A DECADE OF DEVELOPMENT FOR THE CANOLA INDUSTRY IN WESTERN AUSTRALIA

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ABSTRACT

The canola industry in Western Australia is has a value of between $200 and $300 million to the state economy annually. Canola is the predominant oilseed crop in Western Australia, with 350,000 hectares grown in 2001 and is the fourth largest crop in the state after wheat, barley and lupins. Production in recent years has been highly variable due to unfavourable seasonal conditions and in response to fluctuations in canola prices. Despite this, canola has provided a significant opportunity for diversification on farms in Western Australia. Over 95% of the crop in Western Australia is sown to triazine tolerant varieties to overcome brassica weed problems and to assist in managing herbicide resistance in weeds. Only 30,000 tonnes of canola is crushed domestically in Western Australia. Most is exported unprocessed by the Grain Pool Pty Ltd, which through state legislation, has the main export licence. Western Australia is well positioned for export markets in Asia and Europe, with production being close to five strategically positioned port facilities.

This paper also looks at canola production in Australia from a Western Australian perspective. Compared to other states, Western Australia has the greatest potential to expand the industry and become the largest canola exporting state in Australia. In the long term Western Australia has the potential to consistently grow half a million hectares of canola, producing up to 700,000 tonnes of seed per annum.

The primary issues facing the development of the canola industry in Western Australia is high variability in production levels from year to year, poor yields, in-consistent quality and the threat of blackleg disease. Sustained growth of the industry will be determined by the success of new herbicide tolerant varieties, improved varieties for the medium and low rainfall areas, competing enterprises like farm forestry in high rainfall regions and an expansion in the domestic processing industry.

KEYWORDS

Hectares, tonnes, canola, production, crop, Western Australia, Australia

INTRODUCTION

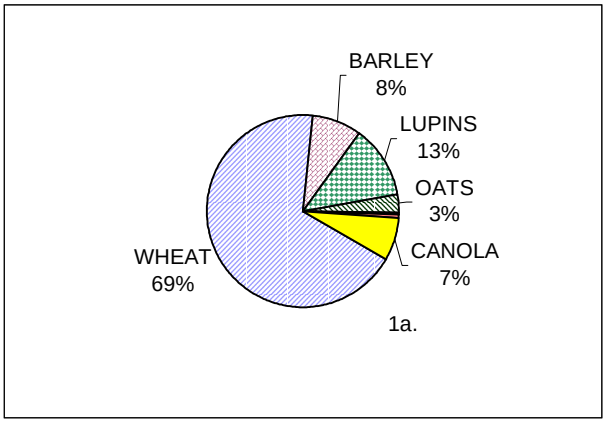
Western Australia is usually the second largest canola producer in Australia after New South Wales, but due to the drought in 2002 it was the largest producing state for the second time in the last decade. WA accounts for between 20 and 30% of the total Australian canola crop producing between 300,000 and 400,000 tonnes out of a 1 to 1.5 million tonne Australian crop. The industry produced over $120 million at the farm gate and is the fourth largest grain grown in the state after, wheat, barley and lupins (see figure 1a). In Western Australia, canola is the major oilseed crop grown, with small areas of mustard, linseed and sunflower sown for the condiment and birdseed market. In other states, oilseed crops such as sunflowers, soybeans and cotton are important representing 33% of all oilseeds grown in Australia Rapeseed production in Western Australia is grown under climatic conditions similar to other parts of Australia although annual rainfall tends to be lower. Sixty percent of the south-west grainbelt receives between 325 and 800mm rainfall per annum (Cramb et al 1991), with daily temperature range between minima 3–4^{o} C to maxima of 16-20^{o} C during winter (June – August). Post-anthesis, temperatures can rise rapidly to exceed 30^{o} C in October combined with decreasing rainfall events results in severe stress and lower yields and oils. The poor moisture holding capacity of soils in Western Australian exacerbates the likelihood of moisture stress. Western Australia has some of the most ancient soils in the world, typically weathered sands over clays or deep sand which leach readily. WA soils, like much of Australia, are low in phosphorus, organic matter and have particularly low pH, often below 6.0 $_{CaCl2}$.

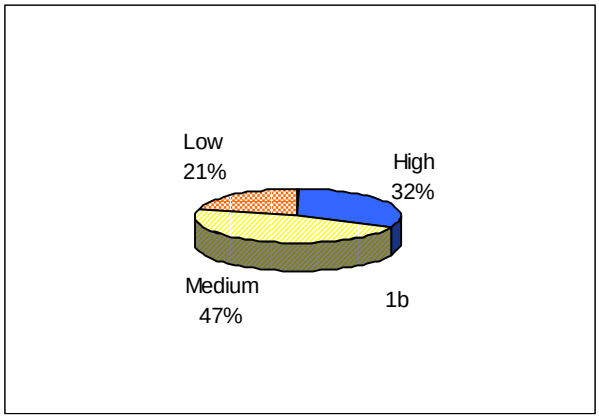
Salinity continues to encroach on valuable cropping land throughout Australia with the worst salinity problem in WA where is it is estimated that 20,000 hectares of arable land is lost each year.

The main constraints to canola production in Australia are; soil fertility, moisture stress, insect pests, disease, development of herbicide resistant weeds, soil compaction and soil acidity with the latter four being especially important for Western Australia.

Rapeseed was first trialed in Australia in the early 1960's with the first commercial crops grown in 1969 following the introduction of wheat quotas (Colton & Potter, 1999). The first varieties grown commercially in WA were of imported varieties from Canada, Arlo and Target.
Canola remained a relatively minor crop throughout the seventies and eighties, then production underwent a dramatic increase with the release of triazine resistant varieties in 1994. Unlike in eastern Australia, cropping in WA hasheavy infestations of Brassica weeds like radish and wild turnip (*Raphanus raphanistrum, Brassica tournefortii*) especially in the northern grainbelt.

Figure 1a) . The relative broadacre crop production for Western Australia in 1999 when canola production had reached record levels. 1b) Percentage of total production in WA according to rainfall zone in 1999.



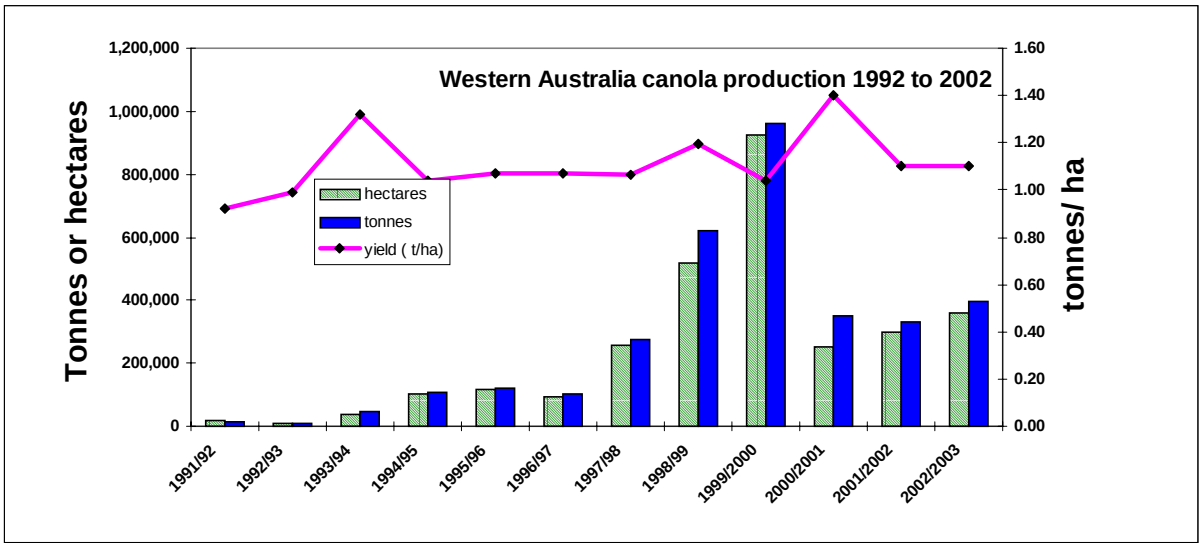


DECADE OF RAPID GROWTH

During the 1990's the canola industry throughout Australia underwent a rapid expansion phase, from a production of 100,000 tonnes to over 1.5 million tonnes. In Western Australia this expansion was the most dramatic. Since 1992, production has increased from 13,500 tonnes to a peak of production in 1999 of 900,000 tonnes (Figure 2). The move to canola cropping began following a collapse in the Reserve price Scheme for wool in the early 1990's. Depressed wool prices reduced profit from sheep and encouraged farmers to move into cropping. This was especially true of the medium to high rainfall zone of the south west of Australia (Kingwell, 2002). Sheep numbers in WA have declined by 37% since early 90's and the increase in canola area sown in WA has been at the expense of pasture. Canola also replaced some grain legumes in higher rainfall districts like lupins, where yields have been poor.

Figure 2. Canola production in Western Australia 1995 to 2004.

Source: Department of Agriculture of WA and Grain Pool Pty Ltd



CANOLA IN AUSTRALIAN FARMING SYSTEMS

Canola plays an important part of the crop rotation. In Victoria a TOPCROP database survey for 1994 and 1995 showed that the most common crop preceding canola was; pulse (29%), pasture (29%) fallow (19%) or wheat (13%). A recent industry survey in Western Australia showed a similar scenario, but with more than 50% of the canola sown after cereal. Seventy percent of farmers in WA practice no-till, therefore a large portion of canola is seeded using no-till techniques or direct drilled.

Grain farming systems in the south-west of Western Australia have been based on a wheat-lupin-pasture rotation since the introduction of lupins in the early 1960's. Over the last decade, the introduction of canola has changed this system to a wheat-canola-wheat-lupin-pasture phase rotation for many farms. Similar changes have occurred in eastern Australia but instead of lupins, grain legumes like field peas and chickpeas are more commonly grown.

Canola fits well into these farming systems providing both effective disease and weed breaks in an otherwise cereal dominated system. Herbicide resistance in WA is a significant factor in the success of canola, allowing the use of grass selective herbicides in cereals as an alternative to the triazines used in canola. However, there it now evidence of emerging resistance to triazines in populations of ryegrass (Walsh et.al. 2000) and radish which will present the industry with some challenges in the future.

Canola yields in Australia can be highly variable from season to season. Typically, yields in the high rainfall districts range from 1.8 to 3.0 tonnes and average 2.0 tonne per hectare. Yields in the medium rainfall can range from 1.0 to 2.0 tonne per hectare and for the low rainfall usually below 1.0 tonnes per hectare. In comparison, to wheat in Australia, canola yield ranges between 0.4 to 0.6 of expected wheat yields in a district (Holland et.al. 1999). Through the recent a series of dry seasons and the drought in 2002, yields relative to wheat have fallen below this range in many medium to low rainfall areas.

In WA canola is frequently grown following cereals and yields tend to be lower compared to canola following pasture, due to lower soil nitrogen residues. Throughout Australia this trend toward canola following cereal crops is partially driven by lower insect and weed populations in the emerging canola when compared to those following pasture. Insects such as red-legged earth mite (*Halotydeus destructor*) can cause serious damage to young canola seedlings.

In Western Australia malting barley or noodle wheat is now frequently grown following canola where the low soil nitrogen allows better control over protein levels in the grain by adjusting fertiliser N rates.

Table 1. Suggested fertiliser strategies for canola in medium to high rainfall region of south-western Australia

Nutrient	Application range (kg/ha)	Best bet applications (kg/ha)
P	10-15	12
N	40-100	70
S	16-25	20
K	Soil Test	20 kg if < 45 ppm in top 20 cms
Lime	Soil Test	1.0 t/ha if pH < 4.7
Trace elements	Unlikely	Apply Cu, Zn, Mo once every four years across the program, or as for wheat.

Growers now have access to sophisticated decision aids like the "N wheel" which has been developed after many years of comparative nutrition trial work in Western Australia on wheat and canola. Unlike eastern Australia, WA has high leaching soils which make soil tests for N unreliable and factors such as rotation, summer rainfall and soil texture are more crucial for fertiliser recommendations. The use of nitrogenous fertilisers in crop rotations have increased dramatically since the early 1990's in Australia and this has been attributed largely to the introduction of canola (ABARE, 1999). Fertilisers make up the a large percentage of the input costs to canola production in Australia and more so in Western Australia where it is more than 35% of the input costs (Table 2).

The introduction of triazine tolerant varieties and earlier maturing varieties in the mid 1990's resulted in an shift from high rainfall to the medium rainfall (450 – 325mm) cropping areas in Australia where large scale grain production is practised. Typical farm size in the medium rainfall region of eastern Australia is 1000 hectare and in WA it is 1500 to 2000 hectares, with a mix of cereals, grain legumes and livestock on the farm. Due to drought in 2002, canola production has reverted back into the high rainfall districts and along the south coast of WA.

Table2. Production of costs of canola production in different rainfall zones of WA (DAWA, 2002)

Basic production inputs cost $/ha	High Rainfall (450-750mm)	Medium Rainfall (325-450mm)	Low Rainfall (< 325mm)
Seed (5kg/ha)	20	24.75	12
Fungicides (eg. Impact or Jockey)	15	15	0
Fertiliser	98.3	84.15	31.7
Machinery operating	54	45	39
Sprays (herbicides, insecticide)	33.01	54.9	55.98
Crop Insurance	4.28	3.96	1.94
Interest	10.65	12.44	6
Contract Swathing/harvesting	50	45	25
Labour	7	7	0
Total	**$292.24**	**$292.20**	**$171.62**
Av. Yields	2	1.4	0.6
Net return (canola On farm $330/tonne)	$367.76	$169.80	$26.38
Net return (canola On farm $380/tonne)	$467.76	$239.80	$56.38

AUSTRALIAN CANOLA VARIETIES

Canola varieties in Australia are all of *B. napus* spring types and commercialised by both public and private breeding programs . Two public breeding programs (Departments of Agriculture of Victoria and New South Wales) dominated commercial varieties at the start of the decade but since then there has been a steady increase in varieties available from private breeding programs. All potential new varieties are evaluated as part of a national trial program coordinated by the four state Departments of Agriculture; New South Wales, Victoria, South Australia and WA .

Table3. Total number of commercially available canola varieties in Australia in 2002 and the portion of which have been privately developed.

Variety type in terms of herbicide tolerances	Conventional	Triazine tolerant	CLEARFIELD™
Total number of varieties	20	10	8
Number developed by private	7	7	8

Over the past decade canola breeding organisations had the the primary objectives to improve oil contents, yield and disease resistance and over 25 new varieties have been released. The public breeding programs are now shifting focus to develop high yielding varieties for the medium and low rainfall environments, an objective that may not be addressed by the private breeding programs. Other new priorities are higher yields but not necessarily higher oils, increased pod shattering tolerance, blackleg and sclerotina disease resistances, herbicide tolerance and shorter growth habit. The focus for the future is to increase the varietal adaptation to the medium and low rainfall environments of Australia.

In WA, over 95% of varieties grown are triazine tolerant (TT) compared to in eastern Australia where the TT varieties constitute less than 50%. The TT varieties have the disadvantage of potentially lower grain yields (10– 20%) and oil contents (2-3%) compared to conventional or CLEARFIELD™ (imidazolinone tolerant) canola. However, the introduction of TT varieties in 1994 have revolutionised where and how canola is grown in farming systems, especially where herbicide resistant weeds now dictate rotational options for farmers. TT canola has also found a niche in farms where “wet weeds” like *Crassula* sp. and silver grass (*Vulpia* sp.) are difficult or expensive to control with conventional herbicides. Triazine tolerant canola (TT canola) provides an important tool in the overall management of these weeds, although the threat of widespread resistance to triazine chemicals in the future is a real possibility. Triazine tolerance varieties offer growers a lower herbicide input cost (up to $20 - 30 per hectare) compared to conventional or CLEARFIELD™ varieties, a significant economic factor in the low rainfall production areas of Australia because of the variable returns.

The first CLEARFIELD™ varieties were introduced in Australia in 2000 where it was sold as a contract package of seed and the herbicide On Duty® . Initially, high resistance to this type of seed marketing was experienced and the company has since freed growers from contractual obligations to use On Duty® with their varieties. Adoption has been slow due to poor control of weeds such as like capeweed (*Arctotheca*

calendula) and silver grass, both of which are readily control by triazines. The area sown to CLEARFIELD™ canola varieties in 2002 was estimated to be 30,000 hectares or 8% of the total crop in WA. The CLEARFIELD™ system does have the advantage over TT varieties of better yield, improved blackleg resistance and better oil yields but due to the technology costs and the risk of herbicide residue in medium and low rainfall environment, is likely to be used predominantly in the high rainfall areas.

GM CANOLA

Currently Western Australia remains free of commercial planting of GMO canola as the State Government legislation has overruled any federal approvals for the release of GMO canola by the Gene Technology Regulatory Office. A state government moratorium on the introduction of GM canola into Western Australia is in place until 2004.

QUALITY OF AUSTRALIAN CANOLA

The oil concentration of Australian canola can vary from 35% to 50% depending on the season and region it is grown in. Growers are paid a price bonus of 1.5% for each percent oil content greater than 40% in eastern Australia or 42% in Western Australia with a similar penalty if oil content falls below these levels. The quality of canola has remained consistent over the last decade, with the exception of the dry years 1994 and 1997, when the Australian average oil fell below 40% overall (Salisbury ed. Mailer, 1999). In Western Australia quality has been consistent throughout the decade, with oil content averaging just over 40% and protein between 33 and 34% in the meal (Table 4). The level of erucic acid did increase late in the 1990's as the triazine tolerant variety Karoo became widely grown in WA. Karoo variety has an unusually high level of erucic acid of over 1 % but the variety has since been superseded by better quality and high yielding varieties for the medium rainfall zone.

Table 4 Quality of Western Australian canola 1995 – 1999 (Mailer, 1995 on)

	1995	*1996*	*1997*	*1998*	*1999*	*2000*
Oil content [1]	41.0	41.0	39.6	41.0	40.6	39.4
Protein (meal)[2]	32.4	33.6	34.2	33.5	33.4	36.5
Oleic %[3]	61.9	61.5	58.7	58.6	58.1	58.7
Erucic %[4]	0.1	0.5	0.7	0.9	1	0.9
Glucosinolates [5]	11.0	8.0	5.0	6.0	8.0	8.0

[1] 8.5% Moisture basis, [2]13% moisture basis in oil free meal, [3&4] percentage of total oil, [5] micromole per gram of whole seed.

A noticeable recent increase in protein levels is the result of breeding programs addressing low seed protein levels earlier in the decade and a requirement of the industry to achieve consistent minimum protein level of 35% in the meal. Agronomic practices have a substantial impact on the quality of canola grown in Australia and are addressed in management packages developed by extension specialists in conjunction with growers and research agronomists.

MARKETS AND PROCESSING

The total crushing capacity for oilseeds in Australia is 1.1 million tonnes of which the majority is located on the east coast and 80% owned by Cargill Australia. In Western Australia the small crusher, Riverland Oilseeds has a 27,000 tonnes capacity. A second crusher is operated by Kojonup Oils in the Great Southern of WA, with a capacity of 2000 tonnes supplying a niche market. The majority of the WA crop is exported as whole seed to Asia by the Grain Pool Pty Ltd who have an export licence for canola, barley and lupins. In 2002 the State Government passed new legislation which deregulates exports of canola in bags and containers and processed Canola and allows the issuing of export licences for bulk canola shipments outside of the Grain Pool Pty Ltd licence.

Historically, canola prices in Australia over the last decade have moved within a range of $280 to $450 per tonne. The last five years have been the most buoyant with domestic prices at record highs, of over $400 per tonne in 1996, 1997, 2001 and again in 2002. For 2003/2004,on-farm prices around $380 to $400 can be expected on average, making canola one of the more profitable broadacre crops for Australia grain growers. WA freight advantages into South East Asia means Western Australian growers can expect a premium over their east-coast counterparts in the short term. The Grain Pool exports through five terminals in the south west of the state; Geraldton, Kwinana, Bunbury, Albany and Esperance. The Grain Pool Pty Ltd. has

developed strong relationships with Japan, Bangladesh, China and more recently Mexico. Japan remains one of the principal buyers of WA canola and often purchases a large proportion of the crop.
The majority of canola meal produced in WA is consumed by the local poultry industry (8,000 to 9,000 tonnes) with the remainder going into the dairy and pig industries. Most of domestically produced oil is processed by Meadow Lea at the Bunbury refinery (bottling plant) with some exports interstate. Recent interest from the biodiesel industry processing sector has emerged in Western Australia witha number of companies investigating opportunities in this area.

Table 4. a)Value of canola export from Western Australia ($A million); b) Destination country of canola exports in 2000/2001 (tonnes) (ABS, 2001)

YEAR	Export value $A million	Destination country	Tonnes 2000/2001
'94/95	39.32	Japan	176,000
'95/96	47.09	China	135,000
'96/97	29.43	Germany	48,000
'97/98	110.67	Malaysia	16,000
'98/99	240.91	Pakistan	4,000
'99/00	293.90	Bangladesh	2,000
'00/01	141.75	India	1,000
		Total tonnage exported	382,000

THE FUTURE

The future for oilseed markets worldwide is positive. World consumption of vegetable oils has increased by more than 200% since 1975. This increase has been driven by two factors: global population has increased by nearly 25% over the last 25 years and the GDP globally has increased by over 85%. Demand is expected to continue to grow as middle income earners throughout the world demand better diets and better quality vegetable oils.
Primary production areas of canola in Australia will remain in the medium and high rainfall zones for the foreseeable future until better-adapted oilseed varieties are developed for the low rainfall districts. In the low rainfall area canola remains an opportunity crop where timing of the break to the season and price determines the size of the crop. In the high rainfall area, canola drives the pasture-cropping rotational system, by reducing diseases in cereals, improving long-term gross margins and cleaning pastures of un-productive weed species.
The area of canola in Australia is expected to vary between 5% and 15% of the total area of winter crops sown from year to year. The outlook for the canola industry is promising with the long-term target of growing 2.0 million hectares, producing 2.0 million tonnes of canola in Australia. The advent of earlier maturing herbicide resistant varieties of canola for the low rainfall districts and the development of canola quality *Brassica juncea* would see the area sown to winter oilseeds increase a even further.

Issues and challenges facing the development of the canola industry in Australia include:

- Continuity of supply and consistency in quality – related to variable seasonal conditions.
- Prices for canola remain competitive with other broad acre crops.
- The threat of disease, pests and weeds to the continued viability of the industry.
- Introduction of GMO canola varieties and their segregation.
- Increased costs of production for oilseeds reducing gross margins .

The Australian canola industry is still a young industry and will continue to experience fluctuations in response to prices, rotations and alternative crops. While yield remains unreliable in the medium rainfall zone, canola production will continue to fluctuate wildly according to season and price. Western Australia is in a unique position to exploit opportunities in production of speciality oils or alternative oilseeds. This is due to its capacity to maintain segregation of the crops through having a world class grain handling system managed by Cooperative Bulk Handling and regional access to a number of export terminals, namely; Geraldton, Kwinana, Bunbury, Albany and Esperance.
Canola will stay in the Australian farming system as long as there is a market for vegetable oils worldwide. Canola production in Western Australia is, by world standards, a low input, low yielding, low environmental impact production system. Alternative oilseed crops like Crambe and Camelina will also have a secondary role in the future. There will be an increase in diversification into different herbicide tolerant crops, specialty oils and high-oleic low-linolenic varieties in the near future. The challenge for growers and the industry will be to maintain segregation between GM, speciality oils and industrial varieties in order to remain internationally competitive.if

ACKNOWLEDGEMENTS

Jamie Henderson, Grain Industry Economist, Department of Agriculture Western Australia
Dr Rod Mailer, Senior Oilseed Chemist, New South Wales, Department of Agriculture

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