BETTER CANOLA – CROP ARCHITECTURE AND SEED QUALITY 2007-2009 RESULTS

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Take home message

- Widening row spacing reduced established plants per area for a given seeding rate
- At a yield of 1.5 t/ha there was no yield difference between 19 and 42 plants/m^2 or between 18 and 30 cm row spacing in 2008
- At a yield of 0.44 t/ha the low plant population (28/m^2) yielded best in 2009
- In the Victorian Better Canola trial farmer-saved hybrid seed reduced crop uniformity (variable plant height), delayed maturity and increased blackleg infection

Background

In the medium rainfall zone of central and southern NSW there is increasing interest in manipulating row spacing and plant population (crop architecture) for canola. This is being driven by a number of factors including stubble retention and moisture conservation, the option of inter-row sowing, the desire to sow into high stubble loads and the shift from open-pollinated varieties to more vigorous hybrids. Low plant populations and/or wider row spacing are being considered as a strategy to reduce the risk of poor yields in dry seasons. Low plant population (low seeding rates) is also seen as a cost saving, especially with more expensive hybrid seed.

The Better Oilseeds project, funded by GRDC and AOF aimed to better understand the interactions between row spacing and plant population in open-pollinated and hybrids by conducting a replicated trial at Junee over three years 2007-2009. At the same site in 2009 a variety trial included a comparison of company produced seed with farmer-saved seed of a representative hybrid and open-pollinated variety. A more detailed study was undertaken in Victoria, also in 2009.

Aim of the crop architecture trial

- To evaluate the effect of row spacing (18, 22 and 30 cm) and target plant population (20, 40 and 60 plants/m^2) on yield and oil content of a representative Clearfield® and TT variety.

Two representative varieties of the appropriate maturity were used; Bravo TT and the Clearfield® hybrid 45Y77. Seeding rates were calculated based on seed weights, germination percentage, estimated establishment percentage, and target plant population.

Results

Establishment

Overall establishment was poorer in 2008 compared to 2007 (Table 1). Poorer seedbed moisture at the time of sowing is the likely reason. Expected establishment losses did not eventuate in 2009, resulting in plant populations higher than the targets. The trend of reduced establishment with wider row spacing was observed in every year (for a given seeding rate - Figure 1 and 2).

Table 1. Average establishment for three plant population targets and three row spacings at Junee in 2007, 2008 and 2009.

	Achieved plant population(/m^2)		
Target plant population(/m^2)	**2007**	**2008**	**2009**
20	21	19	28
40	38	31	53
60	52	42	75
Row spacing (cm)			
18	44	33	60
22	38	34	51
30	30	25	46

Figure 1. Effect of row spacing and target plant population on plant establishment and yield at Junee Better Canola site in 2008 (sown 5 May).

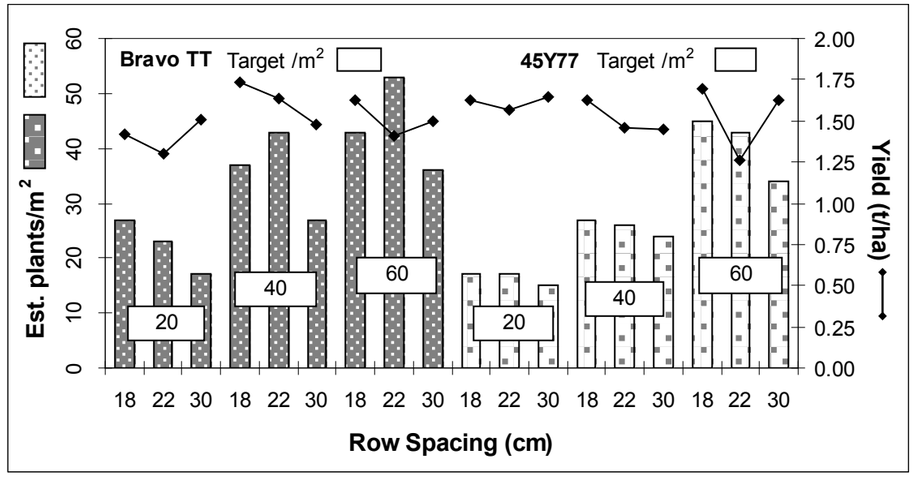
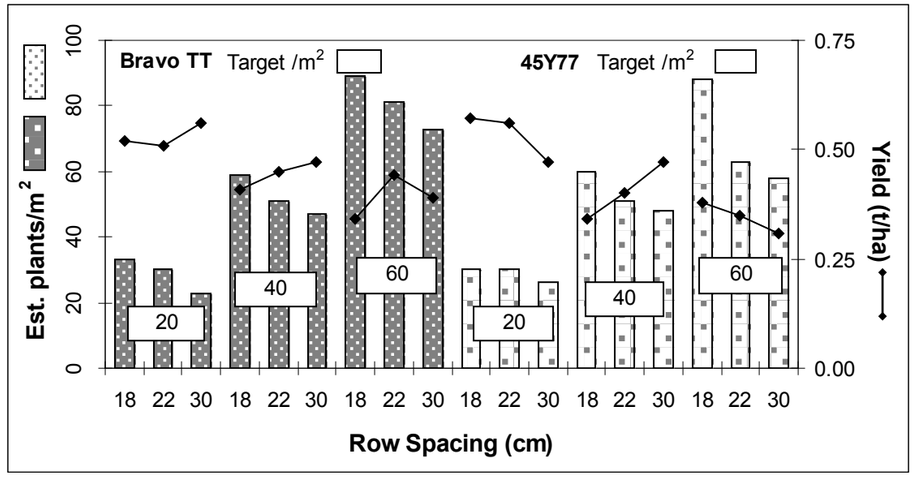


Figure 2. Effect of row spacing and target plant population on plant establishment and yield at Junee Better Canola site in 2009 (sown 5 May)



Yield and oil

The site mean yield of 1.53 t/ha in 2008 is considered average to slightly below average for Junee. In the 2008 trial there was no statistical difference in yield between a target of 20 and 60 plants/m^2 (Table 2), although the achieved plant populations were lower than anticipated at 19 and 42 plants/m^2 respectively. Oil contents were generally disappointing and a reflection of a very tough finish. Overall the oil contents were 7 percentage oil points under the standard of 42%. Plant population had no effect on oil content.

There was no significant difference in yield between 18 and 30 cm row spacing in 2008, yet a row spacing of 22 cm resulted in a significantly lower yield than 18 cm. The lower yield on the 22 cm row spacing cannot be explained. Row spacing had no effect on oil content.

Table 2. Effect of target plant population and row spacing on yield and oil content at Junee in 2008.

	Treatment	Yield (t/ha)	Oil %*
Target plant pop./m^2	20	1.51	34.9
	40	1.57	35.1
	60	1.52	35.3
	Lsd (0.05)	NSD	NSD
Row Spacing (cm)	18	1.62	34.9
	22	1.44	35.1
	30	1.54	35.3
	Lsd (0.05)	0.14	NSD

@ 6% moisture content
Lsd. – least significant difference
NSD – no significant difference

In 2009 row spacing had no effect on yield but the low plant population of 20/m^2 (actual achieved 28/m^2) was significantly higher yielding than 40 and 60 plants/m^2 (actual achieved 53 and 75 plant/m^2), but the yields were poor at 0.44 t/ha (Table 3).

Table 3. Effect of target plant population and row spacing on yield and oil content at Junee in 2009.

	Treatment	Yield (t/ha)	Oil %*
Target plant pop./m^2	20	0.53	n.a.
	40	0.42	n.a.
	60	0.37	n.a.
	Lsd (0.05)	0.06	n.a.
			n.a.
Row Spacing (cm)	18	0.43	n.a.
	22	0.45	n.a.
	30	0.44	n.a.
	Lsd (0.05)	NSD	n.a.

@ 6% moisture content
Lsd. – least significant difference
NSD – no significant difference
n.a. – not available at 18/01/10

Seed source of hybrids and open-pollinated varieties

Farmer-saved seed of open-pollinated varieties has been common practice in some areas, despite past research indicating an average yield penalty of around 12%. Despite a trend in the trials at Junee and Dunkeld for lower yields with farmer-saved the results were too variable to have full confidence in. However, in the Dunkeld trial blackleg infection levels increased, plant height distribution was greater and maturity was delayed in hybrid farmer-saved seed compared to company seed.

Conclusion

At yield levels of 1.5 t/ha achieved in 2008, there was no difference in yield or oil content between plant populations of 19 and 42 plants/m^2 or between 18 and 30 cm row spacing. At higher yield potential (2.0-3.0 t/ha) the outcome may well be different. In all years increasing row spacing from 18 to 30 cm reduced the established plant density for a given seeding rate. The Better Canola project unfortunately did not strike a good year conducive to yields of 2.0-3.0 t/ha Further work is needed on row spacing and plant population at yield potentials of 2.0-3.0 t/ha.

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PERFORMANCE OF BRASSICA JUNCEA AND CANOLA: 2008

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Key Messages

- Juncea canola (Brassica juncea) shows potential as an alternative to canola in the low rainfall zone
- 2008 was another very tough year for both canola and juncea canola. Only one out of six trials were harvested but the results were too variable to be meaningful.

Background

Brassica juncea (Indian mustard) is being developed as an oilseed alternative to canola for the low rainfall cropping zone of NSW. It has better heat and moisture stress tolerance than canola, and so is expected to perform more reliably than canola in poor rainfall years. Juncea canola is the name given to *B. juncea* with canola quality. It has the most market potential in the short-medium term because it can be sold into canola markets. Refer to the 2007 CWFS Research Compendium for further background information.

It remains unclear whether growers should adopt juncea canola in preference to canola as their preferred oilseed break crop. Data is still very limited and the decision hinges very much on the timing of the autumn break and hence sowing time, and subsoil moisture levels at sowing. There is a desire to improve the consistency and reliability of yields over a number of years, as opposed to the boom and bust results with canola. However, there is also a strong focus on developing canola for dry environments.

Aim of the project

To evaluate *B. juncea* against new varieties of canola for yield and oil content

Additional field trials were sown for Vic DPI (*B. juncea* breeders) and GRDC project DAN00119 *Brassica juncea* Agronomy.

Methods

Trials were sown at the following sites:

- Rankins Springs and Condobolin ARAS – Juncea canola breeders trials
- Rankins Springs and Gunning Gap – *B juncea*/ canola comparison trials
- Weethalle – two agronomy trials for DAN00119 – row spacing and seed rate

Results

For the second year running all trials were severely affected by moisture stress. Only Gunning Gap was harvested, which had a site mean yield of 0.67 t/ha. Unfortunately the trial had a co-efficient of variation (CV) of 15.6%, which is considered too high for the data to be useful. All other trials failed due to drought.

NSW state-wide trials

A number of breeder's trials were harvested in the north of the state. Yields and oil contents from these trials in 2007 and 2008 trials are summarised in Tables 1 and 2 in lieu of local results.