



## 2017 Seasonal effects of strategic stubble treatments on Canola in CW NSW

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GRDC project CWF00018 – Maintaining profitable farming systems with retained stubble in Central West, NSW

### Background

CWFS conducted trials across the central western district that:

- investigated the impact that different stubble treatments (burning, cultivation, harrowed or standing stubble) imposed just prior to sowing have on the growth and yield of winter crops, measured using large plots
- evaluate any grower management practices that result in yield responses

2017 was another challenging year with below average rainfall and a record number of frosts that negatively impacted winter crop production, especially canola, in the central west. A CWFS National Paddock Survey site approx. 20km away from the Tottenham Stubble trial site recorded 32 days in total when the temperature dropped below 0 °C. The minimum temperature at that location was -5.5 °C, which occurred on 1/7/17 and 29/8/17. Despite these challenges, yields across the district were reported as 'better than expected', which was attributed to good stored soil moisture from the decile 9 year in 2016.

### Trial design

Four stubble treatments were investigated; standing, burnt, harrowed and cultivated. Cultivation treatments were imposed with offset discs and harrowed treatments with an up-turned set of harrows. Each treatment was replicated four times and randomised in a Latin Square design (Figure 1). The stubble treatment plots were 40 m x 40 m.

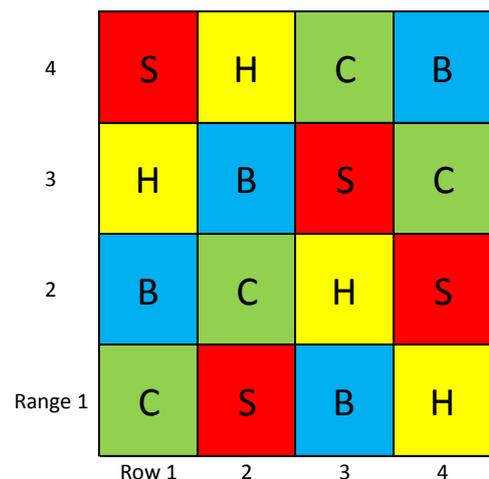


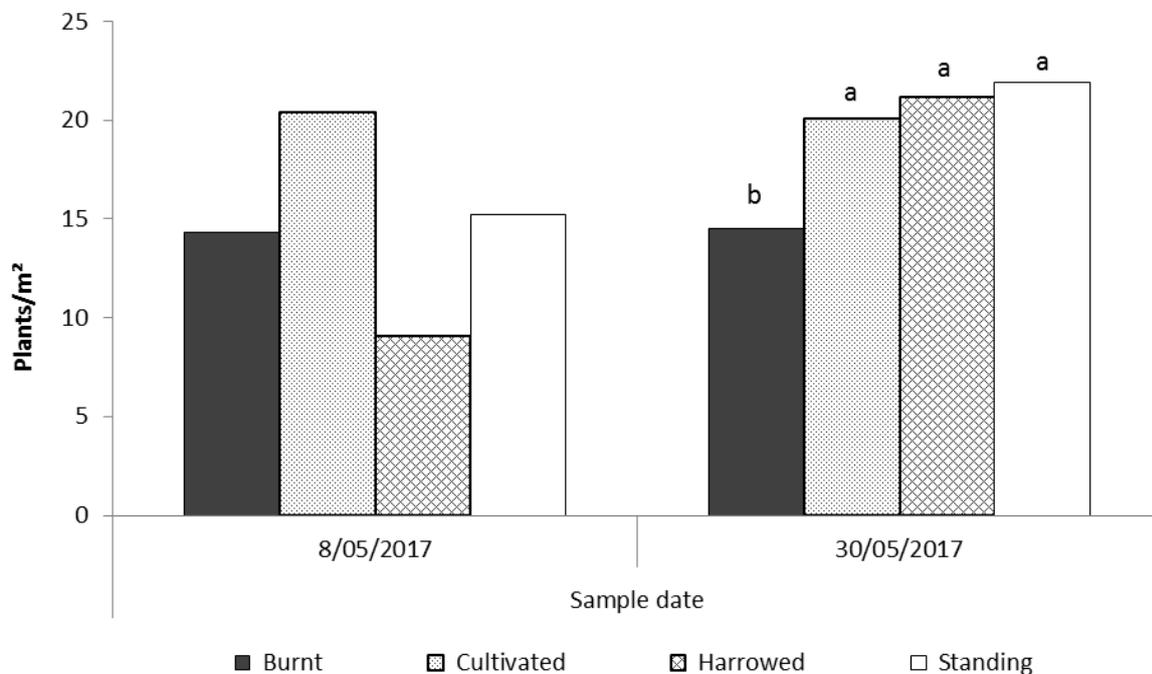
Figure 1: 2017 commercial stubble trial plan. C - cultivated stubble, S - standing stubble, B - burnt stubble, H - harrowed stubble.

## Results

When the first emergence counts were undertaken on 8<sup>th</sup> May (11 days post sowing) the crop was between cotyledons and emergence of first true leaf (1.00-1.01 decimal growth score; Edwards & Hertel 2011). The stubble treatments were not significantly different at this time ( $p = 0.052$ , Figure 2). When the second emergence counts were undertaken thirty three days post sowing, cultivated, harrowed and standing stubble had 50% higher plant populations than the burnt stubble treatment ( $p < 0.05$ , Figure 2).

### Site details

Co-operator; Stacy and John Jarvis  
 Paddock History; 2016 wheat  
 Soil Type; red sandy loam  
 Treatments; cultivate and harrow 3/4/17, burn 11/4/17  
 Sowing; 27/4/17 2.58 kg/ha Crusher canola  
 Fertiliser; 40 kg/ha urea, 60 kg/ha MAP  
 Stubble; 3.9 t/ha, over 60% standing  
 Soil test; 0-10 cm 11 kg N/ha  
                   10-40 cm 30 kg N/ha  
 Colwell P 0-10 cm 8.8 mg P/kg  
 Soil pH<sub>Ca</sub>: 5.1 0-10 cm  
 PreDicta B tests: low-med risk levels Take-all, crown rot and low risk levels of RLN  
 Harvested by CWFS; 3/11/17  
 GSR: 177 mm (sowing-harvest)



**Figure 2: Canola emergence, average plants per m<sup>2</sup>. Different letters indicate a significant difference ( $p < 0.05$ ).**

Biomass cuts were taken on 22<sup>nd</sup> August. The crop had seeds present in the lowest pods however the plants were still producing buds and flowering. Stubble treatments did not have a significant impact on crop biomass at this time ( $p > 0.05$ , Table 1).

Harvest hand cuts were undertaken by CWFS on 3<sup>rd</sup> November and the results can be seen below in Table 1. The harrowed stubble treatment produced 27% greater biomass at harvest than the standing stubble treatment. The Burnt stubble treatment yielded 45% more grain, 19% higher harvest index and 6% higher oil than the standing stubble treatment. The burnt stubble did produce 5% less protein compared to the standing stubble, however this could be due to a dilution effect.

**Table 1: Tottenham crop biomass (kg DM/ha) at flowering and harvest, yield (t/ha), harvest index, oil (%) and protein (%) under the different stubble treatments**

Stubble treatment	Flowering Biomass (kg DM/ha)	Harvest Biomass (kg DM/ha)	Yield (t/ha)	Harvest Index	Oil (%)	Protein (%)
Burnt	1838	3316 <sup>ab</sup>	0.83 <sup>a</sup>	0.25 <sup>a</sup>	42.9 <sup>a</sup>	24.8 <sup>b</sup>
Cultivated	2416	2918 <sup>b</sup>	0.66 <sup>bc</sup>	0.23 <sup>b</sup>	42.3 <sup>ab</sup>	25.3 <sup>b</sup>
Harrowed	3429	3490 <sup>a</sup>	0.77 <sup>ab</sup>	0.22 <sup>b</sup>	41.2 <sup>bc</sup>	26.1 <sup>a</sup>
Standing	3086	2737 <sup>c</sup>	0.57 <sup>c</sup>	0.21 <sup>b</sup>	40.5 <sup>c</sup>	26.2 <sup>a</sup>
<i>Lsd</i>	<i>ns</i>	518.4	0.14	0.02	1.29	0.54

(Values followed by the same letter within each column are not significantly different (P<0.05))

## Discussion

Due to the dry season the crop establishment was staggered and resulted in very uneven crop growth. Crop growth and development was slower than usual, with the low rainfall and record frosts reducing district yields.

Whilst some stubble treatments did perform significantly better than others during the season, there was no consistency of stubble treatment performance throughout the season.

A collaborating paper comparing other Stubble Project trials recommends if stubble is going to negatively impact weed control and timeliness of sowing then taking steps to reduce stubble loads can be justified (Swan et al 2017). Poor weed control during fallow reduces stored soil moisture and nitrogen, both of which are very important in low rainfall farming. Stubble retention does benefit soil structure, prevents erosion and can increase soil organic matter, all of which are important to nutrient cycling and soil health. There is no single solution that will work in every paddock, every year for every crop. The major outcome for this project is to provide growers with options to allow them to make the best decisions on how to manage their stubbles.



**Figure 3: Canola emerging in a standing stubble treatment plot**

## Acknowledgments

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## References

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