



Impact of stubble height on cropping systems in the Western Region

Hosts: Slade Family

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Key messages

- The project will assess the performance of strip and disc systems, in the High Rainfall Zone (HRZ).
- The project will look at how differing stubble architectures and management systems effect a wide range of agronomic variables.
- By 2024 this project will provide growers with key knowledge around stubble architecture to improve crop productivity.

Background

Stirlings to Coast Farmers (SCF) are taking part in a GRDC funded state-wide project managed by the Liebe group. The project explores the effect of stubble architecture and stubble management systems on crop production.

Stubble architecture plays a key role in the cropping cycle. Stubble management, as part of the fallow management of crop, can have a profound impact on the following seasons crop performance, as well as the long-term health of the soil.

Stubble residue interacts with crop productivity through a two-fold effect, its physical structure and its interaction with the soils and environment. In the last three decades there has been a strong move towards stubble retention, to improve groundcover, retain nutrients and cycle carbon, however this is not without it drawbacks.

Stubble plays a key role in providing ground cover during the fallow period to protect soils from wind and water erosion, increasing infiltration and managing weed burdens.

Strip and disc systems have become increasingly popular particularly in the low and medium rainfall regions where preserving soil moisture is of the utmost importance to ensuring the success of a continuous cropping system. However, the performance of the strip and disc system in high rain fall zones with higher stubble loads is still up for debate.

This trial will take 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 your stubble management system.

Trial design and method

The trial is centred around four different stubble architecture treatments: Stripper front + speed tiller + disc seeder, stripper front + disc seeder, draper front standard cut + tyne seeder, and draper front high cut + disc seeder. The stripper front will only be used in the seasons in which cereals are grown, while the seeding implements, and stubble management portions of the treatment plots will be utilised every year.

The 2021 harvest was implemented utilising both a draper front and a stripper front to establish the treatment plots for the following season. Baseline soil, biomass, yield, grain quality, weed, and stubble residue was collected, so changes throughout the time span of the project can be observed.

Within this project we will measure a broad range of variables that interact with stubble management including the following:

- Soil moisture - increases water infiltration and decreases evaporation
- Weed germination due to levels disturbance
- Soil structure
- Disease carryover
- Hair pinning of stubble at seeding
- Herbicide tie up in stubble
- Harvest weed seed control options
- Lack of cultivation below seed, if moving to disc seeding
- Fire risk over summer
- Pre-emergent herbicide efficacy



- Nitrogen inefficiency when top spreading into straw
- Frost risk

Spray efficiency

Spray efficiency testing was conducted across each trial plot as part of the pre-seeding knockdown in 2022. The testing measured spray contact as a percentage at canopy and ground level. Testing aimed to evaluate the effect the differing stubble architecture has on the efficacy of spraying. The sprayer was set up with the nozzles to be 50cm above the stubble canopy to ensure maximum coverage.

The average canopy height for each stubble treatment varied. The stripper front/speed tillage treatment had a canopy height of 0cm. The standard draper cut, high draper cut, and stripper front treatment had an average stubble canopy height of 14cm, 24.8cm and 65.3cm, respectively.

Interestingly, the stubble canopy height reduced over the fallow period by 17% in the high draper cut and 17.3% in the stripper front treatment plots, without grazing or stubble management. This reduction in canopy height was due to the loss of vigour and the beginning of stubble breakdown. Whilst the standard draper cut had no evidence of change in stubble canopy.

Table 1: Average spray coverage percentage by treatment and spray zone, as well as the average canopy height by treatment in centimetres.

The results of the spray efficiency testing showed that

| | Draper/Standard | Stripper | Stripper/Till | Draper/High |
|------------------------|-----------------|----------|----------------|-------------|
| Ground (%) | 12.27 | 7.32 | 13.72 | 8.62 |
| Canopy (%) | 14.08 | 8.97 | Not applicable | 12.34 |
| Ave Canopy Height (cm) | 14.0 | 65.3 | 0 | 24.8 |

the stubble height treatment had a statically significant effect ($P=0.0064$) on the spray coverage. The draper front/standard cut and speed-tiller treatment resulted in the greatest spray coverage at ground level. The improved spray coverage is ideal for eradicating summer grasses. However, the stubble mass acted as a barrier for spray contact where the stubble height was higher. Interestingly,

the stripper front treatment had a lower percentage of spray coverage at the canopy level. The spray paper (used for coverage assessment) was “streaked” rather than the consistent “course” blot that is targeted for knockdown sprays. We think this was due to an increased influence of the wind because the boom was higher (canopy + 50cm) on the stripper front plots. This increased boom height, coupled with greater average stubble height from the stripper front plots, led to the greater variability in the spray coverage at ground level (Figure 1).

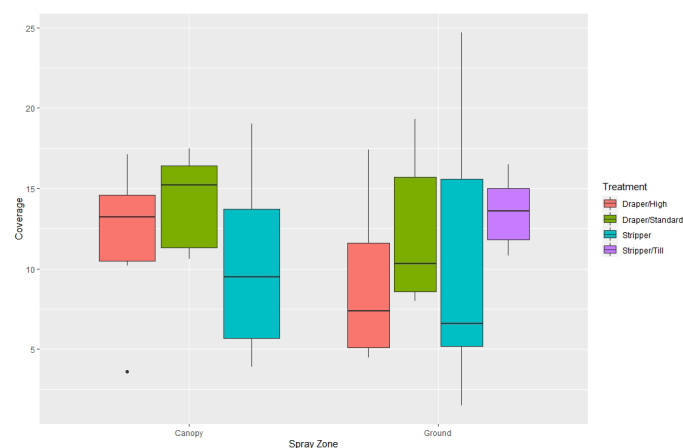


Figure 1: Box plot of the spray coverage percentage achieved in the different stubble height treatments in April 2022 at West Kendenup.