

Selection of canola lines for low rainfall environment in south eastern Australia



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Take home messages

- *Canolas outperformed the mustards in high production situations.*
- *Some early generation material flowered much earlier than current commercial varieties but they struggled to out yield them in 2010.*

Background

The development of a profitable break crop in a 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, high value grain and well anchored stubble). It is relatively free of disease in low rainfall areas and is able to utilise high nitrogen levels following legume-based pastures. This is useful in low rainfall rotations.

Following discussion with the new canola breeding companies (Nuseed, Pioneer, Pacific Seeds and Canola Breeders Western Australia Pty Ltd), GRDC has supported a small program for early lines to be selected in the districts located around Minnipa (SA), Walpeup (Vic), and Condobolin (NSW). The second year of trials has now been completed, even though Pioneer will have material available only for this coming season.

In 2010, well over one hundred lines were trialled at each of the three locations. These included TT, IT, Round up Ready (except in SA because of the GM Moratorium) and conventional lines, all of which were grown with their respective registered herbicides applied.

The various lines were assessed for early vigour, height, standability, time to flowering and 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.

However, even more so than in 2009, seasonal conditions did not lend themselves to evaluating lines under low rainfall stresses.

Results

All three sites had very high production levels for low rainfall locations with site average grain yields above 1.5t/ha (above 2t/ha at Condobolin). Condobolin and Walpeup were the wettest, receiving an annual rainfall about 50% above the long term average. Substantial rainfall pre-January also contributed to the water supply of the 2010 crops. At Minnipa, annual rainfall was above average and the critical months of August, September and October received about twice the average.

Unlike many commercial crops, these trials escaped most of the traumas facing growers this year (such as mice and locusts at establishment, waterlogging and damaging rains at maturity) even though yields at Minnipa and Walpeup were perhaps not as good as seemed likely at

flowering. Plots at Minnipa and Walpeup were largely undamaged prior to harvest, while at Condobolin some losses occurred due to persisting wet conditions leading up to and after maturity.

All three trials were seeded promptly after the break in each location but were not especially early on the calendar by local standards (29 April at Condobolin, 3 May at Walpeup and 26 May at Minnipa). However, the wet and prolonged season in all three districts meant that there was little penalty for the later dates on the calendar.

Due to the very mild temperatures in spring and prolonged moisture in the profile at all sites, it was not possible to evaluate lines in 2010 for their performance under drought and high temperature stress. However, the most desirable lines for low rainfall conditions will not only have to “tough it out” in drought years but also be able to do well in the better rainfall years. The 2010 season allowed us to assess them on that basis.

In 2009, a number of entries were identified as promising for low rainfall environments. Mustards performed well compared with canola under the drought conditions at Condobolin. H6693, H6698, H6756, CBWALR07, CBWALR08 CBWALR11, CBWALR15 and CBWALR20 topped yields at Condobolin and also performed well at Minnipa. They also had no major grain quality weaknesses.

Just as occurred in 2009 at Minnipa (a high yielding site), the mustard lines in 2010 could not match the performance of their canola cousins under good growing conditions. The mustard lines included current commercial releases. The yield gap between mustards and canola in high yielding situations has been substantial, eg over 1t/ha difference at Condobolin. So far, this seems to be a feature of current mustard material: it performs strongly under tough conditions but really struggles to exploit good seasons.

More often than not, the early generation material being tested in this project struggled to outperform current commercial varieties. This is not surprising given that the early generation material was specifically selected for very low rainfall situations whereas the commercial varieties must have more general adaptability.

Of the lines which performed well at both sites in 2009 (H6693, H6698, H6756, CBWALR07, CBWALR08 CBWALR11, CBWALR15 and CBWALR20), only H6693 was carried forward into 2010 trials and it was only just into the top half of the conventional block.

Time to reach 50% flowering occurred over a 3 – 6 week window, depending on the site. Some lines flowered as much as one week earlier than the earliest commercial varieties.

Lines were blocked according to their herbicide tolerance at each site. As a result, direct comparisons between these groups could not be made. However, RR lines appeared to reach similar yields to conventional and IT at the two sites at which they were tested, while the TT continued to carry some yield penalty.

The future

Despite the less than ideal seasons for testing low rainfall material, this project continues to show that there is real potential for some of the new material to do better than current commercial varieties in these locations, increasing the prospects of a more profitable and reliable break crop.

The trials will continue in 2011 with all four breeding companies submitting material for the three sites of Minnipa, Walpeup and Condobolin.

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