

# Impact of retaining stubble - Minnipa Ag Centre S7

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## Key messages

- There was a 0.17 t/ha yield advantage in the 2014 season due to removing or cultivating the previous season's stubble, possibly due to extra nitrogen being available to the crop during the growing season
- There was a 0.08 t/ha yield advantage at MAC this season by inter row cropping rather than placing the seed on row.
- There were no differences in either barley or ryegrass numbers at the start of the cropping season or in crop.

## Why do the trial?

The project 'Maintaining profitable farming systems with retained stubble - upper Eyre Peninsula' aims to produce sustainable management guidelines to control pests, weeds and diseases while retaining stubble to maintain or improve soil health, and reduce exposure to wind erosion. The major outcome to be achieved is increased knowledge and skills allowing farmers and advisers to improve farm profitability while retaining stubble in farming systems on upper Eyre Peninsula (EP).

The MAC S7 stubble retention trial was established to maintain or improve crop production through applying alternative weed, disease and pest control options in pasture wheat rotations in the presence of crop residues. The trial was established in 2013 with different stubble treatments imposed at harvest and was sown either inter row or in row with wheat in 2014.

## How was it done?

The replicated trial was established in S7 within a district practice non grazed zone on 14 May 2013 with Mace wheat @ 60 kg/ha and base fertiliser of DAP @ 60 kg/ha. Pre sowing chemical applications were sprayseed @ 1.6 L/ha, trifluralin @ 1.5 L/ha and a wetter. The trial was harvested on October 30 with a 2 t/ha yield with stubble treatments imposed to the plots; (i) Stubble removed (mowed to ground), (ii) Stubble reapt low (iii) Stubble reapt high/standing (district practice) or (iv) Stubble reapt high then cultivated with offset disc on 4<sup>th</sup> April 2014.

In 2014 the trial was sown either (i) Inter row or (ii) On row on 6 May with CL Grenade wheat @ 60 kg/ha and base fertiliser of DAP@ 60 kg/ha. The treatments were replicated 3 times. Pre seeding chemical applications were sprayseed @ 1.5 L/ha, trifluralin @ 1.5 L/ha and 80 ml/ha Nail. On 25 June Intervix was applied at 700 ml/ha with 500 ml/ha Supercharge for grass control.

The measurements taken during the season were stubble load, soil moisture, emergence count, grass weed counts (at establishment, in crop and at harvest), snail numbers at harvest, grain yield and grain quality.

## What happened?

There were no differences in the stubble load measured before seeding in 2014, although the low cut treatment had slightly higher soil moisture at seeding in the 40-80 cm depth of the profile.

Numbers for ryegrass or barley grass were the same for all stubble architecture and seeding positions. There were greater numbers of ryegrass at the start of the season; however barley grass numbers were higher during the cropping season, due to the later germinating genotype at MAC.

There was a 0.17 t/ha yield advantage in the 2014 season due to removing or cultivating the previous season's stubble, Table 3. Given the rainfall and the seasonal conditions this may have been due to extra nitrogen being available to the crop in those treatments during the growing season. Since 5.8 kg nitrogen is required per ton of stubble to break it down, for approximately 3.5 t/ha wheat stubble approximately 20 kg N is required, or may have been tied up due to the stubble being present in the retained stubble treatments.

There was a 0.08 t/ha yield advantage at MAC last season by inter row cropping rather than placing the seed on row. This may have also been due to nutrition, possibly nitrogen.

In 2014 there were no differences in snail numbers at harvest (average 1.7 m<sup>2</sup>) within the trial area with different stubble treatments at sowing (data not shown).

**Table 1 2014 trial measurements on 2013 stubble treatments**

2013 Stubble treatment	Stubble load (t/ha)	Initial Vol. soil moisture (ml water /cm <sup>3</sup> )
Stubble standing high	3.37	70
Stubble standing low	3.80	76
Stubble cultivated	3.35	-
Stubble removed	-	73
LSD (P=0.05)	ns	ns

**Table 2 2014 grass weed numbers in stubble treatments imposed in 2013**

2013 Stubble treatment	Initial		In Crop	
	Rye grass plants/m <sup>2</sup>	Barley grass plants/m <sup>2</sup>	Rye grass plants/m <sup>2</sup>	Barley grass plants/m <sup>2</sup>
Stubble standing high inter row	9.7	6.1	4.3	8.5
Stubble standing high in row	9.5	3.5	5.1	10
Stubble standing low inter row	10	4.4	4.5	6.6
Stubble standing low in row	12.2	5.7	6.1	9.4
Stubble cultivated inter row	11.8	5.1	5.3	8.5
Stubble cultivated in row	8.0	4.0	4.8	8.8
Stubble removed inter row	5.3	1.8	3.4	7.3
Stubble removed in row	10.3	5.0	8.3	7.5
LSD (P=0.05)	ns	ns	ns	ns

**Table 3 2014 grain yield and quality as affected by stubble management in 2013**

2013 Stubble treatment	Plant count	Yield (t/ha)	Protein (%)	Test weight (kg/hL)	1000 Grain weight (g)	Screenings (%)	Vol. soil moisture at harvest (ml water /cm <sup>3</sup> )
Stubble standing high	91	2.40	10.1	84.7	43.3	3.0	72.2
Stubble standing low	102	2.45	10.1	84.8	43.6	2.5	70.3
Stubble cultivated	94	2.58	10.1	84.8	42.6	3.6	71.1
Stubble removed	94	2.62	10.0	84.9	42.6	3.8	72.5
LSD (P=0.05)	ns	0.08	ns	ns	ns	0.6	ns
Inter row	98	2.55	10.1	85.0	42.7	3.2	72.2
In row	92	2.47	10.1	84.6	43.4	3.2	70.9
LSD (P=0.05)	ns	0.06	ns	ns	ns	ns	ns

### **What does this mean?**

There were no significant differences in the stubble loads or soil moisture at the start of the 2014 growing season. There was a 0.17 t/ha yield advantage in the 2014 season due to removing or cultivating the previous season's stubble, and a 0.08 t/ha yield advantage by inter row cropping rather than placing the seed on row. These increases in yield may be due to nitrogen being available to the crop during the growing season rather than being tied up by the previous crop stubble.

The last few seasons have resulted higher than average stubble loads in current farming systems. The results indicate a second year wheat crop may incur a small yield loss if stubble is intact but inter row sowing may reduce this. In the 2015 season the addition of extra nitrogen at seeding may be included in this trial to determine if this is a nitrogen response.

In this paddock there was a greater number of barley grass weeds germinated in crop compared to ryegrass, but there were no differences in either barley or ryegrass numbers at the start of the cropping season or in crop depending on stubble management. This paddock has some snails present (average 6 snails/m<sup>2</sup> across paddock), but there were no differences this season in snail numbers within the trial area as a result of different stubble treatments.

### **Acknowledgements**

Thanks to Roy Latta for establishing this trial in 2013.

### **Location: S7 Minnipa Agricultural Centre**

#### **Rainfall**

Av. Annual: 325 mm

Av. GSR: 241 mm

2014 Total: 407 mm

2014 GSR: 290 mm

#### **Yield**

Potential: 4.0 t/ha (W)

Actual: 2.5 t/ha

#### **Paddock History**

2014: Mace wheat

2013: Mace wheat

2012: Medic pasture

#### **Soil Type**

Red loam

#### **Plot Size**

34 m x 2 m x 3 reps

