Situation statement for oilseed *Brassica* production in Australia

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ABSTRACT

In the past two years, technological improvements have become available that should see more canola crops grown and an increase in grain yield. Major issues include the use of this technology, continuing the control of disease and insect pests, understanding where canola production is likely to go in future and improving grower capability to produce good economic yields.

Key words: Canola production – technology - grower capability

INTRODUCTION

Canola production in Australia reached a peak 2.3 million tonnes in 1999, and has declined overall since, mainly due to late seasonal breaks, perceived low returns and drought and/or frost. Other factors that have had minor effects include Sclerotinia outbreaks in 1999 and 2000, blackleg in several years (including the breakdown of the *sylvestris* based resistance) and subsoil constraints. These have been collectively called canola yield decline and has resulted in reduction in canola yield relative to wheat, particularly in NSW. In WA, production had been extending into the lower rainfall areas as well as in the south. However, the last several years have had a late or no break to the season in the north and canola production has shifted to higher rainfall zone in the south. Industry will respond to price and seasonal outlook as occurred in WA in 2008 when over 1.2 million tonnes was produced.

Over the past two years there have been a number of changes in technology. These will be discussed below. Disease issues remain important to the Australian industry. The final issues under discussion focus on deciding where canola is likely to be grown in Australia and improving grower capability.

DISCUSSION

Canola remains the premium broadleaf break crop in cropping rotations in Australia. However, a series of poor years has resulted in a decline in area sown. Recent surveys have shown the main reason farmers continue to grow canola is for the rotational benefits, and the main challenge is to increase canola yield, quality and consistency of production. The following section outlines the importance of many factors on canola production in Australia.

New technology

Technological improvements have been noted in canola production over the past several years. Several of these technology changes are now having an impact on the type of canola being grown, the yield being achieved and on the area that is likely to be grown in future.

Production of GM canola

GM canola was grown commercially in NSW and Victoria for the first time in 2008. The dry spring resulted in low grain yields but most farmers were pleased with their results and the level of weed control achieved. About 41,000 hectares were planted in NSW and Victoria in 2009 with 850 hectares being trialled in WA for the first time.

At present, triazine tolerant (TT) canola accounts for about 60% of production in the eastern states and 90% of production in Western Australia. This herbicide option gives good weed control in canola but TT varieties do not have the yield potential of the non-TT types. The use of Roundup Ready® canola allows weed control without the associated yield penalty.

Juncea canola and mustard in lower rainfall areas

The first commercial production of juncea canola occurred in 2007 with small areas planted in NSW and Victoria under a closed loop marketing system. Production has extended into SA in 2009. This is a major breakthrough for the canola industry as large areas of low rainfall cropping country are available in eastern Australia where farmers require a broad leaf rotational option for cereal crops. The first juncea canola variety lacked any herbicide tolerance option. However, Clearfield® varieties were commercial in 2008 and TT juncea canola could be released in 2011. In addition, mustard is also being developed as a feedstock for biodiesel and is being used by several companies throughout Australia. Some varieties for biodiesel have high glucosinolates and/or erucic acid and as such need to be strictly segregated from juncea canola or canola.

As *Brassica* weeds are endemic in many low rainfall areas where juncea canola is to be grown, it is likely that the lack of herbicide tolerance options will reduce the rate of uptake of this new crop. The time taken to improve quality characteristics necessary for juncea canola has also allowed early maturing *B. napus* varieties to be developed that may compete with juncea canola. The major benefits of juncea canola, compared to canola, therefore remains ease of harvest due to shattering tolerance. Whether juncea canola fits into this area will be determined in the next five years.

Specialty varieties

Specialty varieties with high oleic acid and low linolenic acid are being developed in Australia but have historically had lower grain yields than commodity canola varieties. However specialty varieties have attracted a price premium aimed to offset the lower yields. Hybrid specialty lines have also been released. Yields of recent variety releases have been equivalent to commodity canola varieties. It is likely that markets for specialty canola could mean that up to 20% of the Australian canola crop will be sown to specialty types in the future, provided they remain competitive (yield and price) with commodity canola.

Hybrids

Hybrid canola has been shown to significantly out-yield open pollinated varieties in Canada and Europe. In Australia, hybrids have only recently shown similar yield increases. The GM hybrids from Bayer CropScience are also likely to be available in the future. An issue is the use of farmer retained hybrid seed and trials are being conducted to measure the yield, quality and blackleg resistance of this seed compared to the original hybrid.

Precision agriculture

Many farmers have adopted precision agriculture and stubble retention. This has resulted in changes in the agronomy of canola by some farmers. Such changes have been wider row spacing to enable stubble clearance, the use of shielded sprayers between wider rows, inter-row sowing, and the use of technology for variable rate nitrogen application and yield mapping.

Dual purpose canola

Particularly in higher rainfall areas, grazing canola has been shown to produce significant quantities of feed for livestock in winter without having much effect on grain yield.

Other fodder options

In recent years we have seen significant damage to canola crops caused by frost after flowering. Farmer experience and research have shown that cutting these crops for hay has provided good returns compared to harvesting the affected crops. However; dairy farmers are now under increased levels of financial pressure and may not buy canola hay as they have in the past.

Disease and insect issues

Maintaining blackleg resistance and use of fungicides

For the further development of the canola industry, it is critical that high levels of blackleg resistance are maintained or improved. Similarly, the industry relies mainly on one fungicide to augment blackleg resistance. Alternative fungicides also need to be developed to provide a range of options. Surveys conducted in 2008 showed that even highly resistant varieties had higher levels of internal infection than would have been expected. In the areas where these surveys were undertaken, canola is a major component of crop rotations. A new management guide *"Managing your risk of blackleg in canola"* has been published to assist farmers to reduce the risk of blackleg caused by continued use of the same variety and growing it in close proximity to stubble of the same variety from the previous year

Effect of internal blackleg infection on grain yield

In a trial conducted in south-eastern SA in 2008, increasing levels of blackleg significantly reduced dry weight per plant and grain yield but had little effect on harvest index or grain weight (Table 1). Any level of internal infection above 20-40% reduced grain yield to a high degree. This can be compared to a study conducted in 2001 by Steve Marcroft with a good spring where the level of yield loss was about half of that in 2008 with a poor spring (Table 2).

Table 1. Effect of blackleg internal infection on plant yield (g) and yield components 2008

Internal infection	Mean results				
	Plant dry weight (g)	Grain yield (g)	Harvest index	1000 grain wt	Oil %
0-10	17.6	5.1	29.1	2.86	41.8
20-40	15.4	4.4	28.7	2.82	41.2
50-70	12.9	3.6	27.7	2.75	41.7
80-100	8.1	2.2	27.3	2.73	40.8

Table 2. Effect of blackleg internal infection on canola yield in differing seasons

Internal Infection	% yield loss 2001 – good spring	% yield loss 2008 – bad spring
0-10	0	0
20-40	7	14
50-70	12	30
80-100	30	57

Understanding Sclerotinia and control measures

Sclerotinia caused significant yield loss in NSW in 1999 and 2000. Control measures are expensive and the petal test measures the presence or absence of disease but does not predict the possible development of Sclerotinia as this is based on weather conditions. Weather based disease prediction systems are needed to provide farmers with more information as to the chances of development of Sclerotinia, associated likely yield losses and the cost/benefit of fungicides. A factsheet *"Managing sclerotinia stem rot in canola"* has been published to give farmers the most recent information.

Insect pests in stubble retention programs

Insect pests seem to be increasing in numbers particularly as farmers grow more canola under stubble retention systems. Mandalotus weevils have occurred in a range of crops in 2009 on lighter soils in lower rainfall areas. There are many species of Mandalotus weevils and more research needs to be done on ecology and control measures.

Canola yield improvement and costs of production

Grower capability, "Better canola"

This project, funded by GRDC and AOF, has resulted in more information being available to farmers. Demonstration sites, field days, forums, media articles, farmer case studies, annual "*Better canola*" books and the website with agronomic information has been used to further improve farmers knowledge about growing canola.

Where canola is grown in Australia

Canola historically has been grown in the medium to high rainfall zone. However, farmers in the lower rainfall areas have also been interested in incorporating canola into rotations to control cereal diseases. This resulted in increased interest in developing earlier maturing canola or mustard varieties. However, the series of droughts over the last decade has resulted in poor yields in these areas and in all states the area of canola has retreated to the medium to high rainfall areas, where it was originally grown. Whether *Brassica* crops are able to push back into lower rainfall areas will depend on yield potential, price but particularly a return to better seasonal conditions.

Maintaining or increasing the yield of canola relative to wheat

Historically, canola yield has been about 55% of wheat yield. A series of late seasonal breaks, disease issues and droughts, have caused canola yields to decline in many areas relative to wheat. The challenge is to lift the relativity back to historical levels by further improving early maturing canola cultivars for lower rainfall areas and longer season cultivars for higher rainfall areas. Farmers need to use best practice agronomy so that basic principles are not forgotten.

Reducing input costs for growers

Canola has had the reputation of being an expensive crop to grow but when high yields are produced and/or high prices are available this has little effect on farmer attitudes to growing canola. Some farmers have invested up to $400 per hectare to grow a canola crop and many in the industry believe this is too high. During the last 6 years, particularly in NSW, drought has reduced grain yields to such a degree that farmers now see such a cost as unsustainable and efforts must be made to determine what costs of production are really necessary to produce a profitable canola crop. More benchmark studies need to be undertaken and experiments to determine the critical cost components. The results need to be extended to farmers to ensure that expectations of both costs and returns are realistic. One key issue, however, is that farmers should spread some costs over several years of a rotation. For example lime and gypsum application will benefit a range of rotational crops and so the cost of these treatments should be spread over several years.

CONCLUSIONS

Canola production reached a peak in Australia in 1999 but production has reduced since then, mainly due to climatic factors such as late seasonal breaks and drought. The major challenge for the canola industry in Australia is to increase yield, quality and consistency of production from year to year. In a recent survey over 90% of growers indicated that they planned to maintain or increase their canola plantings. Over the past several years, farmers have had a large number of technological advances available to them. These advances should increase the area sown and grain yields but farmers still need to concentrate on the basics of growing canola, particularly the issues of disease control. Industry will respond to price and seasonal outlook as occurred in WA in 2008 when over 1.2 million tonnes was produced.