

Seeding into stubble

Trial 2: the effect of stubble height on lentil growth

Sarah Noack and Peter Hooper, Hart Field-Site Group

Key findings

- There were no significant differences in lentil grain yield among stubble treatments.
- As seen in 2013, stripper and conventional stubble treatments resulted in taller and more erect lentil plants.

Why do the trial?

Refer to 'why do the trial' in the previous article.

How was it done?

Plot size	21.3 m x 50.0 m	Fertiliser	N:P:S (13:19:7) + 1% Zn @ 100 kg/ha
Seeding date	22 nd May 2014	Crop	Jumbo lentils @ 55 kg/ha
Location	Pinery		

The trial was established as a randomised complete block design with three replicates and five barley stubble treatments. The stubble treatments included

1. **Baled** – stubble cut with stripper front, slashed and removed.
2. **Slashed** – stubble cut with stripper front, slashed and spread across the plot.
3. **Short** – stubble retained cut to height of 15 cm.
4. **Medium** – stubble retained and cut to height of 30 cm.
5. **Stripper front** – stubble retained and cut using stripper front.

The barley paddock was harvested using a stripper front in late November 2013. The baled, short and medium treatments were cut on 10th of February.

Plant establishment was assessed by counting 4 x 1 m sections of row across each plot. All plots were assessed for plant height both early in the season and maturity and pod height from soil surface at maturity.

Soil surface temperature was logged using individual tiny tag loggers in each stubble treatment. Soil moisture was assessed using a Sentek Diviner 2000 moisture probe and access tubes cored up to 100 cm prior to seeding. Gravimetric water content was also assessed at the time of access tube installation.

Crop establishment plant growth

There was no significant difference in crop establishment (plants per square metre) among stubble treatments for lentils in this trial (Table 1). Plant and pod height was highest for the medium and stripper front stubble treatments (Table 1). This was followed by the short and baled/slashed stubble treatments. Plant height was assessed both early and later in the season as previous work (Lines et al. 2012 unpublished) has shown there are differences in plant growth among lentil varieties. In particular, Jumbo was shown to be least effected by stubble treatment. Results presented here and seen for Blitz lentils in 2013 have shown they were both effected by stubble height.

The shorter plant height for the baled and short stubble treatments may be attributed to the lack of stubble to support the growth of lentil plants. Evidence for this was also the higher lodging score for these treatments (Table 1). The medium stubble height had a slightly better lodging score compared to the stripper front treatment. This can be attributed to the fact that by the end of the season majority of the stripper front barley straw was no longer standing (fallen flat on the soil surface) and plants were showing signs of lodging. Similar observations were seen in 2013 for Blitz lentils at Hart however, at the end of the season the wheat stubble was still standing in all plots and had not fallen on the soil surface. Overall the stripper and medium stubble treatments resulted in taller and more erect plants with higher pods improving harvestability.

Table 1. Summary of crop measurements establishment (plants per sq metre), plant and pod height (cm), lodging and grain yield (t/ha).

Stubble	Establishment plants/m ²	Early plant height cm	Late plant height cm	Pod height cm	Lodging*	Grain yield t/ha
Slashed	74	5.5c	22.7c	13.3	3-4	1.83
Baled	76	4.9c	22.1c	12.3	3-4	1.71
Short	71	5.8c	25.1bc	13.8	4-5	1.79
Medium	76	7.8b	28.6a	14.7	8-9	1.79
Stripper	76	9.6a	28.1ab	15.7	6-7	1.77
LSD (P≤0.05)	ns	1.4	3.0	ns		ns

*Crop lodging scored as 9 equals erect to 1 completely flat on the ground

Grain yield

There were no differences in lentil yield between stubble treatments. Grain yield ranged from 1.71 – 1.83 t/ha with baled stubble having lowest yield and slashed stubble having the highest yield. These results are in agreement with the Hart trial 2013 which found no difference in Blitz lentil yield for any stubble height.

Soil surface temperature and soil moisture

Prior to seeding the soil moisture underneath the stubble treatments varied by 1-3% across all soil depths. In the top 0-20 cm layer soil moisture increased with stubble height (Table 2). However, this trend was not consistent across all soil depths. The volumetric soil moisture contents also reflect small, inconsistent shifts in soil moisture (Figure 1). As outlined in the article above the amount of summer rainfall and early season growing rainfall may have contributed to the lack differences between stubble treatments observed in 2014.

Table 2. Gravimetric soil water content (%) sampled prior to seeding on 16th of April.

Soil depth cm	Baled	Short	Medium	Stripper
	% soil moisture			
0-20	15.8	15.5	16.4	17.5
20-40	16.8	16.2	15.0	15.7
40-60	17.1	13.9	14.1	15.3
60-80	14.0	14.7	14.0	14.3

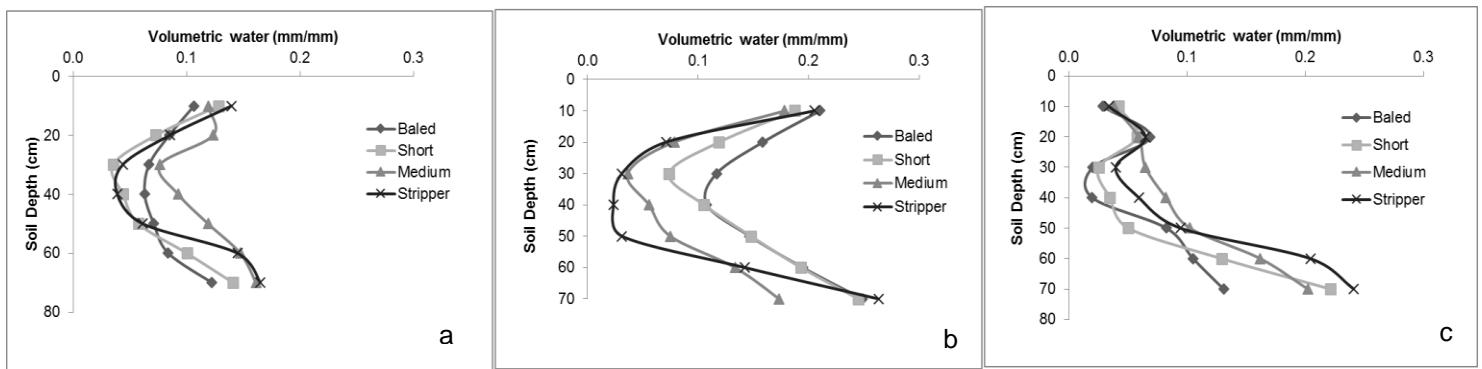


Figure 1. Soil volumetric water content (mm/mm) under the different stubble treatments samples at (a) 25th April (b) 22nd May and (c) 23rd October.

The average maximum daily temperature (Figure 2a) from start of season until end of August was 21.1°C (baled), 23.3°C (medium) and 25.6°C (stripper front). Similarly the stripper front stubble had the highest minimum temperature compared to the medium and baled treatments (Figure 2b). At the end of August there was a re-ordering in soil surface temperature for all stubble treatments. The baled treatment had the highest surface temperature followed by medium and stripper front. This could be attributed to the lentils in the baled treatment becoming lodged and trapping more heat.

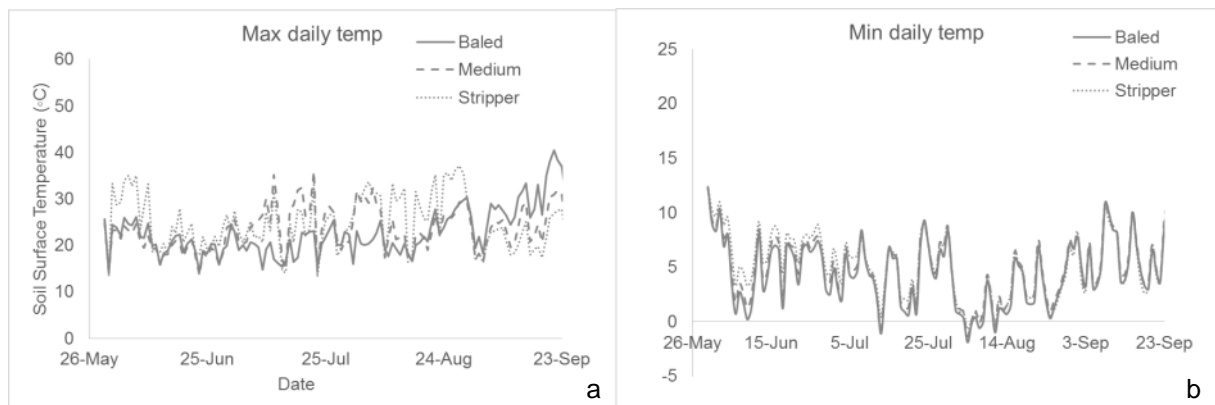


Figure 2. Maximum (a) and minimum (b) daily temperature at the soil surface for all stubble treatments.

Acknowledgements

The HFSG thank the South Australians Grains Industry Trust (H0113) and Caring For Our County (CLG-1206319-906) for providing funding to support this research. We also thank the grower who assisted with trial seeding, spraying, harvesting and providing land for the lentil trial.