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.

Table 1. Average yield and quality of Juncea canola varieties Dune, Oasis CL and Sahara CL in northern NSW in 2007 and 2008, compared with Tarcoola and AG-Outback canola

Variety	Type	Yield as a % of Tarcoola		Oil content (%)	
		2007#	2008##	2007*	2008**
Dune	Juncea canola	90	125	35.0	40.5
Oasis CL	Clearfield Juncea canola	97	128	35.8	42.0
Sahara CL	Clearfield Juncea canola	116	138	36.5	40.6
Tarcoola	Canola	100	100	36.3	42.0
AG-Outback	Canola	105	133	34.1	40.2
Ave. Yield Tarcoola (t/ha)		**1.48**	**1.58**		

Note: All yield data is from northern NSW. Sowing times for Tamworth and Coonamble in 2008 were 10 June and 26 June respectively, which favoured juncea canola over canola
Yield # - Bellata, Tamworth ## - Coonamble, Tamworth
Oil% * - Coonamble, Bellata, Tamworth ** - Coonamble, Tamworth

Table 2. Average yield and quality of the condiment mustard varieties Selection 2 and Micky, and the canola variety Tarcoola in NSW in 2007 and 2008

Variety	Type	Yield as a % of Tarcoola		Oil content (%)	
		2007#	2008##	2007*	2008**
Selection 2	Condiment mustard	139	180	34.1	35.4
Micky	Condiment mustard	132	173	34.6	37.3
Tarcoola	Canola	100	100	37.6	38.3
Ave. Yield Tarcoola (t/ha)		**1.48**	**1.00**		

Note: All yield data is from northern NSW
Yield # - Bellata, Tamworth ## - Coonamble, Narrabri – 2008 trials were sown very late, 26 and 28 June respectively, which heavily favoured B. juncea over canola
Oil% * - Coonamble, Bellata, Tamworth and Merriwagga ** - Coonamble, Narrabri

Discussion

It was very disappointing that no useful data came from the effort put into conducting the various trials in 2008. In lieu of local results, data from northern trials is discussed.

The following comments are based on data from northern trials but also on some observations by the senior author of this report.

Northern trials are usually located on heavy cracking clay soils having significantly better water-holding capacities than those of central-west and south-west NSW. This translates to generally better yields in the north in years with dry springs.

Observations suggest the advantage of *B. juncea* over canola in 2008 trials was very much influenced by the relatively late sowing time. For example the NVT trial east of Coonamble (data not shown) had a site mean yield of 2.1 t/ha for the sowing date of 14 May. Canola out-yielded the juncea canola on average by 25% in this trial. The two breeders trials sown six weeks later (26 June) north-west of Coonamble had site mean yields of 1.75 t/ha and 1.88 t/ha for juncea canola and condiment mustard respectively. In these trials juncea canola and condiment mustard both out-yielded canola on average by 39%.

The observations discussed above are not supported by any experimentation and should be viewed as such. However they do suggest high temperature tolerance could be equally important or even more important than moisture stress tolerance as significant physiological advantages of *Brassica juncea* over canola

Oil contents were on average 5-6 percentage oil points lower for the Coonamble trial compared to the Tamworth trial. The Tamworth trial was sown only 8 days earlier than Coonamble. Therefore it is likely the differences in oil content between these contrasting environments could be expected over the long term. Seasonal effects would close this gap in individual years. Oil contents presented in Table 1 were bolstered by the Tamworth results which averaged 43-45% oil.

There were two unexpected results at the Coonamble site in 2008 for which there appears to be no sound explanation. Firstly, Tarcoola yielded relatively poorly, and secondly the juncea canola oil contents were exceptionally good for the late sowing time, being 4-5 percentage oil points higher than the Coonamble NVT site which was sown 6 weeks earlier

Further work

Clearly there is a need for more work to better understand the interacting agronomy and physiological factors which improve the performance of *Brassica juncea* relative to canola. The *Brassica juncea* Agronomy project is in it second year (2009) examining factors such as time of sowing, seeding rate and row spacing on water use, yield, oil content and other growth parameters. These trials are being conducted at Condobolin ARS and Trangie ARC. There are no collaborative oilseed trials between NSW DPI and CWFS in 2009.

NSW DPI has updated two *Brassica juncea* Primefacts for 2009. They are available on the Departments website: http://www.dpi.nsw.gov.au/agriculture/field/field-crops/oilseeds

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