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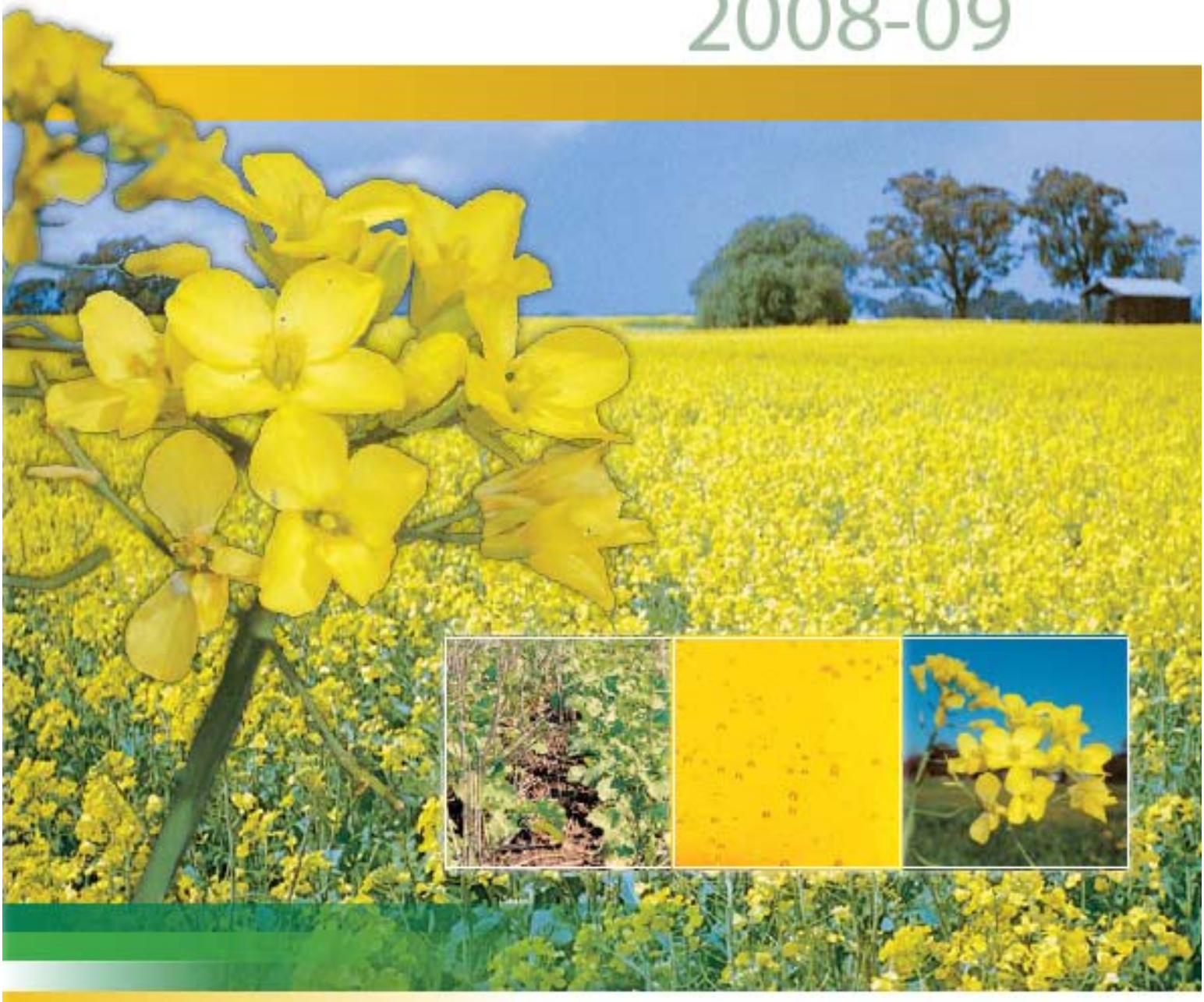
The Quality of Australian Canola

2008-09



AOF Australian Oilseeds Federation

NSW DEPARTMENT OF PRIMARY INDUSTRIES

Quality of Australian Canola 2008

D.E. Seberry, R.J. Mailer & P.A. Parker
Volume No 15
ISSN 1322-9397

Australian Oilseeds Federation

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Acknowledgments

The Australian Oilseeds Federation would like to thank Graincorp Operations Limited, ABB Limited and the Grainpool Pty Ltd. for providing the canola samples from the 2008 harvest. Thank you also to GRDC and the service providers for providing samples from the 2008 National Variety Trials (NVT). The assistance from all those involved in the analysis of these samples and compilation of the book is greatly appreciated.

Introduction

Sample Analysis

Canola samples representing the 2008 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.

The data for NVT samples shown here were from samples analysed by the Australian Oils Research Laboratory in Wagga Wagga.

Weather Production Review

The Season

The pattern of the previous six years was repeated in 2008 with most Western Australian canola growing districts benefiting from generally favourable conditions resulting in above average yields whilst all the south eastern Australian districts experienced another difficult season.

Western Australia: Above average rainfall in April in all districts except Esperance produced an excellent start to the season. This enabled the majority of the crop to be sown on time and, combined with a good price outlook, encouraged growers to increase their canola plantings.

Early crop growth was above average and although several districts experienced a dry, cold period during mid winter, timely rain throughout the late winter-spring period resulted in excellent crop growth setting the base for above average yield prospects across the state. Apart from a heavy frost in some southern districts in late September, favourable rainfall and temperature conditions prevailed throughout flowering and pod-fill further enhancing crop prospects. Late falls of rain in late October and November caused significant delays to harvest in the central and southern districts but these did not result in any grain quality issues. Across the whole state there were very few incidences of insect pests or diseases throughout the growing season which added to the yield potential.

Due to the generally favourable conditions experienced throughout the growing season, harvest yields in all districts were above the long term average. The final production estimates for Western Australia for the 2008 season were around 1.138 million tonnes from a harvested area of 620,000 ha. By comparison production for the 2007 season was around 665,000 tonnes from a harvested area of 390,000 ha. The generally favourable growing conditions, especially the mild temperatures experienced during seed development, also resulted in seed oil contents being well above the long term average.

South Australia: Early to mid autumn rainfall in all districts was very variable but adequate rain fell in early May to enable the majority of the crop to be sown within the recommended sowing window. Although most districts experienced dry conditions during June, there was sufficient soil moisture available to maintain crop growth and crop prospects were at least average. Cold temperatures during July and August slowed crop development but this was tempered by average rainfall being recorded.

Well below average rainfall was received across the whole of the state in September and October. This had a severe impact on crops in nearly all districts particularly those on the Eyre Peninsula where yields were significantly reduced. A heavy frost in November also had an impact on yield potentials in some districts but damage was not as severe as was initially feared as many crops were close to being windrowed. Final estimated production for South Australia for the 2008 season was around 227,000 tonnes of seed from a harvested area of 165,000 ha. By comparison production in 2007 was estimated at 155,000 tonnes from a harvested area of 155,000 ha.

Victoria: The start to the growing season in Victoria was very similar to South Australia with very little sub soil moisture following a dry autumn. Although some rain fell in May the main break did not occur until early June resulting in good seedling emergence and subsequent early crop growth. Despite only average rainfall being recorded throughout the winter period, crops in most districts progressed satisfactorily and exhibited good yield potential going into spring.

Unfortunately conditions continued to deteriorate throughout spring with crops in all districts, particularly the Mallee and Western Districts, experiencing moisture stress, high temperatures and widespread frosts during the critical stage of pod fill. This resulted in many crops failing with the yield potential on those that were harvested being reduced by 30% to 90%. Late rain during harvest in the later ripening Western Districts further reduced the yield of many crops in this area. The adverse dry conditions also affected the seed oil contents of virtually all seed delivered in Victoria.

Final estimated production for Victoria for 2008 was around 251,000 tonnes from a harvested area of 185,000 ha out of the 220,000 ha estimated to have been sown. In the 2007 season production was estimated at 200,000 tonne of seed from the 150,000 ha harvested although 270,000 ha were estimated to have been sown.

New South Wales: All canola growing areas experienced a reasonable late April break but apart from some scattered falls in May, good follow-up rain was not received until mid June. Early growth in many crops was both patchy and variable and generally related to the level of weed control on summer fallows. Rainfall throughout winter was variable across all districts with the Central and North Western districts receiving the better falls. Cold, frosty conditions across NSW in August slowed crop development and assisted in conserving some of the limited available soil moisture for spring crop growth.

Although September saw below average rainfall in most districts, a continuation of cool temperatures enabled crops to make sufficient growth to respond to the good falls of rain that fell in most districts in early October. A return of hot, dry conditions in late October resulted in a severe outbreak of aphids on moisture stressed crops in the Central West and Southern districts. A significant proportion of affected crops required control measures to be undertaken.

Moderate falls of rain in most districts in early November combined with mild temperatures enabled many crops to finish slightly better than initially estimated. However, the moisture stress conditions experienced for much of the seed fill period had an adverse impact on seed oil contents with some loads testing below 30% oil content and being rejected at delivery.

Final estimated production for New South Wales for 2008 was around 262,000 tonnes from a harvested area of 195,000 ha out of the 225,000 ha estimated to have been sown. This was a massive improvement on the 2007 season in which final production was estimated at 44,000 tonnes from a harvested area of 58,000 ha out of the 240,000 ha sown.

As a consequence of the seasonal conditions, the reported incidence of diseases was very low in all states. Likewise with insect pests there were few problems experienced except

in New South Wales where a major outbreak of aphids occurred on moisture stressed crops in the spring with a large percentage of affected crops requiring control measures.

Despite the difficult season experienced in most of south eastern Australia the final production was much better than pre-harvest expectations. However, seed oil contents were low resulting in many growers experiencing significant oil discounts at delivery. In contrast, Western Australia again experienced a very good season which accounted for 60% of the total Australian production. Unfortunately the high costs involved in growing a successful crop combined with a run of difficult seasons have again made growers in Victoria and New South Wales wary of committing to a large scale return to planting canola in 2009.

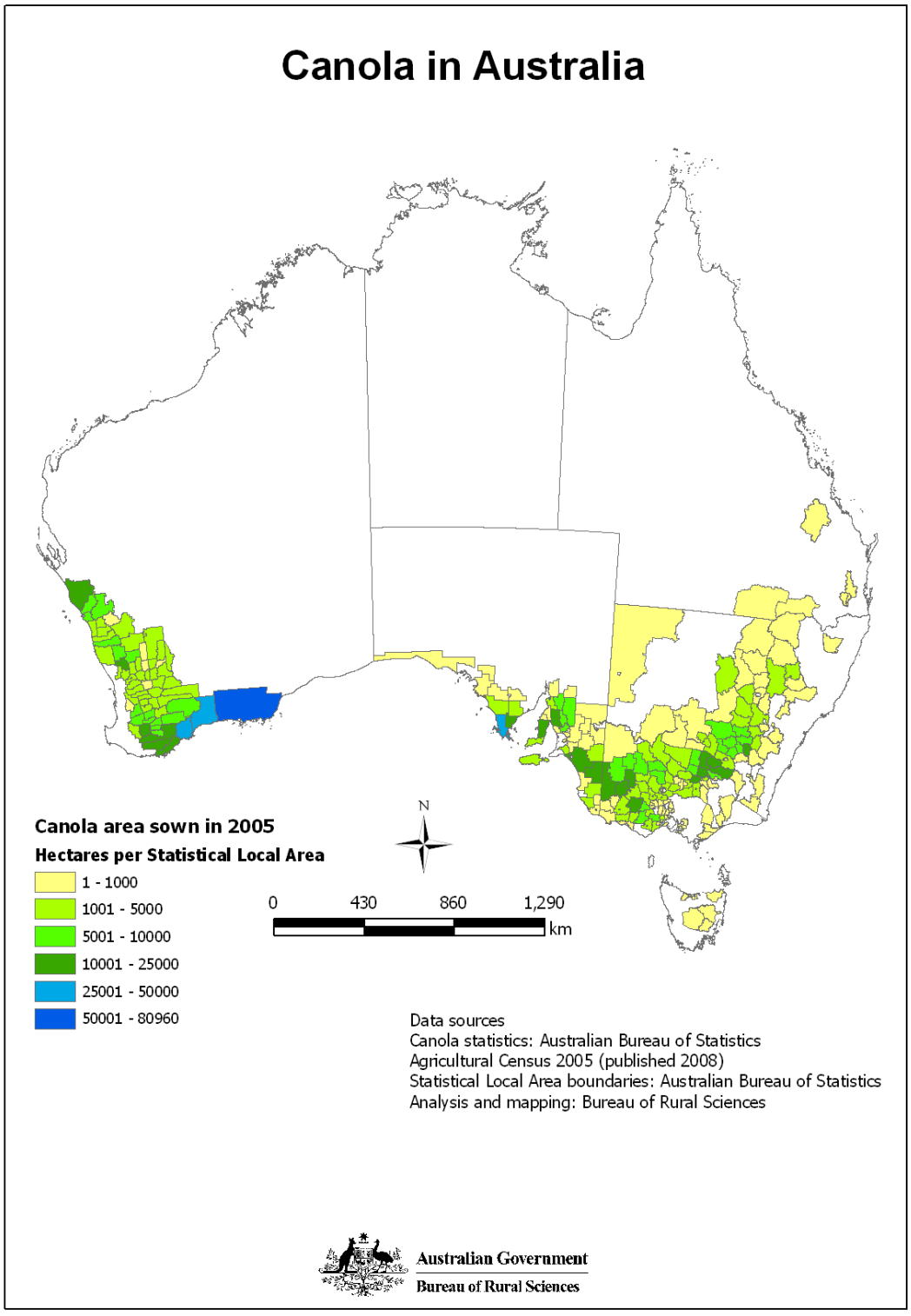

Figure 1: Areas of canola production in Australia
Published with approval of Bureau of Rural Sciences

Yield

The 2008 canola harvest was nearly double the 2007 harvest. In 2008 there was 1,165,000 hectares harvested, this was over 400,000 hectares more than the 758,000 hectares harvested in 2007. A higher yield on top of the increased area harvested resulted in 1,878,000 tonnes harvested in 2008 compared to the 1,069,000 tonnes harvested in 2007. The yield varied from a state average of 1.3 t/ha in New South Wales to 1.8 t/ha in Western Australia. The national yield of 1.6 t/ha was 0.2 t/ha higher than the 2007 average.

Table 1: Canola production in Australia by state 2008

State	Production (kilotonnes)	Area (kilohectares)	Average Yield (tonnes/hectare)
New South Wales	262	195	1.3
Victoria	251	185	1.4
South Australia	227	165	1.4
Western Australia	1138	620	1.8
Australia	1878	1165	1.6

Source: AOF Crop Report February 2009

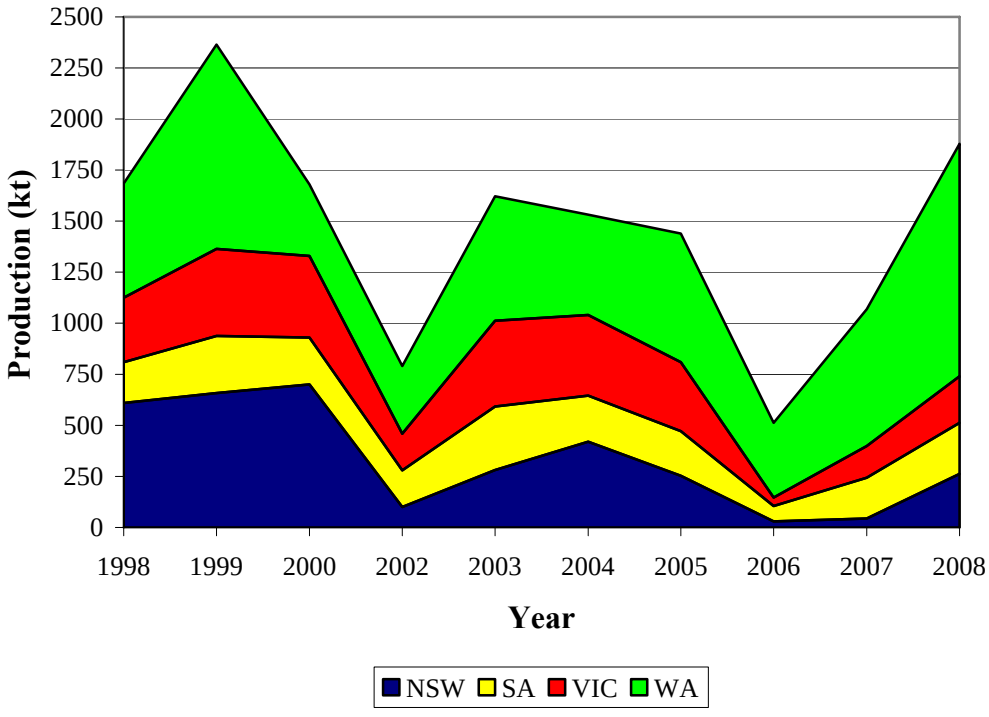

Figure 2: Canola Production in Australia 1998 – 2008

Australian Quality Parameter Summary

The division, state and Australian mean values for all analysis 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. Therefore, the state mean (calculated from the individual sites) wasn't adjusted for tonnage but the Australian mean was. However, as tonnages are confidential information, no individual site tonnages can be reported.

Table 2: Average quality of Australian canola 2008

Quality Parameter	Australian Mean
Oil content, % in whole seed @ 6 % moisture	41.8
Protein content, % in oil-free meal @ 10 % moisture	41.0
Glucosinolates, µmoles/g in whole seed @ 6 % moisture	10
Volumetric grain weights, lbs/b	54.4
kg/hL	67.8
Oleic acid concentration (C18:1), % in oil	60.0
Linoleic acid concentration (C18:2), % in oil	20.3
Linolenic acid concentration (C18:3), % in oil	10.7
Erucic acid concentration (C22:1), % in oil	< 0.1
Saturated fatty acid concentration, % in oil	7.6
Iodine Value	115.7

Oil Content

The average oil content for the 2008 harvest was 41.8 %. This was a decrease of 2.2% from the 2007 harvest and the lowest since 2004. Oil content ranged from a low of 33.8% at Oaklands in New South Wales (received through the Marong Region, Victoria) to a high of 45.9 % at Millicent in South Australia.

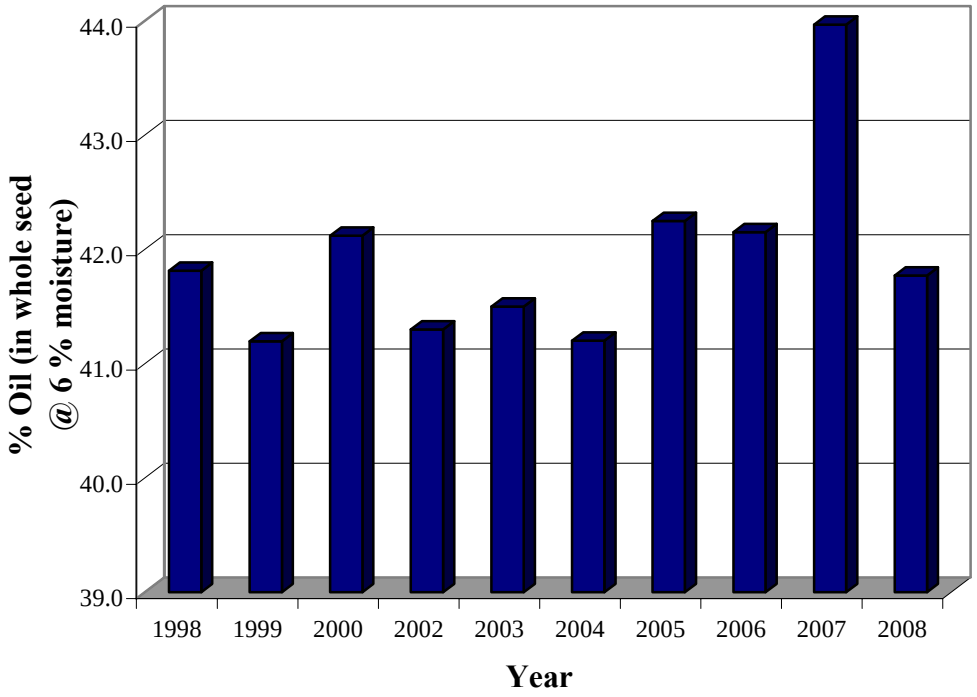

Figure 3: Average Australian oil content 1998 – 2008

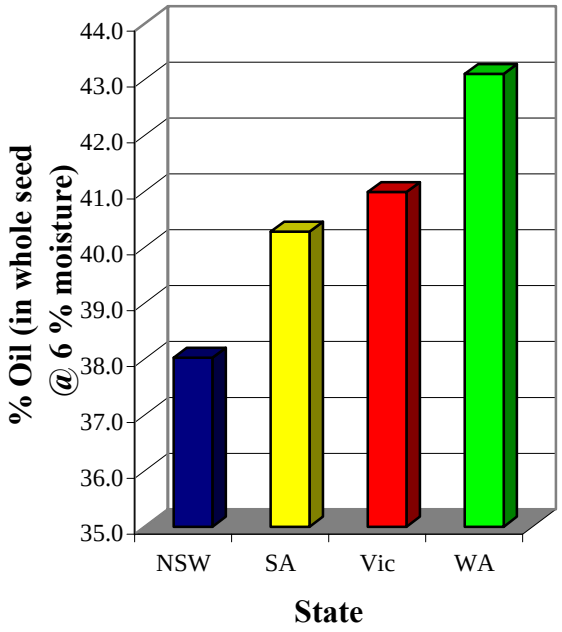

Figure 4: Average oil content by state 2008

Protein Content

The average protein content for the 2008 harvest was 41.0 % in oil free meal. This was an increase of 1.0 % from the 2007 and the highest since 2004. Protein content ranged from 38.3 % at Site # 1090589274 in the Albany Port Zone of Western Australia to 48.4 % at Boree Creek in New South Wales.

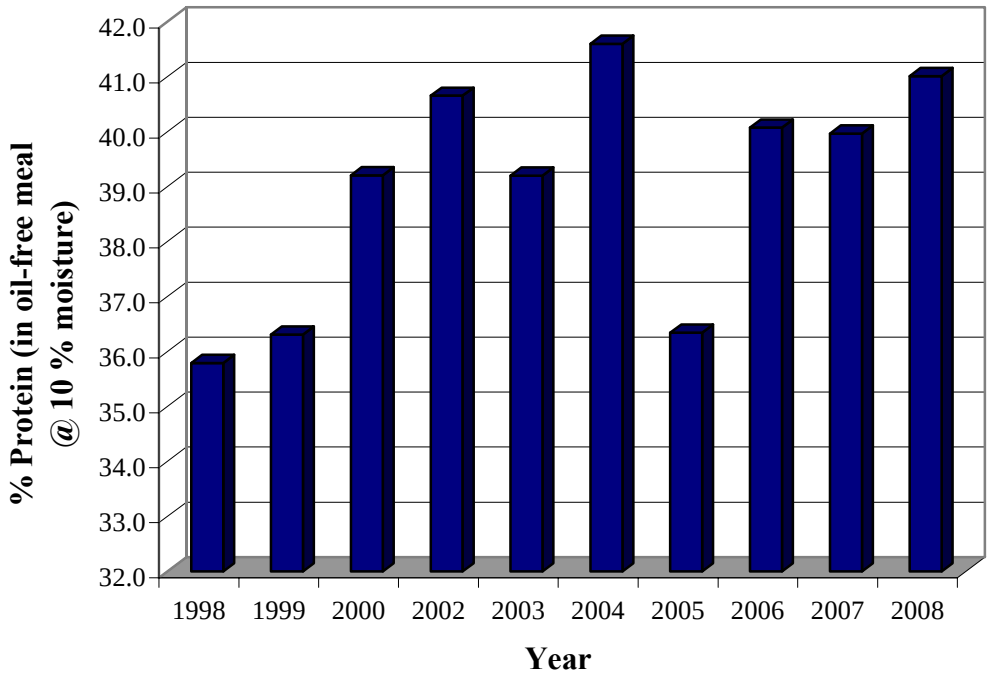

Figure 5: Average Australian protein content 1998 – 2008

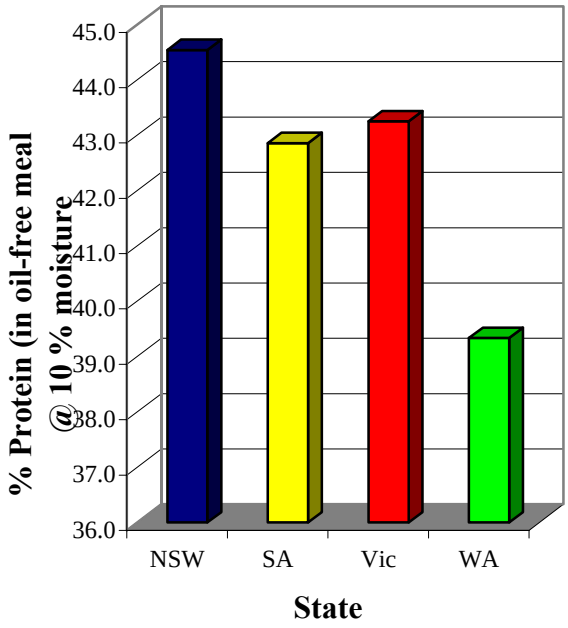

Figure 6: Average protein content by state 2008

Glucosinolate Concentration

The average glucosinolate content for the 2008 harvest was 10 µmoles/g. This was an increase of 2 µmoles/g from the 2007 harvest and the highest since 2004. Glucosinolate content ranged from 5 µmoles/g at Bowmans in South Australia to 19 µmoles/g at Oaklands in New South Wales.

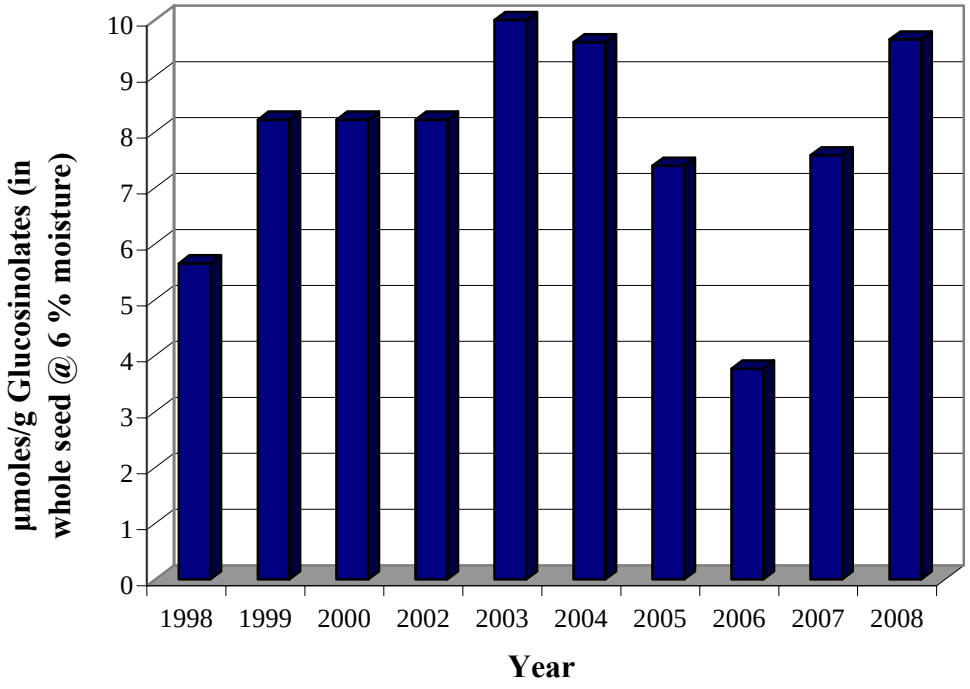

Figure 7: Average Australian glucosinolate content 1998 – 2008

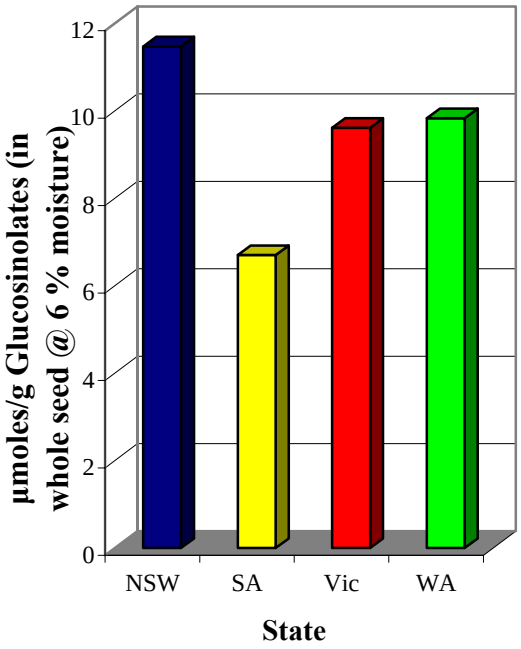

Figure 8: Average glucosinolate content by state 2008

Fatty Acid Composition

Oleic Acid

The average oleic acid (C18:1) concentration in the oil produced from the 2008 harvest was 60.0 %. This was 0.3 % higher than 2007. The concentration ranged from 57.3 % at Oaklands in New South Wales to 65.1 % at Raywood in Victoria.

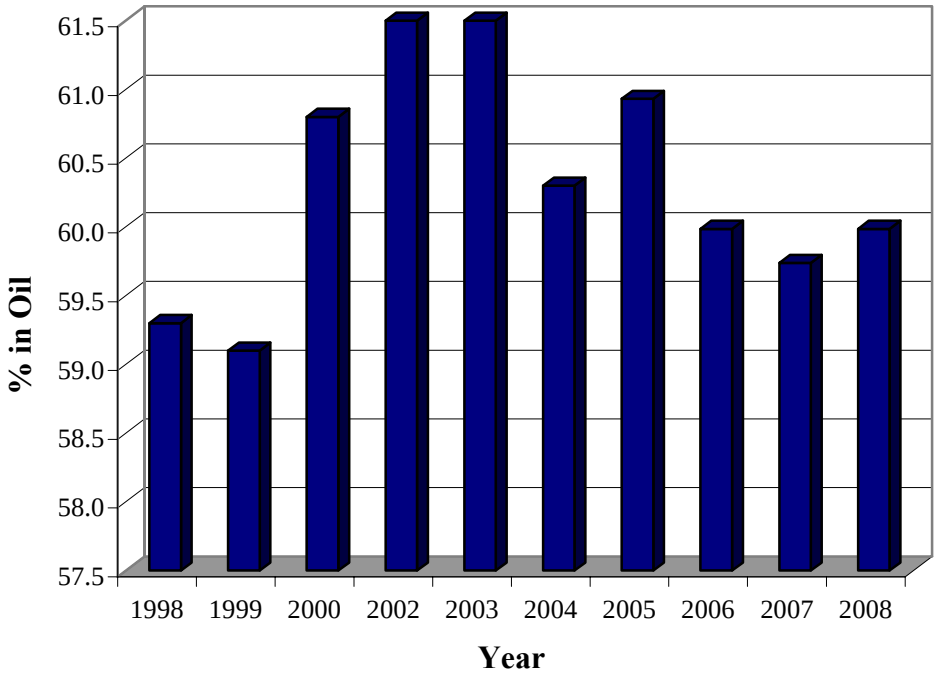

Figure 9: Average Australian oleic acid concentration in canola oil 1998 – 2008

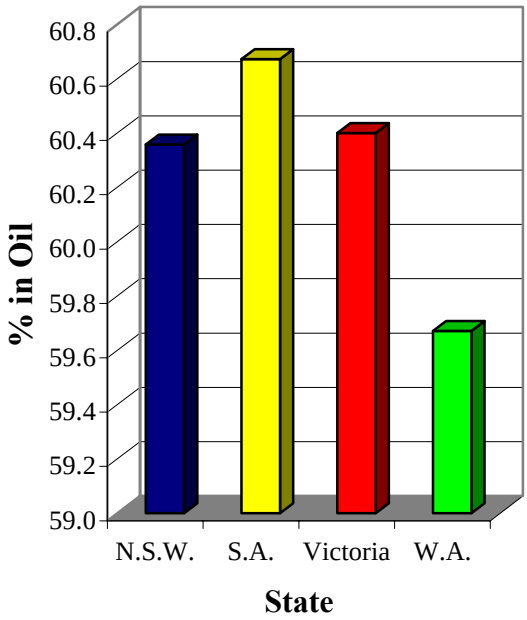

Figure 10: Average oleic acid concentration by state 2008

Linoleic Acid

The average linoleic acid (C18:2) concentration in oil produced from the 2008 harvest was 20.3 % this was 0.1 % lower than 2007. The concentration ranged from 16.5 % at Raywood in Victoria to 24.9 % at Boree Creek in New South Wales.

Linolenic Acid

There was a decrease of 0.3 % in the linolenic acid (C18:3) concentration to 10.7 %. This was the lowest since 2004. Linolenic acid concentrations ranged from 7.2 % at Boree Creek in New South Wales to 12.3 % at Millicent in South Australia.

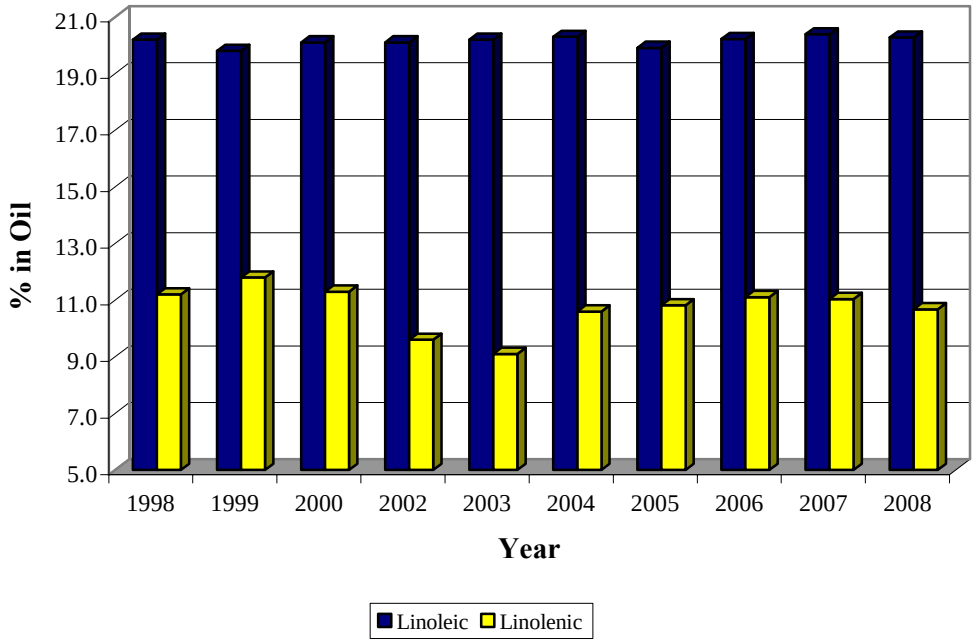

Figure 11: Average Australian linoleic acid and linolenic concentration in canola oil 1998 – 2008

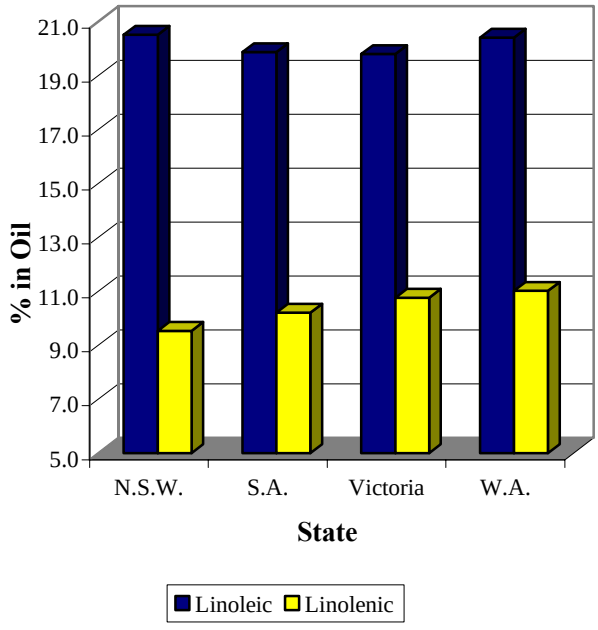

Figure 12: Average linoleic acid and linolenic acid concentration by state 2008

Saturated Fatty Acid

The average saturated fatty acid concentration was 7.6 %. This was a 0.2 % increase from the 2007 harvest and the highest since 1995. Saturated fatty acid concentration ranged from 7.0 % at Millicent in South Australia to 8.6 % at Junee Sub terminal in New South Wales.

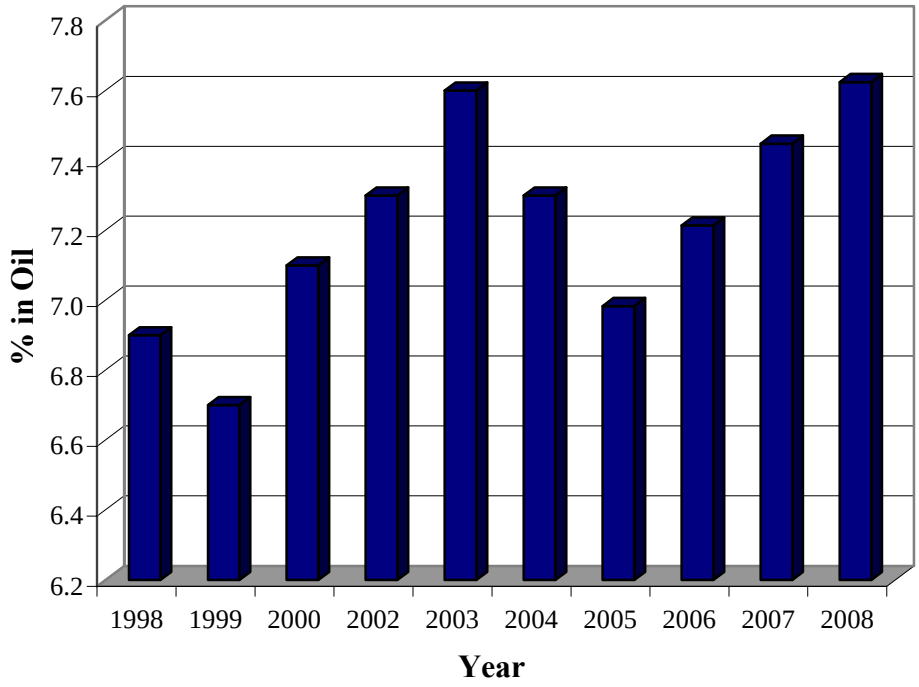

Figure 13: Average Australian saturated fatty acid concentration in canola oil 1998– 2008

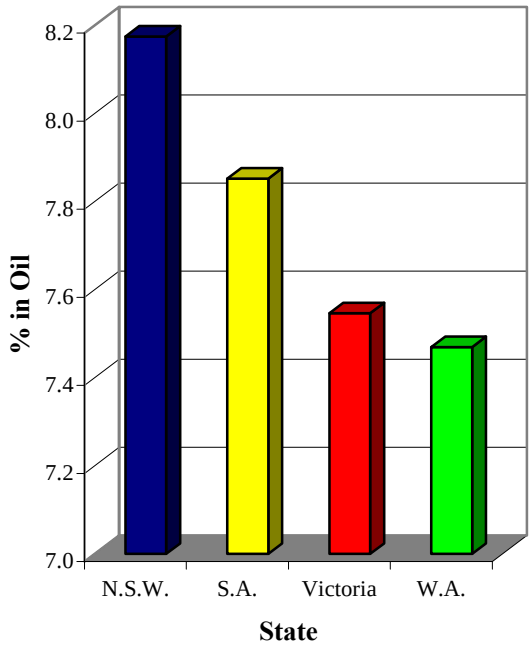

Figure 14: Average saturated fatty acid concentration by state 2008

Quality Data by State

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					
Dubbo					
Curban	37.8	44.8	7	54.2	67.6
Manildra	39.8	42.8	10	53.4	66.6
Mungeribar	39.7	43.2	11	53.7	66.9
Parkes					
Bribaree	37.0	45.9	17	53.3	66.4
Caragabal	37.3	44.8	15	53.4	66.6
Greenthorpe	37.4	44.5	12	53.5	66.7
Milvale	37.5	44.4	13	48.1	60.0
Parkes	39.7	42.8	10	53.4	66.6
Red Bend	38.4	44.8	13	53.8	67.1
Wagga Wagga					
Boorowa	40.6	43.7	10	51.7	64.4
Boree Creek	36.5	48.4	11	53.6	66.8
Coolamon	34.9	46.2	17	53.8	67.1
Cootamunda	37.0	43.9	10	53.0	66.1
Grong Grong	37.4	45.3	13	53.5	66.7
Harden	38.3	45.1	9	53.5	66.7
Henty West	37.0	45.8	12	53.9	67.2
Junee ST	36.6	45.7	11	54.2	67.6
Maimuru	38.7	44.9	11	52.8	65.8
Milbrulong	35.5	45.7	16	54.6	68.0
Stockinbingal	35.8	44.3	9	53.7	66.9
Wylong					
Ardlethan	36.4	45.4	13	53.9	67.2
Barellan	38.0	44.1	10	52.6	65.5
Temora	36.5	45.3	18	53.2	66.3
Wylong	37.6	45.3	12	53.4	66.5
Central Mean	**38.0**	**44.5**	**11**	**53.2**	**66.4**
N.S.W. Mean	**38.0**	**44.5**	**11**	**53.2**	**66.4**

[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

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					
Ardrossan	39.6	43.2	6	56.2	70.0
Eyre Peninsula					
Cummins	41.7	42.9	5	55.6	69.3
Lincoln	41.7	41.9	7	55.4	69.0
Rudall	37.5	42.0	9	55.0	68.5
Ungarra	39.7	42.9	7	55.2	68.8
Yeelanna	38.3	45.0	7	56.0	69.8
Northern Area					
Andrews	40.1	43.6	7	55.0	68.5
Bowmans	39.8	43.6	5	54.6	68.0
Roseworthy	39.4	43.0	8	55.4	69.0
Port Adelaide					
Adelaide	38.4	43.2	8	56.4	70.3
Kingscote	43.5	41.9	7	54.6	68.0
South East					
Frances	41.5	43.4	7	54.8	68.3
Keith	37.3	43.7	6	56.6	70.5
Millicent	45.9	42.6	11	53.6	66.8
Tailem Bend	39.2	41.8	8	56.2	70.0
Wolseley	37.2	44.9	10	54.6	68.0
S.A. Mean	**40.3**	**42.9**	**7**	**55.4**	**69.1**

[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

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	42.7	43.1	9	53.5	66.6
Beulah ST	37.3	43.3	9	54.8	68.3
Carpolac	39.4	43.7	7	52.3	65.3
Goroke	39.9	44.8	8	54.6	68.0
Hamilton	43.2	41.9	10	52.4	65.4
Horsham	39.3	44.4	9	53.6	66.8
Lillimur	36.7	46.3	9	54.3	67.6
Marmalake	40.1	45.3	10	52.8	65.8
Naracoorte	40.8	44.1	9	53.8	67.0
Natimuk	39.6	45.2	9	54.7	68.1
Nhill	38.8	45.1	7	55.4	69.0
Skipton	43.3	42.6	9	52.6	65.5
Warracknabeal ST	36.4	44.5	8	54.7	68.1
Westmere	42.7	41.5	9	53.0	66.0
Willaura	42.0	42.7	11	52.7	65.6
Marong					
Borung	39.3	42.8	9	54.0	67.3
Deniliquin	39.3	41.9	9	52.9	65.9
Donald ST	35.7	46.3	7	55.7	69.4
Dookie ST	37.5	44.7	13	54.8	68.3
Dunolly	38.4	44.2	11	54.2	67.5
Echuca	38.1	43.8	11	54.3	67.6
Elmore	39.1	43.5	10	53.9	67.1
Murchison East	40.1	42.9	10	54.1	67.4
Oaklands	33.8	45.9	19	53.7	66.9
Raywood	39.4	43.0	10	53.8	67.0
St James	36.7	45.6	11	54.6	68.0
Yarrawonga ST	35.8	44.9	12	54.4	67.8
Swan Hill	40.9	41.3	9	53.4	66.5
Quambatook ST	37.3	42.9	8	55.1	68.6
Ports					
Geelong Terminal	42.0	43.2	10	53.3	66.4
Southern Mean	**41.0**	**43.3**	**10**	**53.4**	**66.6**
Vic Mean	**41.0**	**43.3**	**10**	**53.4**	**66.6**

[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

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					
1090588631	43.8	39.3	9	55.0	68.5
1090647585	44.4	39.2	10	54.2	67.5
1090589274	43.0	38.3	12	54.6	68.0
Esperance					
1090589258	43.7	40.1	9	54.6	68.0
1090588607	43.2	39.6	9	56.0	69.8
Geraldton					
1090638675	42.4	39.2	9	54.4	67.8
Kwinana					
1090638683	42.9	38.5	12	53.6	66.8
1090638659	41.5	40.6	10	54.8	68.3
1090648336	42.9	40.1	7	54.4	67.8
1090638667	43.3	39.2	9	55.2	68.8
1090638642	43.0	38.6	12	55.0	68.5
W.A. Mean	**43.1**	**39.3**	**10**	**54.7**	**68.1**

[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

Fatty Acid Composition by State

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																
Dubbo																
Curban	0.1	4.6	0.4	2.2	61.5	19.3	10.1	0.6	0.9	0.2	< 0.1	0.1	0.1	100	7.8	113.7
Manildra	0.1	5.0	0.4	2.2	63.2	18.5	8.6	0.7	0.9	0.2	< 0.1	0.1	0.1	100	8.4	109.8
Mungeribar	0.1	4.7	0.4	2.1	60.6	19.9	10.2	0.7	1.0	0.2	< 0.1	0.1	0.1	100	7.8	114.4
Parkes																
Bribaree	0.1	4.9	0.4	2.2	58.2	22.1	10.1	0.5	1.0	0.3	< 0.1	0.1	0.1	100	8.1	115.9
Caragabal	0.1	4.8	0.4	2.2	59.9	20.3	10.3	0.7	1.0	0.2	< 0.1	0.1	0.1	100	8.1	114.7
Greenthorpe	0.1	5.4	0.4	2.2	59.6	21.3	9.2	0.6	0.8	0.2	< 0.1	0.1	0.1	100	8.6	113.1
Milvale	0.1	4.8	0.3	2.1	61.1	20.3	9.1	0.6	1.0	0.2	< 0.1	0.1	0.1	100	8.0	112.7
Parkes	0.1	4.9	0.4	2.2	61.6	19.8	9.2	0.6	0.9	0.2	< 0.1	0.2	0.1	100	8.2	112.2
Red Bend	0.1	4.8	0.4	2.2	61.0	20.4	9.0	0.5	1.0	0.3	< 0.1	0.1	0.1	100	8.0	112.6
Wagga Wagga																
Boorowa	0.1	4.9	0.3	2.1	61.1	19.9	9.6	0.6	0.9	0.2	< 0.1	0.1	0.1	100	8.0	113.2
Boree Creek	0.1	5.1	0.3	2.2	58.2	24.9	7.2	0.6	1.0	0.3	< 0.1	0.1	0.1	100	8.3	113.1
Coolamon	0.1	5.2	0.4	2.2	59.0	21.3	9.7	0.8	0.9	0.2	< 0.1	0.1	0.1	100	8.6	114.2
Cootamunda	0.1	5.1	0.4	2.2	59.8	21.3	9.1	0.6	0.9	0.2	< 0.1	0.1	0.1	100	8.3	113.3
Grong Grong	0.1	4.6	0.3	2.1	62.0	18.9	9.9	0.5	1.1	0.3	< 0.1	0.1	0.1	100	7.7	113.1
Harden	0.1	4.9	0.4	2.1	60.4	20.6	9.4	0.6	1.0	0.2	< 0.1	0.1	0.1	100	8.1	113.3
Henty West	0.1	5.1	0.4	2.2	58.7	21.8	9.7	0.7	0.9	0.2	< 0.1	0.1	0.1	100	8.4	114.7
Junee ST	0.1	5.3	0.4	2.2	59.1	21.8	9.1	0.7	0.9	0.2	< 0.1	0.1	0.1	100	8.6	113.5
Maimuru	0.1	5.0	0.4	2.1	60.6	20.6	9.2	0.6	1.0	0.2	< 0.1	0.1	0.1	100	8.1	113.1
Milbrulong	0.1	5.3	0.4	2.2	58.9	21.6	9.7	0.6	0.9	0.2	< 0.1	0.1	0.1	100	8.5	114.3
Stockinbingal	0.1	5.1	0.4	2.3	58.5	22.0	9.7	0.7	0.9	0.2	< 0.1	0.1	0.1	100	8.5	114.8
Wylong																
Ardlethan	0.1	5.0	0.4	2.3	58.5	21.4	10.4	0.6	0.9	0.2	< 0.1	0.1	0.1	100	8.3	115.7
Barellan	0.1	5.0	0.4	2.3	59.8	20.1	10.4	0.6	0.9	0.2	< 0.1	0.1	0.1	100	8.3	114.5
Temora	0.1	5.0	0.4	2.0	59.9	20.8	9.7	0.6	1.0	0.2	< 0.1	0.1	0.1	100	8.1	114.2
Wylong	0.1	4.8	0.4	2.2	59.6	20.9	10.0	0.7	0.9	0.2	< 0.1	0.1	0.1	100	8.1	114.7
Central Mean	**0.1**	**5.0**	**0.4**	**2.2**	**60.4**	**20.5**	**9.5**	**0.6**	**0.9**	**0.2**	**< 0.1**	**0.1**	**0.1**	**100**	**8.2**	**113.5**
N.S.W. Mean	**0.1**	**5.0**	**0.4**	**2.2**	**60.4**	**20.5**	**9.5**	**0.6**	**0.9**	**0.2**	**< 0.1**	**0.1**	**0.1**	**100**	**8.2**	**113.5**

[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

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																
Ardrossan	0.1	4.6	0.3	2.1	60.0	20.2	10.7	0.6	0.9	0.2	< 0.1	0.1	0.1	100	7.7	115.6
Eyre Peninsula																
Cummins	0.1	4.7	0.3	2.1	61.8	19.4	9.6	0.7	1.0	0.2	< 0.1	0.1	0.1	100	7.8	113.0
Lincoln	0.1	4.8	0.3	2.0	62.1	18.8	10.0	0.5	1.0	0.2	< 0.1	0.1	0.1	100	7.7	113.2
Rudall	0.1	5.0	0.3	2.0	58.2	21.5	10.9	0.5	1.0	0.2	0.1	0.1	0.1	100	7.9	117.0
Ungarra	0.1	4.8	0.3	2.1	60.3	20.4	10.3	0.4	0.9	0.2	< 0.1	0.1	0.1	100	7.7	115.3
Yeelanna	0.1	4.9	0.3	2.1	59.6	21.2	10.0	0.5	0.9	0.2	< 0.1	0.1	0.1	100	7.9	115.1
Northern Area																
Andrews	0.1	4.8	0.3	2.1	62.1	19.0	9.8	0.5	0.9	0.2	< 0.1	0.1	0.1	100	7.8	112.9
Bowmans	0.1	4.6	0.3	2.2	60.2	20.3	10.4	0.5	1.0	0.2	< 0.1	0.1	0.1	100	7.7	115.3
Roseworthy	0.1	4.9	0.4	2.2	60.3	19.9	10.2	0.6	0.9	0.2	0.1	0.1	0.1	100	8.1	114.1
Port Adelaide																
Adelaide	0.1	4.9	0.4	2.0	58.9	21.4	10.4	0.5	0.9	0.2	< 0.1	0.1	0.1	100	7.9	116.0
Kingscote	0.1	4.7	0.3	2.1	60.2	19.8	10.8	0.6	1.0	0.2	< 0.1	0.1	0.1	100	7.8	115.4
South East																
Frances	0.1	4.8	0.3	2.1	61.4	19.0	10.4	0.6	0.9	0.2	0.1	0.1	0.1	100	7.8	113.9
Keith	0.1	5.2	0.4	2.2	58.1	21.3	11.0	0.6	0.8	0.2	< 0.1	0.1	0.1	100	8.3	116.7
Millicent	0.1	4.2	0.3	1.8	59.2	20.1	12.3	0.5	1.1	0.3	< 0.1	0.1	0.1	100	7.0	118.9
Tailem Bend	0.1	4.8	0.4	2.1	59.7	20.4	10.7	0.6	0.9	0.2	< 0.1	0.1	0.1	100	7.9	115.6
Wolseley	0.1	5.0	0.3	2.2	59.3	20.5	10.7	0.5	0.9	0.2	< 0.1	0.1	0.1	100	8.2	115.4
S.A. Mean	**0.1**	**4.8**	**0.3**	**2.1**	**60.7**	**19.9**	**10.2**	**0.6**	**0.9**	**0.2**	**< 0.1**	**0.1**	**0.1**	**100**	**7.9**	**114.4**

[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

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	4.4	0.3	2.1	61.1	19.4	10.7	0.6	0.9	0.2	< 0.1	0.1	0.1	100	7.4	115.3
Beulah ST	0.1	4.4	0.3	2.2	59.7	20.5	10.9	0.4	1.0	0.2	< 0.1	0.1	0.1	100	7.4	116.6
Carpolac	0.1	4.6	0.3	2.1	60.5	19.9	10.4	0.7	1.0	0.2	< 0.1	0.1	0.1	100	7.8	114.8
Goroke	0.1	4.6	0.3	2.2	61.1	19.3	10.4	0.6	1.0	0.2	< 0.1	0.1	0.1	100	7.8	114.3
Hamilton	0.1	4.5	0.3	2.2	60.3	19.6	11.2	0.5	0.9	0.2	< 0.1	0.1	0.1	100	7.0	116.1
Horsham	0.1	4.4	0.3	2.1	63.3	17.3	10.3	0.5	1.1	0.3	0.1	0.1	0.1	100	7.0	112.6
Lillimur	0.1	4.7	0.3	2.3	60.0	20.0	10.6	0.6	1.0	0.2	< 0.1	0.1	0.1	100	8.0	115.0
Marmalake	0.1	4.5	0.3	2.2	62.3	18.0	10.4	0.6	1.0	0.2	0.1	0.1	0.1	100	7.8	113.1
Naracoorte	0.1	4.6	0.3	2.1	60.6	19.5	10.8	0.5	1.0	0.2	< 0.1	0.1	0.1	100	7.6	115.3
Natimuk	0.1	4.7	0.3	2.2	60.8	19.5	10.5	0.4	1.0	0.2	< 0.1	0.1	0.1	100	7.7	114.7
Nhill	0.1	4.7	0.3	2.4	60.3	19.7	10.5	0.6	1.0	0.2	< 0.1	0.1	0.1	100	8.1	114.6
Skipton	0.1	4.5	0.3	2.1	59.3	20.3	11.6	0.5	0.9	0.2	< 0.1	0.1	0.1	100	7.5	117.5
Warracknabeal ST	0.1	5.0	0.4	2.2	59.5	20.4	10.5	0.8	0.9	0.2	< 0.1	0.1	0.1	100	8.3	115.0
Westmere	0.1	4.7	0.3	2.1	59.9	20.0	11.2	0.6	0.9	0.2	< 0.1	0.1	0.1	100	7.6	116.5
Willaura	0.1	4.5	0.3	2.0	62.2	17.7	11.2	0.6	1.0	0.2	< 0.1	0.1	0.1	100	7.0	114.4
Marong																
Borung	0.1	4.5	0.3	2.2	62.7	18.1	10.0	0.6	1.0	0.3	< 0.1	0.1	0.1	100	7.7	112.7
Deniliquin	0.1	4.8	0.3	2.1	59.9	20.8	10.3	0.5	0.9	0.2	< 0.1	0.1	0.1	100	7.6	115.5
Donald ST	0.1	4.6	0.3	2.3	59.0	21.0	10.7	0.6	1.0	0.2	< 0.1	0.1	0.1	100	7.9	116.2
Dookie ST	0.1	5.0	0.4	2.1	59.6	21.1	9.7	0.7	1.0	0.2	< 0.1	0.1	0.1	100	8.2	114.3
Dunolly	0.1	5.0	0.4	2.2	58.8	20.6	10.7	0.7	1.0	0.2	< 0.1	0.1	0.1	100	8.3	115.6
Echuca	0.1	4.7	0.4	2.1	61.8	19.0	9.8	0.7	1.0	0.3	< 0.1	0.1	0.1	100	7.9	112.8
Elmore	0.1	4.6	0.3	2.2	61.5	19.3	10.0	0.6	1.0	0.2	< 0.1	0.1	0.1	100	7.8	113.5
Murchison East	0.1	4.8	0.3	2.1	60.3	20.6	9.9	0.6	0.9	0.2	< 0.1	0.1	0.1	100	7.8	114.5
Oaklands	0.1	5.2	0.4	2.0	57.3	23.0	10.1	0.7	0.9	0.2	< 0.1	0.1	0.1	100	8.3	116.5
Raywood	0.1	4.5	0.3	2.0	65.1	16.5	9.6	0.5	1.0	0.2	< 0.1	0.1	0.1	100	7.4	110.7
St James	0.1	5.1	0.4	2.2	58.7	21.9	9.8	0.6	0.9	0.2	< 0.1	0.1	0.1	100	8.2	115.2
Yarrawonga ST	0.1	5.2	0.4	2.1	57.8	22.6	10.0	0.6	0.8	0.2	< 0.1	0.1	0.1	100	8.3	116.1
Swan Hill																
Quambatook ST	0.1	4.7	0.4	2.2	58.9	21.1	10.8	0.5	0.9	0.2	< 0.1	0.1	0.1	100	7.8	116.5
Ports																
Geelong Terminal	0.1	4.5	0.3	2.0	60.1	20.3	10.9	0.5	0.9	0.2	< 0.1	0.1	0.1	100	7.3	116.4
Southern Mean	**0.1**	**4.6**	**0.3**	**2.1**	**60.4**	**19.8**	**10.8**	**0.6**	**0.9**	**0.2**	**< 0.1**	**0.1**	**0.1**	**100**	**7.5**	**115.5**
Vic Mean	**0.1**	**4.6**	**0.3**	**2.1**	**60.4**	**19.8**	**10.8**	**0.6**	**0.9**	**0.2**	**< 0.1**	**0.1**	**0.1**	**100**	**7.5**	**115.5**

[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

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																
1090588631	0.1	4.6	0.3	1.9	59.5	20.4	11.2	0.6	0.9	0.2	0.1	0.1	0.1	100	7.0	116.8
1090647585	0.1	4.5	0.3	2.0	60.7	19.4	11.0	0.6	0.9	0.2	0.1	0.1	0.1	100	7.4	115.8
1090589274	0.1	4.5	0.3	2.0	60.5	19.8	10.7	0.7	1.0	0.2	0.1	0.1	0.1	100	7.6	115.3
Esperance																
1090589258	0.1	4.6	0.3	1.9	59.3	20.9	11.1	0.5	0.9	0.2	0.0	0.1	0.1	100	7.4	117.3
1090588607	0.1	4.5	0.3	2.0	60.0	20.5	10.9	0.4	1.0	0.2	0.0	0.1	0.1	100	7.2	116.7
Geraldton																
1090638675	0.1	4.3	0.3	1.8	58.6	20.9	11.9	0.4	1.1	0.3	0.1	0.1	0.1	100	7.0	118.9
Kwinana																
1090638683	0.1	4.7	0.3	1.9	59.9	20.4	10.7	0.6	1.0	0.2	0.0	0.1	0.1	100	7.6	115.9
1090638659	0.1	4.8	0.3	1.9	59.1	20.7	11.2	0.5	0.9	0.2	0.1	0.1	0.1	100	7.6	117.0
1090648336	0.1	4.8	0.3	2.0	60.9	19.8	10.2	0.6	0.9	0.2	0.0	0.1	0.1	100	7.7	114.4
1090638667	0.1	4.6	0.3	1.9	59.9	20.4	10.9	0.5	1.0	0.2	0.0	0.1	0.1	100	8.0	116.4
1090638642	0.1	4.9	0.3	1.8	57.9	21.5	11.3	0.6	1.0	0.2	0.0	0.1	0.1	100	7.7	117.9
W.A. Mean	**0.1**	**4.6**	**0.3**	**1.9**	**59.7**	**20.4**	**11.0**	**0.5**	**1.0**	**0.2**	**0.0**	**0.1**	**0.1**	**100**	**7.5**	**116.6**

[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

National Variety Trials – Quality Data

Table 11: NVT Quality Data

Variety	Oil (% in whole seed @ 6 % moisture)			Protein (% in oil free meal @ 10 % moisture)			Glucosinolates (µmoles/g in whole seed @ 6 % moisture)		
	NSW	SA	WA	NSW	SA	WA	NSW	SA	WA
06H939	38.9	38.7	*	45.1	43.6	*	14	12	*
AG MUSTER	36.7	36.7	44.1	46.8	44.6	37.1	15	9	14
ATR BARRA	*	36.5	44.8	*	48.5	41.2	*	7	8
ATR COBBLER	38.1	37.2	44.7	45.1	44.3	38.8	17	13	13
ATR MARLIN	39.3	39.6	43.1	47.8	45.7	39.1	8	7	13
ATR STUBBY	36.1	35.2	43.1	45.4	45.0	38.3	16	13	12
ATR409	39.2	38.1	45.2	46.7	45.6	40.3	12	10	11
AV GARNET	38.4	39.8	46.0	45.6	43.1	36.9	13	9	14
AV SAPPHIRE	38.6	39.2	45.9	47.1	45.1	38.8	13	9	11
BRAVO TT	37.3	37.4	44.2	46.0	45.4	38.2	14	12	12
CB ARGYLE	39.9	39.4	46.1	48.6	45.6	41.2	5	5	8
CB BOOMER	38.0	35.0	41.8	46.6	45.7	40.8	9	6	8
CB PILBARA	38.0	37.6	43.9	45.5	44.2	39.7	14	9	10
CB SCADDEN	36.9	36.6	42.8	44.6	43.5	38.4	7	7	7
CB TANAMI	37.2	35.8	43.0	43.9	42.7	38.3	15	12	13
CB TELFER	39.1	38.0	46.1	46.1	44.6	39.6	7	5	7
FLINDERS TTC	38.5	38.6	44.7	47.3	45.7	40.4	11	9	11
H4686	37.8	39.5	43.5	47.4	44.9	40.0	14	9	14
HURRICANE TT	39.1	38.7	46.5	48.8	47.6	41.7	7	6	6
HYOLA 50	38.6	39.8	44.4	47.2	45.2	38.9	10	8	12
HYOLA 571CL	38.6	39.0	*	46.6	45.3	*	13	12	*
HYOLA 76	40.0	40.6	46.3	48.3	45.6	38.7	11	10	13
K9209	37.5	*	43.2	47.4	*	41.3	18	*	14
NL042	41.2	41.4	46.2	46.4	43.8	39.3	7	6	7
NL045	40.6	40.2	46.9	46.7	44.0	39.5	6	4	7
NMT310	38.8	39.1	44.1	46.4	44.9	40.1	7	7	8
PIONEER 06N784I	38.5	37.3	*	46.5	45.4	*	10	9	*
PIONEER 06N787I	37.2	*	*	47.1	*	*	9	*	*
PIONEER 43C80	37.2	37.4	44.4	46.9	43.8	39.5	10	6	8
PIONEER 44C73	36.9	35.7	44.0	45.7	43.7	37.9	9	7	8
PIONEER 44C79	38.9	36.6	45.8	47.3	45.6	39.4	9	8	9
PIONEER 45Y77	37.1	37.1	43.1	47.3	45.6	40.1	13	13	11
PIONEER 46Y78	37.8	36.6	44.1	47.7	46.6	38.8	13	11	12
PIONEER 46Y81	39.3	38.4	43.1	48.0	45.2	40.6	8	8	7
PIONEER 06N784I	*	39.7	*	*	43.5	*	*	7	*
PIONEER 06N787I	*	38.8	*	*	44.3	*	*	8	*
PIONEER 44C73	*	37.9	*	*	43.2	*	*	6	*
PIONEER 44C79	*	39.0	*	*	44.5	*	*	7	*
PIONEER 45Y77	*	38.2	*	*	44.9	*	*	9	*
PIONEER 46Y78	*	38.8	*	*	44.9	*	*	9	*
PIONEER 46Y81	*	40.5	*	*	45.1	*	*	6	*
ROTTNEST TTC	37.5	36.9	43.4	44.5	43.3	38.3	10	8	9
STORM TT	36.6	37.5	*	47.2	45.3	*	11	9	*
T2201	37.8	37.6	44.3	47.7	46.1	41.7	7	7	7
TARCOOLA	39.0	40.5	46.4	48.6	45.7	39.2	11	10	10
TAWRIFFIC TT	40.5	39.9	46.6	47.3	45.4	39.7	8	6	8
THUNDER TT	38.5	38.8	44.2	46.6	45.2	40.3	7	6	8
TORNADO TT	38.2	38.2	44.1	47.0	45.6	40.2	7	6	7
TTRIUMPH JARDEE	36.5	35.4	44.2	45.8	46.4	37.8	8	7	9

* Variety not grown in state.

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, protein and glucosinolates 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 either a Foss Soxtec™ 2050 or a Büchi B-811 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. 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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