

Canola - An Exciting New Potential Break Crop For The Mallee.

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Canola demonstrations and trials over the last two seasons in the Mallee have provided very encouraging results. The two varieties Narendra and Hyola 42 (both being early flowering varieties, Narendra being open pollinated and Hyola 42 a hybrid) have yielded extremely well. Yields in 1995 ranged from 0.9t/ha to 1.84t/ha (see Mallee Farmer Newsletter, March 1996 for further details). However, it is not only the yields of canola that look promising but its ability to act as an effective breakcrop that is so exciting for Mallee cropping systems.

Exciting New Break Crop:

There is increasing evidence that cereals following canola are often more vigorous and have improved yields. The break crop advantages of canola runs deeper than merely as a non-host of soil born diseases. Canola stubble breakdown releases molecules called isothiocyanates which act as a soil fumigant. Also the biological drilling potential of canolas taproot may allow a subsequent crop to explore and utilise nutrients from deeper in the soil profile.

A trial was established in the Eastern Mallee in 1995 to study the effect of a 1994 canola stubble on a subsequent wheat crop, and was compared against a 1994 chickpea stubble. This site had extremely low levels of CCN and no signs of any Take-All.

Paddock History:

1990 Field peas

1991 Faba beans

1992 Meering Wheat 4.4t/ha @ 8.9% protein

1993 Medic pasture (sown). good grass control, slashed and scarified 18/10/93

1994 Split paddock - Chick pea yield 0.4t/ha

- Canola yield 0.4t/ha (had 44kg/ha of urea applied)

1995 Last working on 5 May

Wheat sown on 19 May 66kg/ha wheat 52kg/ha MAP

Soil Moisture:

It is of interest to note that the total soil moisture following both the 1994 canola and chickpea crop was very similar (see Table 1) as was the total soil moisture under the wheat crop at harvest. The WUE achieved of 14 and 14.1 kg of grain per mm of used moisture was also a very consistent result.

The 48mm and 56mm of total soil moisture at harvest (0-60cm) was visually extremely dry and was at the lower extractable limit for wheat. It is assumed that none of this total soil moisture was available for the wheat crop and this is consistent with other Mallee results.

Table 1 Soil Moisture and Water Use Efficiency

	Chickpea stubble	Canola stubble
Total soil moisture at sowing 0-60 cm	109 mm	110 mm
Total soil moisture at harvest 0-60 cm	48 mm	56 mm
Soil moisture used by wheat	61 mm	54 mm
Water Use Efficiency (kg of wheat per mm of rainfall)	14.0 kg/mm	14.1 kg/mm

Note Growing Season Rainfall for 1995 was 278 mm of which 50 mm occurred in late October

Soil Nitrogen:

The 0-10cm and 10-60cm soil nitrate tests presowing revealed some 78kg/ha more available nitrogen under the canola stubble (see Table 2). The main contributor to this variation was in the 10-60cm soil level where the canola stubble had 9ppm additional nitrate available than did the chickpea stubble. It should be noted

here that the only differences in any nitrogen treatments for 6 years in this paddock was that the 1994 canola crop had 44kg/ha of urea applied pre-drilled. It is difficult to understand therefore where this 78kg/ha of additional pre-sowing available nitrogen could come from when only 20kg/ha nitrogen was applied as urea (44kg/ha) in the previous crop.

The wheat crop on the canola stubble right up until late tillering looked healthier and greener than that on the chickpea stubble. However, at harvest time soil nitrogen remaining was very similar (see Table 2).

Currently, the most obvious explanation is that the canola stubble had somehow allowed more nitrogen mineralisation to occur, but this “flush” of nitrogen was not sustained into the plants later growing period. This is supported by the number of wheat tillers produced on the canola stubble and their initial higher sap nitrate readings (see Table 3) and then the sap nitrate levels comparatively dropping away.

Table 2 Paddock Nitrogen Results

	Chickpea stubble	Canola stubble
Total soil nitrogen available at sowing 0-60 cm	186 kgN/ha	268 kgN/ha
Total soil nitrogen remaining at harvest 0-60 cm	65 kgN/ha	75 kgN/ha
Soil nitrogen used by wheat crop (40 kgN/ha per ton of grain)	128 kgN/ha	126 kgN/ha

Wheat Yields:

Wheat yields were 3.21t/ha at 10.5% protein and 3.14t/ha at 10.7% protein on chickpea and canola stubble respectively. Both stubbles produced very comparable yield results (see Table 3).

It was interesting that plant density establishment was 10% lower on the canola stubble - this may have been due to some residual chemical carryover from the dry 1994 season. However it tillered more potentially producing an increased number of tillers per square metre (15% greater). Also the density of heads was greater on the canola stubble, but the final harvest did not reflect this possible yield advantage.

There are two possible reasons whilst the canola stubble did not outyield the chickpea stubble.

- (i) The dry August - mid October period when some plants were moisture stressed with the significant rainfall in late October being too late. This effectively produced a “haying-off” effect.
- (ii) Recent research has shown that plants that produce more tillers per plant to achieve a similar final head density sacrifice some yield capability in the process. (ie, higher seeding rates and resultant increased seedling densities are preferred)

Table 3 Other Agronomic Information

	Chickpea stubble	Canola stubble
Seedling density 19/6/95	201 plants/m ²	180 plants/m ²
Plant tillers 29/8/95	429 tillers/m ²	501 tillers/m ²
Heads 23/10/95	306 heads /m ²	358 heads/m ²
Sap Nitrate Readings 20/7/95 (4 leaf)	3300 ppm	4125 ppm
14/8/95 (6 leaf)	2575 ppm	2200 ppm
29/8/95 (7 leaf)	1950 ppm	1498 ppm
Wheat Yield	3.21 t/ha	3.14 t/ha
Grain Protein	10.5%	10.7%

Conclusion:

1995 wheat grown on a 1994 canola and chickpea stubble yielded similarly.

From agronomic measurements taken the wheat grown on the canola stubble had a potential to yield 15% greater than that on the chickpea stubble, however this did not eventuate.

From one year results, wheat grown on a disease free paddock with an immediate history of either chickpeas and/or canola will yield comparably.