

Cropping Systems

Funded by Caring for Our Country and conducted in collaboration with farmers Michael Jaeschke, Justin Wundke and the South Australian No-Till Association.

Key findings

- There was no significant difference between sowing systems or level of nutrition on grain yield but higher grain yield at the higher nitrogen rate.
- Levels of brome grass were higher under the early sowing no-till plots and annual ryegrass was lower in the disc system.

Why do the trial?

To compare the performance of 3 seeding systems and 2 nutrition strategies. This is a rotation trial to assess the longer term effects of seeding systems and higher fertiliser input systems.

How was it done?

Plot size	35m x 13m		Fertiliser	DAP @ 60 kg/ha
			High nutrition	Urea @ 160 kg/ha 18 th August
Seeding date	Disc	5 th May	Medium nutrition	Urea @ 80 kg/ha 18 th August
	No-till	7 th May		
	Strategic	20 th May	Variety	Clearfield canola @ 3 kg/ha

This trial is a randomised complete block design with 3 replicates, each containing 3 tillage treatments and 2 nutrition treatments. The strategic and no-till treatments were sown using local farmers seeding equipment, Michael Jaeschke and Justin Wundke. The disc seeding treatments were sown by Greg Butler and Andrew Bird from the South Australian No Till Association.

Table 1. Previous crops in the long term cropping systems trial at Hart.

	2001	2002	2003	2004	2005	2006	2007	2008	2009
Canola		Janz Wheat	Yitpi Wheat	SloopSA Barley	Kaspa Peas	Kalka Durum	JNZ Wheat	JNZ Wheat	Flagship barley

Tillage treatments:

Disc – sown into standing stubble with a Bertini disc seeder, 275mm (11”) row spacing.

Strategic – worked up pre-seeding, sown with 100mm (4”) wide points at 175mm (7”) row spacing with finger harrows and then prickle chained.

No-till – sown into standing stubble in 1 pass with narrow points with 225mm (9”) row spacing and press wheels.

Nutrition treatments:

Medium – 80 kg/ha post emergent urea on 18th August

High – 80 kg/ha 4th August + 80 kg/ha 18th August post emergent urea

Soil nitrogen (0-60cm) was measured on 10th March in all plots.

For the plant counts, 4 x 1m sections of row were counted across each plot.

All plots were assessed for grain yield and oil content.

Results

Tillage and nutrition treatments significantly influenced the grain yield and quality of Clearfield canola at Hart in 2010.

Conditions at the time of sowing for the disc seeder were dry on the soil surface and so the crop emergence was significantly lower. The no-till seeder was able to mix moist soil into the seedbed and so achieved better emergence.

Grain yield was 0.4 t/ha or 25% greater for the high nutrition treatments where 83 kg/ha of extra nitrogen was applied and there was nearly 20 kg N/ha extra nitrogen in the soil in the 0 to 60cm profile. The increase in grain yield between the medium and high treatments was greater for the no-till and strategic treatments, compared to the disc.

Oil content was higher in the medium nutrition treatment and lower in the strategic tillage treatment, most probably due to the higher level of soil nitrogen.

Table 2. Grain yield (t/ha), oil content (%), crop emergence of Clearfield canola and available soil nitrogen (kg N/ha 0-60cm) for nutrition and tillage treatments at Hart in 2010.

Nutrition	Tillage	Grain yield (t/ha)	Oil (%)	Emergence (plants per sq m)	Available soil nitrogen (kg N/ha)
High	Disc	1.86	42.6	33	70
	No-till	2.04	42.3	52	39
	Strategic	1.94	41.5	65	107
Medium	Disc	1.64	43.4	34	44
	No-till	1.47	43.0	51	39
	Strategic	1.23	42.0	46	79
LSD (0.05)					
Tillage		ns	0.5	15	11
Nutrition		0.16	0.4	ns	9
Tillage * Nutrition		0.28	ns	ns	15

Soil available nitrogen to 60cm was measured in autumn and ranged between 39 kg N/ha (no-till) and 107 kg N/ha (strategic) between the tillage treatments. The strategic tillage treatment had significantly higher soil nitrogen. The high nutrition treatment has accumulated 18 kg N/ha more soil available nitrogen compared to the medium treatment to a depth of 60cm. These results are consistent with those measured previously.