

Canola on Incorporated Stubble

Work by Clive Kirkby, a CSIRO scientist, suggests that to improve our soil carbon levels, stubbles have to be incorporated and rapidly broken down by soil microbes rather than slowly decomposing on the soil surface. However if incorporated stubble does not break down before sowing, there can be an issue with trash flow and/or N tie-up due the microbes trying to break down the stubble as the crop establishes.

Fortunately we have irrigation to provide the necessary moisture for the microbes to breakdown the stubbles, but stubble breakdown also requires enough nutrients for the microbes, in particular N, P and S.

A demonstration was conducted in 2014 to look at the effect of stubble incorporation and the timing of fertiliser application on the speed of stubble breakdown. Clive's rule of thumb is for every tonne of stubble, there needs to be 5 kg N and 3 kg P. In 2014 there was about 7 t/ha of stubble and trash so we applied 35 kg N/ha and 18 kg P/ha. This may have been enough to breakdown the stubble but the emerging canola crop soon ran into N deficiency. So the trial was repeated in 2015 using higher rates of N.

This demonstration was established on a 6 t/ha barley crop stubble, which means there is approximately 8 t/ha of straw and trash. The site was multi-disked to incorporate the stubble. Prior to pre-irrigation in late March, the following treatments were applied:

1. Control – no added fertiliser
2. 35 kg N/ha + 20 kg P/ha
3. 70 kg N/ha + 20 kg P/ha
4. 35 kg N/ha + 20 kg P/ha + 35 kg N/ha shortly after sowing.

Canola was sown at 3.5 kg/ha with 120 kg DAP/ha on April 24th and watered up. The incorporated stubble provided no issue with trash flow at sowing. Establishment was similar across all treatment, averaging 45 plants/m².

N deficiency became readily apparent in the 0 control post sowing, noticeably being a decrease in plant size and a reduction in the vigour of the plants. The difference between the "35N" and the other two treatments was not noticeable.

Another observation from the 0 control was the poorer vigour allowed more ryegrass to compete with the crop.

The trial was top-dressed twice with a total of 100 kg N/ha in addition to any other N treatments.

Dry matter cuts were taken prior to windrowing on November 2nd. The trial was harvested on November 17th.

Treatment	Yield (t/ha)	DM (t/ha)
0 Control	1.55	8.28
35N+20P	2.37	9.20
35+35N+20P	2.69	10.00
70N+20P	2.22	10.67
p	0.076	0.024
lsd	NS	1164
cv%	11.8	3.8

Statistical analysis shows a large amount of variation in the yield data, and therefore the yield differences are not significant. However the dry matter cuts are significant – we grew more crop with the addition of more nitrogen.

Ultimately the aim of the stubble incorporation is to improve soil organic carbon levels. The work to date has focussed on incorporating stubble and testing methods that minimise the effect on the subsequent crop. Future work will now look at soil carbon and whether the incorporation and rapid decomposition has had any effect on increasing our OC levels.