil limitations. These range from physical treatments

of the soil profiles, e.g. claying with deep ripping, mould boarding, near row sowing (precision seeding), soil wetting agents and alternative seeding systems to retain bio-porosity and improve soil wettability.

Nil disturbance seeding systems in combination with CTF and precision near row seeding has some potential to mitigate a non-wetting soil, but the question from 2019 is will the deep tillage response measured continue in future years, and for how long?

Acknowledgements

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References

Roper MM, Ward PR, Keulen AF, Hill JR (2013) Soil & Tillage Research 126:143-150

Recent on-farm research