Canola Production in Australia and the Impact of the National Brassica Breeding Projet

Trent POTTER [1], Rod MAILER [2], Neil WRATTEN [2] and Phillip SALISBURY [3]

[1] South Australian Research and Development Institute, Struan, SA
[2] New South Wales Agriculture, Agricultural Institute, Wagga Wagga, NSW
[3] Agriculture Victoria, University of Melbourne, Victoria

Introduction

In the year 1997, canola production in Australia reached 812,000 tonnes from an area of 680,000 hectares, an average yield of 1.2 t/ha. This yield was reduced below the long term average by a very dry winter and spring in the eastern states, particularly New South Wales and Victoria which between them accounted for 375,000 hectares of canola. The domestic requirement for canola seed to crush is about 310,000 tonnes, leaving about 500,000 tonnes for export.

In 1998 it has been estimated that 1 million hectares will be planted to canola with many new canola growers. The greatest expansion in area is expected in Western Australia but all other canola growing states will also increase in area cropped to canola. Of the total canola crop area, it is likely that triazine tolerant cultivars will account for 45% due to brassica weed infestation of cropping land.

Much of the increase in interest in canola cropping in Australia is due to the increased yield of new cultivars, beginning in the late 1980's (Potter et al. 1989). More recent cultivars have higher yield, but also increased oil and protein content (Potter et al 1997).

National Brassica Improvement Project

The National Brassica Breeding Project, funded by the Grains Research and Development Corporation, has played a major role in the development of improved canola cultivars and so has greatly assisted the increased area of canola grown in Australia.

This project is based at Wagga Wagga, New South Wales, and Horsham, Victoria, with significant additional funding provided by the respective state Departments of Agriculture. Varieties developed by these two programmes account for more than 90% of canola sowings in Australia. As part of the project, lines are evaluated for yield and blackleg resistance in other states. Selection for adaptation is now being extended with selection in Western Australia already established and likely to be expanded to South Australia.

The main emphasis is on *Brassica napus*. Within this species, three maturity groups are recognised, as well as a triazine herbicide tolerant group. A high level of resistance to the basal stem canker phase of blackleg is essential in Australia. In addition, due to our often difficult environment, the ability of a variety to both yield and accumulate high levels of oil and protein under these conditions assumes perhaps a unique requirement.

In addition to further improving canola quality, this project also recognises the potential to develop specialty quality cultivars for specific end-use requirements. There are two main areas of research. For high stability applications like deep fat frying, oils higher in oleic acid but with reduced levels of linoleic and linolenic acids are required. Work is also in progress,

in association with Ag-Seed Research Pty Ltd, to develop oils high in erucic acid for industrial purposes.

Although it probably surprises many people that such a significant proportion of the Australian canola crop is sown to triazine tolerant varieties, the limitations of these varieties are well recognised. The NBIP has, therefore, initiated the development of varieties with broad spectrum herbicide resistance. In some cases, discussions are still in progress, but Australian farmers are likely to enjoy the same range of HR varieties as Canadian farmers, although this is unlikely to occur for maybe five years.

There is also plenty of interest in *Brassica juncea* As a species that is regarded as having a higher tolerance of heat and moisture stress, its potential in Australia is obvious. However, as a winter grown crop, mustard has some agronomic problems in Australia, in particular maturity and height. The breeding programme, based at Horsham, is working to overcome these. In addition, the obvious need for canola quality, improved oil content and increased oleic acid levels are being addressed.

Early generation interstate testing

Since 1983, canola breeders lines that may have been likely to be registered and released were evaluated in a formal interstate testing programme against control cultivars. These lines were grown at about 14 sites throughout the canola growing areas of southern Australia. Grain quality was determined at the oilseeds laboratory at Wagga Wagga. As well, lines were evaluated in controlled disease nurseries to determine the level of resistance to blackleg. Problems with this system were that: only a few lines (often less than 10) were tested each year; selection often had only been conducted in a relatively small area prior to further evaluation; cultivars may have been released after only one year of testing Australia wide.

In 1993 the system of testing was changed so that much more breeding material could be evaluated. As a consequence of the need to develop a wider range of maturity for the many environments in Australia and the need for triazine tolerant canola, trials were split into 4 groups: early, mid and late flowering as well as triazine tolerant. Breeders lines, most at between F4 and F6 are tested against a limited number of control cultivars at about 10 to 12 sites around the main canola growing areas of southern Australia. The number of breeding lines under test within each trial type varies from 10 to 33 with three replicates used for all trials. Breeders lines are sourced from all public and private breeding programmes operating in Australia. Grain yield is determined and grain quality is measured at the oilseeds laboratory at Wagga Wagga. Breeders lines are also tested in blackleg nurseries in New South Wales, Victoria and Western Australia to determine the degree of resistance to blackleg. Canola breeders lines that have high yield, superior blackleg resistance, and good grain quality are then promoted into wider scale testing within individual state canola testing programmes. This wider scale testing occurs for at least one year prior to the release of the cultivar.

Advantages of the new system of evaluation are: testing of a wider range of lines at a number of different environments instead of initial selection by the breeder in few environments; blackleg and grain quality testing consolidated within the same protocols; coordinated testing of public and private breeding lines across Australia.

Potential disadvantages are: increased numbers of entries when the newer private breeding programmes develop lines to test; limited knowledge of the appropriate maturity group trial for inclusion due to the very early generation of testing; transgenic and non-transgenic lines can not be tested together.

Australian Crop Accreditation System

In late 1997, a system has begun to be developed to allow the information about new cultivars to be accredited. Accrediting information means that an independent body ensures that the information about a new cultivar has been produced using appropriate scientific means, and that farmers can rely on the information produced. In order to do this, five committees, including an oilseeds committee, have been established. These committees have developed a set of protocols which will be widely published. The committees will work by inviting breeders to submit the information they wish to accredit on their proposed new cultivar. If the committee accepts that the data were generated using appropriate science and that any conclusions drawn are valid, the committee will accredit the data and publish it annually.

Breeders do not have to submit data about new cultivars, but it is envisaged that when the system becomes well known, farmers will be less likely to accept claims about cultivars that do not have accredited data.

References

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