

Selection of Canola Lines for Low Rainfall Environments in South Eastern Australia

A GRDC - INDUSTRY INITIATIVE

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Key Messages:

- This is a GRDC sponsored project to ensure canola varieties continue to be developed for low rainfall environments.
- 120 advanced canola lines are being trialled including Trizine Tolerant (TT), Round up Ready and conventional lines.
- Some promising results have already been seen with canola yields of up to 1 t/ha in less than 200 mm growing season rainfall.

Aims:

- To trial advanced canola breeding lines in low rainfall cropping regions to ensure canola varieties continue to be developed for low rainfall environments

Background:

The development of a profitable break crop in low rainfall cereal growing areas is essential for sustainable and profitable systems. Until now canola, peas and lupins have been the most promising options, with canola having several valuable characteristics (eg herbicide tolerance and high value grain). It is relatively free of disease in low rainfall areas and is able to utilise the high nitrogen levels following medics and leguminous crops which makes it ideally suited to low rainfall rotations.

With the decision by GRDC to withdraw from mainstream canola breeding, selection and evaluation, this role has been taken over by the four major commercial companies, namely Nuseed, Pioneer, Pacific Seeds and Canola Breeders Western Australia Pty Ltd (CBWA).

There have been concerns that the commercial breeding companies may not select and evaluate new lines in low rainfall areas because of geography, cost, small size of the potential market and risk of losing

material in poor seasons. This was confirmed in discussion with the breeders, although CBWA are committed to breeding for low rainfall areas.

Following discussion with the companies, GRDC agreed to support a program for early lines from the various canola breeding programs to be selected in trials in the districts located around Minnipa (SA), Walpeup (Vic), and Condobolin (NSW).

About the trial:

In 2009, about 120 lines were trialled at Minnipa and Condobolin. These included Trizine Tolerant (TT), Round up Ready (except in SA because of the GM Moratorium) and conventional lines. There were no trials in the Victorian Mallee because DPI Victoria did not have its protocols in place.

Assessments:

All potential lines were assessed for:

- early vigour
- height
- standability
- time to mid-flowering
- yield

Other characteristics which may be of commercial significance (eg sensitivity to herbicides) were also noted.

Grain analysis included commercial tests such as oil content and protein.

Results:

The results for 2009 have in many respects been quite spectacular.

At **Minnipa**, where it was one of the best seasons ever, with 330 mm rainfall in the growing season, yields ranged from 1.64 to 2.94 t/ha, with an average over 2t/ha.

Many of the new lines yielded better than those currently available commercially, while others were disappointing, even under the good seasonal conditions.

At **Condobolin**, under what were very tough conditions, there were some spectacular successes and some abject failures.

Establishment conditions were less than ideal, with little rain received in May after sowing (Table 1). There were considerable differences among

the lines, a result of variations in seed size and quality. Rain in June and July was sufficient to give good growth and ground cover but August and September were exceptionally dry, so that flowering and seed fill occurred under severe water stress, particularly for later-flowering lines.

Table 1. Growing season rainfall (mm) at Condobolin

April	May	June	July	August	September	October	Total
44.9	14.2	52.5	23.4	10.7	16.7	34.2	196.6

Water stress was exacerbated by the lack of stored moisture following the relatively dry summer and autumn. Soil water contents at emergence and maturity are shown in Figure 1. There was no available water stored below 50 cm in 2009.

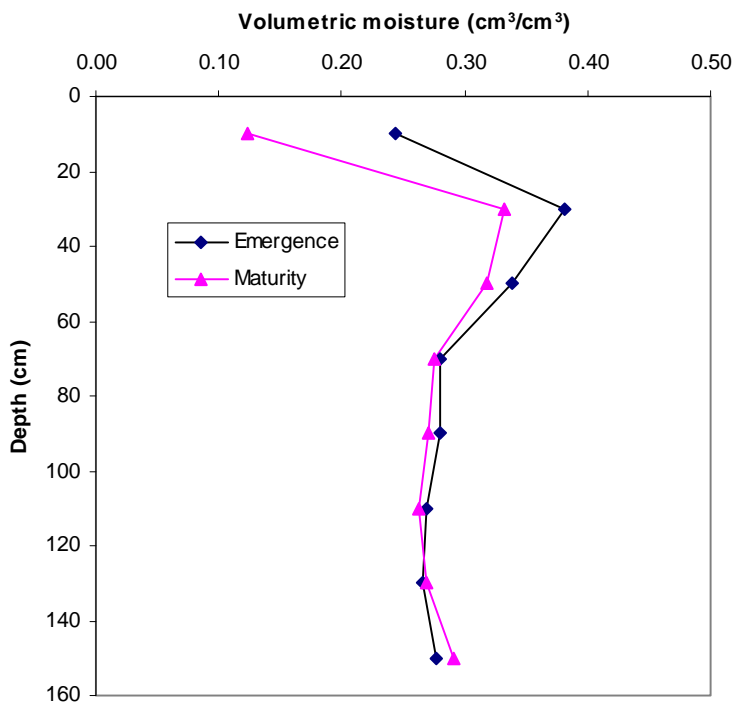


Figure 1. Soil moisture profiles at emergence and maturity at Condobolin, 2009

There was a large spread in flowering time among the entries and many were much slower to flower and begin seed filling than early maturity, conventional canola line Tarcoola. These later-developing lines suffered greatly under the dry spring conditions and are not suited to low-rainfall regions.

Grain yields also differed among the entries, with individual plots yielding up to 1t/ha.

There was some variability across the site in establishment and water stress and careful spatial data analysis will be required to reduce these effects. Despite this variability, it is likely that a number of the entries will be identified as promising for this low rainfall environment.

Already this Low Rainfall Canola Project work is showing that there is real potential for some of the new material to do much better in the low rainfall environment, increasing the prospects of a more profitable and reliable break crop.

Who's involved:

This trial is supported by
Grains Research and Development Corporation (GRDC)
Low Rainfall Collaboration Project
Minnipa Agricultural Centre
Upper Eyre Peninsula Farming Systems Group
Condobolin Agricultural Research and Advisory Station
Central West Farming Systems

Future Directions:

The trials will continue in 2010 and involve all four breeding companies and sites at Minnipa, Victorian Mallee and Condobolin. Mallee farmers will get an opportunity to see these canola lines for themselves at field days throughout the year.

