

Farming Systems

Impact of stripper front and straw length on harvest efficiency, summer weed control, soil moisture retention and pest populations in upper Eyre Peninsula systems

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Location

Cleve - Bammann

Rainfall

Av. Annual: 375 mm

Av. GSR: 250 mm

2023 Total: 288 mm

2023 GSR: 133 mm

Paddock History

2024: Leader lentils

2023: Wheat

2022: Leader lentils

2021: Spartacus barley

Soil type

Red loam

Plot size

18 m x 500 m x 3 reps of stubble treatments to be sown with 24.1 cm row spacing

Location

Minnipa - Scholz

Rainfall

Av. Annual: 325 mm

Av. GSR: 241 mm

2023 Total: 280 mm

2023 GSR: 169 mm

Key messages

- **Large plots of stripper stubble and two heights of conventional stubble were set up during the harvest of 2023 at Cleve and Minnipa to measure their effects on soil water evaporation using soil moisture probes.**
- **Various herbicide strategies have been implemented across the three stubble types to measure the effect of summer weeds on soil water losses over summer.**
- **The different stubble systems will be sown in 2024 by disc.**

Why do the trial?

At the Minnipa GRDC NGN Forum, growers identified the need to better understand the pros and cons of strip and disc systems in their local environments as a high priority. Growers are seeking to better understand which components are key to managing the system and what some of the potential trade-offs might be around transitioning to

a strip and disc system in local soils which include large areas of alkaline and sandy soils. It was hypothesised that the use of strip and disc systems (which reduce evaporation), may contribute to significant yield improvements in years with summer and early autumn rain.

Growers believed there were opportunities for strip and disc systems to minimise soil disturbance, conserve more soil moisture, improve logistics (particularly speed of operations), and potentially improve yields. However, some of the challenges such as the impact of high stubble on summer spray efficacy, an improved pest habitat for snails, mice, and weeds, extra investment into machinery, differing herbicide options for discs with differing amounts of soil throw and integration of livestock, needed further investigation.

Soil type

Red loam flats with undulating sandhills

Plot size

12 m x 230 m long x 3 replicates of stubble treatment to be sown with disc system

How was it done?

Replicated broadacre stubble management treatments were implemented using growers' harvester fronts in November 2023 at Cleve (Bammann) and Minnipa (Scholz). The Cleve soil type is a red loam. The Minnipa site was implemented over two soil types, a red loam flat and a sandhill to capture differences in soil moisture on the different soil types.

The Cleve stubble treatments were implemented on 17 November. The stubble heights at Cleve were stripper stubble at 55 cm high, draper medium stubble at 25 cm high, and draper low stubble at 15 cm high. The entire site was harvested first using the stripper front, and then conventional stubble treatments were created by a second pass with a draper front, so grain losses were only estimated in the stripper stubble.

The Minnipa stubble treatments were implemented on 21 November. Grain harvest losses were captured the same day using trays placed on the ground in front of the different harvester systems. Stubble heights at Minnipa were stripper stubble at 70 cm high, draper medium stubble at 38 cm high, and draper low stubble at 23 cm high.

Rainfall, humidity, wind speed and soil moisture are being measured at both sites. Sentek Drill & Drop Bluetooth soil moisture probes have been placed within the stubble systems to measure at 10 cm intervals to 30 cm soil depth. Gravimetric soil moisture (0-120 cm) has also been manually measured at both sites and this will be periodically taken, along with soil fertility.

A smaller replicated trial to assess the impact of stubble on summer spray efficacy was also implemented across the three stubble systems at both sites. These trials will allow us to measure the effect of weed management on soil water losses over summer. Herbicides were applied at 80 or

120 L/ha output rates, either early in the morning with a lower delta T or at mid-day with a higher delta T.

The herbicide mix used at Cleve was Glyphosate 1.2 L/ha, Garlon 80 mL/ha, Hammer 80 mL/ha, SOA 1 kg/100 L and LI700 400 mL/ha, applied on 20 December, 2023. The herbicide mix at Minnipa was Glyphosate 1.5 L/ha, Garlon 120 mL/ha, SOA 1 kg/100 L, LI700 1 L/ha and Genwet 1 L/100 L which was applied on 5 January 2024. Spray cards were used to capture herbicide coverage (% spray card coverage) in the different stubble systems. The main weeds are volunteer cereals from the previous crop and heliotrope.

What happened?

At this early stage of the research trials only the average % spray coverage data has been presented (Table 1 & 2). At both the Cleve and Minnipa sites an increase in water rate from 80 L/ha to 120 L/ha increased the % spray coverage (Table 1 & 2). The lower stubble had higher spray coverage than the higher stubble.

Table 1. Average % Spray coverage at Cleve with different stubble heights, water rate and Delta T measured on 17 November 2023.

Water rate (L/ha)	Delta T (measured)	Low stubble spray coverage (%)	Medium stubble spray coverage (%)	High stubble spray coverage (%)	Average Spray coverage (%) with different water rates and Delta T
80	Low (3.3)	17.6	18.3	17.1	17.7
120	Low (4.4)	32.4	23.2	23.3	26.3
80	Higher (5.6)	16.2	15.2	12.1	14.5
120	Higher (5.7)	23.8	22.2	22.3	22.8
Average Spray coverage (%) with different Stubble treatments		22.5	19.7	18.7	

Table 2. Average % Spray coverage at Minnipa with different stubble heights, water rate and Delta T measured on 5 January 2024.

Water rate (L/ha)	Delta T (measured)	Low stubble spray coverage (%)	Medium stubble spray coverage (%)	High stubble spray coverage (%)	Average Spray coverage (%) with different water rates and Delta T
80	Low (3.4)	28.0	21.9	16.6	22.2
120	Low (4.5)	36.4	30.4	20.5	29.1
80	Higher (11)	16.6	20.5	9.9	15.7
120	Higher (12)	25.8	22.4	15.1	21.1
Average Spray coverage (%) with different Stubble treatments		26.7	23.8	15.5	

What does this mean?

Further data will be collected over summer in 2024 to determine the impact of stubble management, weed management, pests and environmental conditions on soil water at seeding within these systems. All treatments at both sites will be sown with disc seeding systems in 2024. This research will be continued in 2024 and 2025 to

enable replicated broadacre side-by-side comparisons of different stubble management, summer weed control and the impact on soil water in upper Eyre Peninsula farming systems.

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Elijah Luo spraying with the handboom.



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