NSW GOVERNMENT
Department of Primary Industries

Quality of Australian canola

2015–16

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AOF
Australian Oilseeds Federation

NSW GOVERNMENT Department of Primary Industries

Quality of Australian Canola 2015-2016

NSW DPI MANAGEMENT GUIDE

D.E. Seberry, D.W. McCaffery and T.M. Kingham
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NSW DPI would like to acknowledge the Bureau of Meteorology, Australian Bureau of Statistics (ABS) and Commonwealth Scientific and Industrial Research Organisation (CSIRO), GrainCorp and Viterra for the production and use of the maps in this publication.

Assistance of staff from the Australian Oils Research Laboratory in the analysis of samples and compilation of this book is greatly appreciated.

Introduction

Sample Analysis

Canola samples representing the 2015 harvest were received from the bulk handlers in New South Wales, South Australia and Victoria. These samples are representative of the seed collected at each receival point and have been taken to cumulatively represent the Australian harvest. The NSW DPI Australian Oils Research Laboratory has no control over the collection of the samples and all data published is based on the analysis of the samples provided.

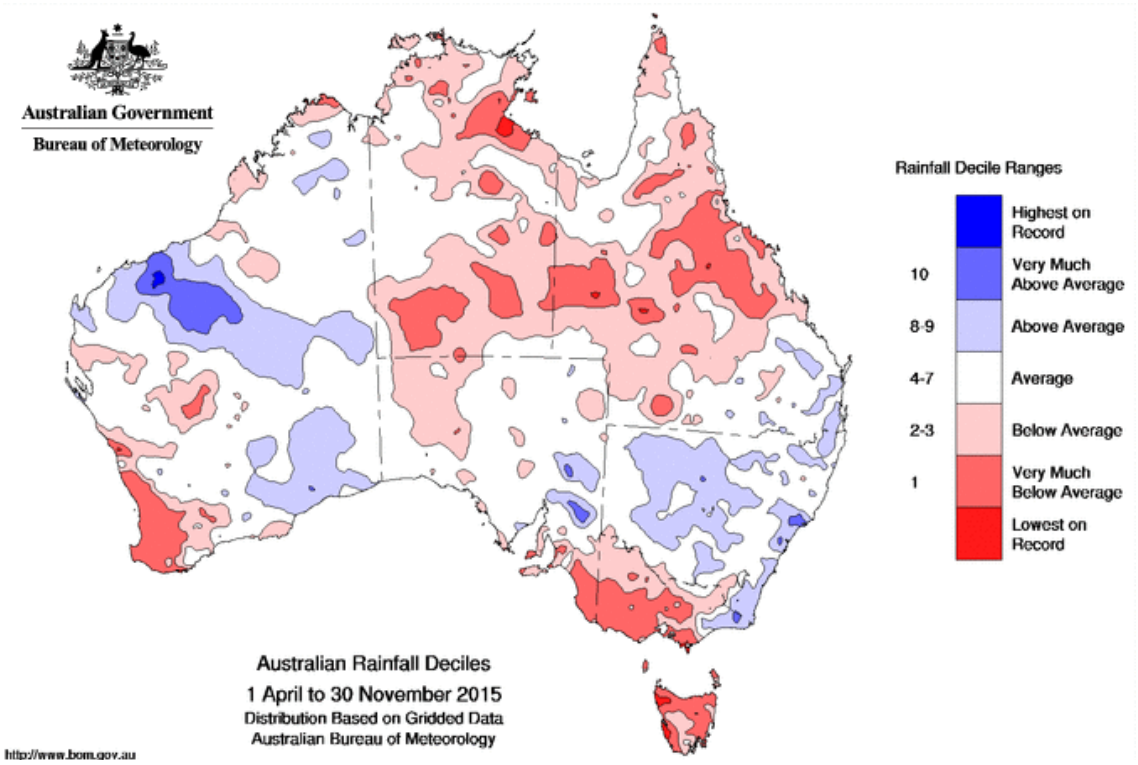
Samples were unavailable from Western Australia for the compilation of this book. All averages are therefore weighted averages based on the other three states.

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 of this book. All analysis was undertaken at the NSW DPI Australian Oils Research Laboratory in Wagga Wagga. Oil and glucosinolate concentrations are reported at 6% moisture in whole seed and protein is reported in oil-free meal at 10% moisture.

Weather Production Review

The Season

The season can best be described as one of high variability in rainfall and temperature. Crop yield overall was aided by early sowing in all states except Victoria and combined with subsoil moisture in states such as New South Wales provided the necessary buffer against a very dry September and a very dry October with record high temperatures. Figure 1 is a good representation of growing season rainfall across Australia, even though it is about 4–6 weeks longer than the canola growing season.



Source: Bureau of Meteorology

Figure 1 Australian rainfall deciles 1 April–30 November 2015

New South Wales

A timely autumn break in early April, with follow-up rain in mid–late April allowed sowing of about 80% of the canola crop by the end of the month. All areas, except the north-west of the state recorded 60–100 mm for April which provided good to excellent conditions for crop establishment and topped up subsoil moisture reserves. No canola was planted west of about 20–30 km west of the Newell highway in the north for the third consecutive season.

Rainfall was average to below average in May through central and southern parts of the state and average to above average for June, July and August. Following good rain of 60-110 mm in July, soil moisture profiles were 75-100% full by the end of the month for the main canola producing areas of central and southern NSW. The last useful fall of rain for the season was in late August. September was very dry with below average temperatures and a series of frosts, whilst the first week of October was very hot and windy, and combined with moisture stress caused flower and pod abortion, reducing yield potential on later maturing crops.

Crop development was again earlier than normal despite a cold July, with crops commencing flowering in July and exposed to Sclerotinia infection through August. Many crops were sprayed through August and into early September, but dry conditions from then onwards prevented further infection. Blackleg cankers were observed on branches and pods in many crops.

Harvest was again earlier than normal due to the dry, warm-hot conditions in spring that finished crops early. Oil contents were highly variable and average to below average, depending on pod and seed development at the time of the heat and moisture stress in late September and early-mid October. Some very low oil contents were recorded in the western areas of central NSW that suffered the most from the moisture and heat stress.

Stored soil moisture was the key to a final estimated production for NSW of 890,000 t from an estimated 525,000 ha, for an average yield of 1.70 t/ha.

Victoria

The season started poorly for most of the Victorian cropping belt with only the far north-west Mallee and parts of the North East receiving a sowing rain in mid-April. The majority of the states cropping region started the season with less than a 25% soil moisture profile, which was about normal. Most of the crop was sown into low-moderate seedbed moisture in May and early June. Major reductions in area occurred in the northern Wimmera and the Mallee.

Rainfall through June and July was generally average to below average, and below average to well below average for August, especially in the Wimmera. Around 5-10% of the Wimmera crop was either abandoned or grazed out.

The spring months of September and October were similar or drier than NSW and had similar extreme high temperatures in early October, which ceased flowering and reduced potential yield as well as oil contents. Only parts of the South West and North East had average yields.

Final estimated production for Victoria was 387,000 t from an estimated 315,000 ha, for an average yield of 1.23 t/ha.

South Australia

Following good early and mid-April rain sowing of the states canola crop was completed by the end of April/ first week of May. The exception was the South East, which received less rain and finished sowing towards the end of May. Area sown was down about 30% on 2014, due primarily to poor yields in 2014, problems with the green peach aphid, higher growing costs and perceived higher risk.

Rainfall was average to below average for June and July for most areas, and average to above average in August for most areas except for the South East that was below average. A series of frosts during July delayed development of crops in many parts of the state.

Spring rainfall was well below average and similar to NSW and Victoria, and with extreme high temperatures in early October, that served to reduce yield potential.

Sclerotinia was more prevalent than in previous years, particularly on the Lower Eyre Peninsula, and blackleg pod infection was also more prevalent.

Final estimated production for South Australia was 293,300 t from an estimated 210,500 ha, for an average yield of 1.39 t/ha.

Western Australia

The canola area in Western Australia declined by about 4% to 1.143 million hectares in 2015.

Widespread rainfall in late March and April supported an early sowing of canola, that commenced in early April in the Geraldton Port Zone, onto good soil moisture following March rain from tropical cyclone Olwyn.

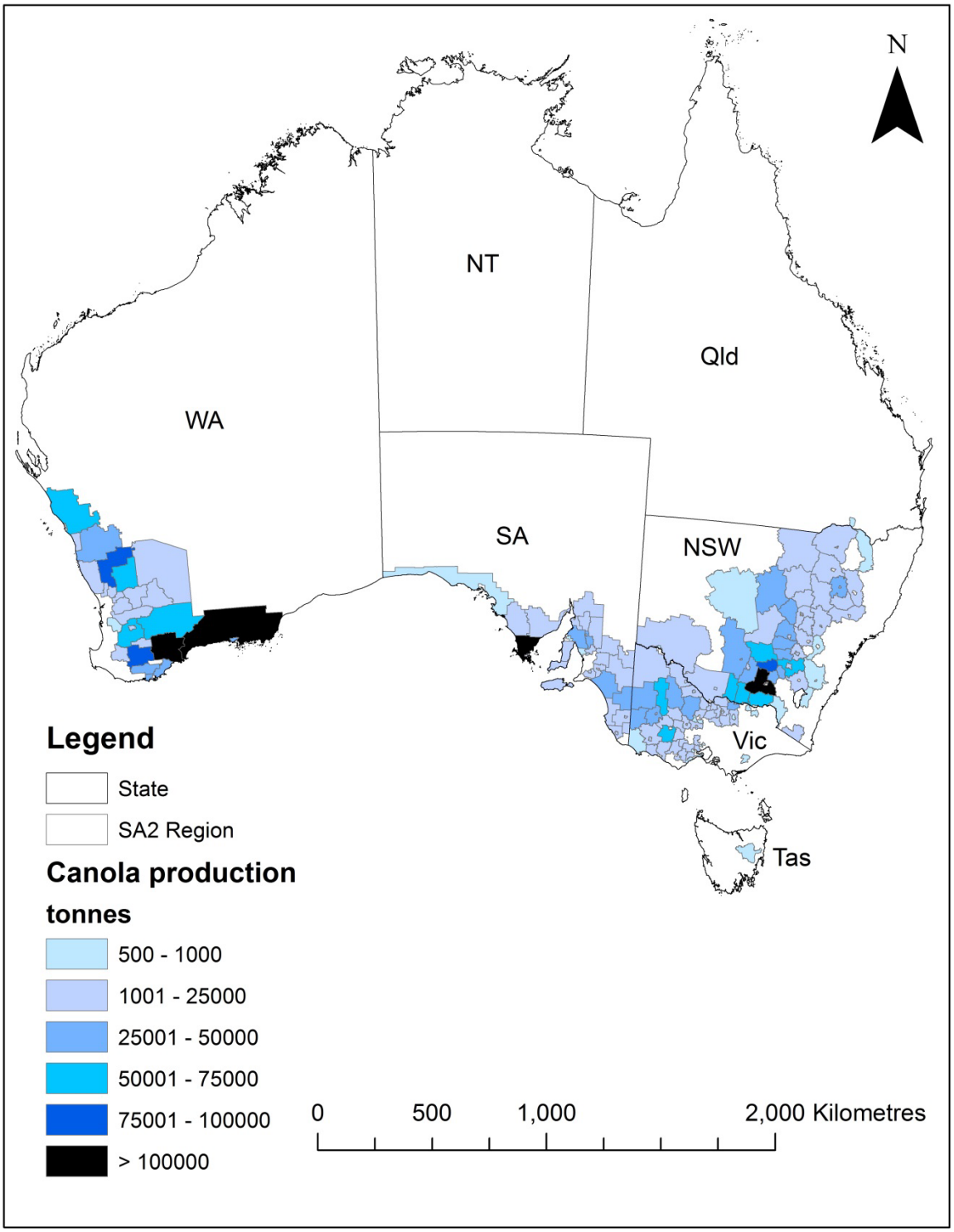
Rainfall was below average to well below average in May causing some crops that were sown into soils with low-moderate moisture showing signs of moisture stress by the end of the month. The WA canola crop yield potential was maintained by two major rainfall events in winter, the first in late June, and a larger widespread rainfall in late July. Average to above average rain in August improved yield potential but September and October, similar to eastern Australia was very dry.

Flowering commenced in early June in very early sown crops, and due to the warm conditions through June and July that encouraged early flowering, Sclerotinia was observed in crops in July and spraying commenced.

The season was defined by generally good rainfall across most canola growing regions, but with long dry periods in between rainfall events, and a dry September.

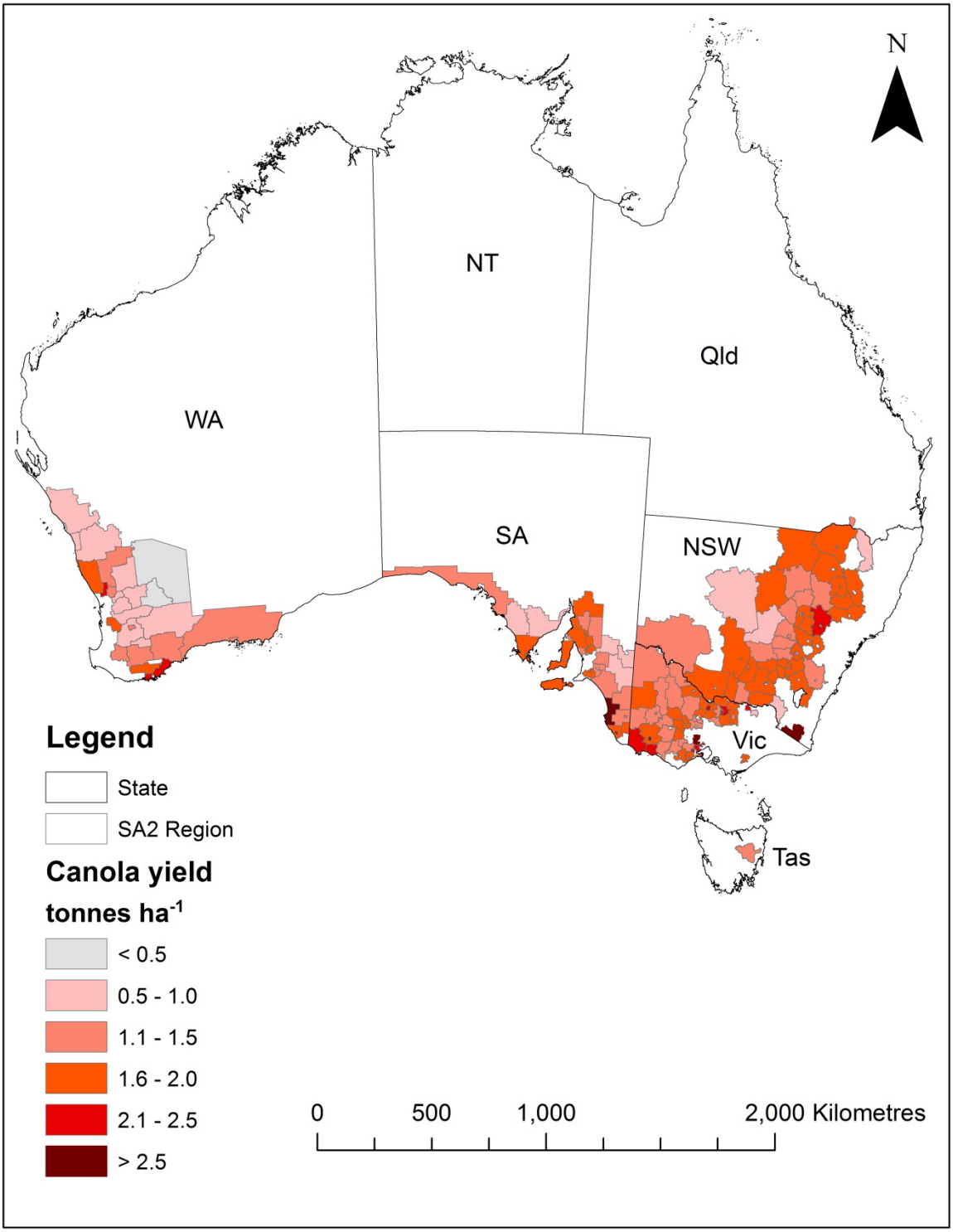
Yields were generally average but highly variable, and in line with the variable seasonal rainfall. An early sowing meant that crops had set yield potential by the end of August and so were less affected by the dry September. Oil contents were about average and highest in southern coastal districts of the Esperance Zone.

Final estimated production for Western Australia was 1.528 million tonnes from an estimated 1.143 million ha for an average yield of 1.34 t/ha.



Source: Map produced by CSIRO using ABS statistics

Figure 2: Average canola production from 2010 to 2014



Source: Map produced by CSIRO using ABS statistics

Figure 3: Average canola production yields from 2010 to 2014

Area and Production

Australia produced in excess of three million tonnes for the fourth consecutive year in 2015, following a harvest of 3.43 million tonnes in 2014, 3.90 million tonnes in 2013 and 4.27 million tonnes in 2012.

Area sown and production figures from each state are shown in Table 1. Final production of 3.098 million tonnes was the fifth highest on record. Western Australia's 1.528 million tonnes was the third highest for the state and was 49% of the total canola production for Australia.

Although total production was lower, the Australian average yield was 0.11 t/ha higher than the 2014 harvest at 1.41 t/ha. Yield ranged from 1.23 t/ha in Victoria (the second lowest on record for the state) to 1.70 t/ha in New South Wales (the highest for the state since 1.85 t/ha was recorded in 2011.

Table 1: Estimated canola production in Australia by state 2015

State	Production (tonnes)	Area Harvested (hectares)	Average Yield (tonnes/hectare)
New South Wales	890,000	525,000	1.70
Victoria	387,000	315,000	1.23
South Australia	293,300	210,500	1.39
Western Australia	1,528,000	1,143,000	1.34
Australia	3,098,300	2,193,500	1.41

Source: AOF Industry Estimates

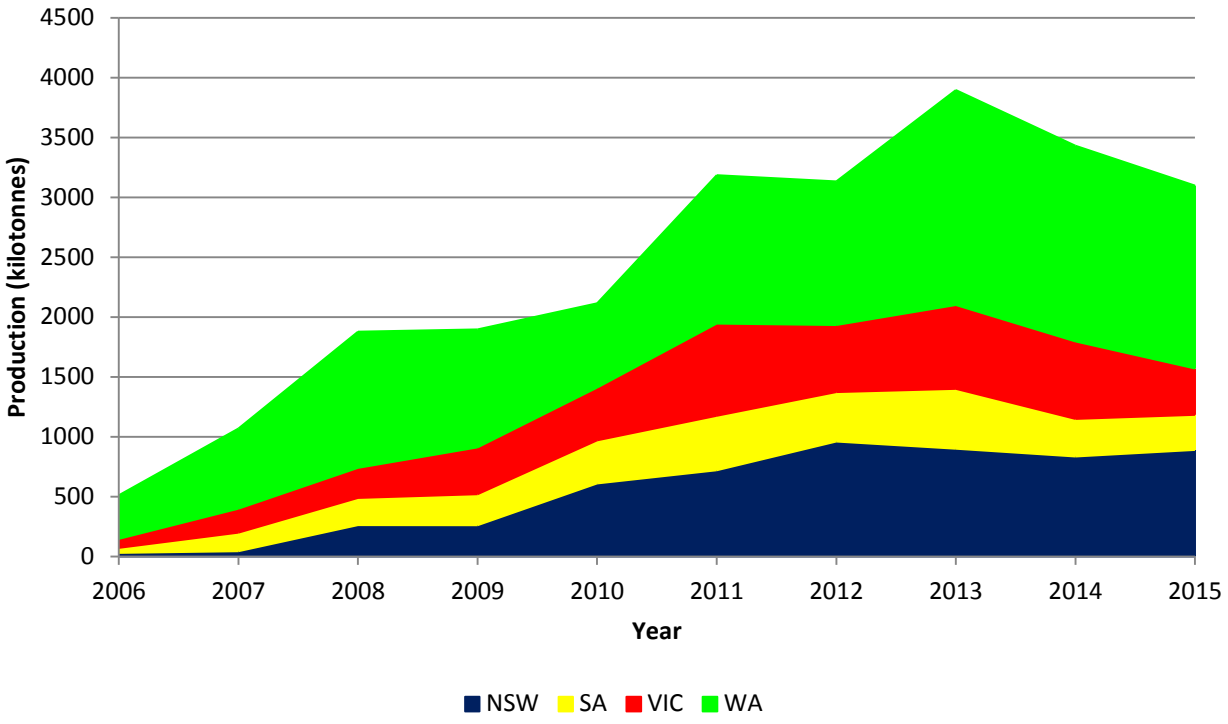


Figure 4: Canola Production in Australia 2006 – 2015

Australian Quality Parameter Summary

The average regional and state values for all analyses for New South Wales, South Australia and Victoria were calculated on the basis of the tonnage each Site and Grade represents.
The Australian average values were calculated using the sum of the tonnages for each Site and Grade in New South Wales, South Australia and Victoria. No samples or data was available from Western Australia and therefore the Western Australian harvest for 2015 is not represented in this publication.
Individual site tonnages are confidential and therefore cannot be reported.

Table 2: Average quality of Australian canola 2015

Quality Parameter		Australian Average
Oil content, % in whole seed @ 6 % moisture		42.0
Protein content, % in oil-free meal @ 10 % moisture		39.9
Glucosinolates, µmoles/g in whole seed @ 6 % moisture		6
Volumetric grain weights,	kg/hL	66.3
	lbs/b	53.2
Oleic acid concentration (C18:1), %[1]		64.3
Linoleic acid concentration (C18:2), %[1]		17.9
Linolenic acid concentration (C18:3), %[1]		8.6
Erucic acid concentration (C22:1), %[1]		<0.1
Polyunsaturated fatty acid concentration, %[1]		26.5
Monounsaturated fatty acid concentration, %[1]		65.9
Saturated fatty acid concentration, %[1]		7.6
Iodine Value		109.8

[1] Fatty acids are reported as % of total fatty acids in the oil portion of the seed.

Oil Content

The average oil content for the Australian harvest in 2015 was 42.0%. This was 2.1% lower than 2014 and the lowest since 2009. Oil content ranged from 37.9% at Donald in Victoria to 45.6% at Harden in NSW.

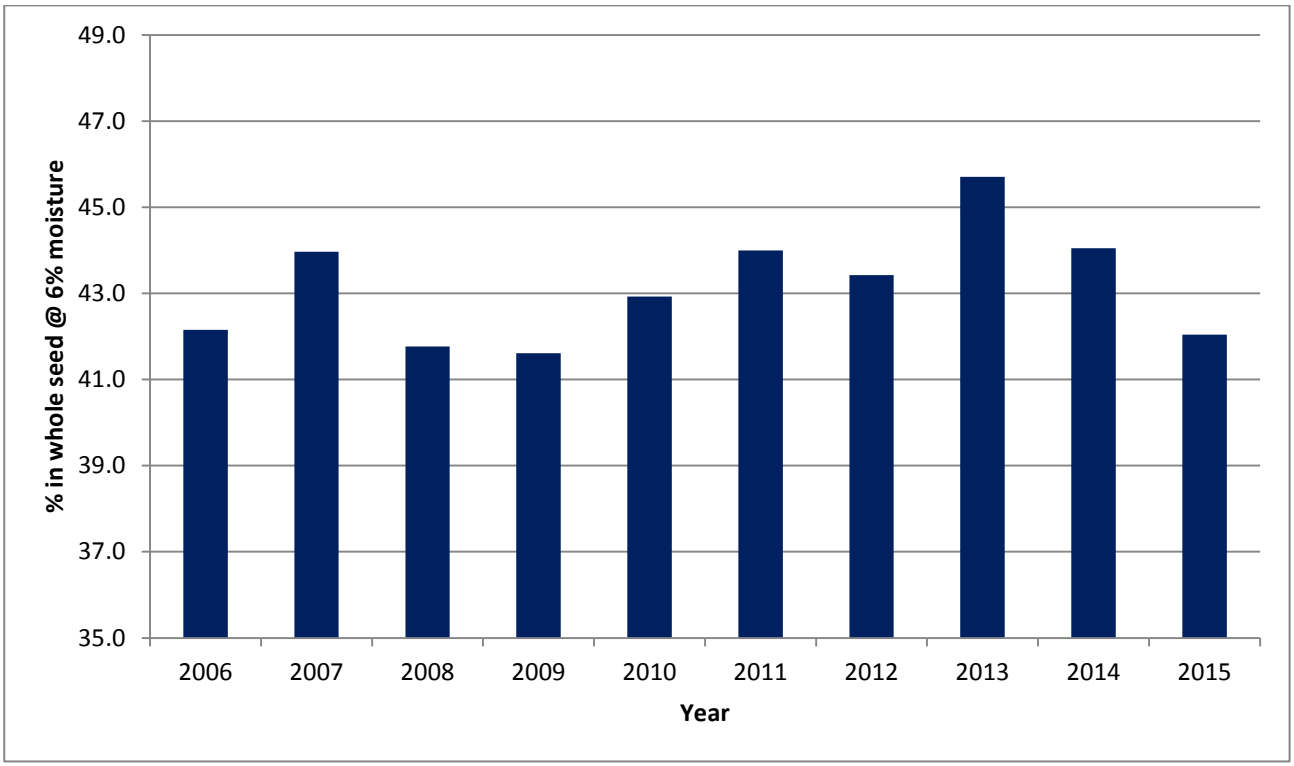


Figure 5: Average Australian oil content 2006 - 2015

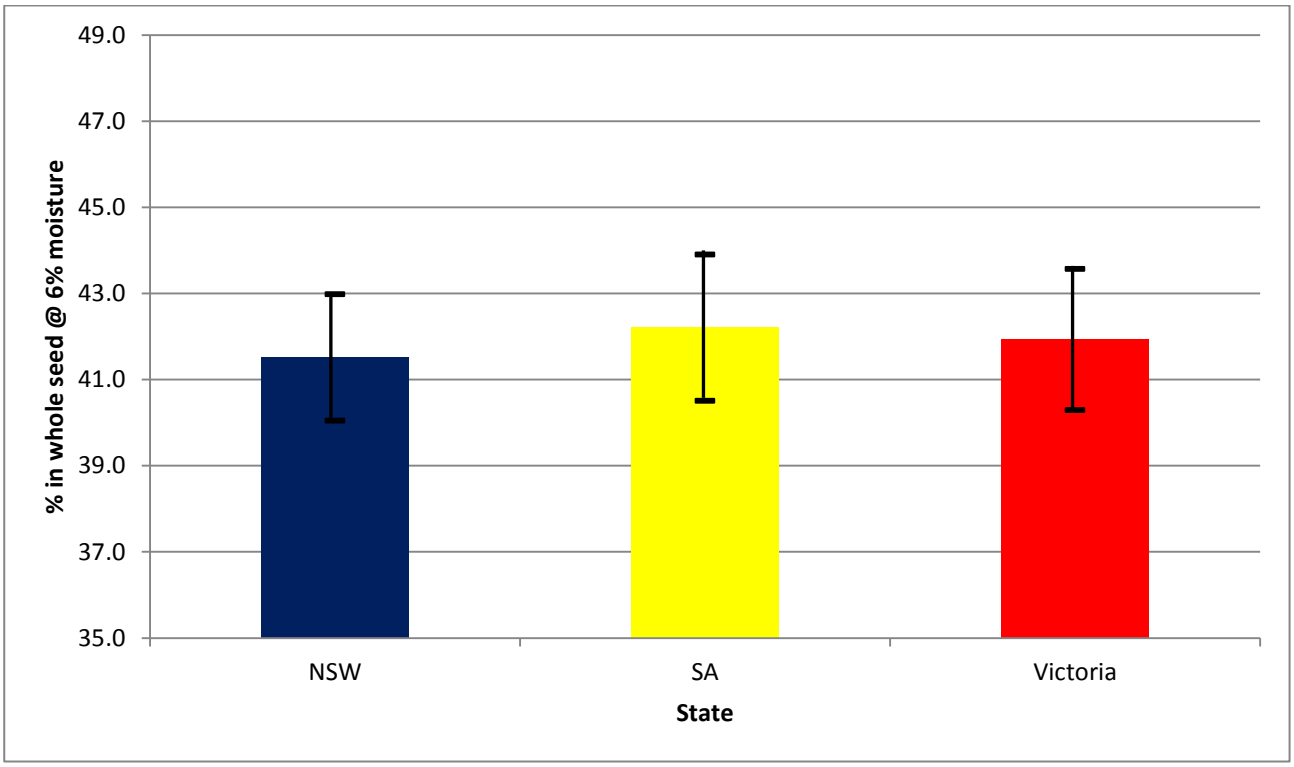


Figure 6: Average oil content by state 2015

Bars indicate the standard deviation for each state.

Protein Content

The average protein content for the 2015 Australian harvest was 39.9% in oil free meal. This was an increase of 1.1% from the 2014 harvest and the highest average since 2009. Protein ranged from 36.4% at Tumby Bay in South Australia to 45.7% at Bordertown in South Australia.

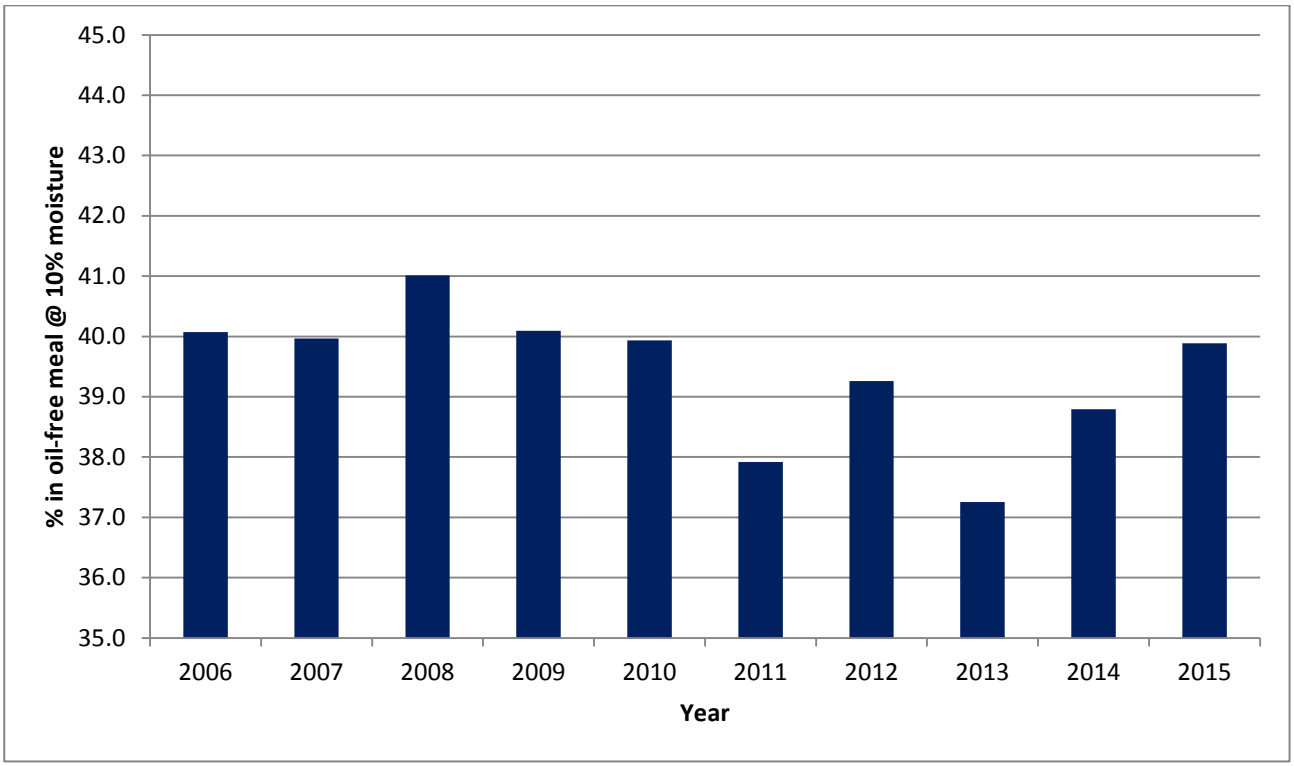


Figure 7: Average Australian protein content 2006 - 2015

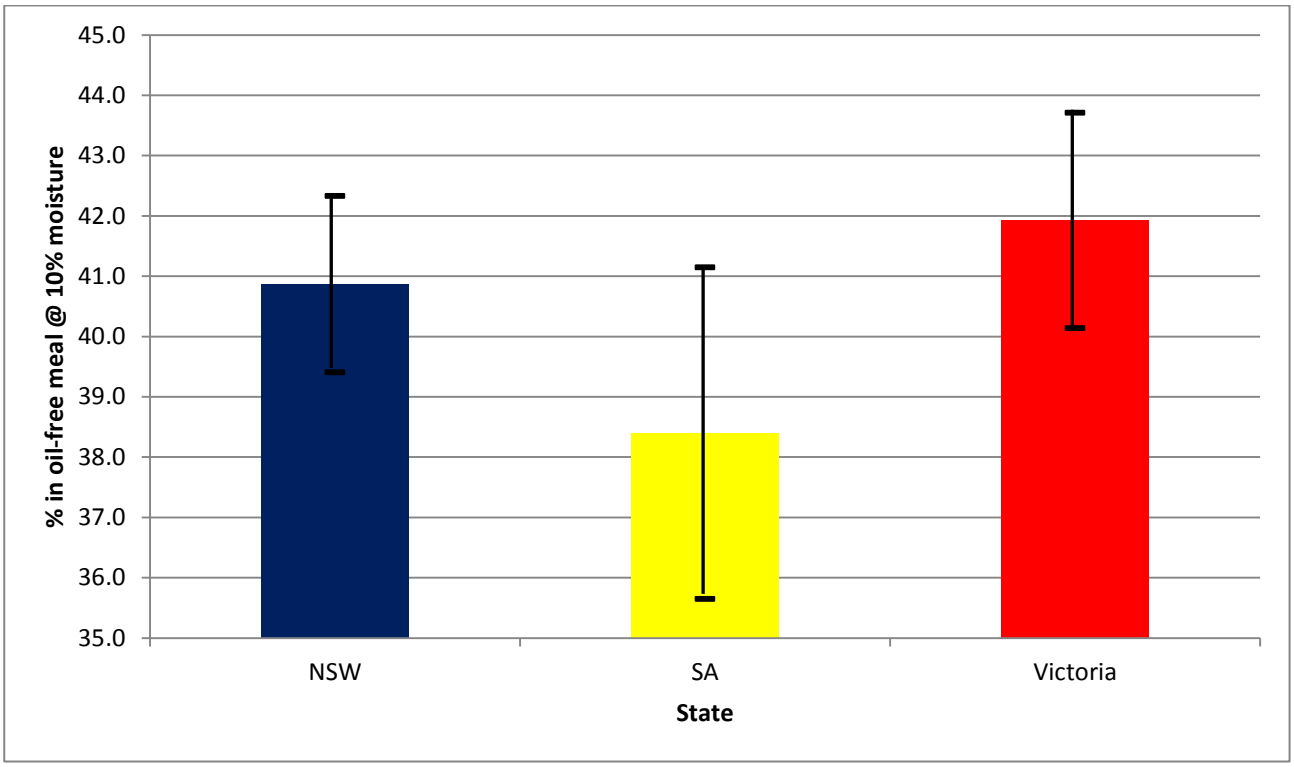


Figure 8: Average protein content by state 2015

Bars indicate the standard deviation for each state.

Glucosinolate Concentration

The average glucosinolate content for the Australian harvest in 2015 was 6 µmoles/g for the third consecutive year. Glucosinolate content ranged from 4 µmoles/g at Milbrulong, Greenethorpe, Coolamon and Ardlethan in NSW to 14 µmoles/g at Henty West in NSW.

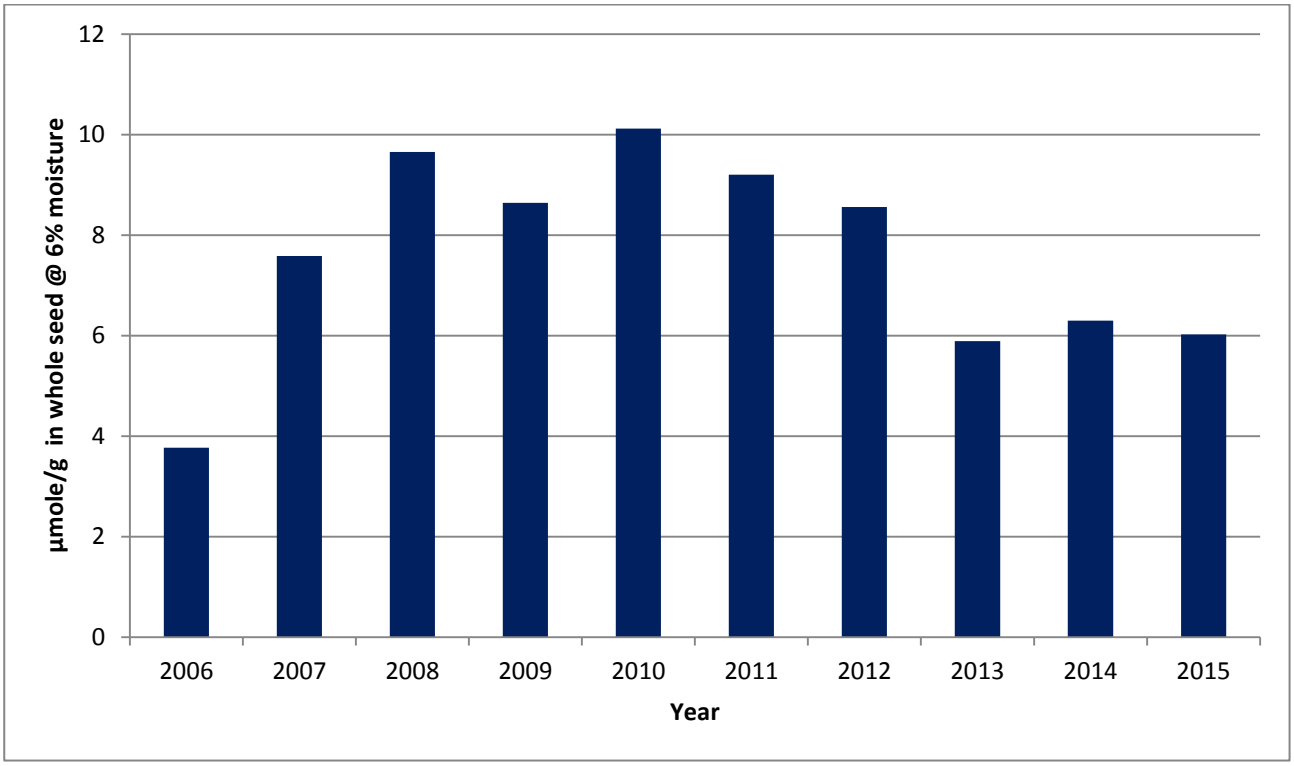


Figure 9: Average Australian glucosinolate content 2006 – 2015

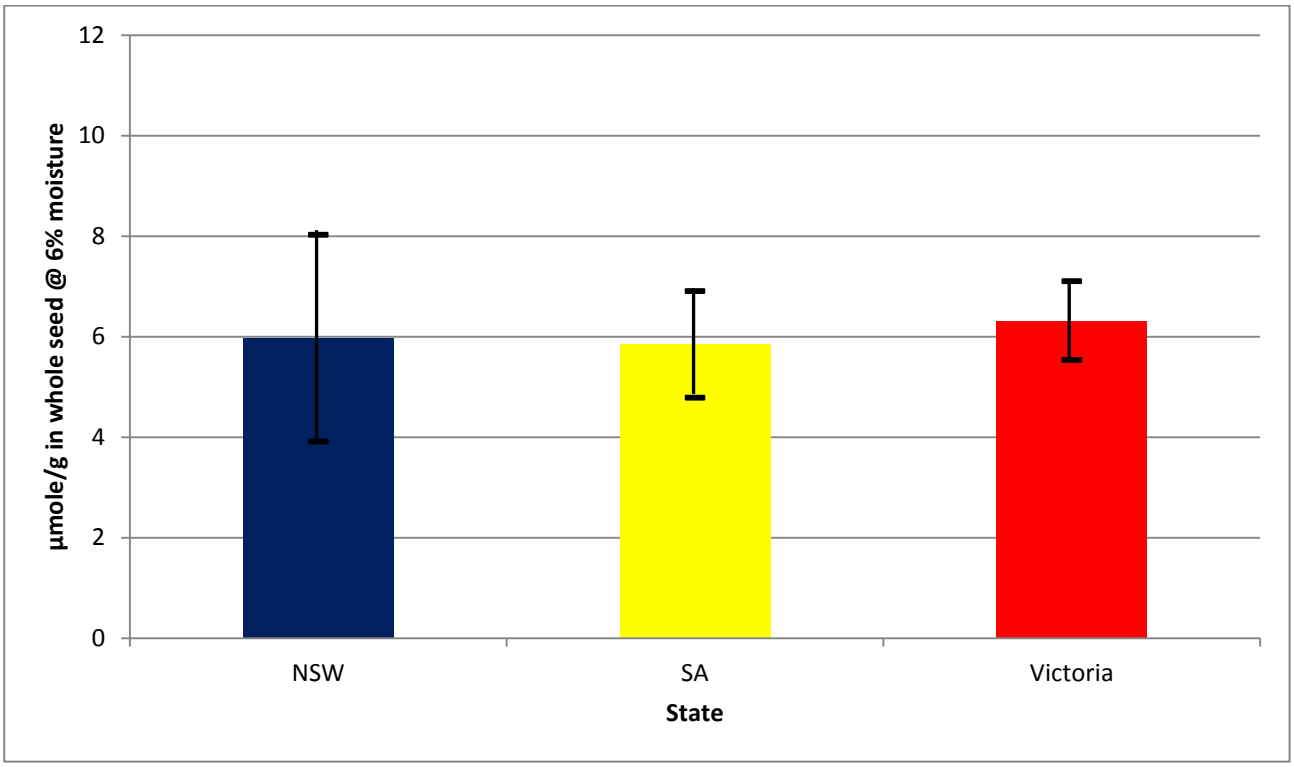


Figure 10: Average glucosinolate content by state 2015

Bars indicate the standard deviation for each state.

Fatty Acid Composition

The consistent rise of oleic acid (C18:1) and corresponding decrease of Iodine Value over the past ten years raised questions as to whether the increase of oleic acid content was a trend across the entire crop, or if the growing percentage of Monola®(high oleic, low linolenic acid) plantings was influencing the national crop average. Therefore, the fatty acid compositions were split this year according to grade and receival sites with Monola® grades excluded from all weighted averages.

Oleic Acid

The average oleic acid concentration from the 2015 harvest was 64.3% of total fatty acids. This was 0.6% higher than the 2014 harvest, despite the removal of receival sites with Monola® grades, and continued the steady rise of oleic acid content for the past ten years. Oleic acid content ranged from 61.1% at Frances in South Australia to 72.6% at Ariah Park in NSW.

There appears to be a genuine trend of increasing oleic acid content across the entire Australian canola crop, indicated by both the national average breaking last years' record high and the Frances receival site's 61.1% being higher than the national average recorded in the majority of years up to 2008, despite the removal of receival sites with Monola® grades this year.

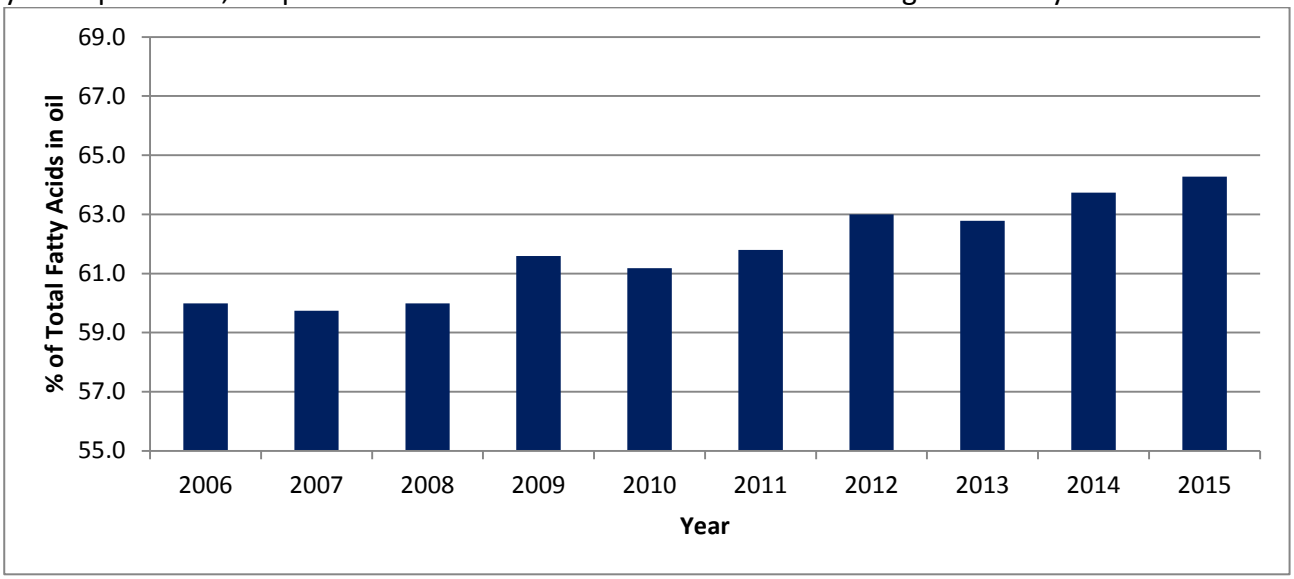


Figure 11: Average Australian oleic acid concentration in canola oil 2006 – 2015

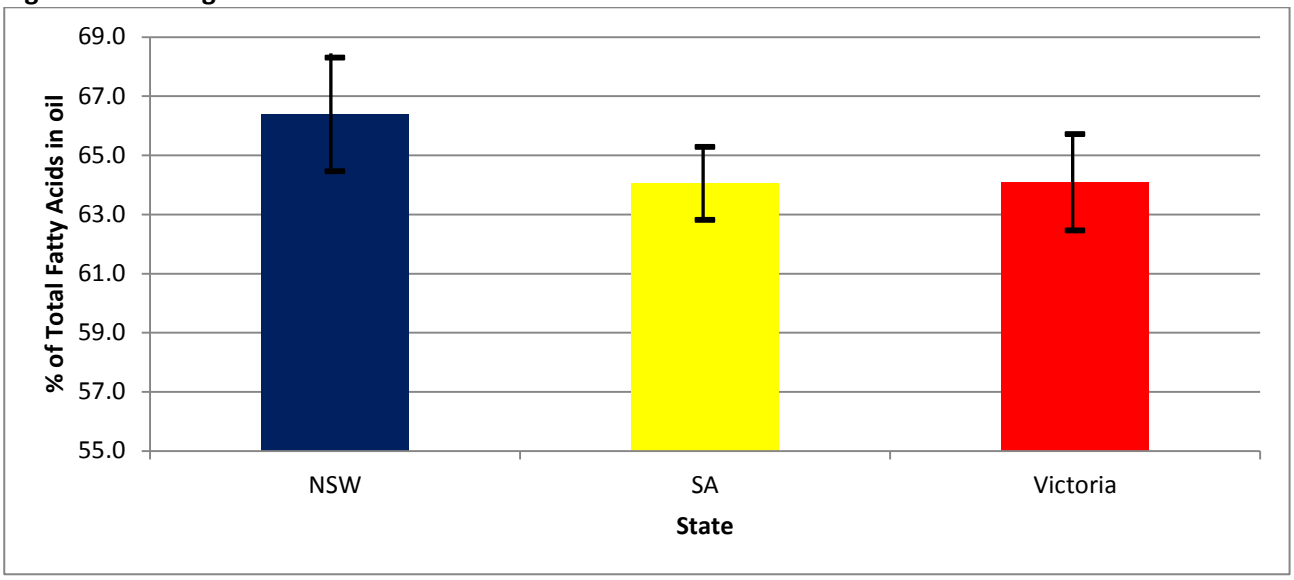


Figure 12: Average oleic acid concentration by state 2015

Bars indicate the standard deviation for each state.

Linoleic Acid

The average linoleic acid (C18:2) concentration in the oil produced from the 2015 harvest was 17.9% of total fatty acids. This was the same as the 2014 harvest and the equal lowest recorded in the history of this publication. The concentration ranged from 11.8% at Ariah Park in New South Wales to 21.3% at Elmore in Victoria.

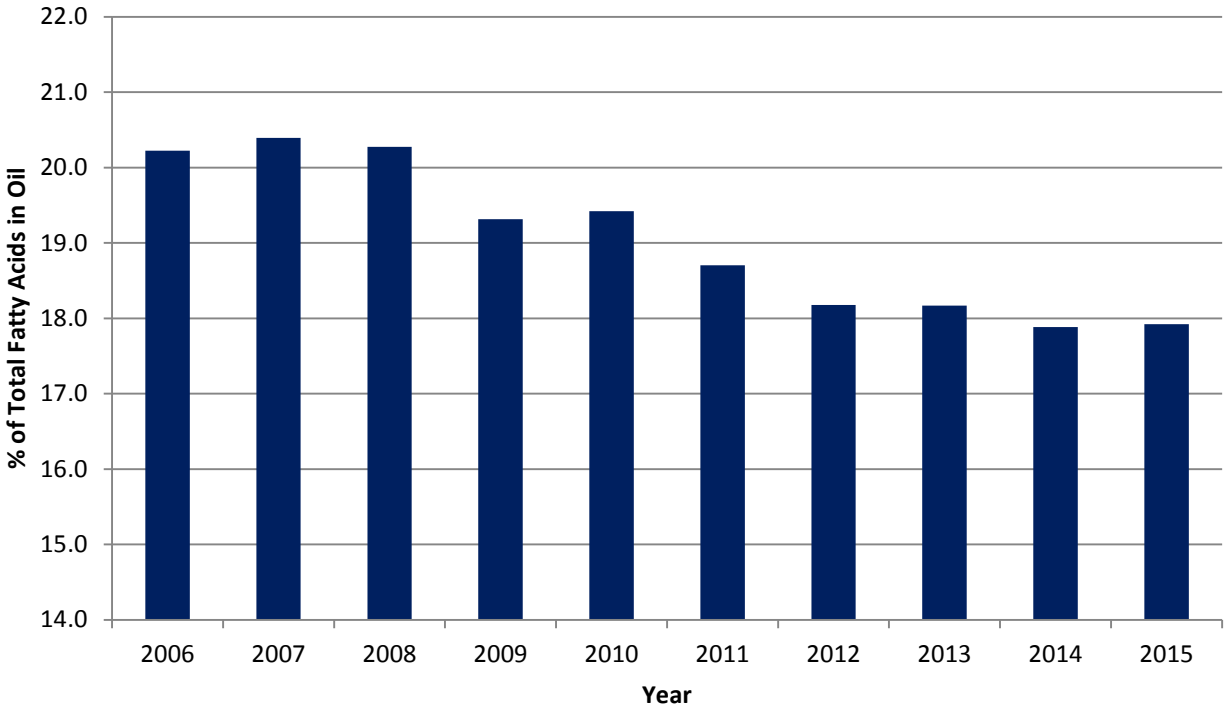


Figure 13: Average Australian linoleic acid concentration in canola oil 2006 – 2015

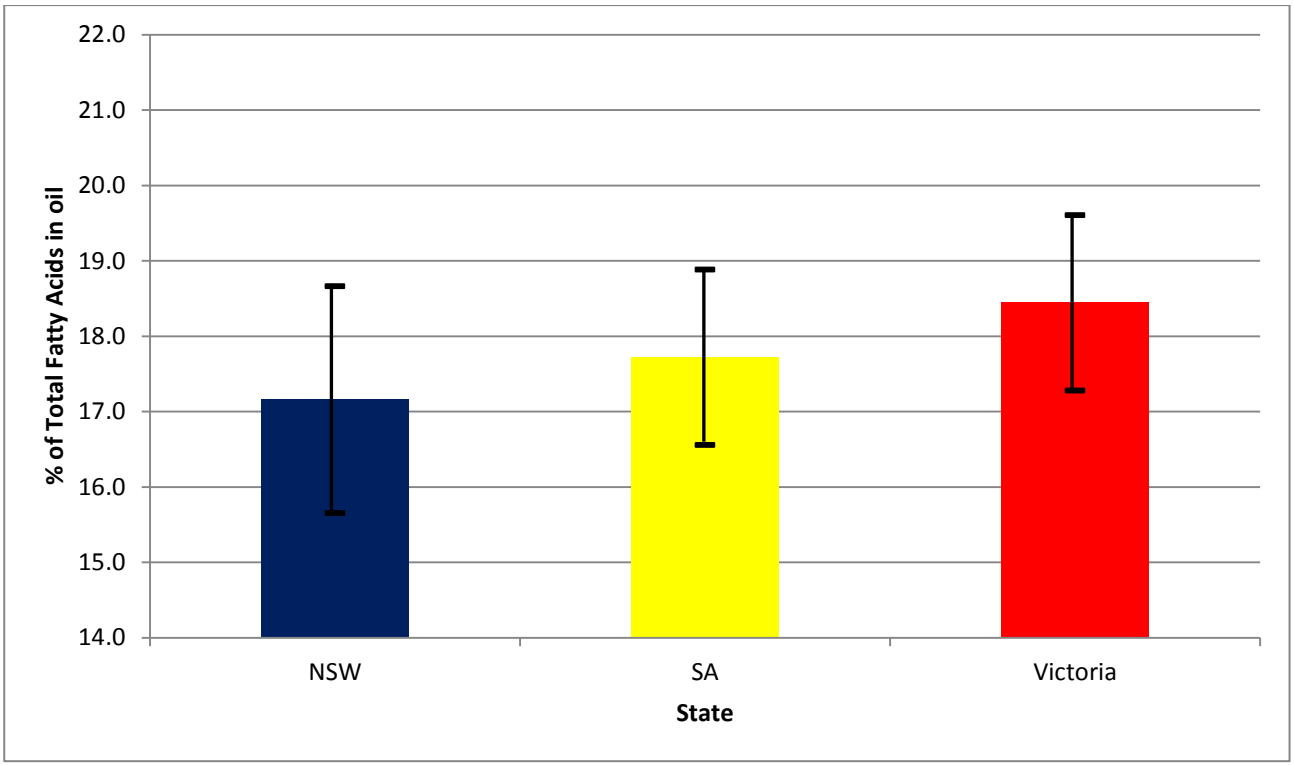


Figure 14: Average linoleic acid concentration by state 2015

Bars indicate the standard deviation for each state.

Linolenic Acid

The linolenic acid (C18:3) concentration for 2015 was 8.6% of total fatty acids in oil. This was 0.7% lower than the 2014 harvest and the lowest recorded in the history of this publication. Linolenic acid concentrations ranged from 6.1% at Mungeribar in New South Wales to 9.9% at Charlton and Westmere in Victoria and Naracoorte in South Australia (considered a part of GrainCorp's Victorian operation).

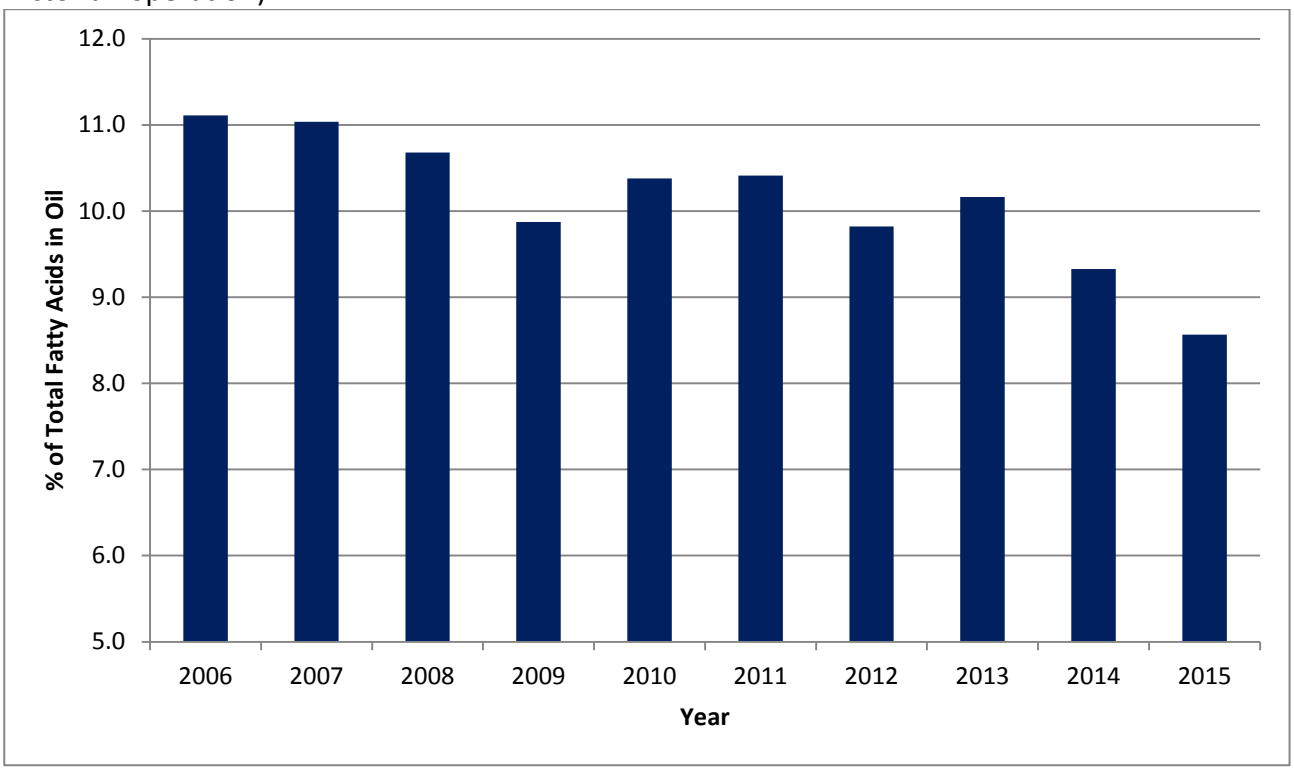


Figure 15: Average Australian linolenic concentration in canola oil 2006 – 2015

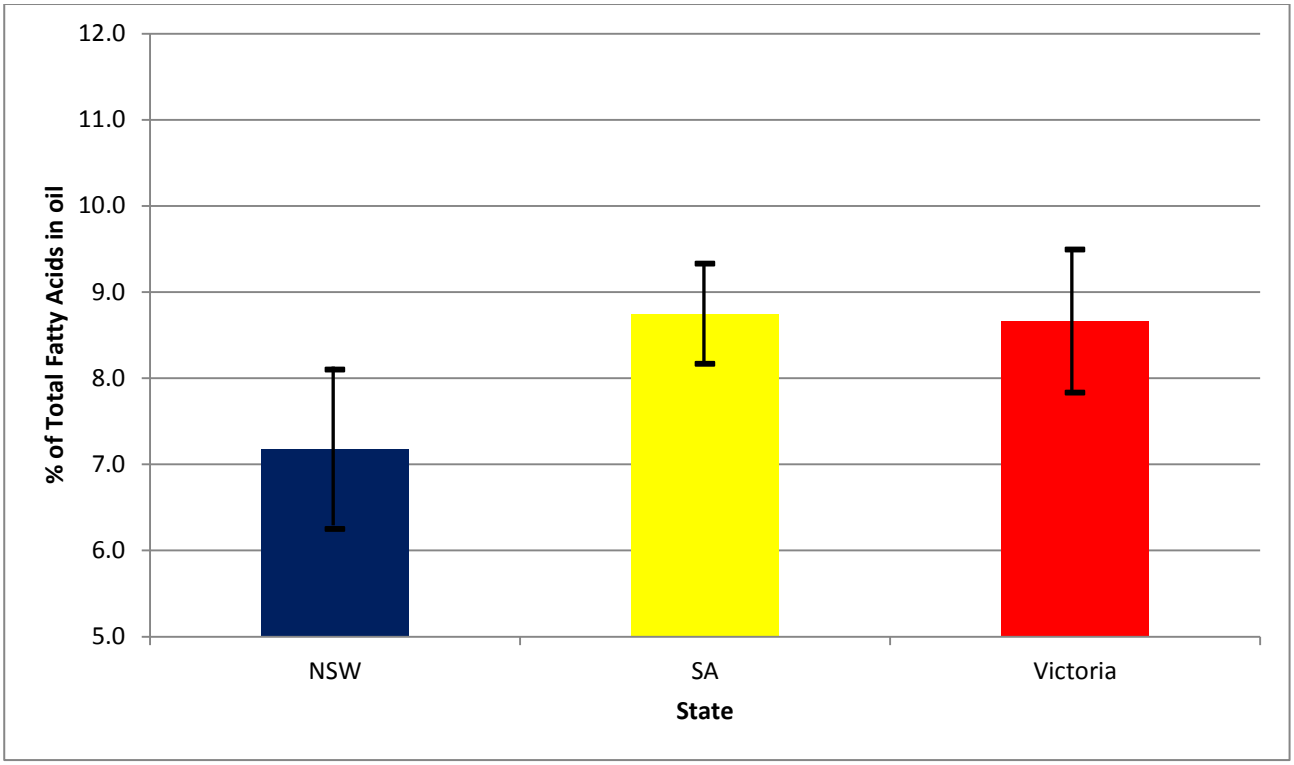


Figure 16: Average linolenic acid concentration by state 2015

Bars indicate the standard deviation for each state.

Saturated Fatty Acid

The average saturated fatty acid concentration for the 2015 harvest was 7.6% of total fatty acids in oil. This was 0.1% higher than the 2014 harvest and the highest since 2009. Saturated fatty acid concentration ranged from 6.9% at Harden in NSW to 8.3% at Ardrossan in SA.

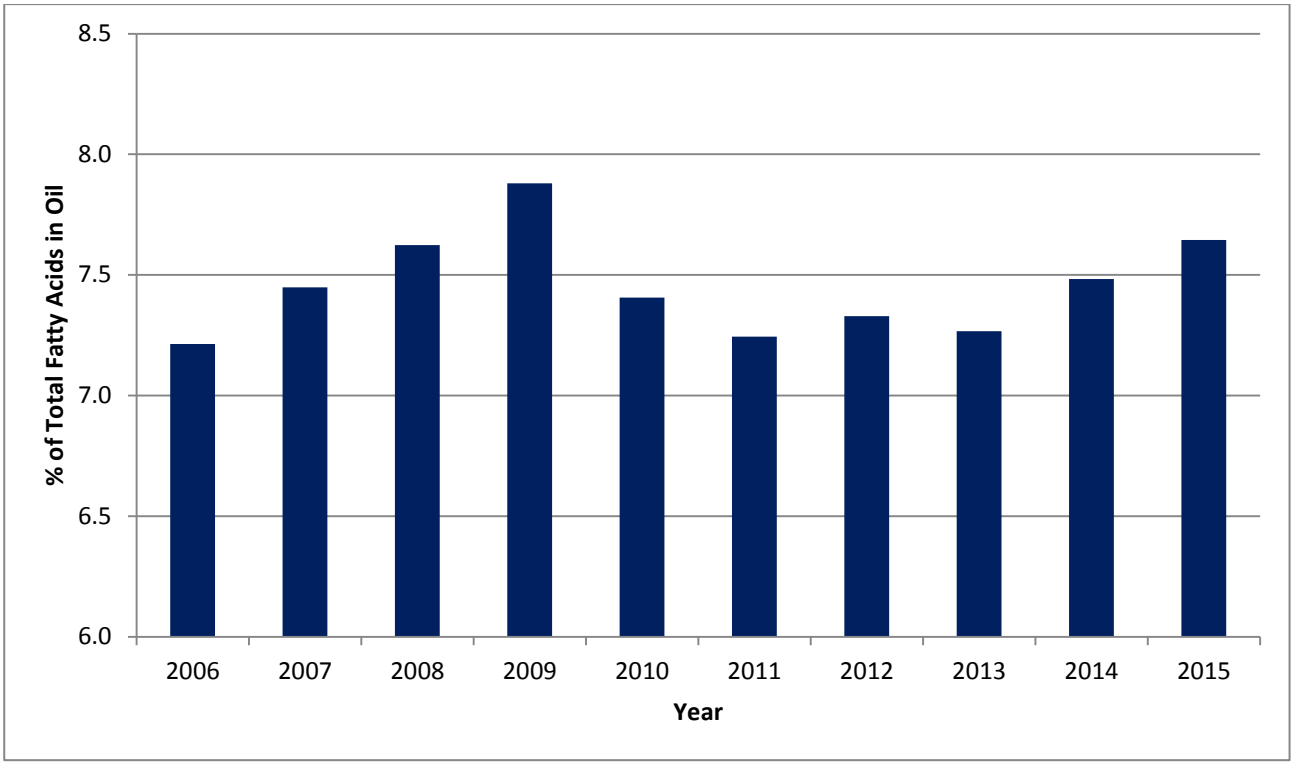


Figure 17: Average Australian saturated fatty acid concentration in canola oil 2006 – 2015

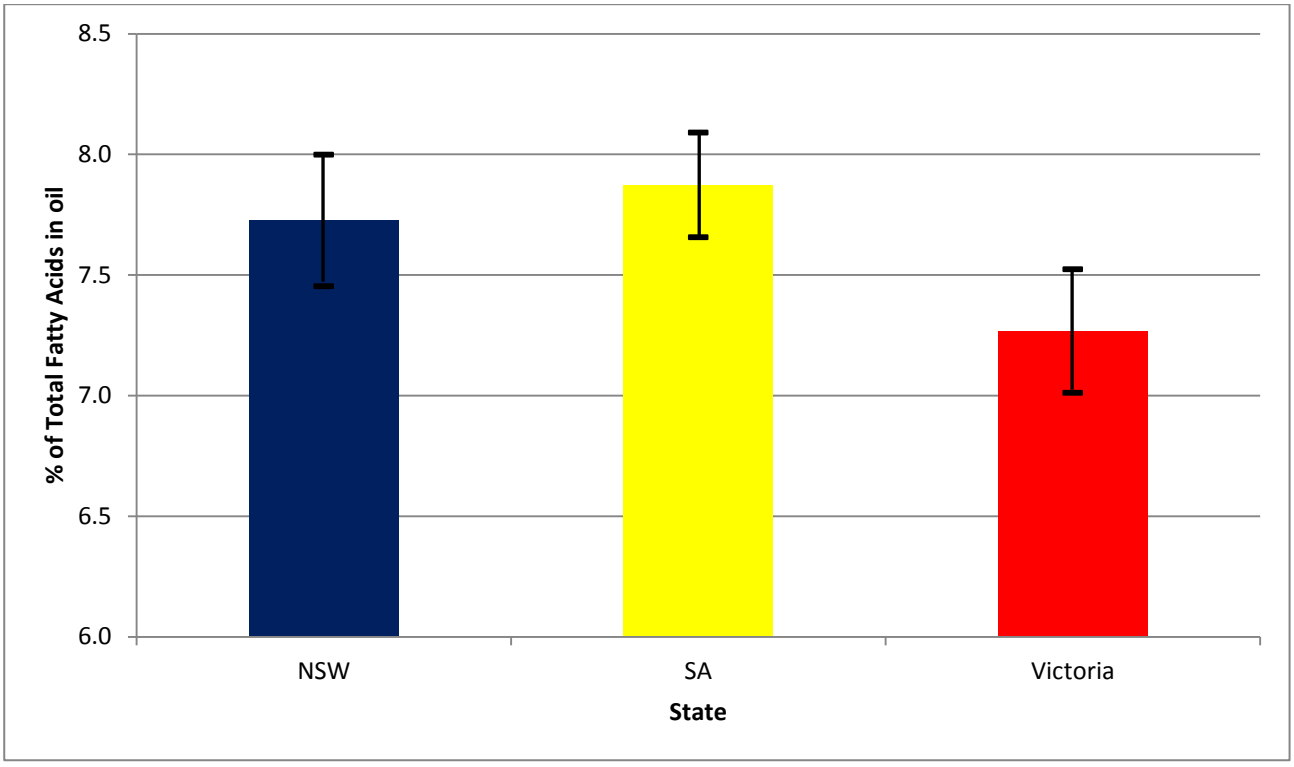


Figure 18: Average saturated fatty acid concentration by state 2015

Bars indicate the standard deviation for each state.

Monounsaturated Fatty Acid

The average monounsaturated fatty acid concentration for the 2015 harvest was 65.9% of total fatty acids in oil. Monounsaturated fatty acid concentration ranged from 62.8% at Frances in South Australia and Charlton in Victoria to 74.3% at Ariah Park in New South Wales.

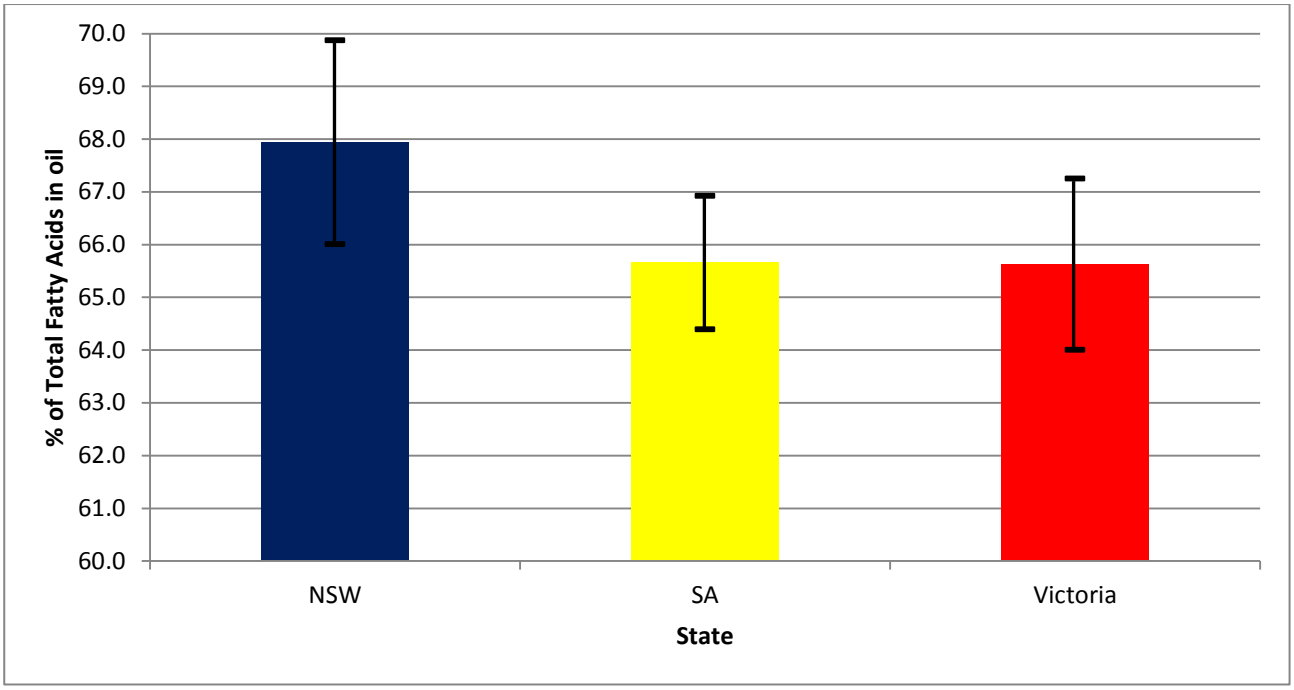


Figure 19: Average monounsaturated fatty acid concentration by state 2015

Bars indicate the standard deviation for each state.

Polyunsaturated Fatty Acid

The average polyunsaturated fatty acid concentration for the 2015 harvest was 26.5% of total fatty acids in oil. Polyunsaturated fatty acid concentration ranged from 18.6% at Ariah Park in New South Wales to 29.7% at Frances in South Australia.

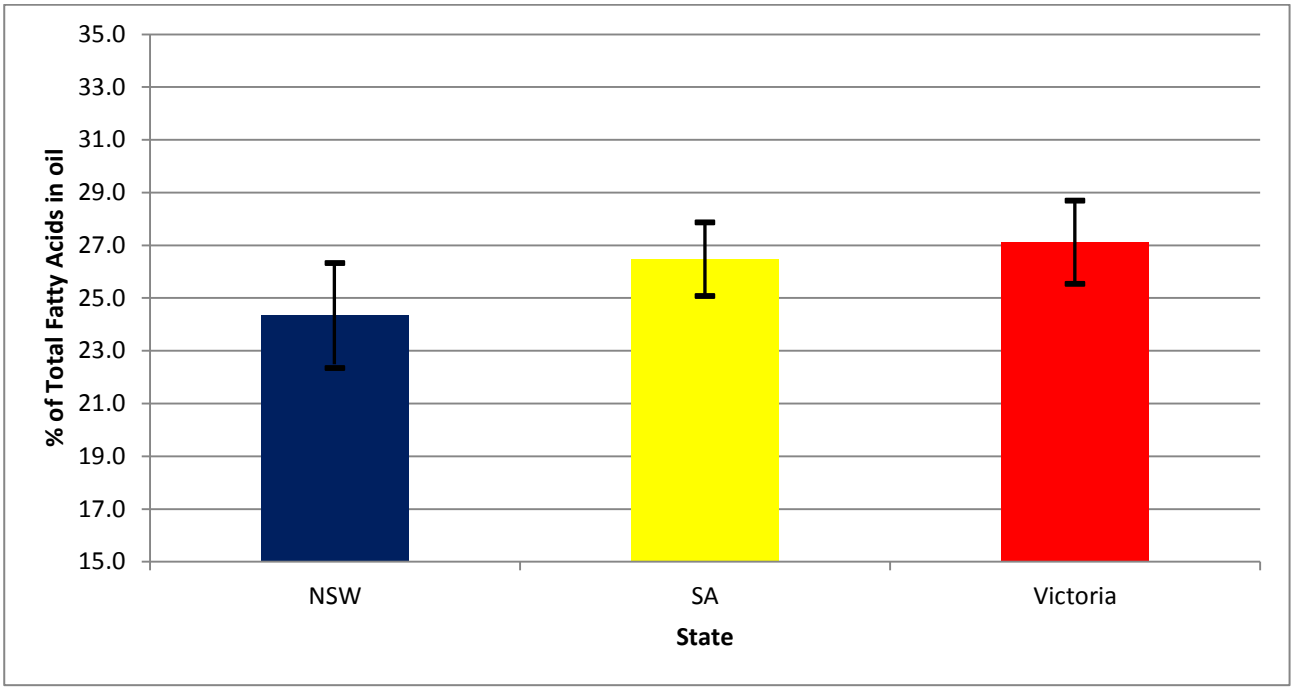


Figure 20: Average polyunsaturated fatty acid concentration by state 2015

Bars indicate the standard deviation for each state.

Iodine Value

The average iodine value for the 2015 harvest was 109.8. This is 1.5 lower than the 2014 harvest and the lowest iodine value recorded in the history of this publication. Iodine value ranged from 101.8 at Ariah Park in New South Wales to 113.8 at Westmere in Victoria.

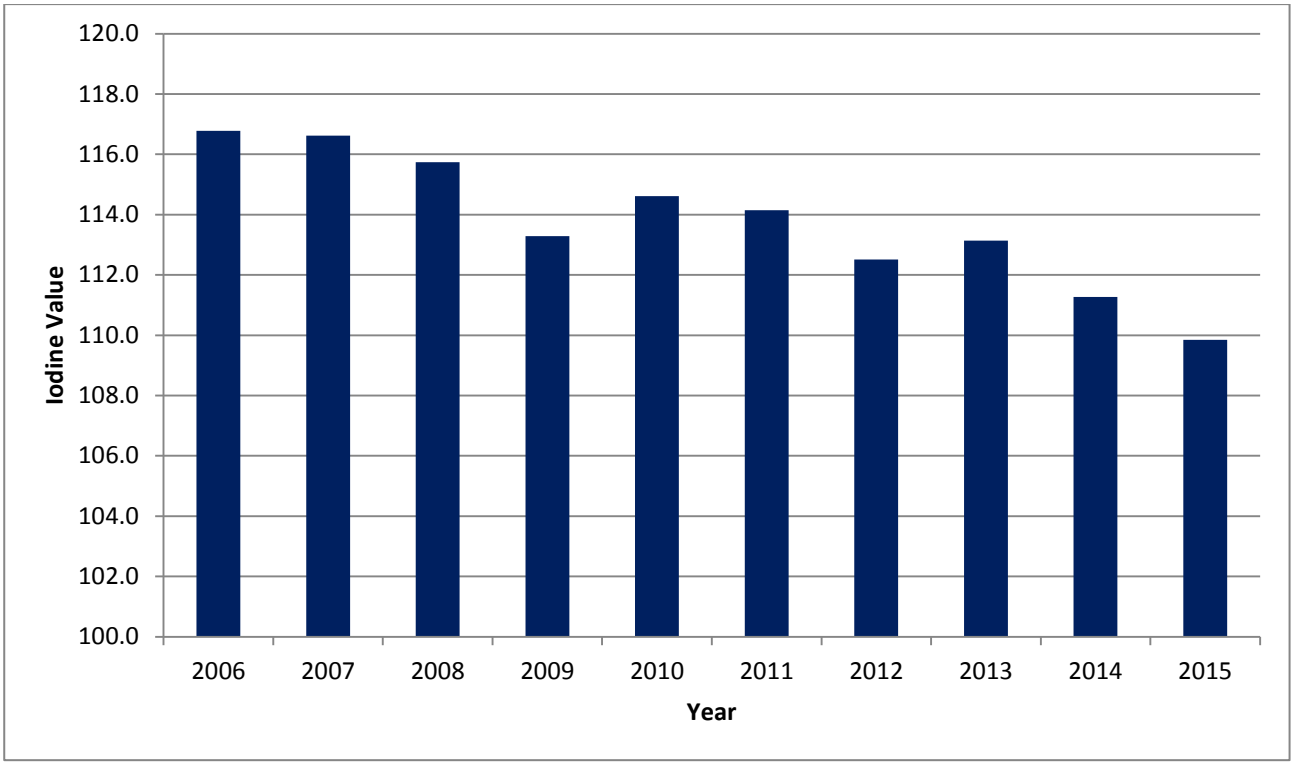


Figure 21: Average Australian iodine value in canola oil 2006 – 2015

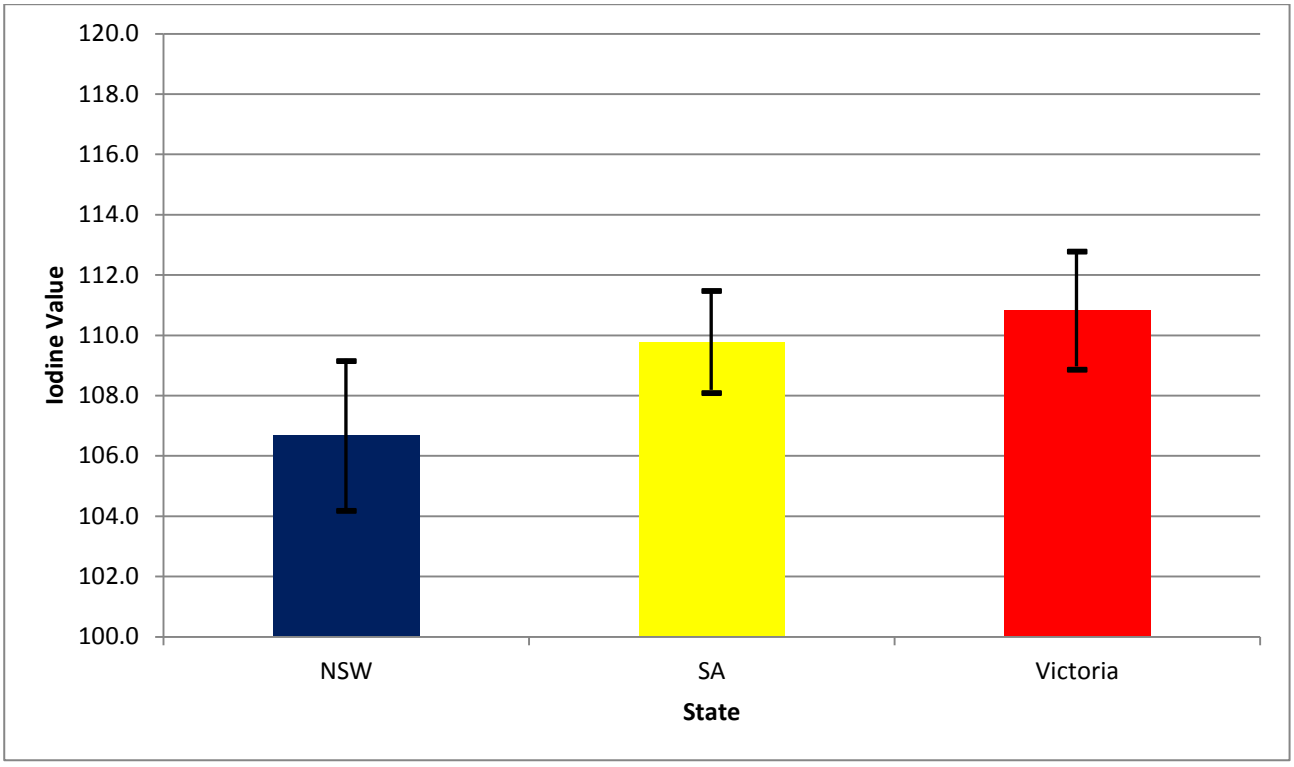


Figure 22: Average iodine value by state 2015

Bars indicate the standard deviation for each state.

Quality Data by State

In each state the receival sites are grouped into Zones and Regions by the bulk handlers. Results are reported according to these Zones and Regions.

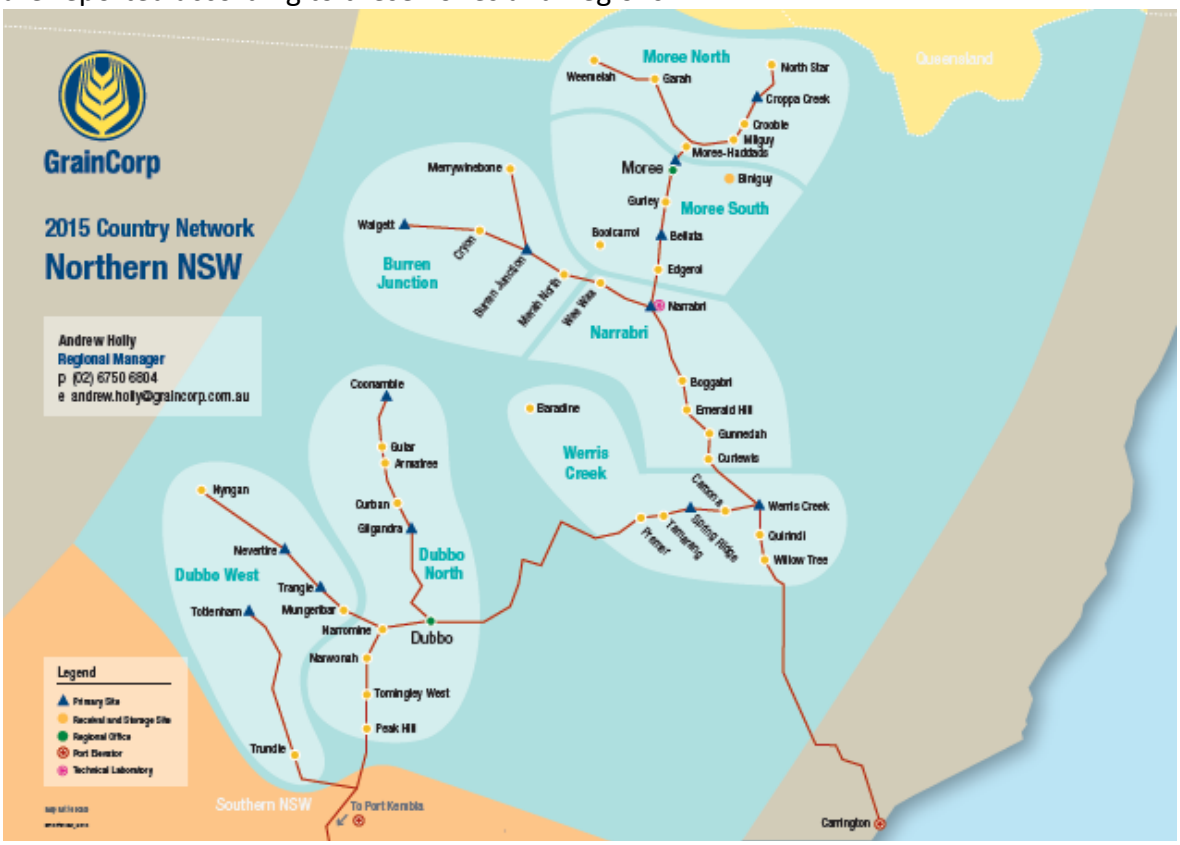


Figure 23: GrainCorp map of Northern NSW regions

Source: http://www.graincorp.com.au/storage-and-logistics/country-operations/nsw

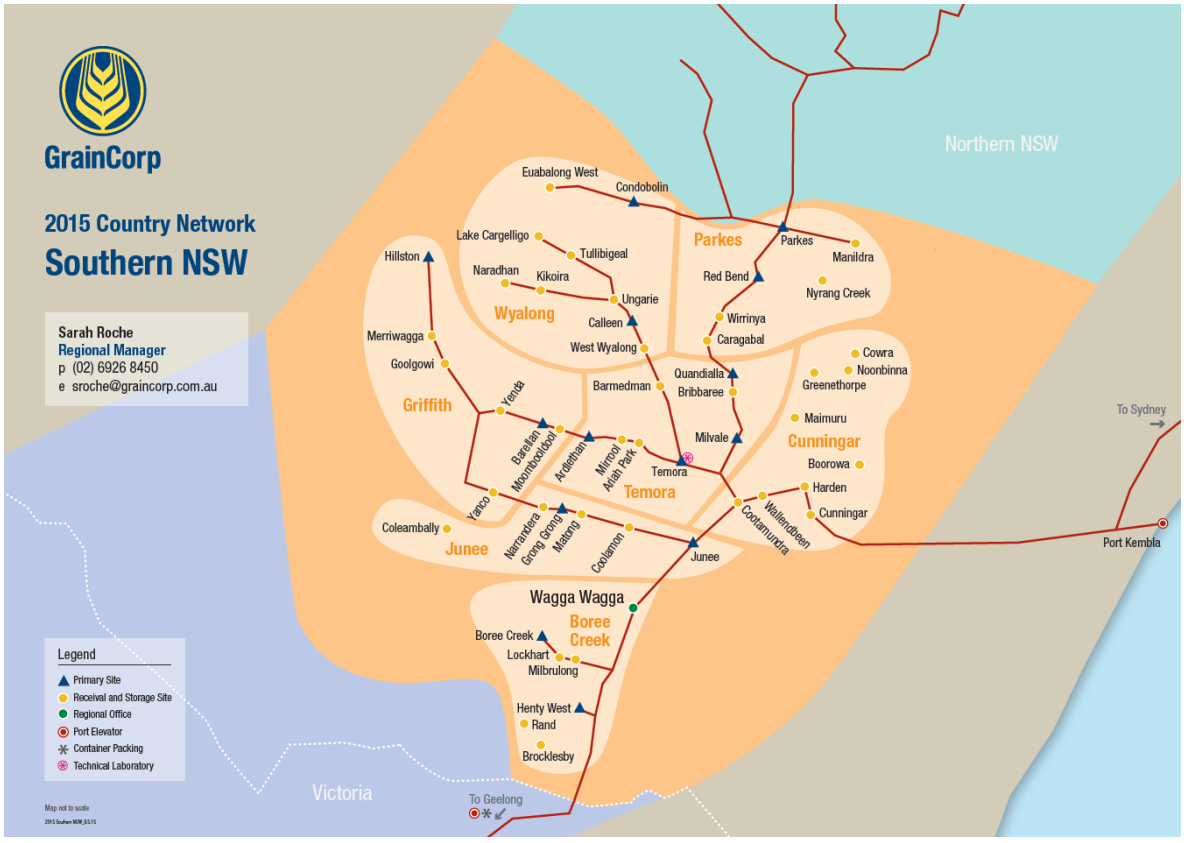


Figure 24: GrainCorp map of Southern NSW regions

Source: http://www.graincorp.com.au/storage-and-logistics/country-operations/nsw

Figure 25: GrainCorp map of Victorian regions

Source: http://www.graincorp.com.au/storage-and-logistics/country-operations/vic

Figure 26: Map of Viterra's Storage and Handling Network
Source: http://www.viterra.com.au/storage-handling/sites-and-locations

Table 3: Quality Data – New South Wales

Region/ Zone/ Receival Site	Grade	[1] Oil %	[2] Protein %	[3] Glucosinolates µmoles/g	[4] Grain Weight kg/hL	lbs/b
Northern NSW						
Dubbo North						
Curban	CAN	40.7	40.4	7	66.25	53.15
Dubbo West						
Mungeribar	CAN	41.5	41.4	6	63.88	51.25
Nevertire	CAN	39.7	41.7	7	65.75	52.75
Nyngan	CAN	40.1	41.9	6	63.75	51.15
Trundle	CAN	41.9	40.5	6	62.25	49.94
Moree North						
Moree-Haddads	CAN	41.7	40.2	6	66.25	53.15
Werris Creek						
Premer	CAN	40.0	42.7	5	66.13	53.05
Willowtree	CAN	40.5	41.8	5	65.13	52.25
Northern NSW Mean		**40.8**	**41.3**	**6**	**65.10**	**52.23**
Southern NSW						
Boree Creek						
Boree Creek	CAN	43.8	39.4	5	64.50	51.75
Henty West	CAN	44.0	38.4	14	63.25	50.74
Milbrulong	CAN	44.8	39.1	4	65.50	52.55
Rand	CAN	43.2	40.6	6	66.13	53.05
Cunningar						
Boorowa	CAN	43.9	37.9	13	64.75	51.95
Cootamundra	CAN	45.1	38.8	7	63.75	51.15
Cowra	CAN	43.3	39.3	6	65.50	52.55
Cunningar	CAN	44.8	40.1	5	64.63	51.85
Greenethorpe	CAN	45.2	38.9	4	64.38	51.65
Harden	CAN	45.6	38.5	5	64.50	51.75
Maimuru	CAN	43.4	39.3	5	64.25	51.55
Griffith						
Barellan	CAN	42.1	38.9	6	62.63	50.24
Junee						
Coleambally	CAN	42.2	38.6	7	65.00	52.15
Coolamon	CAN	42.0	38.5	4	65.38	52.45
Junee Sub	CAN	42.4	39.2	5	65.13	52.25
Matong	CAN	43.6	38.5	6	63.75	51.15
Narrandera	CAN	42.7	39.6	5	65.13	52.25
Parkes						
Caragabal	CAN	43.3	41.7	6	63.50	50.95
Manildra	CAN	41.9	40.8	7	63.75	51.15
Parkes Sub	CAN	41.4	41.9	6	60.13	48.24
Redbend	CAN	41.2	43.4	6	61.63	49.44
Wirrinya	CAN	44.2	38.3	5	65.38	52.45
Temora						
Ardlethan	CAN	43.0	39.3	4	62.25	49.94
Ariah Park	CAN	42.5	38.9	8	60.75	48.74
Bribbaree	CAN	42.3	40.9	6	64.50	51.75
Milvale	CAN	42.0	41.0	5	64.63	51.85
Temora Sub	CAN	42.5	41.1	5	64.25	51.55

[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- kg/hL: Kilograms per hectolitre, lbs/b: Pounds per bushel

Table 3: Quality Data – New South Wales – Continued

Region/ Zone/ Receival Site	Grade	[1] Oil %	[2] Protein %	[3] Glucosinolates µmoles/g	[4] Grain Weight kg/hL	lbs/b
Wyalong						
Calleen	CAN	41.7	42.0	6	62.25	49.94
Condobolin	CAN	41.6	40.8	6	61.50	49.34
Wyalong	CAN	41.5	43.1	5	65.38	52.45
Southern NSW Mean		**43.0**	**39.9**	**6**	**63.93**	**51.29**
NSW Mean		**41.5**	**40.9**	**6**	**64.72**	**51.92**
NSW Minimum		*39.7*	*37.9*	*4*	*60.13*	*48.24*
NSW Maximum		*45.6*	*43.4*	*14*	*66.25*	*53.15*

[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- kg/hL: Kilograms per hectolitre, lbs/b: Pounds per bushel

Table 4: Quality Data – South Australia

Region/ Zone/ Receival Site	Grade	[1] Oil %	[2] Protein %	[3] Glucosinolates µmoles/g	[4] Grain Weight kg/hL	lbs/b
Adelaide						
Port Adelaide	CANO	42.0	39.1	7	67.50	54.15
Adelaide Mean		**42.0**	**39.1**	**7**	**67.50**	**54.15**
Central						
Ardrossan	CANO	40.1	39.0	5	67.50	54.15
Bowmans	CANO	42.1	38.9	7	67.00	53.75
Gladstone	CANO	40.8	39.7	5	66.88	53.65
Port Giles	CANO	41.4	37.9	5	66.88	53.65
Roseworthy	CANO	40.2	40.7	6	67.13	53.85
Central Mean		**41.1**	**39.5**	**6**	**67.03**	**53.78**
Eastern						
Bordertown	CANO	38.7	45.7	9	68.38	54.86
Dooen	CANO	40.9	43.5	6	67.50	54.15
Frances	CANO	39.9	44.0	7	67.88	54.46
Keith	CANO	39.5	41.6	9	67.63	54.26
Tailem Bend	CANO	41.2	39.4	5	67.25	53.95
Wolseley	CANO	38.3	43.6	6	68.38	54.86
Eastern Mean		**40.8**	**40.2**	**6**	**67.39**	**54.07**
Western						
Cummins	CANO	43.1	37.2	6	66.25	53.15
Port Lincoln	CANO	43.0	37.7	6	66.88	53.65
Rudall	CANO	43.8	36.8	6	66.13	53.05
Tumby Bay	CANO	44.3	36.4	6	66.88	53.65
Western Mean		**43.2**	**37.3**	**6**	**66.51**	**53.36**
SA Mean		**42.2**	**38.4**	**6**	**66.82**	**53.61**
SA Minimum		*38.3*	*36.4*	*5*	*66.13*	*53.05*
SA Maximum		*44.3*	*45.7*	*9*	*68.38*	*54.86*

[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- kg/hL: Kilograms per hectolitre, lbs/b: Pounds per bushel

Table 5: Quality Data – Victoria

Region/ Zone/ Receival Site	Grade	[1] Oil %	[2] Protein %	[3] Glucosinolates µmoles/g	[4] Grain Weight kg/hL	lbs/b
Central Victoria						
Charlton	CAN	38.1	44.6	6	68.63	55.06
Dookie	CAN	41.2	42.6	6	64.75	51.95
Dunolly Sub	CAN	40.4	45.3	7	65.38	52.45
Elmore	CAN	41.4	43.3	6	65.50	52.55
Mitiamo	CAN	42.1	42.4	8	65.50	52.55
Murchison East	CAN	40.8	43.1	6	64.63	51.85
Tandarra	CAN	41.3	44.9	8	65.00	52.15
Central Mean		**41.1**	**43.4**	**6**	**65.03**	**52.17**
North East						
Deniliquin	CAN	42.3	40.0	7	66.25	53.15
Oaklands	CAN	42.7	40.3	6	65.00	52.15
Tocumwal	CAN	42.2	42.2	7	65.00	52.15
Yarrawonga	CAN	43.4	41.1	6	65.88	52.85
North East Mean		**42.9**	**40.9**	**6**	**65.60**	**52.63**
Mallee						
Ouyen (Northern Mallee)	CAN	42.3	38.9	7	66.75	53.55
Beulah (Southern Mallee)	CAN	38.8	43.0	6	66.88	53.65
Donald (Southern Mallee)	CAN	37.9	44.4	7	67.63	54.26
Mallee Mean		**39.3**	**42.4**	**7**	**66.95**	**53.71**
Swan Hill						
Boort	CAN	41.4	40.4	6	65.00	52.15
Piangil	CAN	40.0	39.8	8	67.38	54.05
Quambatook	CAN	39.6	42.1	7	65.13	52.25
Swan Hill Mean		**40.4**	**40.7**	**7**	**65.79**	**52.78**
Western Districts						
Berrybank	CAN	43.1	40.6	6	66.00	52.95
Carpolac	CAN	39.5	45.1	7	67.75	54.36
Hamilton	CAN	43.4	40.9	6	65.63	52.65
Naracoorte	CAN	41.0	41.8	7	67.50	54.15
Natimuk	CAN	40.8	44.1	7	66.00	52.95
Westmere	CAN	43.0	41.1	6	67.25	53.95
Willaura	CAN	40.6	42.1	6	66.13	53.05
Western Districts Mean		**42.5**	**41.5**	**6**	**66.41**	**53.28**
Wimmera						
Lillimur	CAN	38.4	43.8	7	67.50	54.15
Murtoa Sub	CAN	39.4	44.7	8	66.50	53.35
Nhill	CAN	38.8	43.4	6	67.50	54.15
Wimmera Mean		**38.9**	**44.0**	**7**	**67.08**	**53.82**
Victoria Mean		**41.9**	**41.9**	**6**	**65.91**	**52.88**
Victoria Minimum		*37.9*	*38.9*	*6*	*64.63*	*51.85*
Victoria Maximum		*43.4*	*45.3*	*8*	*68.63*	*55.06*

[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- kg/hL: Kilograms per hectolitre, lbs/b: Pounds per bushel

Table 6: Quality Data – GM

Region/ Zone/ Receival Site	Grade	[1] Oil %	[2] Protein %	[3] Glucosinolates µmoles/g	[4] Grain Weight kg/hL	lbs/b
NSW						
Wallendbeen	CANG	44.0	39.1	4	66.25	53.15
Junee Sub	CANG	44.9	36.7	6	64.13	51.45
Parkes Sub	CANG	42.9	40.2	6	65.25	52.35
NSW Mean		**43.9**	**38.7**	**6**	**65.21**	**52.32**
Victoria						
St James	CANG	39.8	42.0	6	66.00	52.95
Oaklands	CANG	42.7	39.6	5	64.75	51.95
VIC Mean		**42.1**	**40.2**	**5**	**65.03**	**52.17**
GM Mean		**42.3**	**39.9**	**5**	**65.05**	**52.19**
GM Minimum		*39.8*	*36.7*	*4*	*64.13*	*51.45*
GM Maximum		*44.9*	*42.0*	*6*	*66.25*	*53.15*

[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- kg/hL: Kilograms per hectolitre, lbs/b: Pounds per bushel

Fatty Acid Composition by State

Table 7: Fatty Acid Composition – New South Wales

Region/ Zone/ Receival Site	14:0	16:0	16:1	17:0	17:1	18:0	18:1	18:2	18:3	20:0	20:1	22:0	22:1	24:0	24:1
Northern NSW															
Dubbo North															
Curban	0.1	4.4	0.3	0.2	0.1	2.4	66.6	17.4	6.7	0.5	1.0	0.2	<0.1	0.1	0.1
Dubbo West															
Mungeribar	0.1	4.5	0.3	0.2	0.1	2.3	67.6	16.9	6.1	0.5	1.0	0.2	<0.1	0.1	0.1
Nevertire	0.1	4.5	0.3	0.2	0.1	2.2	67.6	16.6	6.4	0.6	1.0	0.3	<0.1	0.2	0.1
Nyngan	0.1	4.2	0.4	0.2	0.2	2.7	68.0	16.1	6.2	0.5	1.0	0.2	<0.1	0.1	0.1
Trundle	0.1	4.5	0.3	0.1	0.1	2.0	68.1	16.5	6.2	0.5	1.0	0.3	<0.1	0.2	0.1
Moree North															
Moree-Haddads	0.1	4.1	0.3	0.2	0.2	2.4	64.0	17.6	9.0	0.6	1.0	0.3	<0.1	0.1	0.1
Werris Creek															
Premer	0.1	4.4	0.3	0.2	0.1	2.2	65.0	18.5	7.3	0.5	0.9	0.2	<0.1	0.1	0.1
Willow Tree	0.1	4.1	0.3	0.2	0.2	2.5	66.4	17.0	7.0	0.6	1.0	0.3	<0.1	0.2	0.1
Northern NSW Mean	**0.1**	**4.3**	**0.3**	**0.2**	**0.2**	**2.4**	**66.5**	**17.1**	**7.0**	**0.5**	**1.0**	**0.2**	**<0.1**	**0.1**	**0.1**
Southern NSW															
Boree Creek															
Boree Creek	0.1	4.3	0.3	0.1	0.1	1.9	67.5	16.3	7.3	0.6	1.0	0.3	<0.1	0.1	0.1
Henty West	0.1	4.1	0.3	0.2	0.2	1.7	63.7	19.2	8.4	0.5	1.1	0.3	<0.1	0.1	0.1
Milbrulong	0.1	4.3	0.3	0.1	0.1	1.9	66.5	16.9	7.6	0.6	1.0	0.3	<0.1	0.1	0.1
Rand	0.1	4.4	0.3	0.2	0.1	1.9	64.2	19.6	7.4	0.5	1.0	0.2	<0.1	0.1	0.1
Cunningar															
Boorowa	0.1	4.3	0.3	0.2	0.2	1.6	63.5	19.1	8.5	0.5	1.1	0.3	<0.1	0.1	0.1
Cootamundra	0.1	4.2	0.3	0.2	0.1	1.8	63.8	18.1	9.4	0.5	1.1	0.3	<0.1	0.1	0.1
Cowra	0.1	4.3	0.3	0.1	0.1	1.9	64.6	18.0	8.5	0.6	1.0	0.3	<0.1	0.1	0.1
Cunningar	0.1	4.2	0.3	0.1	0.1	1.8	63.7	18.3	9.4	0.5	1.0	0.2	<0.1	0.1	0.1
Greenethorpe	0.1	4.2	0.3	0.1	0.1	2.0	65.7	17.3	8.2	0.5	1.0	0.3	<0.1	0.1	0.1
Harden	0.1	4.1	0.3	0.1	0.1	1.8	66.7	15.6	9.2	0.5	1.1	0.3	<0.1	0.1	0.1
Maimuru	0.1	4.2	0.3	0.2	0.1	2.1	66.9	16.1	7.9	0.6	1.0	0.3	<0.1	0.1	0.1
Griffith															
Barellan	0.1	4.1	0.4	0.2	0.2	2.5	67.4	16.2	7.1	0.5	0.9	0.2	<0.1	0.1	0.1
Junee															
Coleambally	0.1	4.5	0.3	0.2	0.1	2.0	65.3	17.5	7.9	0.6	1.1	0.3	0.1	0.2	0.1
Coolamon	0.1	4.4	0.3	0.2	0.1	2.1	64.9	18.0	7.7	0.6	1.0	0.3	<0.1	0.2	0.1
Junee Sub	0.1	4.2	0.3	0.2	0.1	2.0	66.4	16.5	8.1	0.6	1.0	0.3	<0.1	0.1	0.1
Matong	0.1	4.2	0.3	0.2	0.2	2.3	66.7	16.5	7.6	0.6	1.0	0.3	<0.1	0.1	0.1
Narrandera	0.1	4.4	0.3	0.2	0.1	2.1	66.0	17.7	7.2	0.6	1.0	0.3	<0.1	0.1	0.1
Parkes															
Caragabal	0.1	4.3	0.3	0.2	0.1	2.1	66.9	17.1	6.9	0.6	1.0	0.3	<0.1	0.1	0.1
Manildra	0.1	4.1	0.3	0.2	0.1	2.2	69.0	14.9	6.9	0.6	1.1	0.3	<0.1	0.2	0.1
Parkes Sub	0.1	4.4	0.3	0.2	0.1	2.1	67.7	16.6	6.5	0.5	1.0	0.2	<0.1	0.1	0.1
Red Bend	0.1	4.5	0.3	0.1	0.1	2.0	64.8	19.1	6.8	0.5	1.1	0.3	0.2	0.1	0.1
Wirrinya	0.1	4.3	0.3	0.1	0.1	2.1	68.2	16.3	6.3	0.6	1.0	0.3	<0.1	0.1	0.1
Temora															
Ardlethan	0.1	4.4	0.3	0.1	0.1	2.0	65.4	18.4	7.1	0.6	1.0	0.3	<0.1	0.1	0.1
Ariah Park	0.1	3.9	0.3	0.1	0.1	1.9	72.6	11.8	6.7	0.6	1.2	0.3	0.1	0.2	0.1
Bribbaree	0.1	4.2	0.3	0.2	0.1	2.0	69.2	15.1	6.6	0.6	1.1	0.3	<0.1	0.2	0.1
Milvale	0.1	4.4	0.3	0.2	0.1	2.0	66.4	17.0	7.5	0.6	1.0	0.3	<0.1	0.1	0.1
Temora Sub	0.1	4.4	0.3	0.1	0.1	1.9	63.8	19.1	8.0	0.6	1.0	0.3	<0.1	0.1	0.1

Table 7: Fatty Acid Composition – New South Wales – Continued

Region/ Zone/ Receival Site	[1] Poly	[2] Mono	[3] Sat.	[4] Iodine Value
Northern NSW				
Dubbo North				
Curban	24.0	68.1	7.9	105.9
Dubbo West				
Mungeribar	23.0	69.1	7.9	104.3
Nevertire	23.0	69.1	7.9	104.7
Nyngan	22.3	69.7	8.1	103.7
Trundle	22.7	69.6	7.7	104.4
Moree North				
Moree-Haddads	26.6	65.7	7.7	110.2
Werris Creek				
Premer	25.8	66.4	7.7	108.2
Willow Tree	24.0	68.1	7.9	106.1
Northern NSW Mean	**24.1**	**68.0**	**7.8**	**106.2**
Southern NSW				
Boree Creek				
Boree Creek	23.7	69.0	7.4	106.6
Henty West	27.6	65.4	7.0	111.2
Milbrulong	24.6	68.0	7.4	107.5
Rand	27.0	65.6	7.4	109.5
Cunningar				
Boorowa	27.6	65.2	7.2	111.1
Cootamundra	27.5	65.3	7.1	111.9
Cowra	26.5	66.1	7.4	110.1
Cunningar	27.7	65.2	7.1	112.2
Greenethorpe	25.5	67.2	7.3	108.9
Harden	24.8	68.3	6.9	109.5
Maimuru	24.0	68.5	7.6	107.1
Griffith				
Barellan	23.3	68.9	7.7	105.6
Junee				
Coleambally	25.4	67.0	7.6	108.3
Coolamon	25.6	66.4	7.9	108.1
Junee Sub	24.6	67.9	7.5	108.0
Matong	24.1	68.3	7.7	106.8
Narrandera	24.9	67.5	7.6	107.3
Parkes				
Caragabal	24.0	68.4	7.6	106.2
Manildra	21.7	70.6	7.6	104.2
Parkes Sub	23.0	69.3	7.7	104.9
Red Bend	25.9	66.5	7.6	107.9
Wirrinya	22.6	69.7	7.7	104.4
Temora				
Ardlethan	25.5	66.9	7.7	107.7
Ariah Park	18.6	74.3	7.1	101.8
Bribbaree	21.7	70.8	7.5	104.0
Milvale	24.5	67.9	7.6	107.2
Temora Sub	27.1	65.4	7.5	110.0

[1] Poly - Sum of the polyunsaturated fatty acids (18:2 & 18:3)

[2] Mono - Sum of the monounsaturated fatty acids (16:1, 17:1, 18:1, 20:1, 22:1 & 24:1)

[3] Sat - Sum of the saturated fatty acids (14:0, 16:0, 17:0, 18:0, 20:0, 22:0 & 24:0)

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

Table 7: Fatty Acid Composition – New South Wales – Continued

Region/ Zone/ Receival Site	14:0	16:0	16:1	17:0	17:1	18:0	18:1	18:2	18:3	20:0	20:1	22:0	22:1	24:0	24:1
Wyalong															
Calleen	0.1	4.2	0.3	0.2	0.1	2.0	67.7	16.9	6.4	0.6	1.0	0.3	<0.1	0.2	0.1
Condobolin	0.1	4.3	0.3	0.2	0.1	2.3	66.6	17.7	6.2	0.6	1.0	0.3	<0.1	0.1	0.1
Wyalong	0.1	4.8	0.4	0.2	0.1	2.0	63.4	20.3	7.1	0.5	0.9	0.2	<0.1	0.1	0.1
Southern NSW Mean	**0.1**	**4.3**	**0.3**	**0.2**	**0.1**	**2.0**	**66.2**	**17.2**	**7.5**	**0.6**	**1.0**	**0.3**	**<0.1**	**0.1**	**0.1**
NSW Mean	**0.1**	**4.3**	**0.3**	**0.2**	**0.1**	**2.2**	**66.4**	**17.2**	**7.2**	**0.5**	**1.0**	**0.3**	**<0.1**	**0.1**	**0.1**
NSW Minimum	*0.1*	*3.9*	*0.3*	*0.1*	*0.1*	*1.6*	*63.4*	*11.8*	*6.1*	*0.5*	*0.9*	*0.2*	<0.1	*0.1*	*0.1*
NSW Maximum	*0.1*	*4.8*	*0.4*	*0.2*	*0.2*	*2.7*	*72.6*	*20.3*	*9.4*	*0.6*	*1.2*	*0.3*	*0.2*	*0.2*	*0.1*

Table 7: Fatty Acid Composition – New South Wales – Continued

Region/ Zone/ Receival Site	[1] Poly	[2] Mono	[3] Sat.	[4] Iodine Value
Wyalong				
Calleen	23.3	69.2	7.4	105.4
Condobolin	24.0	68.2	7.9	105.4
Wyalong	27.4	64.8	7.8	109.2
Southern NSW Mean	**24.8**	**67.7**	**7.5**	**107.6**
NSW Mean	**24.3**	**67.9**	**7.7**	**106.7**
NSW Minimum	*18.6*	*64.8*	*6.9*	*101.8*
NSW Maximum	*27.7*	*74.3*	*8.1*	*112.2*

[1] Poly - Sum of the polyunsaturated fatty acids (18:2 & 18:3)

[2] Mono - Sum of the monounsaturated fatty acids (16:1, 17:1, 18:1, 20:1, 22:1 & 24:1)

[3] Sat - Sum of the saturated fatty acids (14:0, 16:0, 17:0, 18:0, 20:0, 22:0 & 24:0)

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

Table 8: Fatty Acid Composition – South Australia

Region/ Zone/ Receival Site	14:0	16:0	16:1	17:0	17:1	18:0	18:1	18:2	18:3	20:0	20:1	22:0	22:1	24:0	24:1
Adelaide															
Port Adelaide	0.1	4.6	0.3	0.2	0.1	2.2	62.1	19.5	8.8	0.6	1.0	0.3	<0.1	0.1	0.1
Adelaide Mean	**0.1**	**4.6**	**0.3**	**0.2**	**0.1**	**2.2**	**62.1**	**19.5**	**8.8**	**0.6**	**1.0**	**0.3**	**<0.1**	**0.1**	**0.1**
Central	0.1	4.5	0.3	0.2	0.1	2.3	67.6	16.9	6.1	0.5	1.0	0.2	<0.1	0.1	0.1
Ardrossan	0.1	4.5	0.4	0.2	0.2	2.3	64.0	17.1	8.7	0.7	1.1	0.3	0.1	0.2	0.1
Bowmans	0.1	4.6	0.3	0.2	0.1	2.2	64.5	18.0	8.0	0.6	1.0	0.3	<0.1	0.1	0.1
Gladstone	0.1	4.5	0.3	0.2	0.1	2.2	64.4	18.7	7.5	0.6	1.0	0.3	<0.1	0.1	0.1
Port Giles	0.1	4.4	0.4	0.2	0.2	2.4	63.4	17.7	9.1	0.6	1.0	0.3	<0.1	0.1	0.1
Roseworthy	0.1	4.6	0.3	0.2	0.1	2.1	64.0	18.1	8.4	0.6	1.0	0.3	<0.1	0.1	0.1
Central Mean	**0.1**	**4.5**	**0.4**	**0.2**	**0.1**	**2.2**	**64.2**	**18.1**	**8.2**	**0.6**	**1.0**	**0.3**	**<0.1**	**0.1**	**0.1**
Eastern															
Bordertown	0.1	4.6	0.3	0.2	0.1	2.1	61.8	19.5	9.4	0.5	1.0	0.2	<0.1	0.1	0.1
Dooen	0.1	4.4	0.3	0.1	0.1	1.8	61.5	20.7	8.9	0.5	1.0	0.2	<0.1	0.1	0.1
Frances	0.1	4.4	0.3	0.2	0.1	2.0	61.1	20.2	9.6	0.5	1.1	0.3	<0.1	0.1	0.1
Keith	0.1	4.4	0.4	0.2	0.2	2.2	62.2	18.3	9.8	0.6	1.0	0.3	<0.1	0.2	0.1
Tailem Bend	0.1	4.5	0.3	0.2	0.1	2.1	63.8	18.1	8.7	0.5	1.0	0.2	<0.1	0.1	0.1
Wolseley	0.1	4.6	0.4	0.2	0.1	2.1	61.9	19.1	9.5	0.6	1.0	0.3	<0.1	0.1	0.1
Eastern Mean	**0.1**	**4.5**	**0.3**	**0.2**	**0.1**	**2.1**	**63.4**	**18.3**	**8.9**	**0.5**	**1.0**	**0.2**	**<0.1**	**0.1**	**0.1**
Western															
Cummins	0.1	4.4	0.3	0.2	0.1	2.1	65.1	16.7	8.8	0.6	1.0	0.3	<0.1	0.1	0.1
Port Lincoln	0.1	4.4	0.3	0.2	0.1	2.2	63.8	17.2	9.3	0.6	1.0	0.3	0.1	0.2	0.1
Rudall	0.1	4.7	0.3	0.2	0.1	2.0	61.4	20.4	9.0	0.5	0.9	0.2	<0.1	0.1	0.1
Tumby Bay	0.1	4.5	0.3	0.2	0.1	2.1	62.9	18.6	9.0	0.6	1.0	0.3	<0.1	0.1	0.1
Western Mean	**0.1**	**4.4**	**0.3**	**0.2**	**0.1**	**2.2**	**64.3**	**17.3**	**9.0**	**0.6**	**1.0**	**0.3**	**<0.1**	**0.1**	**0.1**
SA Mean	**0.1**	**4.5**	**0.3**	**0.2**	**0.1**	**2.2**	**64.0**	**17.7**	**8.7**	**0.6**	**1.0**	**0.3**	**<0.1**	**0.1**	**0.1**
SA Minimum	*0.1*	*4.4*	*0.3*	*0.1*	*0.1*	*1.8*	*61.1*	*16.7*	*7.5*	*0.5*	*0.9*	*0.2*	<0.1	*0.1*	*0.1*
SA Maximum	*0.1*	*4.7*	*0.4*	*0.2*	*0.2*	*2.4*	*65.1*	*20.7*	*9.8*	*0.7*	*1.1*	*0.3*	*0.1*	*0.2*	*0.1*

Table 8: Fatty Acid Composition – South Australia – Continued

Region/ Zone/ Receival Site	[1] Poly	[2] Mono	[3] Sat.	[4] Iodine Value
Adelaide				
Port Adelaide	28.3	63.7	8.0	111.3
Adelaide Mean	**28.3**	**63.7**	**8.0**	**111.3**
Central				
Ardrossan	25.8	65.9	8.3	108.7
Bowmans	26.0	66.0	8.0	108.6
Gladstone	26.2	65.9	7.9	108.4
Port Giles	26.8	65.1	8.1	110.2
Roseworthy	26.5	65.6	7.9	109.5
Central Mean	**26.3**	**65.7**	**8.0**	**109.0**
Eastern				
Bordertown	28.8	63.4	7.8	112.5
Dooen	29.6	63.0	7.3	113.2
Frances	29.7	62.8	7.5	113.7
Keith	28.1	64.0	7.9	112.1
Tailem Bend	26.8	65.4	7.8	110.1
Wolseley	28.6	63.5	7.9	112.3
Eastern Mean	**27.2**	**65.0**	**7.8**	**110.7**
Western				
Cummins	25.5	66.7	7.8	109.1
Port Lincoln	26.5	65.5	8.0	110.2
Rudall	29.4	62.9	7.7	112.8
Tumby Bay	27.7	64.5	7.8	111.1
Western Mean	**26.3**	**65.9**	**7.8**	**109.9**
SA Mean	**24.3**	**67.9**	**7.7**	**106.7**
SA Minimum	*25.5*	*62.8*	*7.3*	*108.4*
SA Maximum	*29.7*	*66.7*	*8.3*	*113.7*

[1] Poly - Sum of the polyunsaturated fatty acids (18:2 & 18:3)

[2] Mono - Sum of the monounsaturated fatty acids (16:1, 17:1, 18:1, 20:1, 22:1 & 24:1)

[3] Sat - Sum of the saturated fatty acids (14:0, 16:0, 17:0, 18:0, 20:0, 22:0 & 24:0)

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

Table 9: Fatty Acid Composition – Victoria

Region/ Zone/ Receival Site	14:0	16:0	16:1	17:0	17:1	18:0	18:1	18:2	18:3	20:0	20:1	22:0	22:1	24:0	24:1
Central Victoria															
Charlton	0.1	4.6	0.3	0.2	0.2	2.1	61.3	19.7	9.9	0.4	0.9	0.2	<0.1	0.1	0.1
Dookie	0.1	4.3	0.3	0.1	0.1	1.9	64.7	18.6	7.9	0.5	1.0	0.3	<0.1	0.1	0.1
Dunolly Sub	0.1	4.3	0.3	0.1	0.1	1.8	61.7	20.4	9.1	0.5	1.1	0.3	<0.1	0.1	0.1
Elmore	0.1	4.4	0.3	0.1	0.1	1.9	61.8	21.3	8.0	0.5	1.0	0.3	<0.1	0.1	0.1
Mitiamo	0.1	4.3	0.3	0.1	0.1	1.9	65.0	18.2	8.0	0.5	1.0	0.2	<0.1	0.1	0.1
Murchison East	0.1	4.2	0.3	0.1	0.1	1.8	65.5	17.6	8.1	0.5	1.1	0.3	<0.1	0.1	0.1
Tandarra	0.1	4.3	0.3	0.1	0.1	1.8	62.6	20.1	8.5	0.5	1.0	0.2	<0.1	0.1	0.1
Central Mean	**0.1**	**4.3**	**0.3**	**0.1**	**0.1**	**1.9**	**63.8**	**19.2**	**8.2**	**0.5**	**1.0**	**0.3**	**<0.1**	**0.1**	**0.1**
North East															
Deniliquin	0.1	4.4	0.3	0.1	0.1	1.9	65.5	17.9	7.6	0.5	1.0	0.3	<0.1	0.1	0.1
Oaklands	0.1	4.3	0.3	0.1	0.1	1.9	66.3	17.8	7.2	0.5	1.0	0.3	<0.1	0.1	0.1
Tocumwal	0.1	4.4	0.3	0.1	0.1	1.9	64.1	19.1	8.0	0.5	1.0	0.2	<0.1	0.1	0.1
Yarrawonga	0.1	4.2	0.3	0.1	0.1	1.9	67.2	16.5	7.6	0.5	1.0	0.3	<0.1	0.1	0.1
North East Mean	**0.1**	**4.3**	**0.3**	**0.1**	**0.1**	**1.9**	**66.3**	**17.4**	**7.6**	**0.5**	**1.0**	**0.3**	**<0.1**	**0.1**	**0.1**
Mallee															
Ouyen (Northern Mallee)	0.1	4.7	0.3	0.2	0.2	2.1	62.1	19.5	9.0	0.4	0.9	0.2	0.1	0.1	0.1
Beulah (Southern Mallee)	0.1	4.6	0.3	0.2	0.1	2.0	61.9	20.5	8.3	0.5	0.9	0.2	<0.1	0.1	0.1
Donald (Southern Mallee)	0.1	4.3	0.3	0.2	0.2	2.1	62.0	19.6	9.3	0.5	1.0	0.2	<0.1	0.1	0.1
Mallee Mean	**0.1**	**4.6**	**0.3**	**0.2**	**0.1**	**2.1**	**62.0**	**20.2**	**8.5**	**0.5**	**0.9**	**0.2**	**<0.1**	**0.1**	**0.1**
Swan Hill															
Boort	0.1	4.2	0.3	0.1	0.1	2.1	65.0	17.5	8.4	0.6	1.0	0.3	<0.1	0.1	0.1
Piangil	0.1	4.2	0.3	0.2	0.2	2.4	66.4	16.6	7.6	0.5	1.0	0.2	<0.1	0.1	0.1
Quambatook	0.1	4.4	0.3	0.2	0.2	2.2	63.0	18.7	8.9	0.5	1.0	0.3	<0.1	0.1	0.1
Swan Hill Mean	**0.1**	**4.3**	**0.3**	**0.2**	**0.2**	**2.2**	**64.8**	**17.6**	**8.3**	**0.5**	**1.0**	**0.3**	**<0.1**	**0.1**	**0.1**
Western Districts															
Berrybank	0.1	4.3	0.3	0.1	0.1	1.8	62.3	19.2	9.8	0.5	1.0	0.2	<0.1	0.1	0.1
Carpolac	0.1	4.2	0.3	0.1	0.1	1.9	64.2	17.7	9.3	0.5	1.1	0.3	<0.1	0.1	0.1
Hamilton	0.1	4.2	0.3	0.2	0.1	1.8	63.1	18.4	9.8	0.5	1.1	0.2	<0.1	0.1	0.1
Naracoorte	0.1	4.3	0.3	0.2	0.2	2.0	61.8	18.8	9.9	0.6	1.1	0.3	<0.1	0.1	0.1
Natimuk	0.1	4.1	0.3	0.1	0.1	1.8	64.3	17.6	9.4	0.5	1.1	0.3	<0.1	0.1	0.1
Westmere	0.1	4.2	0.3	0.1	0.1	1.8	62.3	19.2	9.9	0.5	1.0	0.2	<0.1	0.1	0.1
Willaura	0.1	4.2	0.3	0.1	0.1	1.8	64.3	17.4	9.7	0.5	1.1	0.3	<0.1	0.1	0.1
Western Districts Mean	**0.1**	**4.2**	**0.3**	**0.1**	**0.1**	**1.8**	**62.9**	**18.6**	**9.8**	**0.5**	**1.1**	**0.2**	**<0.1**	**0.1**	**0.1**
Wimmera															
Lillimur	0.1	4.4	0.3	0.2	0.2	2.1	62.7	18.5	9.5	0.5	1.0	0.3	<0.1	0.1	0.1
Murtoa Sub	0.1	4.2	0.3	0.2	0.1	1.9	63.7	18.2	9.2	0.5	1.1	0.2	<0.1	0.1	0.1
Nhill	0.1	4.5	0.4	0.2	0.1	2.1	62.1	19.6	8.9	0.5	1.0	0.3	<0.1	0.1	0.1
Wimmera Mean	**0.1**	**4.4**	**0.3**	**0.2**	**0.1**	**2.0**	**62.9**	**18.8**	**9.2**	**0.5**	**1.0**	**0.3**	**<0.1**	**0.1**	**0.1**
Victoria Mean	**0.1**	**4.3**	**0.3**	**0.1**	**0.1**	**1.9**	**64.1**	**18.4**	**8.7**	**0.5**	**1.0**	**0.3**	**<0.1**	**0.1**	**0.1**
Victoria Minimum	*0.1*	*4.1*	*0.3*	*0.1*	*0.1*	*1.8*	*61.3*	*16.5*	*7.2*	*0.4*	*0.9*	*0.2*	0.0	*0.1*	*0.1*
Victoria Maximum	*0.1*	*4.7*	*0.4*	*0.2*	*0.2*	*2.4*	*67.2*	*21.3*	*9.9*	*0.6*	*1.1*	*0.3*	*0.1*	*0.1*	*0.1*

Table 9: Fatty Acid Composition – Victoria – Continued

Region/ Zone/ Receival Site	[1] Poly	[2] Mono	[3] Sat.	[4] Iodine Value
Central Victoria				
Charlton	29.6	62.8	7.6	113.7
Dookie	26.5	66.2	7.3	109.6
Dunolly Sub	29.5	63.2	7.3	113.3
Elmore	29.3	63.3	7.4	112.0
Mitiamo	26.3	66.5	7.2	109.6
Murchison East	25.8	67.0	7.2	109.3
Tandarra	28.6	64.2	7.2	112.1
Central Mean	**24.1**	**68.0**	**7.8**	**106.2**
North East				
Deniliquin	25.5	67.1	7.5	108.3
Oaklands	25.0	67.8	7.3	107.6
Tocumwal	27.1	65.6	7.3	110.1
Yarrawonga	24.1	68.7	7.2	107.2
North East Mean	**24.9**	**67.8**	**7.3**	**107.9**
Mallee				
Ouyen (Northern Mallee)	28.5	63.7	7.8	111.9
Beulah (Southern Mallee)	28.7	63.5	7.8	111.4
Donald (Southern Mallee)	28.9	63.6	7.5	112.6
Mallee Mean	**28.7**	**63.5**	**7.7**	**111.7**
Swan Hill				
Boort	25.9	66.6	7.5	109.3
Piangil	24.2	68.0	7.8	106.8
Quambatook	27.6	64.6	7.9	110.8
Swan Hill Mean	**25.9**	**66.4**	**7.7**	**109.0**
Western Districts				
Berrybank	28.9	63.9	7.2	113.5
Carpolac	27.0	65.8	7.2	111.3
Hamilton	28.2	64.7	7.1	112.9
Naracoorte	28.7	63.6	7.7	112.9
Natimuk	27.0	65.9	7.1	111.4
Westmere	29.1	63.9	7.1	113.8
Willaura	27.1	65.9	7.1	111.8
Western Districts Mean	**28.4**	**64.5**	**7.1**	**113.0**
Wimmera				
Lillimur	27.9	64.4	7.7	111.8
Murtoa Sub	27.4	65.4	7.2	111.6
Nhill	28.5	63.8	7.7	111.8
Wimmera Mean	**27.9**	**64.6**	**7.5**	**111.7**
Victoria Mean	**27.1**	**65.6**	**7.3**	**110.8**
Victoria Minimum	*24.1*	*62.8*	*7.1*	*106.8*
Victoria Maximum	*29.6*	*68.7*	*7.9*	*113.8*

[1] Poly - Sum of the polyunsaturated fatty acids (18:2 & 18:3)

[2] Mono - Sum of the monounsaturated fatty acids (16:1, 17:1, 18:1, 20:1, 22:1 & 24:1)

[3] Sat - Sum of the saturated fatty acids (14:0, 16:0, 17:0, 18:0, 20:0, 22:0 & 24:0)

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

Table 10: Fatty Acid Composition – GM

Region/ Zone/ Receival Site	14:0	16:0	16:1	17:0	17:1	18:0	18:1	18:2	18:3	20:0	20:1	22:0	22:1	24:0	24:1
NSW															
Wallendbeen	0.1	4.4	0.3	0.2	0.1	2.1	63.8	18.0	8.9	0.6	1.1	0.3	<0.1	0.1	0.1
Junee Sub	0.1	4.7	0.3	0.2	0.1	2.1	63.8	18.7	7.9	0.6	1.0	0.3	<0.1	0.2	0.1
Parkes Sub	0.1	4.3	0.3	0.2	0.1	2.4	66.4	17.6	6.4	0.6	1.0	0.3	<0.1	0.2	0.1
NSW Mean	**0.1**	**4.5**	**0.3**	**0.2**	**0.1**	**2.2**	**64.7**	**18.1**	**7.7**	**0.6**	**1.0**	**0.3**	**<0.1**	**0.2**	**0.1**
VIC															
St James	0.1	4.4	0.3	0.2	0.1	2.3	65.5	17.5	7.6	0.6	1.0	0.2	<0.1	0.1	0.1
Oaklands	0.1	4.2	0.3	0.1	0.1	2.2	66.2	16.9	7.7	0.6	1.1	0.3	<0.1	0.1	0.1
VIC Mean	**0.1**	**4.3**	**0.3**	**0.1**	**0.1**	**2.3**	**66.1**	**17.0**	**7.7**	**0.6**	**1.1**	**0.3**	**<0.1**	**0.1**	**0.1**
GM Mean	**0.1**	**4.3**	**0.3**	**0.1**	**0.1**	**2.3**	**65.9**	**17.2**	**7.7**	**0.6**	**1.1**	**0.3**	**<0.1**	**0.1**	**0.1**
GM Minimum	0.1	4.2	0.3	0.1	0.1	2.1	63.8	16.9	6.4	0.6	1.0	0.2	<0.1	0.1	0.1
GM Maximum	0.1	4.7	0.3	0.2	0.1	2.4	66.4	18.7	8.9	0.6	1.1	0.3	<0.1	0.2	0.1

Table 10: Fatty Acid Composition – GM – Continued

Region/ Zone/ Receival Site	[1] Poly	[2] Mono	[3] Sat.	[4] Iodine Value
NSW				
Wallendbeen	26.9	65.4	7.7	110.5
Junee Sub	26.5	65.3	8.1	108.9
Parkes Sub	24.0	68.0	8.0	105.6
NSW Mean	**25.8**	**66.2**	**7.9**	**108.3**
VIC				
St James	25.1	67.0	7.8	107.7
Oaklands	24.5	67.8	7.7	107.4
VIC Mean	**24.7**	**67.6**	**7.7**	**107.5**
GM Mean	**24.8**	**67.4**	**7.7**	**107.6**
GM Minimum	*24.0*	*65.3*	*7.7*	*105.6*
GM Maximum	*26.9*	*68.0*	*8.1*	*110.5*

[1] Poly - Sum of the polyunsaturated fatty acids (18:2 & 18:3)

[2] Mono - Sum of the monounsaturated fatty acids (16:1, 17:1, 18:1, 20:1, 22:1 & 24:1)

[3] Sat - Sum of the saturated fatty acids (14:0, 16:0, 17:0, 18:0, 20:0, 22:0 & 24:0)

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

Definitions

Canola

Canola is defined as seed of the species Brassica *napus* or Brassica *rapa* but containing less than 30 micromoles of specified glucosinolates per g of oil-free air-dry solids and not more than 2% erucic acid in the oil component, as a proportion of the total fatty acids content. The specified glucosinolates are any one or a mixture of 3-butenyl, 4-pentenyl, 2-hydroxy-3-butenyl and 2-hydroxy-4-pentenyl glucosinolates (AOF 2015, page 27,).

GM Canola

The term "genetically modified organism" (GMO) is legally defined by the European Commission. An organism is "genetically modified" if “the genetic material has been altered in a way that does not occur naturally by mating and/or natural recombination” (Directive 2001/18/EC 2001, page 4).

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, protein and glucosinolates to the appropriate moisture content for reporting.

Oil Content

Oil content is determined by NIR, calibrated from results obtained using method ISO 659 “Oilseeds -- Determination of oil content (Reference method)”. Oil is extracted from ground seed on either a Foss Soxtec™ 2050 or 8000 Extraction System using hexane for four hours. The sample is reground and extracted for 2 hours. The sample is again ground and extracted for a further 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. 33 2015: "Determination of Fatty Acid Methyl Esters by Gas Chromatography". 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 AOCS Cd 1c-85: Calculated Iodine Value.

Volumetric Grain Weights

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

References

Australian Oilseeds Federation *Section 1: Quality Standards, Technical Information & Typical Analysis* (2015) **Issue 14**

DIRECTIVE 2001/18/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 12 March 2001 on the deliberate release into the environment of genetically modified organisms and repealing Council Directive 90/220/EEC (2001) **L106,** pp 1-38.