SOUTHERN AUSTRALIA FOCUS

COVERING CROPPING SYSTEMS OF SOUTHERN NSW, VICTORIA, TASMANIA, SOUTH AUSTRALIA & WESTERN AUSTRALIA

THE RESEARCH VIEW

Long-term canola study helps to shed the 'risky' tag

By Liam Lenaghan[1] and Kate Burke[2]

Canola is perceived as a risky crop relative to other crop types. But is this perception justified? This article details canola performance and variability on a number of farms across three regions in Western Victoria over an 11 year period.

Production review

Ten grain growers from the consultancy firm John Stuchbery and Associates client base in Western Victoria contributed yearly weighted crop yield averages and rainfall data for the period 1996–2007. The data was analysed within as follows:

The Mallee, Wimmera and Western District have been defined as:

- Mallee – Galaquil and Rosebery, Underbool and Murrayville districts.
- Wimmera – Murtoa, Longerenong, Natimuk and Nhill districts.
- Western District – Lake Bolac, Yalla-Y-Poora and Wickliffe districts.

Two statistical terms (standard deviation and coefficient of variation) have been used to describe the rainfall and crop performance data.

Standard deviation (SD) is a measure

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Kate Burke, agronomist with JSA.

Consultants' Corner

Consultants' Corner is an initiative by *Australian Grain* highlighting current GRDC-funded research with a particular focus on the commercial implications of adopting cutting-edge research.

TABLE 1: Rainfall by region (1996–2007)

		Mallee	Wimmera	Western District
Annual rainfall	Rainfall (mm)	285	367	527
	SD (mm)	82	80	86
	CV	29%	22%	16%
	*Long term av	346	424	615
GSR rainfall	GSR (mm)	182	264	367
	SD (mm)	50	56	78
	CV	28%	21%	22%
	*Long term av	230	297	425

Source JSA client survey 2008
* District long term averages are composite values (source BoM)

TABLE 2: Canola crop performance by region (1996–2007)

	Mallee	Wimmera	Western District
Yield (t/ha)	0.90	1.34	1.82
SD (t/ha)	0.56	0.57	0.53
CV (per cent)	62	43	29
WUE (kg/mm/ha)	8.3	8.5	6.8
SD (kg/mm/ha)	4.4	3.5	2.0
CV	54%	41%	30%

TABLE 3: Canola crop performance compared to other crops by region (1996–2007)

		Mallee	Wimmera	Western District
Canola	Yield (t/ha)	0.90	1.34	1.82
	SD (t/ha)	0.56	0.57	0.53
	CV	62%	43%	29%
	WUE (kg/mm/ha)	9.7	7.6	10.1
Wheat	Yield (t/ha)	1.70	2.31	3.61
	SD (t/ha)	0.86	1.23	0.88
	CV	51%	53%	25%
	WUE (kg/mm/ha)	16.6	14.2	13.7
Barley	Yield (t/ha)	1.68	2.68	3.97
	SD (t/ha)	0.84	1.45	1.46
	CV	50%	54%	37%
	WUE (kg/mm/ha)	14.5	14.6	13.6
Lentil	Yield (t/ha)	0.66	1.16	na
	SD (t/ha)	0.63	0.82	na
	CV	95%	70%	na
	WUE (kg/mm/ha)	6.4	7.9	na

◁i...CANOLA CROP PERFORMANCE

of how widely values within a dataset are dispersed from the average; it is used as a measure of variability of rainfall and crop performance.

Coefficient of variation (CV) describes the relative relationship between standard deviation and the average, and is expressed as a percentage. It allows the variability of two different datasets to be compared.

Growing season rainfall (GSR) was defined as April to October for Wimmera and Mallee, and April to November for Western District

Cost of production model

Determining the cost of production for a crop (or whole business) is critical for the purpose of measuring financial performance and risk. A crop production model prepared by Liam Lenaghan was used to model the drivers of production and the relative contributions of the key costs for the 2008 season based on current input prices and a range of price outcomes for a Wimmera scenario.

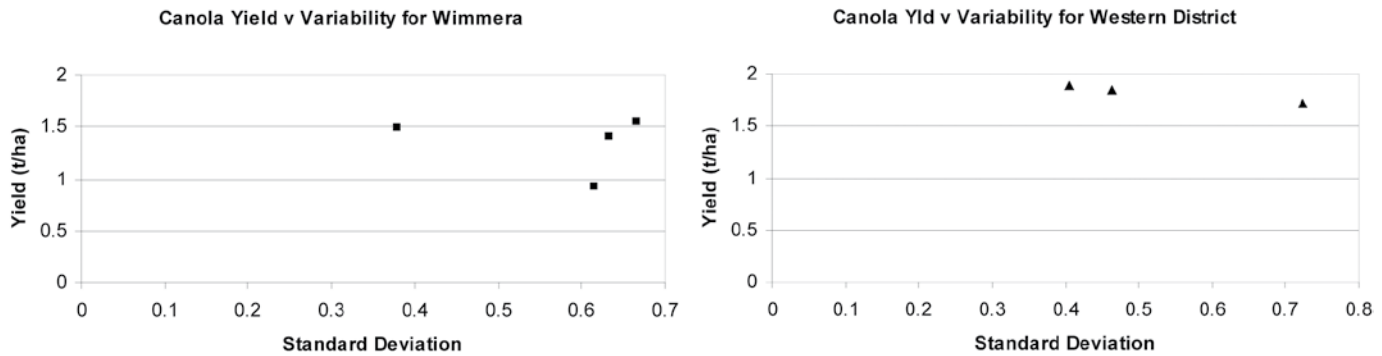
In determining the cost of production, this study has included:

- Input costs – fertiliser, fuel, herbicides, seed etc;
- Machinery costs at contract rates; and,
- Land cost – to recognise the opportunity cost of land ownership or access. The land cost has been set at six per cent of current market value.

Historically, dryland broadacre farmers have dismissed the appropriateness or value of the cost of production figure to their businesses given the volatility of yield outcomes (cost of production being determined by production costs divided by yield).

To overcome this perceived limitation a GSR continuum has been modelled to generate expected yield outcomes and

FIGURE 1: Canola yield and variability among the Wimmera and Western District crops



Source JSA client survey 2008.

likely costs of producing that yield. In this way continuous cost of production values are derived.

Limitations of this study

It should be noted that the survey data is derived from a small population and therefore may not be entirely representative.

The crop cost of production model is based on an assumption set which aims to best represent commercial best practice. Changes to key parameters (such as stored water, available N, water use efficiency and input costs) will influence the outputs of the model.

RESULTS OF THE STUDY

Rainfall

In all districts the annual rainfall and GSR for the period 1996–2007 were significantly lower than the long term averages. Average annual rainfall was 285 mm, 367 mm and 527 mm for the Mallee, Wimmera and Western District respectively. The standard deviation of all districts was very similar, 80–86 mm.

This resulted in greater relative variability in the lower rainfall districts – almost twice the variability in the Mallee compared to the Western District.

Average growing season rainfall (GSR) was 182 mm, 264 mm and 367 mm for the Mallee, Wimmera and Western District respectively. GSR was more variable in the Mallee than the Wimmera or Western District (Table 1).

Canola performance

Canola yield averages of 0.9 tonnes per hectare, 1.3 tonnes and 1.8 tonnes were reported for the Mallee, Wimmera and Western District respectively (Table 2). Western District yields were the least variable with Mallee yields being most variable.

Canola's water use efficiency was comparable between the Mallee (8.3kg/mm/ha) and Wimmera (8.5 kg/mm/ha) but lower in the Western District (6.8 kg/mm/ha) indicating potential for further yield improvement in the Western District.

Within-region variability

Figure 1 illustrates the variation among the regions in average yield performance and variability as measured by standard deviation. In the Wimmera, there were differences among individuals in both average yield and variability.

The main cause of high variability for an individual was crop failure in very dry seasons.

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FIGURE 2: Cost of production versus GSR outcomes for wheat, barley, canola and lentil in the Wimmera

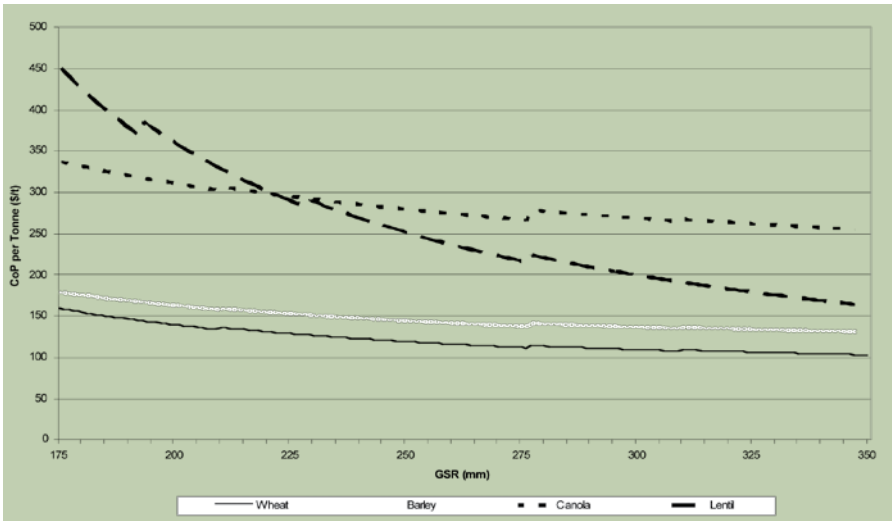

TABLE 4: Break-even matrix when cost of production is taken into account against likely yield outcomes resulting from typical GSR ranges and harvest prices for wheat, barley, canola and lentil

		GSR (mm)					
		125	175	225	275	325	375
Wheat price ex-farm ($/t)	200	X	✔	✔	✔	✔	✔
	250	X	✔	✔	✔	✔	✔
	300	X	✔	✔	✔	✔	✔
	350	✔	✔	✔	✔	✔	✔
	400	✔	✔	✔	✔	✔	✔
	450	✔	✔	✔	✔	✔	✔
		GSR (mm)					
		125	175	225	275	325	375
Barley price ex-farm ($/t)	200	X	✔	✔	✔	✔	✔
	250	?	✔	✔	✔	✔	✔
	300	✔	✔	✔	✔	✔	✔
	350	✔	✔	✔	✔	✔	✔
	400	✔	✔	✔	✔	✔	✔
	450	✔	✔	✔	✔	✔	✔
		GSR (mm)					
		125	175	225	275	325	375
Canola price ex-farm ($/t)	300	X	X	?	✔	✔	✔
	400	X	✔	✔	✔	✔	✔
	500	✔	✔	✔	✔	✔	✔
	600	✔	✔	✔	✔	✔	✔
	700	✔	✔	✔	✔	✔	✔
	800	✔	✔	✔	✔	✔	✔
		GSR (mm)					
		125	175	225	275	325	375
Lentil price ex-farm ($/t)	400	X	X	✔	✔	✔	✔
	450	X	?	✔	✔	✔	✔
	500	X	✔	✔	✔	✔	✔
	550	X	✔	✔	✔	✔	✔
	600	X	✔	✔	✔	✔	✔
	650	X	✔	✔	✔	✔	✔

◁iii...CANOLA CROP PERFORMANCE

One Wimmera grower had much less variability while maintaining a good yield by growing canola on fallow or on pulse stubbles with greater than 50 mm stored water, managing nitrogen inputs and early sowing and establishment with press wheels. This strategy has eliminated crop failures in drought years and resulted in canola being a reliable crop on that farm.

Canola performance relative to other crop types

Canola was regularly perceived as a high risk crop but this perception did not hold true for canola in either the Wimmera or Western District, but it did for the Mallee.

In the Wimmera yield variability of canola as measured by CV was less than wheat and barley, while in the Western District it was less variable than barley but more variable than wheat.

In the Mallee canola's yield variability was 23 per cent greater than cereals. Canola was much less variable than lentils in both the Wimmera and the Mallee.

COST OF PRODUCTION

Figure 2 illustrates a cost of production curve for canola grown in the Wimmera compared to other crops.

Canola has a much higher cost of production curve than cereals ($338/t at 175 mm GSR; $268/t at 275 mm GSR; $255/t at 350 mm GSR). Canola's cost of production is slightly more than double wheat owing largely to its inherently lower water use efficiency, higher N requirement and extra machinery costs.

Wheat has the lowest cost of production of the four crops investigated ($158/t at 175 mm GSR; $111/t at 275 mm GSR; $100/t at 350 mm GSR).

Barley is slightly higher than wheat owing mainly to greater nitrogen costs (assumed lower starting N than wheat) ($180/t at 175 mm GSR; $138/t at 275 mm GSR; $130/t at 350 mm GSR).

In lower rainfall situations (<260 mm) lentils have the highest cost of production but in higher rainfall seasons (>300 mm) their cost of production falls well below that of canola ($452/t at 175 mm GSR; $217/t at 275 mm GSR; $163/t at 350 mm GSR). Lentils' unique cost of production curve is primarily a result of it being a pulse – that is, low yield potential in a dry season, higher seed and herbicide costs upfront and, regardless of GSR, no requirement for fertiliser N (a relative advantage over canola in higher rainfall years).

Break-even matrices (Wimmera)

A range of likely costs of production per tonne for each crop type has been determined for typical GSR events and probable yields. This makes it possible to develop break-even matrices (Table 4) for a range of likely prices (ex-farm basis). Note that these matrices only show circumstances in which the cost of production is surpassed, they do not reflect individual crop profitability. Compared to lentil, canola has a higher chance of break-even.

TO SUM UP

- Canola yields were higher and least variable in the Western District and most variable in the Mallee.
- Canola yield variability can be reduced at the farm level by utilising stored water and optimising the use of growing season rainfall through early sowing and good agronomic practices.
- Despite the common perception of high risk, canola was not always the riskiest crop grown.
- Canola has a high cost of production, so it is imperative to minimise yield variability and to have reduced 'exposure' in lower rainfall regions.
- Canola's cost of production (per tonne of grain produced) relative to lentils is lower in low rainfall environments (less than 225 mm) and would therefore be a viable alternative to lentils in these environments.

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THE COMMERCIAL VIEW

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Steve Marcroft.

Compared to wheat, canola is a relatively new crop to Australian agriculture. Since the commercialisation of cultivars with improved yield, blackleg resistance and oil quality, the industry has grown from a few hectares to an average area exceeding one million hectares per annum.

Canola has been credited with increased cereal yields through rotational disease control and better weed management. In the higher rainfall regions of Australia, canola production is secure and is viewed as a vital part of those farming systems. Unfortunately, a decade of lower than average rainfall has seen canola area decline in the medium to lower rainfall regions. But when asked, most growers in these regions plan to grow canola when the seasons improve.

Liam Lenaghan and Kate Burke's paper is featured in the recently launched publication *Raising the bar with better canola agronomy*. This publication aims to increase the reliability of canola production by sharing the knowledge and experience of leading canola producers. It contains the results from the *Better Canola* demonstration trials which are aimed at overcoming specific issues for canola production.

The *Better Canola* project is jointly funded by the Grains Research and Development Corporation and the Australian Oilseeds Federation. The project provides much needed support for oilseed growers, aiming to lift the productivity of oilseed crops, ensuring critical mass, consistency of production and improving the quality of grain.

Australian oilseed production peaked in 1999, but the peak was less than what many analysts believed was the potential. In recent years, lower rainfall and/or lower prices has resulted in the crop area declining from the 1999 peak and has also contributed to oilseeds disappearing from some farms in traditional growing areas.

The *Better Canola* project aims to put aside the weather and price factors and to look at ways to support the industry. The project outcome is for the industry to improve the skill level of advisors and growers enabling them to more reliably produce oilseeds under our current climatic conditions and to be able to take advantage of more favourable seasons when they return.

For more information on *Raising the bar with better canola agronomy*, visit www.grdc.com.au and go to the Events & Publications page.