

Impact of stubble height on cropping systems in the Western Region

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BACKGROUND:

This trial, which is being led by the Liebe Group with investment from GRDC, takes an extensive look at different stubble management and stubble architectures and how they interact with a wide range of variables, to provide growers with a comprehensive insight into how to best optimise stubble management systems for improved productivity in the following crop.

METHODOLOGY/TREATMENTS:

Four different stubble architecture treatments:

- Stripper front + disc seeder (strip & disc)
- Stripper front + speed tiller + disc seeder (strip & disc with tillage)
- Draper front high cut + disc seeder (draper-high & disc)
- Draper front standard cut + tyne seeder (Draper & tyne – standard practice)

Crops planted in the trial paddock;

2021 – Barley

2022 – Canola (all harvest treatments were conducted with a draper front, at a standard cut height)

2023 – Kinsei wheat

RESULTS

Stubble loads

Seeding canola into high stubble loads on a paddock with a history of non-wetting posed a significant issue. The 2021 barley crop produced an average yield of 7.4t/ha across the plotted area, which resulted in an extremely high stubble load at the time of seeding the 2022 canola crop (Figure 1).

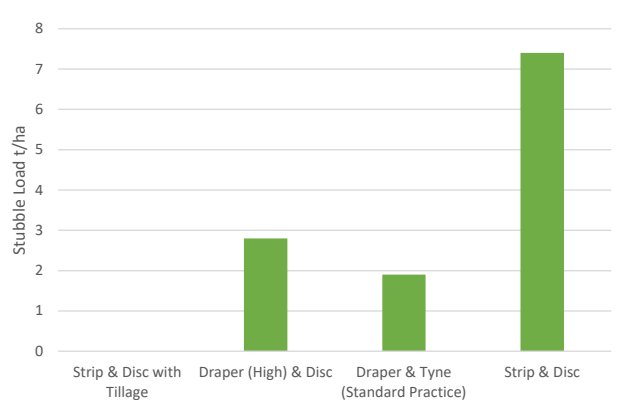


Figure 1. Stubble load at the time of seeding for each stubble treatment in 2022.

2022 Yield Data

The yield results showed that the plots that had previously been harvested with a stripper front performed better than those that had been harvested with a draper front, despite the poor plant establishment in the plots where the heavy residue impacted plant establishment (canola was able to compensate).

The strip and disc treatment produced a canola yield of 3.14t/ha, while the strip/disc with tillage resulted in a canola



yield of 3.42t/ha, slightly higher due to the good initial plant establishment and even plant growth development within the tilled plots (Figure 2). Both plots seeded on the 2021 draper cut stubble performed worse than those on the 2021 stripper front stubble. The standard practice control, which utilised draper front cut at approximately 12cm and tyned seeder, was the worst performing plot treatment. However, it should be noted that the tyned seeder was borrowed from a neighbour, and due to time constraints was not set up to properly interrow sow between the existing narrow row spacings (6.6 inch). As a result, there was a lot of hair pinning and bulldozing of residue in these plots.

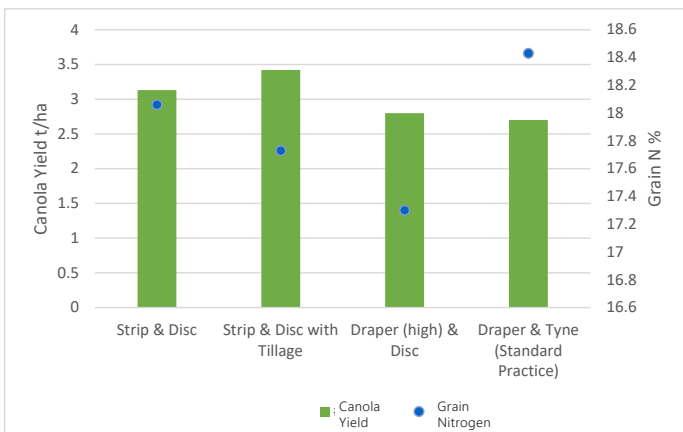


Figure 2. Canola yield and grain nitrogen for each of the stubble treatments in 2022.

2023

At seeding of the wheat in 2023, there were still high amounts of stubble residue from the 2021 barley crop where the stripper front treatments had been applied. This residue, in addition to the narrow row spacings in the crop, made seeding difficult and there was staggered and uneven germination in these plots. It appeared that the high levels of surface residue may have also exacerbated the non-wetting issues on the forest gravel soils.

Although the stubble treatment was uniform across all plots in 2022/3 rotating out of the canola phase, the 2021 stubble treatments still impacted on plant establishment. The strip and disc treatment resulted in 15-20 less plants per m² than the other stubble treatments (Figure 3).

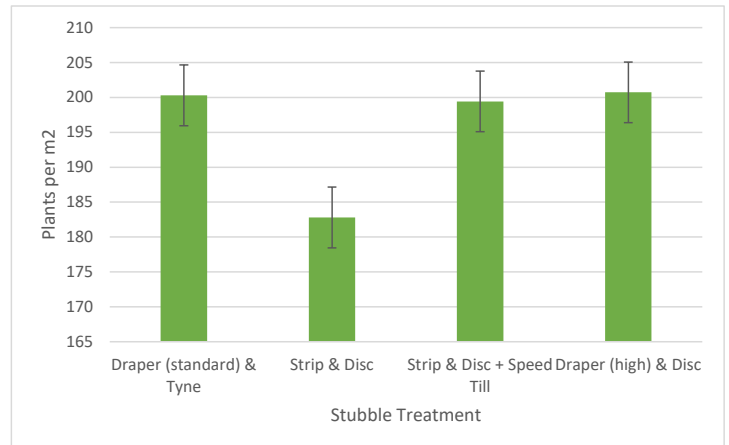


Figure 3. Plant establishment counts for each of the stubble treatments in 2023.

This impact on plant establishment may result in yield loss come the end of the season. Additionally, the slow break down of the high cereal residue loads from 2021, will result in increased disease pressure. Stubble is a major vector for disease in the high rainfall zone, where mildew, blotches and scold can be carried on stubble over the fallow period. In a system where stubble is retained, a diverse crop rotation is the best management for disease pressure. However, if high stubble loads resulting from a strip and disc system are likely to be present for 2 or 3 years post-harvest, this presents a unique challenge, where disease loading could be present in the paddock for a number of years post that crop. This could not only impact the paddock in which a strip and disc system has been utilised but also those adjacent. Although we have not observed an increase in disease presence this season in the Kinsei wheat, it will be interesting to observe the disease loading when the paddock rotates back into barley in 2024.

In addition to the stubble measurements, spray efficacy, disease, crop productivity and canopy temperature have all been recorded this season. These measurements will hopefully provide greater insight into how the stubble management strategies drive crop canopy environmental conditions that impact disease, and whether stubble management can also influence frost prevalence.

