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Quality of Australian Canola 2007/08

AOF Australian Oilseeds Federation

NSW DEPARTMENT OF PRIMARY INDUSTRIES

Quality of Australian Canola 2007

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Acknowledgments

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Introduction

Sample Analysis

Canola samples representing the 2007 harvest were received from the bulk handlers in New South Wales, South Australia, Victoria and Western Australia. These samples are representative of the seed collected at each of their receival points and have been taken to cumulatively represent the Australian harvest. The Department of Primary Industries Australian Oils Research Laboratory has no control over the collection of the samples and all data given is based on the analysis of the samples provided.

Each sample was analysed for oil, protein and glucosinolate concentrations; fatty acid profiles and volumetric grain weights according to the standard AOF methods outlined in the methods section at the back of this book. The Department of Primary Industries Australian Oils Research Laboratory in Wagga Wagga performed all analyses on the samples. Oil and glucosinolate concentrations are reported at 6 % moisture in whole seed and protein is reported in oil-free meal at 10 % moisture.

Breeding Trials

The "National *Brassica* Improvement Project" ceased to exist in mid 2007. The discontinuation of a public breeding program means that the 'Quality of Australian Canola' booklet will no longer be able to provide quality data on potentially new cultivars.

Weather Production Review

The Season

For the fifth consecutive year, most Australian canola growing districts again experienced a variable start to the 2007 season.

In Western Australia, the southern and south coastal districts received good falls of rain during March and early April which built up subsoil moisture levels and enabled the majority of sowings to be completed on time in these areas. In the central districts rainfall was lighter but sufficient to enable the majority of the intended crop area to be sown on time. However, the northern region around Geraldton received only patchy autumn and winter rain limiting sowing opportunities and resulting in most of the intended crop not being sown.

Slightly above average temperatures combined with generally adequate falls of rain throughout the winter and early spring, especially in the southern districts (which also had good levels of stored soil moisture) resulted in good crop growth throughout most of the season. The exception to this was some sections of the central districts where rainfall was a little more patchy. Favourable rainfall and temperature conditions throughout flowering further enhanced crop prospects and subsequent yield potentials for most southern and some central districts. For the second consecutive year harvest yields in most districts were above the long term average. The final production estimates for Western Australia for the 2007 season were around 665,000 tonnes from a harvested area of 390,000 ha. By comparison production for the 2006 season was around 365,000 tonnes from a harvested area of 300,000 ha. The generally favourable growing conditions, especially the mild temperatures experienced during seed development also resulted in larger than normal sized seed with seed oil contents being well above the long term average. In the southern port zones oil contents of seed receivals averaged between 43 and 44%.

In South Australia good falls of rain were received in March on the Eyre Peninsula and in the mid north districts and again in late April across all districts enabling the majority of the crop to be sown on time. Despite periods of dry, warmer weather the crop progressed well during winter but many districts, particularly those in the lower rainfall zones, suffered a set back due to variable early spring rainfall which ultimately impacted on yields. Final estimated production for South Australia for the 2007 season was around 155,000 tonnes of seed from a harvested area of 155,000 ha. By comparison production in 2006 was estimated at 75,000 tonnes from an estimated harvested area of 110,000 ha.

Although the early autumn period was dry, good falls of rain fell across Victoria in late April-early May resulting in the best autumn break the state had experienced for many years. This enabled the majority of the crop to be sown on time in most districts although there were some late sown crops planted in the Mallee region. Across all regions early crop growth was excellent but unfortunately the onset of record dry late winter conditions resulted in many crops, particularly those in the Mallee district, suffering from severe moisture stress during the critical growth stages of stem elongation and flowering. As a consequence of the adverse conditions a significant area of crop was grazed out or cut for

hay in the Mallee and parts of the Wimmera districts. However, in the major canola growing area in the Western districts crops experienced better spring conditions which lifted prospects for yields and seed oil levels. Final estimated production for Victoria for 2007 was around 200,000 tonnes from a harvested area of 150,000 ha out of the 270,000 ha estimated to have been sown. In the 2006 season production was estimated at 42,000 tonne of seed from the 75,000 ha harvested although 213,000 ha were estimated to have been sown. Due to the better finishing conditions experienced in the Western districts seed oil levels were higher than otherwise would have been expected.

In New South Wales all canola growing areas experienced a variable late autumn break but rainfall was sufficient to allow a more timely sowing for most of the crop in comparison to the previous few seasons. However, the biggest concern for growers was that the majority of the crop was sown without significant sub soil moisture reserves meaning that good winter and spring rainfall was essential for crops to be successful. Unfortunately the required good, widespread rainfall did not eventuate resulting in the majority of the crop across the state being grazed out or cut for hay or silage. As a consequence of the difficult season and drought conditions that the crop experienced for most of the year, it was estimated that only 58,000 ha out of the 240,000 ha sown was eventually harvested for a final estimated production of 44,000 tonnes. However, this was an improvement on the 2006 season when only 40,000 ha were harvested from a sown area of 180,000 ha for a final production of about 30,000 tonnes. Oil contents for the 2007 harvest were also low due to the extreme drought conditions experienced during flowering and pod fill.

As a consequence of the seasonal conditions, the reported incidence of diseases was very generally low in all states. However, in NSW there were reports of significant levels of seedling blackleg occurring in crops sown into paddocks that had grown canola in 2005. This occurred as a consequence of the drought conditions experienced throughout 2006 which prevented canola stubble from breaking down with a subsequent release of blackleg spores following the autumn rain in 2007.

Likewise with insect pests there were few problems experienced until the spring when there were reports of stressed crops experiencing a build up of aphids with some requiring control measures.

Overall the 2007 season was variable with Western Australia experiencing a good season with a favourable finish whilst the eastern states, and NSW in particular, experiencing a more difficult season. Unfortunately the high costs involved in growing a successful crop combined with a run of difficult seasons has made growers wary of committing to a large scale return to planting canola.

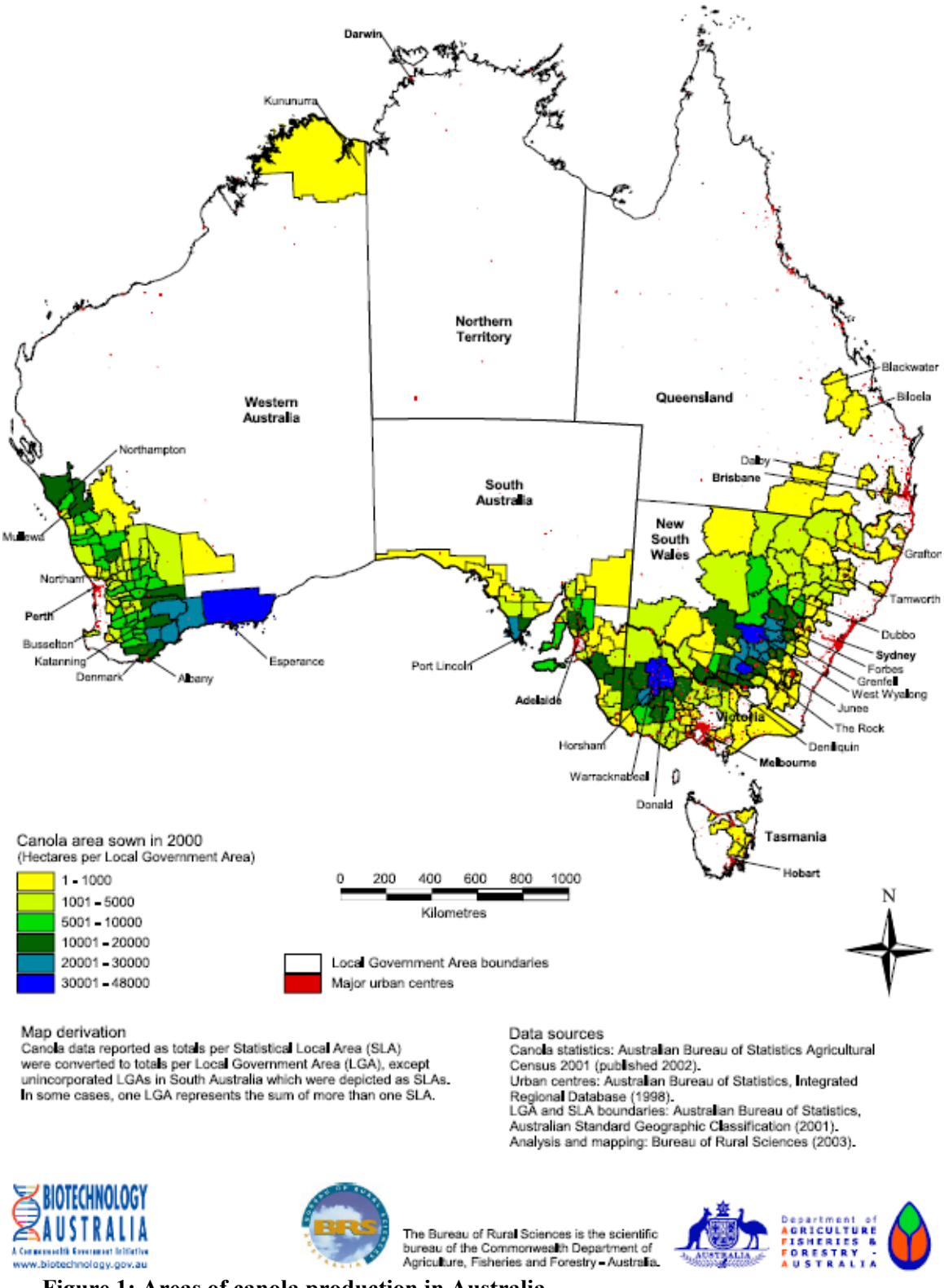

Figure 1: Areas of canola production in Australia
Published with approval of Biotechnology Australia

Yield

The 2007 canola harvest was more than double the 2006 harvest. In 2007 there was 758,000 hectares harvested, this was over 200,000 hectares more than the 525,000 hectares harvested in 2006. A higher yield on top of the increased area harvested resulted in 1,069,000 tonnes harvested in 2007 compared to the 512,000 tonnes harvested in 2006. The yield varied from a state average of 0.8 t/ha in New South Wales to 1.7 t/ha in Western Australia. The national yield of 1.4 t/ha was 0.4 t/ha higher than the 2006 average.

Table 1: Canola production in Australia by state 2007

State	Production (kilotonnes)	Area (kilohectares)	Average Yield (tonnes/hectare)
New South Wales	44	58	0.8
Victoria	200	150	1.3
South Australia	155	160	1.0
Western Australia	670	390	1.7
Australia	1069	758	1.4

Source: AOF Crop Report February 2008

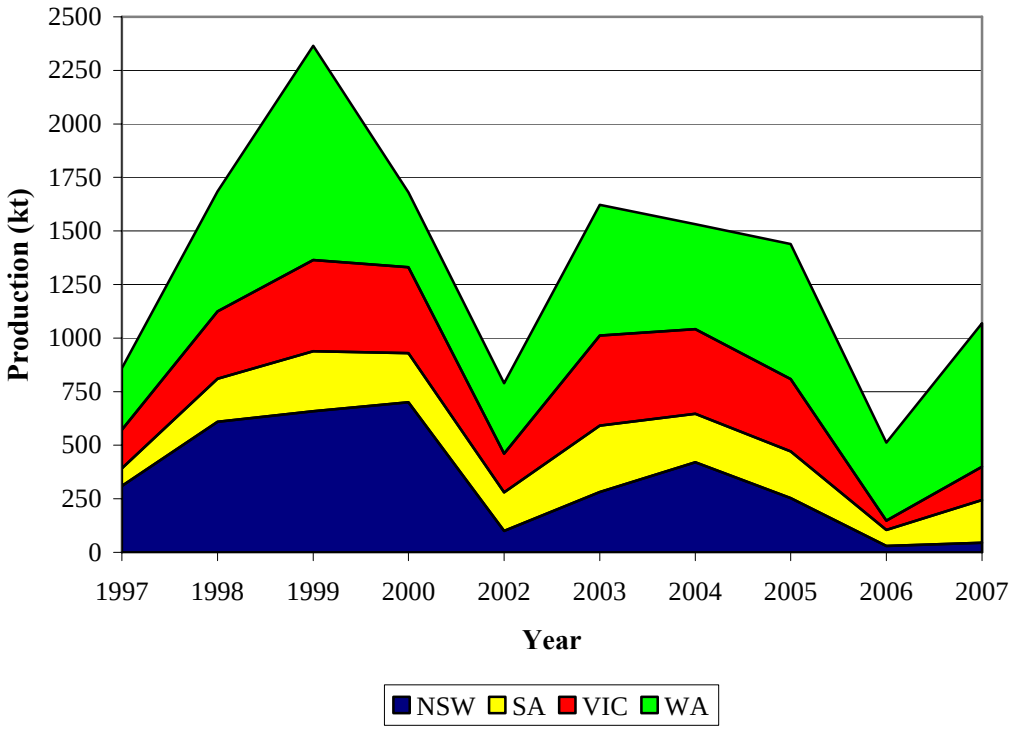

Figure 2: Canola Production in Australia 1997 – 2007

Australian Quality Parameter Summary

The division, state and Australian mean values for all analyses are calculated on the basis of the tonnage that each site represents. Tonnages for each site were not received from Western Australia, only the state total. This means that the Western Australia state mean (calculated from the individual sites) wasn't adjusted for tonnage but the Australian mean was. Due to tonnages being confidential information, no individual site tonnages can be reported.

Table 2: Average quality of Australian canola 2007

Quality Parameter	Australian Mean
Oil content, % in whole seed @ 6 % moisture	44.0
Protein content, % in oil-free meal @ 10 % moisture	40.0
Glucosinolates, µmoles/g in whole seed @ 6 % moisture	8
Volumetric grain weights, lbs/b	53.5
kg/hL	66.7
Oleic acid concentration (C18:1), % in oil	59.7
Linoleic acid concentration (C18:2), % in oil	20.4
Linolenic acid concentration (C18:3), % in oil	11.0
Erucic acid concentration (C22:1), % in oil	0.0
Saturated fatty acid concentration, % in oil	7.4
Iodine Value	116.6

Oil Content

The average oil content for the 2007 harvest was 44.0 %. This was 1.8 % higher then 2006 and the highest recorded since the inception of this booklet in 1993. Oil content ranged from a low of 34.6 % at Temora ST in New South Wales to a high of 47.7% at Dale in Western Australia.

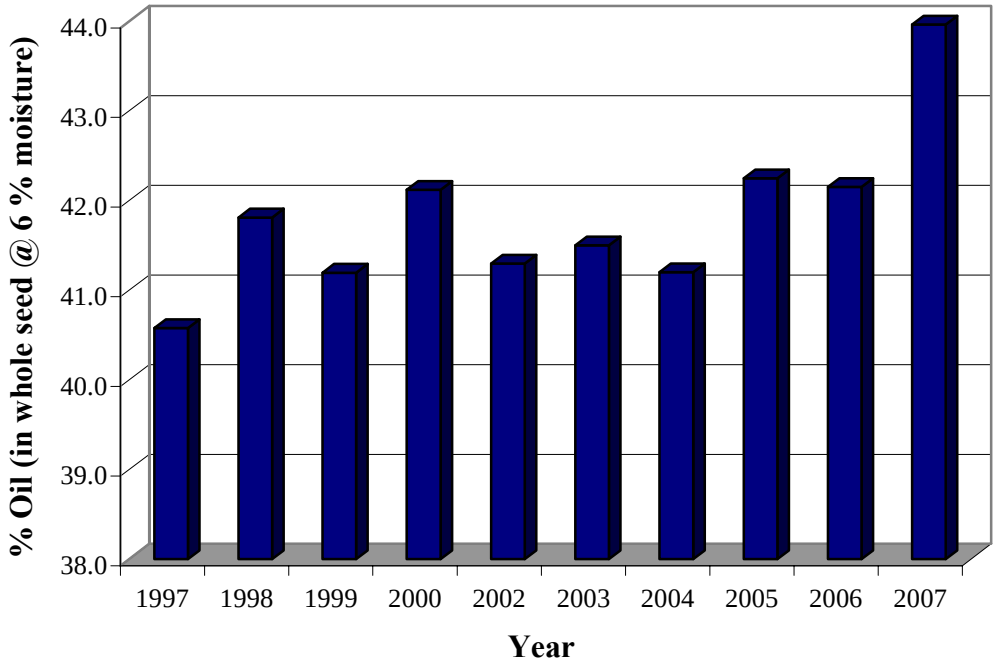

Figure 3: Average Australian oil content 1997 – 2007

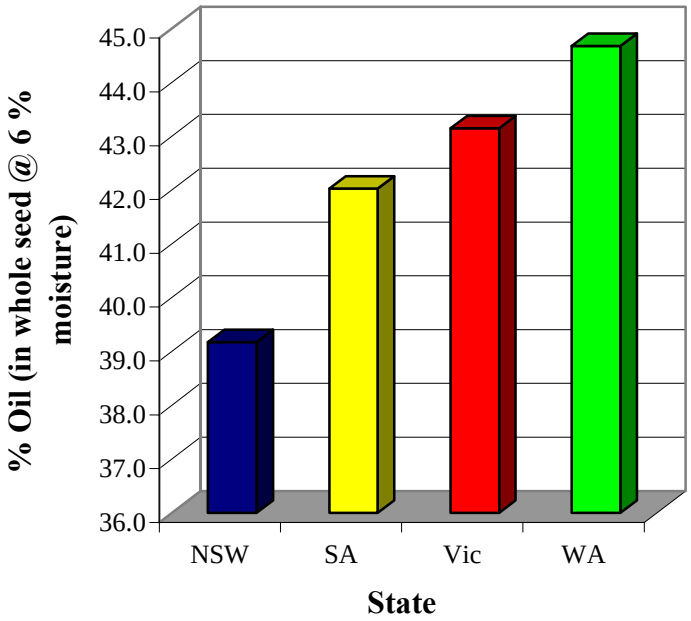

Figure 4: Average oil content by state 2007

Protein Content

The average protein content for the 2007 harvest was 40.0 % in oil free meal. This was a decrease of 0.1 % from the 2006 harvest. Protein content ranged from 36.2 % at Wickepin in Western Australia to 46.9 % at Greenethorpe in New South Wales.

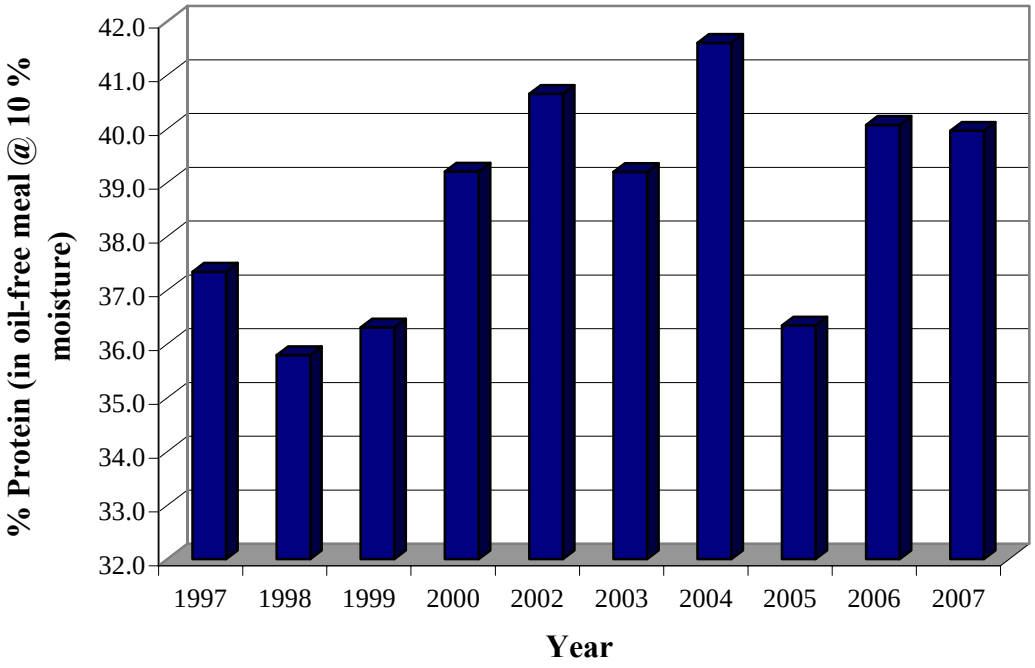

Figure 5: Average Australian protein content 1997 – 2007

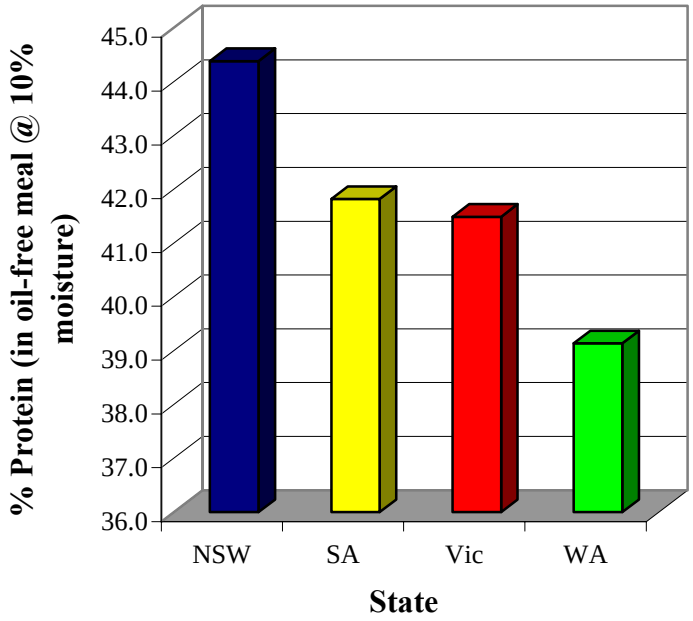

Figure 6: Average protein content by state 2007

Glucosinolate Concentration

The average glucosinolate content for the 2007 harvest was 8 µmoles/g. This was an increase of 4 µmoles/g from the 10 year low of the 2006 harvest. Glucosinolate content ranged from 2 µmoles/g at Dale in Western Australia to 15 µmoles/g at Temora ST in New South Wales.

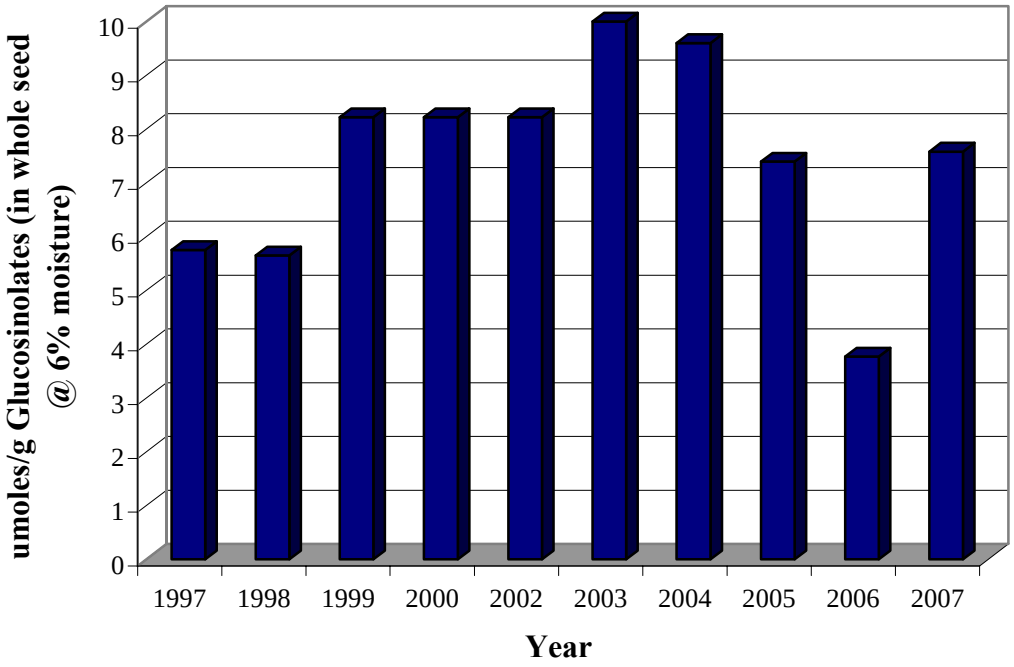

Figure 7: Average Australian glucosinolate content 1997 – 2007

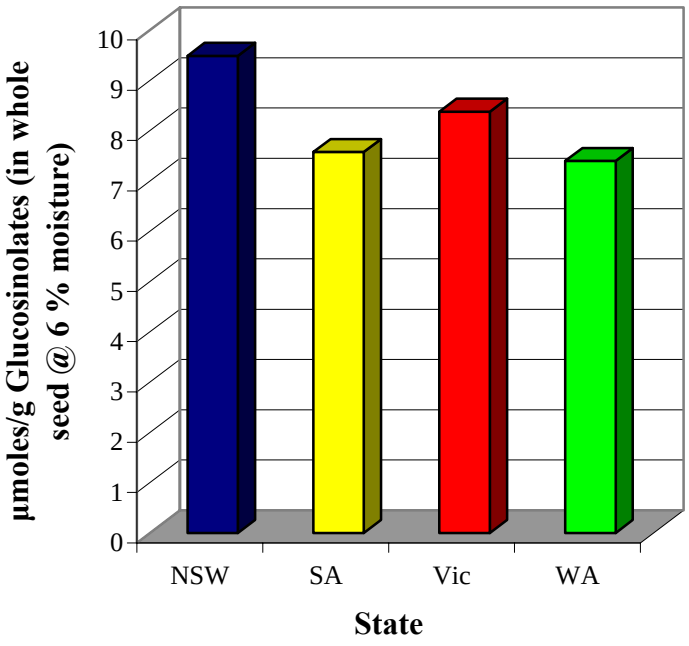

Figure 8: Average glucosinolate content by state 2007

Fatty Acid Composition

Oleic Acid

The average oleic acid (C18:1) concentration in the oil produced from the 2007 harvest was 59.7 %. This was 0.3 % lower than 2006 and the lowest since 1999. The concentration ranged from 56.5 % at Coolamon in New South Wales to 63.1 % at Millicent in South Australia.

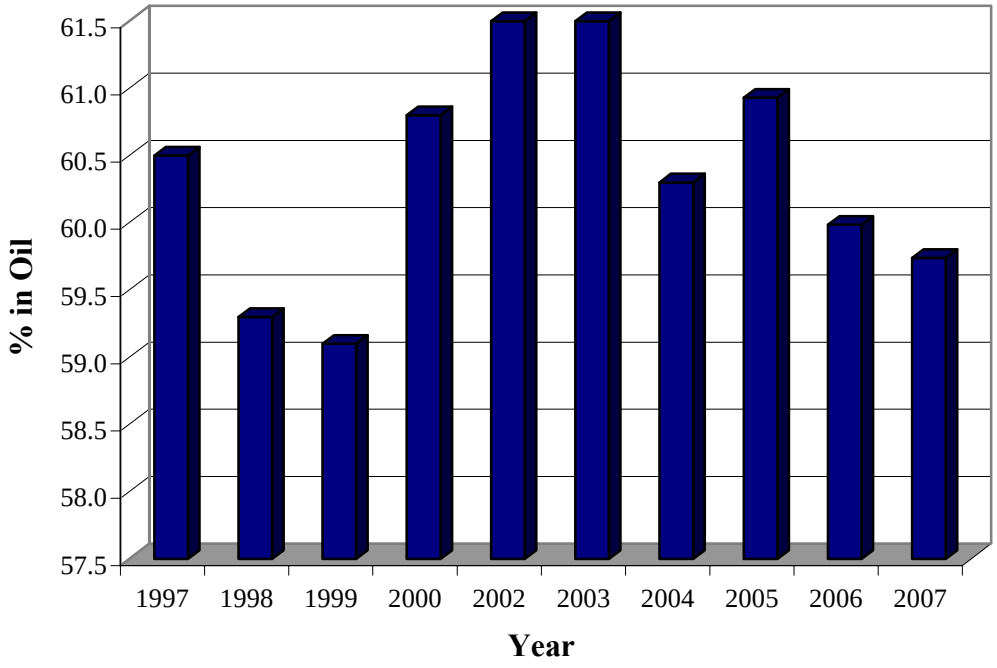

Figure 9: Average Australian oleic acid concentration in canola oil 1997 – 2007

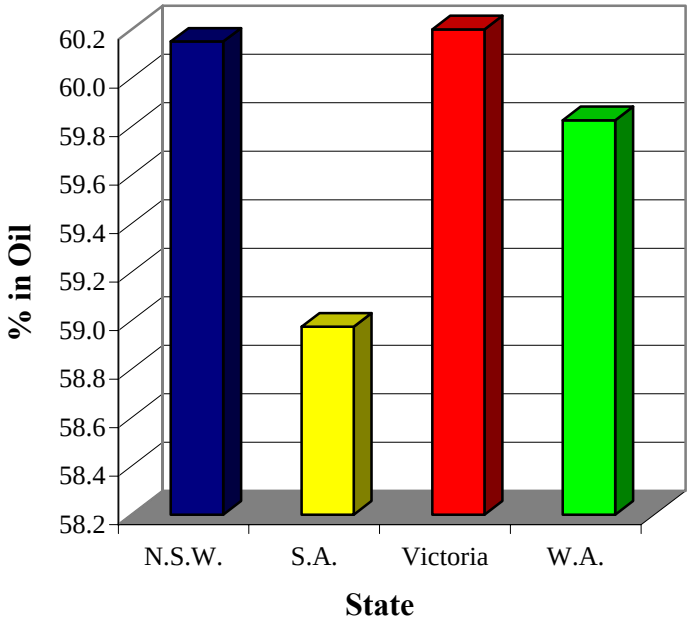

Figure 10: Average oleic acid concentration by state 2007

Linoleic Acid

The average linoleic acid (C18:2) concentration in oil produced from the 2007 harvest was 20.4 % this was 0.2 % higher than 2006 and the highest since 1993. The concentration ranged from 18.1 % at Millicent in South Australia to 22.8 % at Boree Creek in New South Wales.

Linolenic Acid

There was a decrease of 0.1 % in the linolenic acid (C18:3) concentration to 11.0 %. This was the first fall in four years. Linolenic acid concentrations ranged from 9.2 % at Greenethorpe and Temora ST in New South Wales to 12.2 % at Ungarra in Victoria.

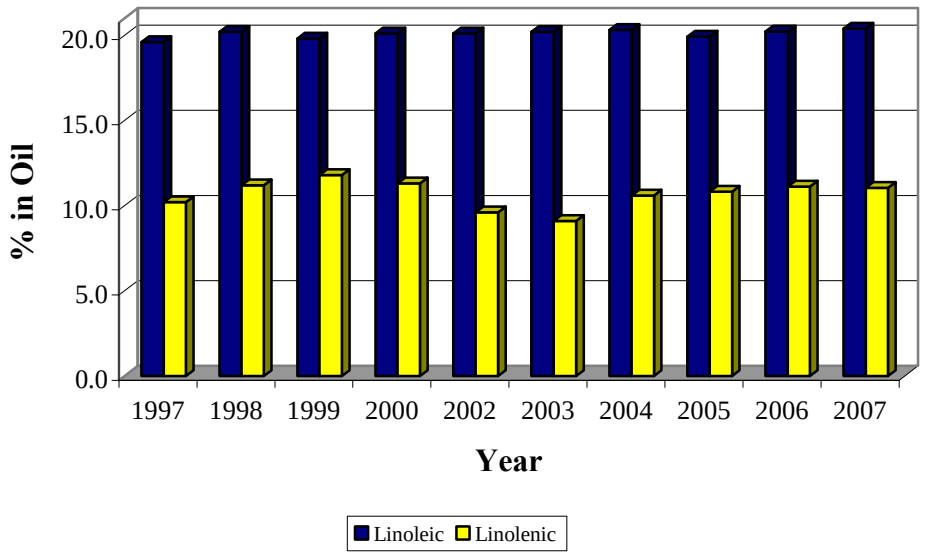

Figure 11: Average Australian linoleic acid and linolenic concentration in canola oil 1997 – 2007

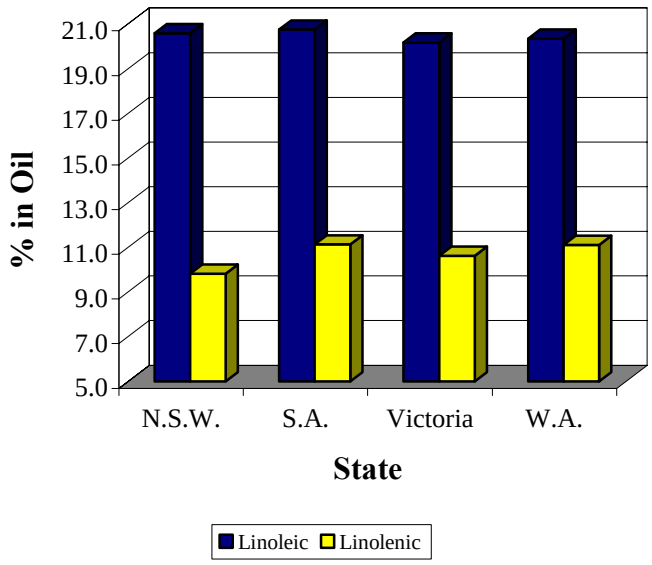

Figure 12: Average linoleic acid and linolenic acid concentration by state 2007

Saturated Fatty Acid

The average saturated fatty acid concentration was 7.4 %. This was a 0.2 % increase from the 2006 harvest. Saturated fatty acid concentration ranged from 6.8 % at Narembeen in Western Australia to 9.0 % at Tocumwal. Although Tocumwal is in New South Wales the sample was received from ABB, South Australia and calculated into the South Australian mean.

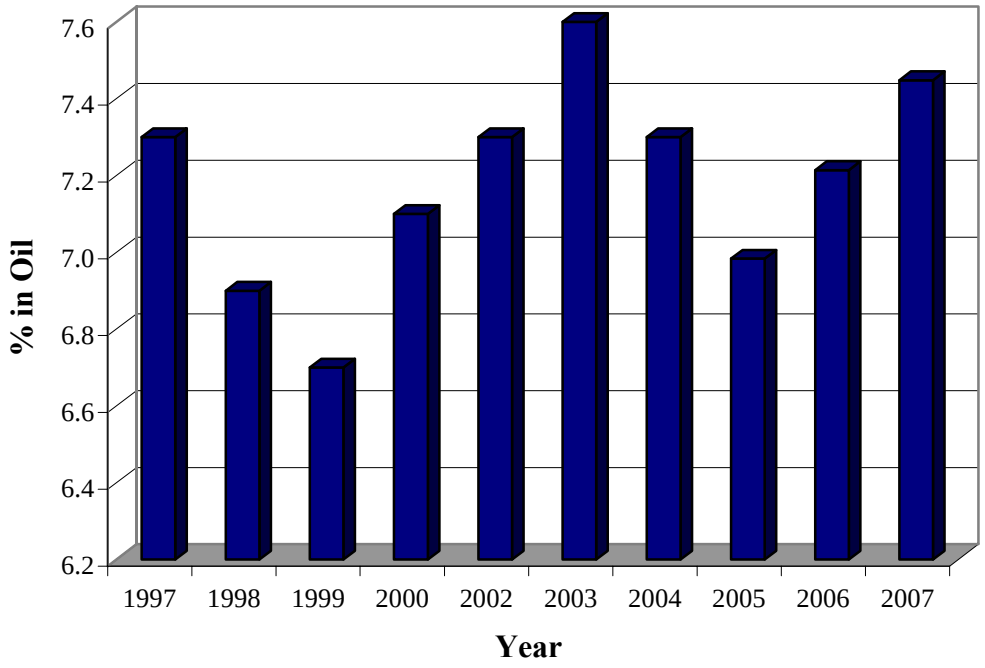

Figure 13: Average Australian saturated fatty acid concentration in canola oil 1997 – 2007

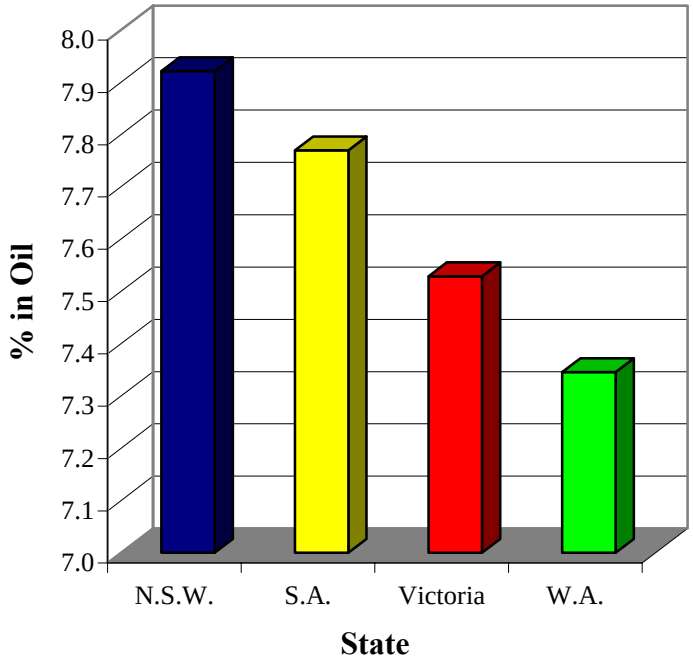

Figure 14: Average saturated fatty acid concentration by state 2007

Quality Data by State

Quality Data – New South Wales

Table 3: Quality Data – New South Wales

Division/ Region/ Receival Site	[1] Oil	[2] Protein	[3] Glucosinolates µmoles/g	[4] Grain Weight lbs/b	kg/hL
Central					
Parkes					
Bribbaree	36.5	46.2	10	51.7	64.5
Caragabal	36.2	46.5	10	53.8	67.0
Greenethorpe	37.9	46.9	9	52.6	65.5
Milvale	37.6	44.7	10	53.4	66.5
Wagga Wagga					
Boree Creek	37.4	44.1	8	52.1	65.0
Coolamon	37.4	44.9	9	52.6	65.5
Cootamundra	39.5	45.9	9	52.6	65.5
Grong Grong	40.5	45.5	10	53.4	66.5
Harden	39.3	45.6	9	52.6	65.5
Henty West	38.1	44.6	12	53.4	66.5
Junee ST	36.9	45.0	10	52.1	65.0
Wyalong					
Barellan	41.7	39.3	10	50.5	63.0
Merriwagga	40.5	42.6	9	54.2	67.5
Temora ST	34.6	43.8	15	46.5	58.0
Central Mean	**39.2**	**44.4**	**9**	**52.4**	**65.3**
NSW Mean	**39.2**	**44.4**	**9**	**52.4**	**65.3**

[1] % in whole seed @ 6% moisture, [2] % in oil free meal @10% moisture, [3] µmoles/g in whole seed @ 6% moisture

[4] Volumetric Grain Weights- lbs/b: Pounds per bushel, kg/hL: Kilograms per hectolitre

Quality Data – South Australia

Table 4: Quality Data – South Australia

Region/ Receival Site	[1] Oil	[2] Protein	[3] Glucosinolates µmoles/g	[4] Grain Weight lbs/b	kg/hL
Ardrossan & Port Giles					
Ardrossan	41.0	41.0	7	55.0	68.5
Eyre Peninsula					
Cummins	41.8	42.8	9	53.8	67.0
Port Lincoln	41.7	42.6	8	53.8	67.0
Rudall	39.2	43.0	9	53.0	66.0
Ungarra	40.4	43.3	8	52.6	65.5
Yeelanna	39.8	43.5	6	52.6	65.5
North Area					
Andrews	43.0	42.7	7	53.4	66.5
Bowmans	41.2	42.6	7	53.0	66.0
Roseworthy	43.7	40.9	7	53.4	66.5
Port Adelaide & KI					
Kingscote	45.5	40.3	8	54.2	67.5
Port Adelaide	42.3	40.9	6	52.1	65.0
South East					
Frances	43.0	42.3	8	53.8	67.0
Keith	42.0	41.8	7	53.8	67.0
Millicent	43.6	41.4	7	53.0	66.0
Tailem Bend	40.8	41.6	8	53.8	67.0
Wolseley	42.1	42.1	7	53.8	67.0
Southern NSW					
The Rock	38.6	44.4	10	53.4	66.5
Tocumwal	43.1	38.7	6	53.8	67.0
Victoria					
Tatyoon North	43.7	41.4	8	54.6	68.0
SA Mean	**42.0**	**41.8**	**8**	**53.8**	**67.1**

[1] % in whole seed @ 6% moisture, [2] % in oil free meal @10% moisture, [3] µmoles/g in whole seed @ 6% moisture

[4] Volumetric Grain Weights- lbs/b: Pounds per bushel, kg/hL: Kilograms per hectolitre

Quality Data – Victoria

Table 5: Quality Data – Victoria

Division/ Region/ Receival Site	[1] Oil	[2] Protein	[3] Glucosinolates µmoles/g	[4] Grain Weight lbs/b	kg/hL
Southern					
Horsham					
Berrybank	45.4	40.2	8	53.8	67.0
Beulah ST	39.4	40.3	7	53.4	66.5
Carpolac	43.0	41.8	7	53.4	66.5
Hamilton	44.9	40.9	5	53.0	66.0
Horsham	42.4	41.3	9	52.6	65.5
Lillimur	41.6	42.2	5	53.8	67.0
Marmalake	41.2	43.1	8	51.3	64.0
Naracoorte	43.2	40.6	10	53.4	66.5
Natimuk	42.4	41.4	7	53.4	66.5
Nhill	40.9	42.0	7	53.0	66.0
Skipton	44.3	40.9	9	53.0	66.0
Warracknabeal ST	39.4	41.9	10	53.4	66.5
Westmere	44.4	41.3	9	53.0	66.0
Willaura	43.2	41.6	9	52.6	65.5
Marong					
Deniliquin	43.1	42.3	7	52.1	65.0
Donald Street	40.2	42.0	8	53.0	66.0
Dookie Street	40.3	42.8	10	53.0	66.0
Dunolly	40.9	43.0	11	52.1	65.0
Echuca	41.7	42.3	8	53.0	66.0
Elmore	41.7	42.1	9	52.6	65.5
Murchison East	40.5	41.7	8	53.4	66.5
Raywood	40.9	41.3	9	53.4	66.5
Yarrawonga ST	38.7	43.8	8	53.4	66.5
Swan Hill					
Quambatook ST	39.1	41.8	9	53.8	67.0
Vic Mean	**43.2**	**41.5**	**8**	**53.0**	**66.0**

[1] % in whole seed @ 6% moisture, [2] % in oil free meal @10% moisture, [3] µmoles/g in whole seed @ 6% moisture

[4] Volumetric Grain Weights- lbs/b: Pounds per bushel, kg/hL: Kilograms per hectolitre

Quality Data – Western Australia

Table 6: Quality Data – Western Australia

Region/ Receival Site	[1] Oil	[2] Protein	[3] Glucosinolates µmoles/g	[4] Grain Weight lbs/b	kg/hL
Albany					
Albany	46.1	38.5	7	54.2	67.5
Borden	45.0	38.7	7	54.2	67.5
Boyup	46.7	39.4	8	53.0	66.0
Cranbrook	46.8	37.7	6	53.8	67.0
Gairdener	45.2	40.9	7	53.4	66.5
Hyden	41.5	42.7	10	53.8	67.0
Jacup	44.3	39.5	7	53.4	66.5
Katanning	47.2	37.2	6	53.4	66.5
Kojoneerup	46.2	39.7	8	53.8	67.0
Kojonup	46.5	37.4	6	53.8	67.0
Newdgate	43.0	40.1	8	53.8	67.0
Tambellup	45.5	37.3	6	53.8	67.0
Wagin	46.1	37.4	7	53.4	66.5
Wellstead	45.6	41.1	7	53.4	66.5
Esperance					
Beumont	45.3	38.7	6	54.2	67.5
Cascade	44.1	40.1	6	54.2	67.5
Esperance	46.3	38.6	5	54.6	68.0
Lake Varley	42.8	42.2	8	54.6	68.0
Mount Madden	42.9	39.5	10	51.3	64.0
Munglinup	46.2	40.4	7	54.2	67.5
Ravensthorpe	44.0	39.2	8	52.6	65.5
West River	42.1	39.8	8	52.6	65.5
Geraldton					
Geraldton	42.2	41.9	9	53.4	66.5
Kwinana East					
Bulyee	44.5	38.0	9	53.4	66.5
Narembeen	42.2	39.9	12	53.4	66.5
Wickepin	43.6	36.2	8	55.0	68.5
Kwinana West					
Avon	43.6	39.0	9	53.8	67.0
Brookton	45.9	38.1	7	53.0	66.0
Dale	47.7	37.7	2	52.6	65.5
Konnongorring	42.7	39.7	10	54.6	68.0
Mogumber	44.2	39.1	6	54.2	67.5
Moora	43.3	39.7	8	53.4	66.5
Narrakine	47.2	37.9	5	52.6	65.5
Quairading	44.1	38.1	9	53.8	67.0
Yerecoin	42.4	39.4	7	53.4	66.5
York	45.5	38.4	6	53.8	67.0
WA Mean	**44.7**	**39.1**	**7**	**53.6**	**66.8**

[1] % in whole seed @ 6% moisture, [2] % in oil free meal @10% moisture, [3] µmoles/g in whole seed @ 6% moisture

[4] Volumetric Grain Weights- lbs/b: Pounds per bushel, kg/hL: Kilograms per hectolitre

Fatty Acid Composition by State

Fatty Acid Composition – New South Wales

Table 7: Fatty Acid Composition – New South Wales

Division/ Region/ Receival Site	**14:0**	**16:0**	**16:1**	**18:0**	**18:1**	**18:2**	**18:3**	**20:0**	**20:1**	**22:0**	**22:1**	**24:0**	**24:1**	**Total**	**[1] Sat.**	**[2]Iodine Value**
Central																
Parkes																
Bribbaree	0.1	4.8	0.4	2.2	58.6	21.8	9.8	1.0	0.9	0.2	0.1	0.1	0.1	100.0	8.4	114.8
Caragabal	0.1	4.8	0.3	2.2	57.4	22.2	10.9	0.5	1.0	0.3	0.0	0.1	0.1	100.0	8.0	117.4
Greenethorpe	0.1	4.7	0.3	2.1	60.4	20.9	9.2	0.5	1.1	0.3	0.0	0.2	0.1	100.0	7.9	113.4
Milvale	0.1	4.8	0.3	2.1	58.1	22.1	10.0	1.1	0.9	0.2	0.0	0.1	0.1	100.0	8.4	115.4
Wagga Wagga																
Boree Creek	0.1	4.9	0.3	2.1	56.7	22.8	11.1	0.5	1.0	0.3	0.0	0.1	0.1	100.0	7.9	118.3
Coolamon	0.1	4.8	0.4	2.3	56.5	22.1	11.6	0.6	1.1	0.3	0.1	0.2	0.1	100.0	8.2	118.4
Cootamundra	0.1	4.7	0.3	2.2	60.3	20.6	9.5	0.9	0.9	0.2	0.0	0.1	0.1	100.0	8.3	113.3
Grong Grong	0.1	4.6	0.3	2.3	57.3	22.1	11.5	0.4	0.9	0.2	0.1	0.1	0.1	100.0	7.7	118.7
Harden	0.1	4.6	0.3	2.1	60.6	20.1	10.0	0.5	1.1	0.3	0.0	0.2	0.1	100.0	7.7	114.3
Henty West	0.1	4.8	0.4	2.1	60.9	20.3	9.4	0.5	1.1	0.3	0.0	0.2	0.1	100.0	7.9	113.2
Junee ST	0.1	4.9	0.4	2.2	58.4	21.9	10.0	0.5	1.1	0.3	0.0	0.2	0.2	100.0	8.2	115.3
Wyalong																
Barellan	0.1	4.4	0.3	2.3	61.4	19.7	9.7	0.9	0.9	0.2	0.0	0.1	0.1	100.0	7.9	113.3
Merriwagga	0.1	4.7	0.3	2.3	59.8	20.6	10.0	0.6	1.0	0.3	0.0	0.2	0.1	100.0	8.1	114.4
Temora ST	0.1	5.2	0.4	2.1	57.7	22.7	9.2	1.1	0.9	0.3	0.0	0.2	0.1	100.0	8.9	114.2
Central Mean	**0.1**	**4.7**	**0.3**	**2.2**	**60.1**	**20.6**	**9.8**	**0.6**	**1.0**	**0.3**	**0.0**	**0.1**	**0.1**	**100.0**	**7.9**	**114.2**
N.S.W. Mean	**0.1**	**4.7**	**0.3**	**2.2**	**60.1**	**20.6**	**9.8**	**0.6**	**1.0**	**0.3**	**0.0**	**0.1**	**0.1**	**100.0**	**7.9**	**114.2**

[1]Sat - Sum of the saturated fatty acids including 14:0, 16:0, 18:0, 20:0 and 24:0

[2] Iodine Value - Calculated from the fatty acid composition

Fatty Acid Composition – South Australia

Table 8: Fatty Acid Composition – South Australia

Region/ Receival Site	**14:0**	**16:0**	**16:1**	**18:0**	**18:1**	**18:2**	**18:3**	**20:0**	**20:1**	**22:0**	**22:1**	**24:0**	**24:1**	**Total**	**[1] Sat.**	**[2]Iodine Value**
Ardrossan & Port Giles																
Ardrossan	0.1	4.5	0.3	1.9	57.7	21.6	11.9	0.5	1.0	0.2	0.0	0.1	0.1	100.0	7.3	119.3
Eyre Peninsula																
Port Lincoln	0.1	4.9	0.3	1.9	57.9	21.5	11.4	0.8	0.9	0.2	0.0	0.1	0.1	100.0	7.9	117.9
Yeelanna	0.1	4.7	0.3	1.9	57.4	21.4	11.8	1.0	0.9	0.2	0.0	0.1	0.1	100.0	7.9	118.5
Cummins	0.1	4.7	0.3	1.9	57.6	21.6	11.9	0.6	1.0	0.2	0.0	0.1	0.1	100.0	7.5	119.0
Ungarra	0.1	4.6	0.3	1.9	57.0	22.0	12.2	0.5	1.0	0.2	0.1	0.1	0.1	100.0	7.3	120.1
Rudall	0.1	4.7	0.3	1.9	56.8	22.6	11.7	0.4	0.9	0.2	0.1	0.1	0.1	100.0	8.0	119.7
Northern Area																
Andrews	0.1	4.4	0.3	2.0	60.5	19.6	11.0	0.4	1.0	0.2	0.1	0.1	0.1	100.0	7.3	116.1
Roseworthy	0.1	4.5	0.3	2.1	60.9	19.5	9.5	1.8	0.9	0.2	0.0	0.1	0.1	100.0	8.7	112.1
Bowmans	0.1	4.7	0.3	2.0	59.3	20.4	11.0	0.9	0.9	0.2	0.0	0.1	0.1	100.0	7.9	116.2
Port Adelaide & KI																
Port Adelaide	0.1	4.4	0.3	2.0	59.9	20.2	11.3	0.6	0.9	0.2	0.0	0.1	0.1	100.0	7.3	117.1
Kingscote	0.1	4.5	0.3	1.9	58.9	20.4	11.9	0.4	1.0	0.2	0.0	0.1	0.1	100.0	7.3	118.3
South East																
Tailem Bend	0.1	4.7	0.3	2.0	58.7	20.8	11.3	0.9	0.9	0.2	0.1	0.1	0.1	100.0	7.9	117.0
Frances	0.1	4.9	0.3	1.9	60.8	20.5	9.6	0.8	0.8	0.2	0.0	0.1	0.1	100.0	7.9	113.8
Wolseley	0.1	4.5	0.3	2.1	59.0	20.0	11.9	0.5	1.0	0.2	0.0	0.1	0.1	100.0	7.5	117.8
Millicent	0.1	4.1	0.3	2.2	63.1	18.1	9.9	0.5	1.2	0.3	0.0	0.1	0.1	100.0	7.3	112.7
Keith	0.1	4.6	0.3	2.1	59.7	19.6	11.2	1.0	0.9	0.2	0.0	0.1	0.1	100.0	8.1	115.8
Southern NSW																
The Rock	0.1	4.6	0.3	2.2	60.4	20.7	10.0	0.5	0.9	0.2	0.0	0.1	0.1	100.0	7.7	114.7
Tocumwal	0.1	4.8	0.3	2.5	60.0	20.8	9.3	0.8	0.9	0.2	0.0	0.1	0.1	100.0	9.0	113.1
Victoria																
Tatyoon North	0.1	4.7	0.3	2.0	60.6	20.4	9.8	0.8	0.9	0.2	0.1	0.1	0.1	100.0	7.8	114.2
SA Mean	**0.1**	**4.6**	**0.3**	**2.0**	**59.0**	**20.8**	**11.1**	**0.8**	**0.9**	**0.2**	**0.0**	**0.1**	**0.1**	**100.0**	**7.8**	**116.8**

[1]Sat - Sum of the saturated fatty acids including 14:0, 16:0, 18:0, 20:0 and 24:0

[2] Iodine Value - Calculated from the fatty acid composition

Fatty Acid Composition – Victoria

Table 9: Fatty Acid Composition – Victoria

Division/ Region/ Receival Site	**14:0**	**16:0**	**16:1**	**18:0**	**18:1**	**18:2**	**18:3**	**20:0**	**20:1**	**22:0**	**22:1**	**24:0**	**24:1**	**Total**	**[1] Sat.**	**[2] Iodine Value**
Southern																
Horsham																
Berrybank	0.1	4.5	0.3	1.9	60.1	20.2	11.0	0.4	1.0	0.2	0.1	0.1	0.1	100.0	7.2	116.7
Beulah ST	0.1	4.5	0.4	2.2	59.3	20.8	10.7	1.0	0.7	0.1	0.0	0.1	0.1	100.0	7.9	116.1
Carpolac	0.1	4.3	0.3	2.2	61.1	19.6	10.3	0.8	1.0	0.2	0.0	0.1	0.1	100.0	7.6	114.4
Hamilton	0.1	4.5	0.3	2.0	60.7	19.9	10.7	0.5	0.9	0.2	0.0	0.1	0.1	100.0	7.3	115.7
Horsham	0.1	4.4	0.3	1.9	62.3	18.7	10.0	0.5	1.1	0.3	0.1	0.1	0.1	100.0	7.4	113.3
Lillimur	0.1	4.5	0.3	2.1	60.8	18.9	11.2	0.5	1.0	0.2	0.0	0.1	0.1	100.0	7.5	115.6
Marmalake	0.1	4.4	0.3	2.2	61.2	19.1	10.4	0.7	1.1	0.2	0.0	0.1	0.1	100.0	7.8	114.1
Naracoorte	0.1	4.4	0.3	2.0	58.8	21.1	11.1	0.6	1.1	0.3	0.1	0.1	0.1	100.0	8.0	117.3
Natimuk	0.1	4.5	0.3	2.1	60.7	19.5	10.6	0.8	1.0	0.2	0.0	0.1	0.1	100.0	7.8	114.7
Nhill	0.1	4.6	0.3	2.2	60.4	19.5	10.9	0.8	0.9	0.2	0.0	0.1	0.1	100.0	8.0	115.1
Skipton	0.1	4.5	0.3	2.1	60.0	20.4	10.6	0.5	1.0	0.2	0.0	0.1	0.1	100.0	7.5	115.9
Warracknabeal ST	0.1	4.8	0.4	2.2	58.1	21.5	10.8	0.9	0.9	0.2	0.0	0.1	0.1	100.0	8.2	116.6
Westmere	0.1	4.4	0.3	2.0	59.8	20.7	10.8	0.5	1.0	0.2	0.1	0.1	0.1	100.0	7.3	116.5
Willaura	0.1	4.6	0.3	2.0	60.3	20.5	10.1	0.7	1.0	0.2	0.0	0.1	0.1	100.0	7.7	114.9
Marong																
Deniliquin	0.1	4.6	0.3	2.1	61.7	19.5	10.0	0.6	0.9	0.2	0.0	0.1	0.1	100.0	7.6	113.8
Donald ST	0.1	4.5	0.3	2.1	60.0	20.2	10.8	0.7	1.0	0.2	0.0	0.1	0.1	100.0	7.7	115.7
Dookie ST	0.1	4.7	0.3	2.0	61.0	20.4	9.4	0.7	1.0	0.2	0.0	0.1	0.1	100.0	7.8	113.3
Dunolly	0.1	4.5	0.3	2.1	59.5	20.4	10.9	0.5	1.1	0.3	0.0	0.2	0.1	100.0	7.7	116.1
Echuca	0.1	4.5	0.3	2.0	63.0	18.3	9.9	0.5	1.0	0.2	0.0	0.1	0.1	100.0	7.4	112.8
Elmore	0.1	4.6	0.3	2.1	60.8	20.0	10.0	0.5	1.1	0.2	0.1	0.1	0.1	100.0	7.6	114.2
Murchison East	0.1	4.8	0.3	2.1	60.4	20.6	9.7	0.8	0.9	0.2	0.0	0.1	0.1	100.0	8.0	114.0
Raywood	0.1	4.4	0.3	2.1	62.3	18.9	9.8	0.4	1.1	0.2	0.1	0.1	0.1	100.0	7.4	113.1
Yarrawonga ST	0.1	4.8	0.3	2.1	60.1	20.8	9.7	0.7	1.0	0.2	0.1	0.1	0.1	100.0	7.9	114.2
Swan Hill																
Quambatook ST	0.1	4.5	0.4	2.1	57.9	21.4	11.5	0.5	1.0	0.2	0.1	0.1	0.1	100.0	7.6	118.3
Vic Mean	**0.1**	**4.5**	**0.3**	**2.0**	**60.2**	**20.2**	**10.6**	**0.6**	**1.0**	**0.2**	**0.0**	**0.1**	**0.1**	**100.0**	**7.5**	**115.7**

[1] Sat - Sum of the saturated fatty acids including 14:0, 16:0, 18:0, 20:0 and 24:0

[2] Iodine Value - Calculated from the fatty acid composition

Fatty Acid Composition – Western Australia

Table 10: Fatty Acid Composition – Western Australia

Region/ Receival Site	14:0	16:0	16:1	18:0	18:1	18:2	18:3	20:0	20:1	22:0	22:1	24:0	24:1	Total	[1] Sat.	[2] Iodine Value
Albany																
Albany	0.1	4.4	0.3	1.9	60.0	19.9	11.7	0.4	0.8	0.2	0.0	0.1	0.1	100.0	7.1	117.7
Borden	0.1	4.5	0.3	1.9	59.3	20.5	11.6	0.5	0.9	0.2	0.1	0.1	0.1	100.0	7.2	117.8
Boyup	0.1	4.2	0.3	1.9	60.5	18.9	12.0	0.4	1.0	0.2	0.2	0.1	0.1	100.0	6.9	117.5
Cranbrook	0.1	4.4	0.3	2.0	60.3	19.5	11.5	0.5	0.9	0.2	0.1	0.1	0.1	100.0	7.2	116.9
Gairdener	0.1	4.5	0.3	1.9	58.4	20.9	12.1	0.4	0.9	0.2	0.0	0.1	0.1	100.0	7.2	119.2
Hyden	0.1	4.5	0.3	1.9	61.4	19.5	10.2	0.8	1.0	0.2	0.1	0.1	0.1	100.0	7.0	114.4
Jacup	0.1	4.5	0.3	2.0	59.0	20.8	11.5	0.5	0.9	0.2	0.1	0.1	0.1	100.0	7.3	117.9
Katanning	0.1	4.4	0.3	2.0	60.4	19.7	11.4	0.4	0.9	0.2	0.0	0.1	0.1	100.0	7.2	116.8
Kojoneerup	0.1	4.3	0.3	1.8	59.6	20.1	12.0	0.4	0.9	0.2	0.0	0.1	0.1	100.0	6.9	118.6
Kojonup	0.1	4.7	0.3	2.0	59.7	19.9	11.4	0.6	0.9	0.2	0.1	0.1	0.1	100.0	7.6	116.7
Newdgate	0.1	4.9	0.4	1.7	57.9	21.6	11.4	0.6	0.9	0.2	0.0	0.1	0.1	100.0	7.7	118.2
Tambellup	0.1	4.6	0.3	2.0	59.7	19.6	11.7	0.6	0.9	0.2	0.1	0.1	0.1	100.0	7.6	116.9
Wagin	0.1	4.4	0.3	2.0	60.1	19.9	11.4	0.4	0.9	0.2	0.1	0.1	0.1	100.0	7.2	117.1
Wellstead	0.1	4.2	0.3	1.9	60.1	19.6	11.8	0.4	1.1	0.2	0.0	0.1	0.1	100.0	7.0	117.7
Esperance																
Beumont	0.1	4.5	0.3	1.9	58.7	21.2	11.3	0.7	0.9	0.2	0.0	0.1	0.1	100.0	8.0	117.7
Cascade	0.1	4.3	0.3	1.9	59.7	20.5	11.3	0.4	1.0	0.2	0.1	0.1	0.1	100.0	7.0	117.6
Esperance	0.1	4.4	0.3	1.9	59.8	20.5	11.2	0.4	0.9	0.2	0.1	0.1	0.1	100.0	7.1	117.4
Lake Varley	0.1	4.4	0.3	2.0	60.2	20.3	10.7	0.6	1.0	0.2	0.0	0.1	0.1	100.0	7.4	115.9
Mount Madden	0.1	4.6	0.3	1.9	58.1	21.2	12.0	0.4	0.9	0.2	0.1	0.1	0.1	100.0	7.3	119.1
Munglinup	0.1	4.6	0.3	1.8	60.6	20.0	10.6	1.1	0.8	0.1	0.0	0.0	0.1	100.0	7.7	115.3
Ravensthorpe	0.1	4.4	0.3	1.9	59.0	20.7	11.9	0.4	0.9	0.2	0.0	0.1	0.1	100.0	7.0	118.6
West River	0.1	4.6	0.3	1.9	57.2	22.4	11.7	0.5	0.9	0.2	0.0	0.1	0.1	100.0	7.4	119.5
Geraldton																
Geraldton	0.1	4.5	0.3	1.7	57.9	21.9	11.6	0.5	1.0	0.2	0.1	0.1	0.1	100.0	7.1	119.1
Kwinana East																
Bulyee	0.1	4.6	0.3	1.8	60.3	20.5	10.6	0.4	1.0	0.2	0.0	0.1	0.1	100.0	7.2	116.2
Narembeen	0.1	4.2	0.3	1.7	59.7	20.3	11.7	0.5	1.0	0.3	0.0	0.1	0.1	100.0	6.8	118.3
Wickepin	0.1	5.0	0.4	2.1	57.7	21.4	11.4	0.6	0.9	0.2	0.1	0.1	0.1	100.0	8.0	117.6
Kwinana West																
Avon	0.1	4.5	0.3	1.9	60.8	20.3	10.2	0.5	1.0	0.2	0.0	0.1	0.1	100.0	7.3	115.2
Brookton	0.1	4.7	0.3	1.9	60.4	19.9	10.5	0.8	0.9	0.1	0.1	0.1	0.1	100.0	7.8	115.0
Dale	0.1	4.3	0.3	2.0	62.0	19.1	10.6	0.4	0.9	0.2	0.0	0.1	0.1	100.0	6.9	115.3
Konnongorring	0.1	4.8	0.3	1.9	59.9	20.8	10.2	0.5	1.0	0.2	0.0	0.1	0.1	100.0	7.6	115.3
Mogumber	0.1	4.9	0.3	1.9	60.6	20.5	10.0	0.6	0.8	0.2	0.0	0.1	0.1	100.0	7.8	114.5
Moora	0.1	5.0	0.3	1.9	60.3	20.4	10.0	0.8	0.8	0.1	0.0	0.1	0.1	100.0	8.0	114.4
Narrakine	0.1	4.3	0.3	1.9	60.4	19.6	11.4	0.4	1.0	0.2	0.1	0.1	0.1	100.0	7.1	116.8
Quairading	0.1	4.8	0.3	1.8	60.1	20.9	9.9	1.0	0.8	0.2	0.0	0.1	0.1	100.0	7.8	114.8
Yerecoin	0.1	4.6	0.3	1.9	61.9	19.9	9.4	0.6	0.9	0.2	0.0	0.1	0.1	100.0	8.0	113.2
York	0.1	4.4	0.3	1.9	62.1	19.3	10.1	0.4	0.9	0.2	0.0	0.1	0.1	100.0	7.1	114.3
WA Mean	**0.1**	**4.5**	**0.3**	**1.9**	**59.8**	**20.3**	**11.1**	**0.5**	**0.9**	**0.2**	**0.0**	**0.1**	**0.1**	**100.0**	**7.3**	**116.8**

[1] Sat - Sum of the saturated fatty acids including 14:0, 16:0, 18:0, 20:0 and 24:0

[2] Iodine Value - Calculated from the fatty acid composition

Definitions

Canola is a term used to describe seed of the species *Brassica napus or Brassica campestris*, the oil component of which seed contains less than 2 % erucic acid (C22:1) and the solid component of which seed contains less than 30 micromoles of any one of, or any mixture of, 3-butenyl glucosinolate, 4-pentenyl glucosinolate, 2-hydroxy-3-butenyl glucosinolate and 2-hydroxy-4-pentenyl glucosinolate per gram of air-dry, oil-free solid as measured by the gas chromatographic method of the Canadian Grain Commission (Canola Council, Winnipeg, Manitoba, Canada).

Methods

Moisture Content:

Moisture is determined on whole seed using a 6500 near infrared (NIR) spectrometer calibrated using AOF 4-1.6: “Moisture Content of Oilseeds Oven Method”. The moisture contents are used to convert the raw data for oil and protein to the appropriate moisture content for reporting.

Oil Content:

Oil content is determined by NIR, calibrated from results obtained using method AOCS Am2-93 “Determination of Oil Content in Oilseeds”. Oil is extracted from ground seed on a Goldfische apparatus either a Foss Soxtec™ 2050 or a Büchi B-811 Extraction System using hexane for four hours. The sample is reground and extracted for a further 2 hours. The sample is again reground and extracted for another 2 hours. The results are reported as a percentage of the seed at 6 % moisture.

Protein Content:

Protein content is determined on whole seed by NIR, calibrated from samples analysed by the LECO elemental analyser using AOF 4-3.3: “Protein, Crude, of Meals (Combustion)”. Results are reported as percent protein (Nitrogen x 6.25) and calculated to 10 % moisture in oil-free meal.

Glucosinolate Content:

Total glucosinolate concentration is determined by NIR, calibrated by method AOF 4-1.22: “Glucosinolate Content, Glucose Method, Canola and Rapeseed”. The method involves an enzymatic hydrolysis to release glucose followed by a colorimetric reaction and determination by a UV-Vis spectrophotometer. The method has compared favourably with the HPLC methodology of the AOCS with the added advantage of speed and economy. Results are reported as μmoles glucosinolates/gram whole seed at 6 % moisture.

Fatty Acid Composition:

Fatty acid composition involves methylation of fatty acids with a methanolic solution of potassium hydroxide. The method is based on IOC COI/T.20/Doc. No. 24 2001: “Preparation of the Fatty Acid Methyl Esters from Olive Oil and Olive-Pomace Oil”. The methyl esters are then separated on a gas chromatograph using a BPX70 capillary column. Fatty acids are reported as a percentage of the total fatty acids.

Iodine Values:

Iodine values are calculated from the fatty acid profile using AOF 4-2.14: “Iodine Value by Fatty Acid Composition”.

Volumetric Grain Weights:

Volumetric grain weights are measured using a Franklin chrondrometer and reported as both pounds/bushel and kilograms/hectolitre.

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