

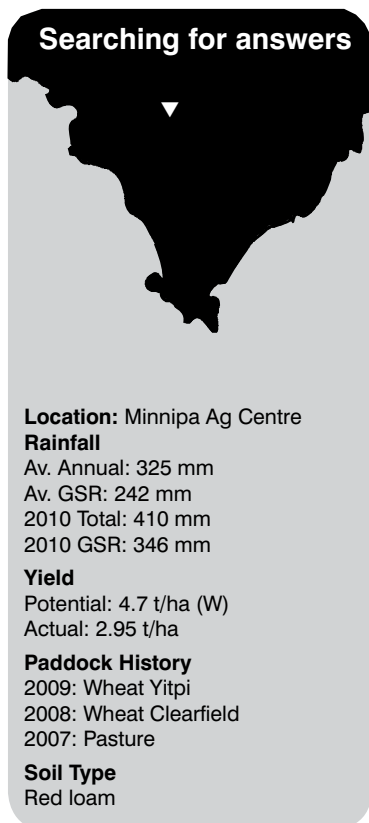
# Stubble Management Demonstration

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DEMO

## Searching for answers



## Key messages

- Different methods of stubble handling had little impact on yield.
- Early soil testing allowed good decision making for crop nutrition and budgeting.
- Soil biota were more active in the in-row root zone, as opposed to the mid row zone.

## Why do the demo?

Following a Farm Management meeting at Minnipa Agricultural Centre (MAC), it was decided that a demonstration paddock on stubble management would be implemented due to many farmers across upper EP facing large stubble loads for the 2010 growing season. The impact of different stubble management techniques on soil biota activity and nutrition demands would be monitored using the same fertiliser applications in crop and by comparing yields. In subsequent years the effect of different treatments will be monitored.

## How was it done?

The South 4 (S4) paddock was chosen for the demonstration site as in 2009 it grew a 3.4 t/ha crop of Yitpi wheat with standing stubble left about 50 cm high. Treatments included; using a stone roller, slashing, off-set discing, burning and inter-row sowing into standing stubble. These practices were expected to be used by farmers in 2010 due to the previous season's high stubble loads and high mice activity. The demonstrations were approximately 4 ha each, with 4 ha of standing stubble left as a comparison between each demonstration.

An expected high demand for nitrogen from stubble incorporation, and mining of nutrition from last season's 3.4 t/ha crop made a pre-seeding deep N soil test an essential decision support tool. The soil N results (Table 2) lead to the application of 40 kg/ha of 18:20 and 40 kg/ha of urea applied at time of sowing across all treatments.

Stubble management treatments were applied during the period 10-15 March when soil was dry and conditions hot. Soil samples from between the crop rows were tested for nitrogen and soil biota on 2 November with the wheat crop at dough stage.

Wyalkatchem wheat was sown on 3 June at 65 kg/ha with 40 kg/ha 18:20 and 40 kg/ha of urea below the seed. A knockdown of 800 ml GlyphosateCT®, 300 ml Ester 680, 100 ml Striker® and 125 ml Li 700® per ha was used, no other weed control was required.

## What happened?

Comments on the success of stubble management operations:

- Roller didn't smash up stubble as much as we thought. Maybe it wasn't hot enough on the day and the roller could have been a bit heavier.
- A good burn resulted in total removal of all stubble (and a couple of scorched trees on the fenceline).
- Off set disc did not incorporate all stubble.

Surface stubble biomass was measured after treatments (Table 1).

Table 1 Surface stubble biomass, 16 March 2010

Treatment	Biomass (t/ha)
Standing Stubble	3.6
Offset	2.7
Slashed	2.7
Rolled	2.3
Burned	0.0

**Table 2 S4 paddock soil test results**

Soil depth (cm)	Ammonium N (mg/kg)	Nitrate N (mg/kg)	Organic Carbon (%)	Colwell P Phosphorus (mg/kg)	Conductivity (dS/m)	Boron (mg/kg)	pH (CaCl <sub>2</sub> )
0 - 10	2	10	1.1	28	0.171	1.9	7.7
10 - 60	1	10	0.6	6	0.534	12.1	8.0

**Table 3 Crop establishment, 29 July, 2010**

Treatment	Plants/m <sup>2</sup> GS 22
Offset	83
Slashed	88
Rolled	86
Burned	79
*Standing average	99

\* Standing stubble next to burnt area 42 plants/m<sup>2</sup>

**Table 4 Soil and microbial N and microbial C levels (0-10 cm) in response to burning stubble and following subsequent growing season (0-10 cm)**

	Sample date	Nitrate (mg/kg)	Ammonium (mg/kg)	Microbial N (ugN/g)	Microbial C (ugC/g)
Before burning	4 March	13.66	1.39	8.50	46.95
After burning	12 April	11.17	1.67	9.80	54.63
At senescence	2 November	4.61	0.51	79.01	436.66

The soil test results (Table 2) indicate good phosphorus, nitrogen and organic carbon levels. The available nitrogen in 10-60 cm is limited by increasing boron levels. High stubble loading may require the application of extra nitrogen.

The wheat crop looked healthy and had a low weed count, except for some mouse damage at establishment, especially in standing stubble next to burnt

section (Table 3).

Soil microbial N and C levels showed no decline in response to burning stubble with a subsequent increase over the growing season (Table 4). Nitrogen levels declined over growing season.

Soil samples were tested for nitrogen and soil biota on 2 November with the wheat crop at dough stage. Samples were taken in close proximity to the plant

rows plus a comparison made between near-row in-row and mid-row samples (Table 5). There were high levels of soil microbial activity measured and also some mineral N still available. Microbial activity was similar across all treatments although there was an increase in in-row microbial N and C compared to mid-row. There were some trend differences in nitrate and ammonia component (rolled stubble had less nitrate, more ammonia than alternatives).

**Table 5 Soil N and biota tests at crop maturity, 2 November 2010**

ID #	Sample Name	Nitrate (mg/kg)	Ammonia (mg/kg)	Microbial N (ugN/g dry soil)	Microbial C (ugN/g dry soil)
1	Rolled	3.7	1.3	65.3	361
2a	Standing	5.2	0.7	-	-
2b	Standing	5.5	0.1	-	-
3	Slashed	4.9	0.5	68.1	376
4	Standing	4.4	0.6	68.3	377
5	Disced	5.0	0.3	74.0	409
6	Standing	4.0	0.4	78.9	436
7	Burnt	4.6	0.5	79.0	437
10	Standing ave	4.6	0.6	61.2	338
<b>Comparison between near row, in row and mid row samples in standing stubble treatment</b>					
2	Standing near-row	5.5	0.7	61.2	338
8	Standing in-row	4.2	0.4	72.9	403
9	Standing mid-row	2.9	0.5	57.6	318

**Table 6 Harvest results S4 stubble demonstration**

Treatment	Yield (t/ha)	Protein (%)	Screenings (%)
Rolled	3.0	9.7	0.7
*Standing	2.8	9.9	2.0
Slashed	2.5	9.4	1.6
Off-set	2.7	9.8	1.5
Burnt	2.9	9.4	0.7

*\*average of 3 plots*

Grain yields (Table 6) did not vary greatly between stubble handling approaches except the slashing may have had less yield. Seeding into standing stubble resulted in a higher screening percentage. Rolled and burnt operations had low screenings, burning and slashing protein figures were lower than the other 3 treatments. Standing stubble next to the burnt ground recovered from low plant numbers due to mice damage to record a comparable yield.

### What does this mean?

The fertiliser recommendation provided adequate nutrition for the 3 t/ha crop despite the wheat

on wheat rotation. In-season response of adding additional nitrogen was not taken to boost protein in a decile 7-8 season.

Providing adequate nutrition up front saw little impact on yields with different stubble treatments. This was a different result in many paddocks across upper Eyre Peninsula where different stubble treatment practices produced a great variation in yields. Burning in many cases was used as a last option to get through stubbles and expose mice and gave the best result only if adequate N was included. Soil testing gave a guide on crop inputs that matched future crop requirements.

Monitoring next season will be of interest to see if there are any long term effects of the different treatments in nutritional requirements and yield.

### Acknowledgements

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