Assessment of the potential for canola in the northern region

Summary

Canola is the fastest expanding crop in Australia with the area sown increasing from 73,000ha in 1990-1991 to approx. 1 million ha in 1999-2000. Whilst the crop is adapted, in general terms, to the same areas as wheat, it has made little impact in the northern region. This may be because higher temperatures promote earlier flowering and an associated increased frost risk, and more rapid maturation that limits seed yield.

Growers in the northern region require a suite of crops that can be sown whenever favourable climatic conditions occur. The *Brassica* species are potentially useful crops for the region as they are generally sown and harvested earlier than wheat. An agronomic evaluation of canola for Queensland (QLD) conducted by Garside and Meinke in 1993 concluded that the crop had potential in southern QLD and northern New South Wales (NSW), but that varieties available at the time were unsuitable. Since that time, new varieties of canola and Indian mustard, particularly with adaptation to drier areas, have been developed and warrant assessment in the northern region. There have been major advances in the development of crop simulation models that can assist in evaluating crops in farming systems and the adaptation of different varieties to prevailing climatic conditions.
This project aimed to evaluate a broad range of *Brassica* germplasm to identify canola and mustard varieties best adapted to the northern region and to determine the contribution of different traits to phenological adaptation and productivity, and to provide an assessment of the potential to improve climatic adaptation through breeding. These outcomes are in line with the GRDC five-year program objectives to encourage a wider geographic spread of oilseed production and to develop *Brassica* species for low rainfall environments.

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**Conclusions**

- Canola has a future as a break crop in wheat-based farming systems of the northern region. It was found that using current and soon-to-be-released varieties with current agronomic guidelines, it is possible to grow profitable crops on a commercial basis. This assertion has been backed by the growth in the area of the crop over the term of the project.
- While the unique combination of climatic challenges in the northern region poses problems for canola production, the correct combination of variety maturity and sowing date for a given location was shown to minimise frost risk and maximise grain yield and oil content.
- Canola can offer significant benefits to the overall farming system in the north. The wet 1998 and 1999 seasons demonstrated the limitations of existing farming systems, with wheat and barley suffering severe disease and quality downgrade with wet harvests, whereas canola has yielded well in experiments throughout the northern region in both seasons with no significant disease problem and an ability to withstand the wet harvest periods. In terms of grass weed control in winter cereal crops, growing canola provides an alternative to the traditional sorghum option.

**Recommendations**

- Given the expansion of the area of canola in the northern region and the existence of a range of unresolved issues (see below), it is recommended that GRDC maintains and perhaps increases its investment in research and development (R&D) for canola in the north. This will ensure that the crop will continue to grow in area and stability of production.
- Feedback from growers indicates that distance from the current delivery point at Newcastle is the biggest factor limiting the expansion of canola in southern QLD and far northern NSW, transport costs being from $40/t ex-Goondiwindi to $50/t.
ex-Roma. At present there is no bulk handling of canola grain at railway sidings as with cereals nor will there be until there are significant tonnages grown. There is a very small local bird seed and stock feed market available on the Darling Downs (less than 200t). There is, however, a potential market niche in being able to market the crop before the rest of the industry and potentially capture high early season bonuses, as crop harvest in the most advanced districts of the northern region begins in the first week of October. These bonuses need to be in excess of the transport costs. There could be a role for GRDC to investigate issues concerning access to market and marketing niches for the crop.

**Outcomes**

The major benefit achieved during this project has been the expansion in the area of canola in the northern region due to provision of advice from the project on varieties and agronomic management. Canola area from 1998 (when the project started) has increased from 7,000ha to an estimated 32,000ha in 2001. It is difficult to partition the contribution of this project to this expansion in the industry versus the contribution from other drivers that are external to the project. However, the scale of industry expansion would not have occurred had not advice on varieties and agronomic practices been available to make this possible.

Expected benefits post project will be a continued increase in the area of canola in the north, perhaps up to 15% of the current area occupied by winter cereals. Another benefit expected to flow will be greater stability of production from year to year through the use of well adapted varieties and superior agronomic management. Finally, an increased frequency of canola crops in wheat based systems will see some improvement in the yield of winter cereals through the control of diseases and weed problems.

**Achievements/Benefits**

**Project Aims**

The project aims were:

1. To determine the adaptation of current canola and mustard varieties in the northern region.
2. To assess *Brassica napus* and *B. juncea* germplasm for traits to improve phenologic adaptation to the northern region.
3. To develop a growth simulation model for canola based on currently available data from southern Australia and new data to be obtained in this project.

**Major Achievements**

1. The canola industry has undertaken a major unprecedented expansion phase in the northern region over the course of the project. The area sown to canola has increased from 2,000ha in 1997 to an estimated 33,000ha in 2001. Part of this expansion has been driven by perceived problems with wheat based farming systems, the expansion of canola production in southern and northern Australia and reasonably high process for canola grain. However, the results from the project have been instrumental in assisting the expansion of the industry with advice on suitable varieties, agronomic advice (sowing date, fertiliser, water use efficiency (WUE)) and promoting the benefits of canola as a break crop in the traditional wheat based rotations.

2. Model parameters used to predict phenological development of the major Australian canola varieties have been developed and tested on a comprehensive dataset collected in the northern region and with assistance of others in the national canola improvement program around Australia. This is the first time the phenological development of Australian varieties has been quantified in terms of temperature, day length and vernalisation and is a significant outcome from this project to the national canola industry.

3. The Agricultural Production Systems siMulator (APSIM)-Canola v1 has been completed, with parameters derived from the literature and growth analysis collected in the project. The module has been tested on a comprehensive dataset collected from southern Australia. The model was able to simulate with reasonable accuracy yields ranging from 0.3t/ha to 5.0t/ha, including crops in this project. The model has been used to evaluate agronomic strategies and varietal adaptation in a number of settings in the northern region.

4. A high degree of cooperation has been established with the Western Farming Systems (WFS) project in QLD and Pacific Seeds, as well as NSW Agriculture. Activities have included monitoring and adding value to commercial canola crops in the northern region, which have involved variety comparisons, sowing date comparisons, nutrition studies and examination of the
impact of preceding canola crops on subsequent winter cereal productivity. This interaction has raised the profile of canola and the research and development (R&D) effort in the western cropping areas of both states. A number of joint publications have been produced detailing results from activities.

5. The project has produced a number of varietal and agronomic guidelines for successfully growing the crop in the north. These include:

- Establishment of date guidelines that minimise frost risk to canola crops in the north. Frost risk is a major constraint to canola production in the north. Knowledge of phenological development of varieties has been coupled with long term climate data from several northern locations to derive frost risk profiles for variety x sowing date combinations. These calculations show that it is possible to minimise frost risk to approx. 10% with suitable choice of variety for a given sowing date. These findings have been published at the 2001 Australian Agronomy Conference and at five industry field days in QLD and northern NSW.
- Quantifying varietal performance from a wide range of maturity groups, triazine and non-triazine tolerant varieties and hybrids and open-pollinated varieties. Varietal advice has been made available through NSW Agriculture AgNotes and AgFacts, field days and GRDC updates, and articles in the rural press (including Ground Cover).
- Identifying problems with harvesting management and assessing ways around these problems.
- Quantifying the crop response to nitrogen (N), phosphorus (P) and sulphur (S) and establishing rules of thumb for fertiliser requirements relative to wheat crops.
- Establishing benchmarks for WUE, soil water extraction for canola crops on the clay soils of the northern region.
- Quantifying the yield penalties associated with delayed sowing.
- Preliminary data on the performance of Indian mustard (B. juncea) compared to canola (B. napus).

Other research

A number of unresolved issues relevant to commercial canola production have been identified during the course of the project.

These include:

(1) The impact of canola crop residues on the establishment, growth and yield of summer crops.

(2) The performance of advanced breeding lines of Indian mustard relative to canola should be investigated over a wider range of environments.

(3) The influence of northern climatic conditions on oil content and quality and ways and means to produce quality canola.

(4) A clearer understanding of the benefits of canola on the productivity of subsequent crops in the rotation and under what circumstances these benefits are likely to be seen.

Additional information

Publications


