4.2 The effect of stubble treatments on Canola establishment: Paddock size trial - Mininera, Vic

Location: Mininera Research Site

Funding:
Cultivations and establishment completed by Vaderstad Pty Ltd

Researchers:
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Background/Aim:
With more stubble to cope with this year, and increased interest in stubble retention or incorporation, it was agreed at the February Streatham Branch meeting to develop the Mininera site into a Canola establishment demo area. Split into 4 different stubble treatments the aim of this trial is to demonstrate the pros and cons of different stubble/ soil management and establishment treatments.

Summary of findings:
- Early stubble incorporation prior to sowing lead to better weed control in the crop as we were able to create an early germination of ryegrass
- There was considerable difference in soil moisture and its distribution through the profile at establishment
- Straw length at harvest was the biggest drawback in incorporating and establishment
- Previous trial cropping areas, on parts of the paddock, still showed up the biggest difference in the crop's establishment

Rainfall:

Avg. Annual:	540
Avg. G.S.R.:	401
2010 Total:	748
2010 G.S.R.:	506

Methods:
The four treatments were compared at the Mininera Site:
- Stubble burning – burnt a few weeks prior to sowing
- Vaderstad Top Down
- Carrier carried out on the 25th Feb
- Retained stubble.

Ideally the Carrier and TopDown should be carried out directly after harvest to maximise moisture infiltration, residue break down and weed control prior to the following crop.

The Carrier was developed in direct response to the reduction of stubble burning in Europe in the early 90's. Consisting of a double bank of mulching discs with a consolidating press, the aim is to keep the straw mulched into the aerobic 5-8cm topsoil. The TopDown combines the Carrier mulching discs and press with deep ripping tines working down to 25-30cm for improved drainage and structure.

Variety:
Jardee TT (Hybrid) and Lightning TT (OP)

Sowing rate: 2.5kg/ha

Sowing date: 3rd and 4th May 2010

Treatments:
4 stubble treatments running north/south, parallel to the road. Each plot width 60m:
- Burnt
- TopTown (discs and ripper tines -deep)
- Carrier (shallow)
- Stubble Retained.

3 establishment treatments running north/south:
- Top Down Bio drill (Broadcast)
- Seed Hawk tine seeders - 10' spacing
- Rapid disc seeders - 5' spacing

Each establishment technique had two varieties: Jardee and Lightning

Fertiliser:
- 03/05/2010: Map 80.0 Kg
- 03/09/2010: Urea 190.0 Kg

Fungicides:
07/07/2010: Prosaro 420 SC 0.30 L

Herbicides:
- 03/05/2010: Roundup P-Max 1.2 L, Triflur X 480 2.5L, Li 700 0.2 L
- 07/07/2010: Atrazine 900 Wg 2.0 kg, Select 240 0.4L, Hasten (1%) 0.8 L, Liase 0.8 L

Insecticides:
- 11/05/2010: Endosulfan 350 0.5 L
- 18/05/2010: Metarex 2.5 kg

Paddock History:
2008: Mixture of trial sites
2009: Bolac wheat

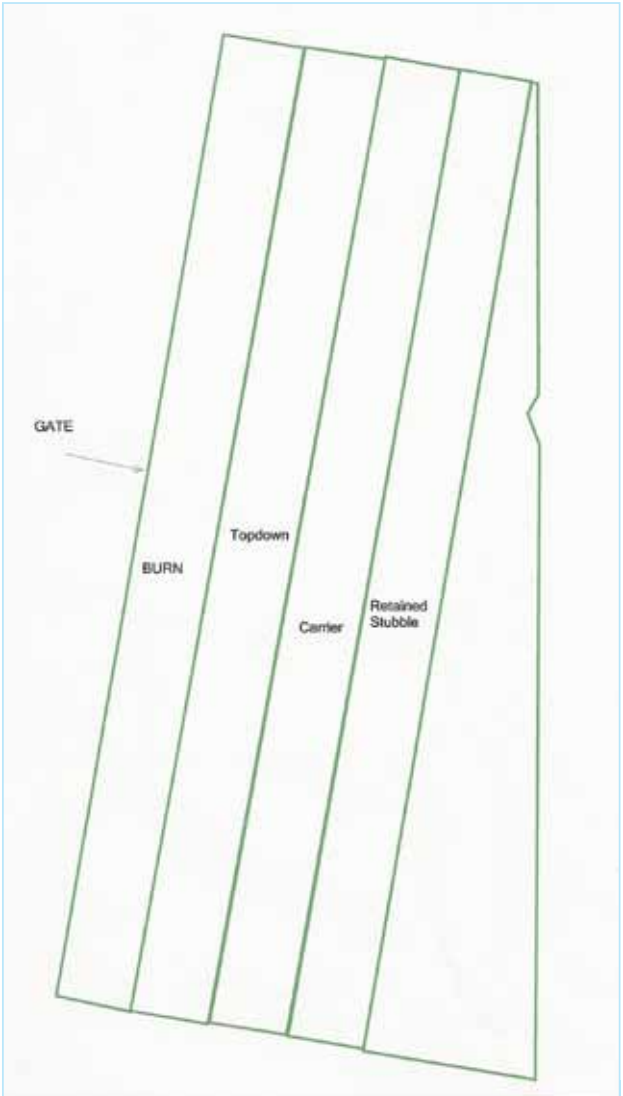
Image 1: The TopDown working on the 25th Feb 2010

Between the stubble incorporation on the 25th February and sowing on the 3/4th May the site received 102mm of rainfall. Looking at the soil profile on the day of sowing, the burnt and Carrier plots had plenty of moisture in the top 10cm of soil down to a historic pan in the paddock. The retained stubble was the driest plot, both visually evident and confirmed by weighing the same volumes of top soil from each plot. The Top down plot had even moisture spread down to a depth of 40cm.

TopDown treatment.

Stubble waiting to be burnt after one month

Good burn achieved.



Mininera Site Layout

Table 1: Rough measurements of soil moisture based on volume.

	Probe Depth Easily Reached	Volume Weight 11l	Comments
Stubble Burnt	25 Cm	16.8kg	Top 10cm, Very Damp Above The Pan
TopDown - To 30 Cm	40 Cm	15 Kg	Moisture Through The Profile
Carrier - 8 Cm	25 Cm	16.2 Kg	Top 10cm Damp Till The Pan
Retainer Stubble	25 Cm	12.9 Kg	Top 8 Cm Drier, Moisture At 10cm
	60%	30%	

Mininera Stubble Trial	
Treatment	Yield (t/ha)
Burnt	2.04
Disc + Ripper Tine	1.68
Disc	1.47
Stubble Retained	1.34

Each stubble treatment plot was overlaid with 3 sowing methods; the tine based Seed Hawk (10' spacing plus press wheels), the disc based Rapid (5' spacing) and David Jamieson's TopDown 600 equipped with a broadcasting Bio drill. The 3/4th May were both showery days and rain stopped us on both days for a few hours. Changing between systems did pose some challenges, with the straw length causing the biggest problems.

The moisture and warmth lead to good establishment; unfortunately the straw residue, some slug damage and water logging limited the potential of both varieties

Results and discussion:
The yield results show that the highest yield was achieved after burning, across all sowing methods and varieties. Burning removed the stubble residue which was left too long at harvest to effectively use sowing equipment without causing blockages. The poorest yields occurred in the retained stubble treatment with little difference between variety or the sowing method used.
The second highest yield came from the TopDown treatment, which is based on a disc and ripper tine followed by a consolidating roller. Within this treatment the broadcasting and the Rapid disc seeder gave the best establishment. The knifepoint and press wheel on the Seedhawk were not initially set up correctly when moving from the firm ground where the stubble was burnt into the disced and ripped ground. As a result this caused the seed to be sown deeper than optimum and this affected plant establishment, vigour and final yield.
In both the disced stubble and the fully retained stubble all sowing equipment struggled apart from the Rapid disc seeder. This problem was due to the stubble being left too long at harvest rather than being cut as short as possible and all the stubble residue and chaff being spread evenly over the cutterbar width.

Summary:
The main lessons learnt; a short stubble height is critical for good incorporation and this then aids sowing and plant establishment. The longer the time between incorporation and sowing the better for residue breakdown if there is both moisture and warm temperatures.