

# Quality of Australian Canola

# 2006/07



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## **Introduction**

### ***Sample Analysis***

Canola samples representing the 2006 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***

An excerpt of the 2006 trial results for the “National *Brassica* Improvement Project” funded by the Grains Research and Development Corporation has been included. The project involves trials of potential new cultivars at various sites across New South Wales, South Australia, Victoria and Western Australia. Yield and quality data is collected and used to evaluate a cultivar’s performance under a range of conditions. The quality parameters analysed by the Australian Oils Research Laboratory were oil, protein and glucosinolate concentrations. The quality results from one site in each state have been included to give an indication of the quality ranges for each cultivar. No yield data is published in this booklet.

# Weather Production Review

## *The Season*

For the fourth consecutive year, 2006 saw a variable start to the season growing across all Australian canola growing districts.

In Western Australia, most districts received good falls of rain during March which built up subsoil moisture levels and enabled sowings to start on time in the core growing areas. However, below average rainfall during April and early May slowed the completion of sowing and delayed crop emergence in all districts except for the south coast region. Although light falls of rain across most growing districts enabled an estimated 90% of intended plantings to be completed by early June, seedling emergence was slow and patchy in many crops. Below average winter rainfall in all districts, except in the Esperance region, further impacted on crops raising concerns for yield prospects and oil levels. Light falls of rain throughout the spring assisted crops to finish better than expected in all districts, particularly in the southern half of the state, resulting in yields being above the long term average. Although seed oil contents were 2-3% below the record levels achieved in 2005 they were still better than had been expected given the less than ideal conditions that most canola growing areas experienced throughout the season. The final production estimates for Western Australia for the 2006 season were around 365,000 tonnes from a harvested area of 300,000 ha out of the 400,000 ha estimated to have been sown. By comparison the 2005 season production estimates were 600,600 tonnes from an estimated harvested area of 440,000 ha.

In both South Australia and Victoria good falls of rain were received in late April-early May which enabled the planting of early sown crops to begin on time although the need to control weeds prior to sowing caused delays for some growers. Unfortunately later sown crops across most of Victoria and the Lower South East in SA experienced drying conditions due to below average rainfall during June and early July and were slow to germinate and emerge. In contrast to this the Eyre Peninsula in South Australia and the Western Districts in Victoria experienced more favourable conditions during winter setting them up for a potentially good harvest. However, well below spring rainfall across most districts in both states resulted in crops suffering from varying levels of moisture stress during the critical flowering and pod fill stages of growth with a subsequent adverse impact on potential grain yields. The Western Districts in Victoria suffered a severe frost in late November during the late stages of pod development which resulted in many crops being abandoned for harvest. As a consequence of the drought conditions and late frost a high percentage of crops, particularly in Victoria, were either grazed off or cut for hay or silage as growers attempted to salvage some of their growing costs. The adverse finishing conditions had a major impact on final production in both states: in South Australia it was estimated that 110,000 ha out of the 150,000 ha planted was harvested for a total production of 75,000 tonnes of canola seed whilst in Victoria only 75,000 ha out of the 213,000 ha sown was harvested for a total production of 42,000 tonne of seed. By comparison, in the 2005 season 210,000 tonnes were harvested from 150,000 ha in South Australia and 371,000 tonnes from 225,000 ha in Victoria. The adverse conditions of 2006 also resulted in seed oil contents being below average but overall they were slightly better than many growers expected.

The majority of New South Wales experienced an extremely difficult growing season with the seasonal break not occurring until mid June in all districts except the North West region. A significant proportion of the crop in the Central and Southern regions was sown dry prior to the break with germination not commencing until after mid-June. Although crops in the Central and Southern regions received limited and spasmodic falls of rain during winter the absence of subsoil moisture reserves combined with cold ground temperatures had a major adverse impact on plant growth and development. With the continuation of the dry conditions throughout the spring, resulting in 94% of the state being drought declared by October, crop conditions deteriorated resulting in 140,000 ha (78%) of the estimated sown area being either grazed off or cut for hay or silage. Despite winter/spring rainfall in the North West being below average most crops, were sown into soils with reasonable levels of stored subsoil moisture which enabled them to produce satisfactory yields. The final estimated harvest area of 40,000 ha for a total production of 30,000 tonnes of seed indicates the severity of the drought during the NSW growing season. Out of this production, the estimated 6,500 ha of irrigated crop produced 13,000 tonne of seed whilst the estimated 9,500 ha harvested in the North West region produced 11,000 tonnes. By comparison, in 2005 NSW produced 187,000 tonnes of seed from 125,000 ha. Oil contents for the 2006 harvest were also low but as with South Australia and Victoria the average level was slightly better than was anticipated given the extreme conditions experienced during flowering and pod fill.

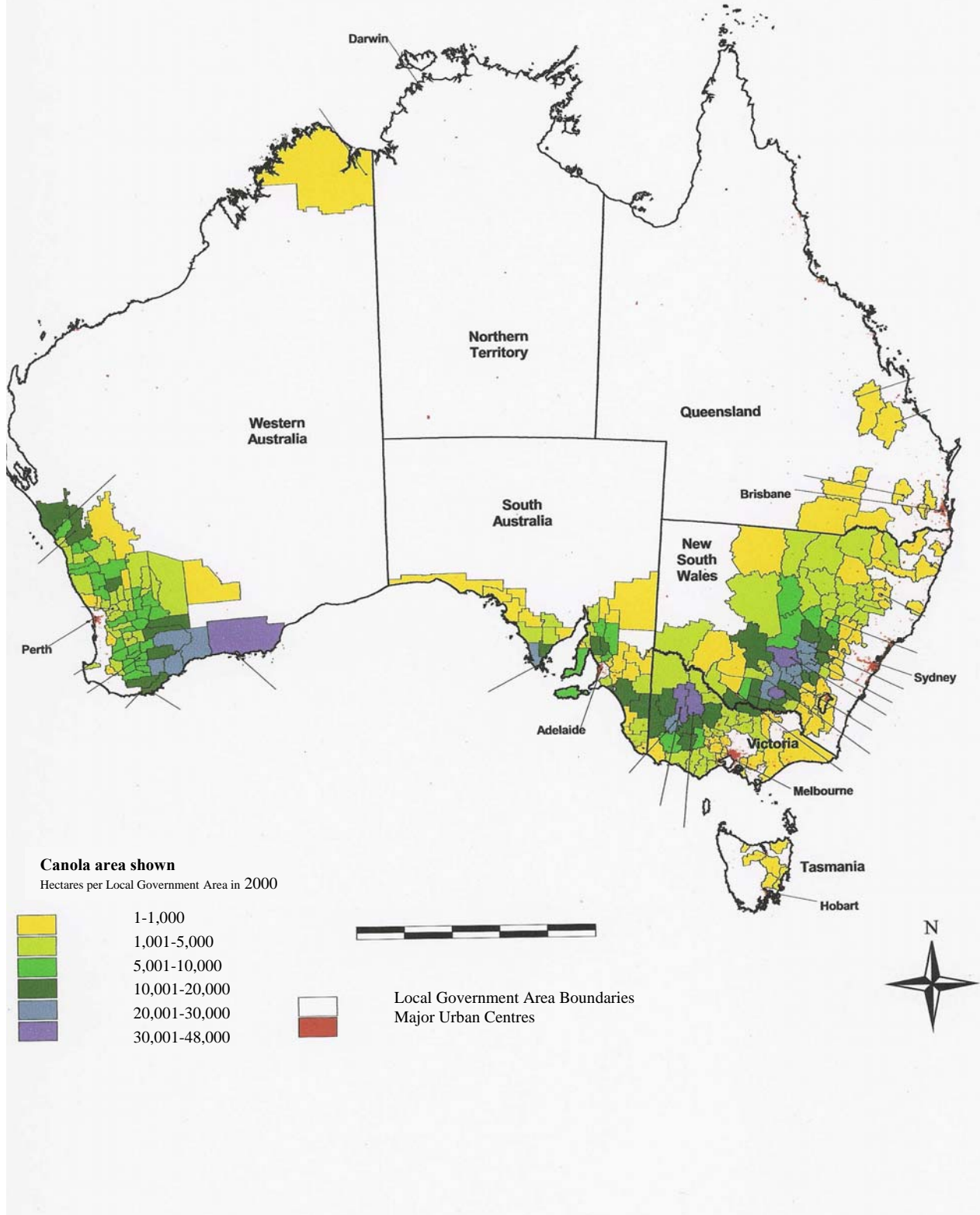
Because of the difficult growing conditions growers in many districts took a conservative, but realistic, approach to crop nutrition with very few crops receiving either upfront or subsequent in crop nitrogen applications. Whilst this may have had an adverse impact on crop yields and seed oil levels in a more normal season this was not the situation in 2006.

As a consequence of the seasonal conditions, the reported incidence of seedling diseases, especially blackleg, was very low in all states.

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 and Diamond Back moth. However, as the worst affected crops were not harvested due to low yield potential no control measures were carried out.

Overall the 2006 season could best be described as being very challenging and, for the eastern states, very disappointing. One positive that came out of a difficult season is that a great deal of information was gathered on the feeding value of failed crops that were grazed off in the paddock or cut for hay/silage and then subsequently fed out to livestock.

# Canola in Australia



**Figure 1: Areas of canola production in Australia**  
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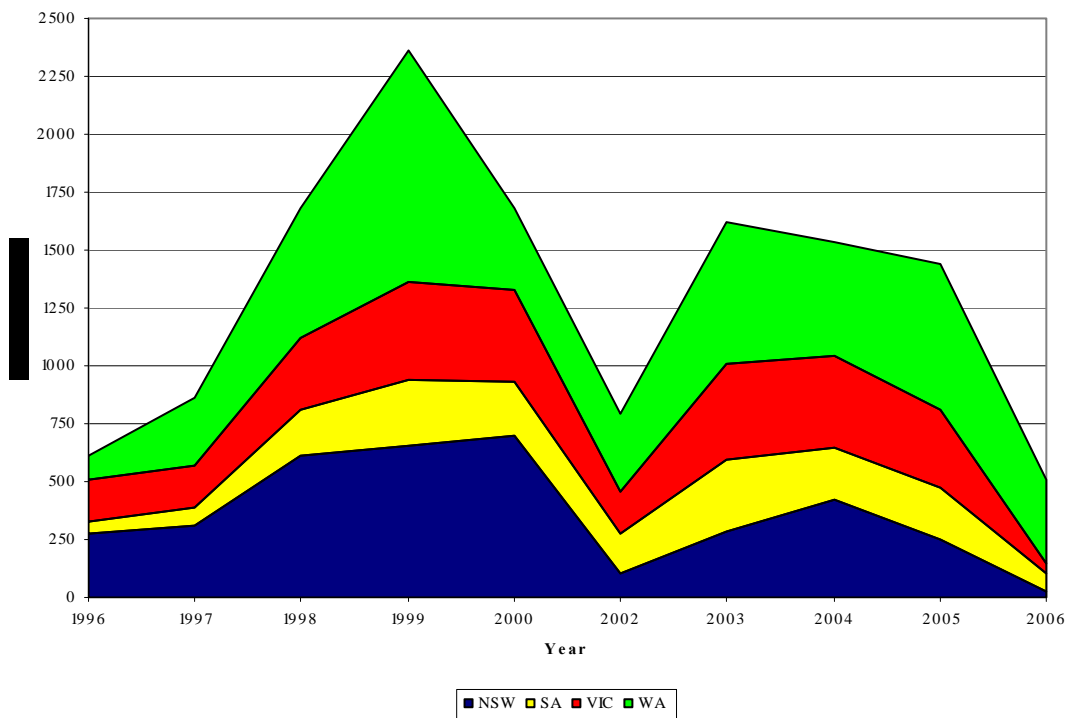
## Yield

The 2006 canola harvest was much smaller than 2005. In 2006 there was 525,000 hectares harvested, which is well down on the 960,000 hectares harvested in 2005. The smaller harvest was compounded by the lower yields, resulting in only 512,000 tonnes harvested compared to the 1,439,000 tonnes harvested in 2005. The yield varied from a state average of 0.6 t/ha in Victoria to 1.2 t/ha in Western Australia. The national yield of 1.0 t/ha was 0.5 t/ha lower than the 2005 average.

**Table 1: Canola production in Australia by state 2006**

State	Production (kilotonnes)	Area (kilohectares)	Average Yeild (tonnes/hectare)
New South Wales	30	40	0.8
Victoria	42	75	0.6
South Australia	75	110	0.7
Western Australia	365	300	1.2
Australia	512	525	1.0

Source: AOF Crop Report January 2007



**Figure 2: Canola Production in Australia 1996 – 2006**

## 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. However, due to tonnages being confidential information, no individual site tonnages can be reported.

**Table 2: Average quality of Australian canola 2006**

<b>Quality Parameter</b>	<b>Australian Mean</b>
Oil content, % in whole seed @ 6 % moisture	42.2
Protein content, % in oil-free meal @ 10 % moisture	40.1
Glucosinolates, $\mu$ moles/g in whole seed @ 6 % moisture	4
Volumetric grain weights, lbs/b	55.2
kg/hL	68.8
Oleic acid concentration (C18:1), % in oil	60.0
Linoleic acid concentration (C18:2), % in oil	20.2
Linolenic acid concentration (C18:3), % in oil	11.1
Erucic acid concentration (C22:1), % in oil	0.1
Saturated fatty acid concentration, % in oil	7.2
Iodine Value	116.8

## Oil Content

The average oil content for the 2006 harvest was 42.2 %. This was the same as the 2005 harvest. Oil content ranged from a low of 34.7 % at Henty West in New South Wales to a high of 44.9 % at Goroke in Victoria.

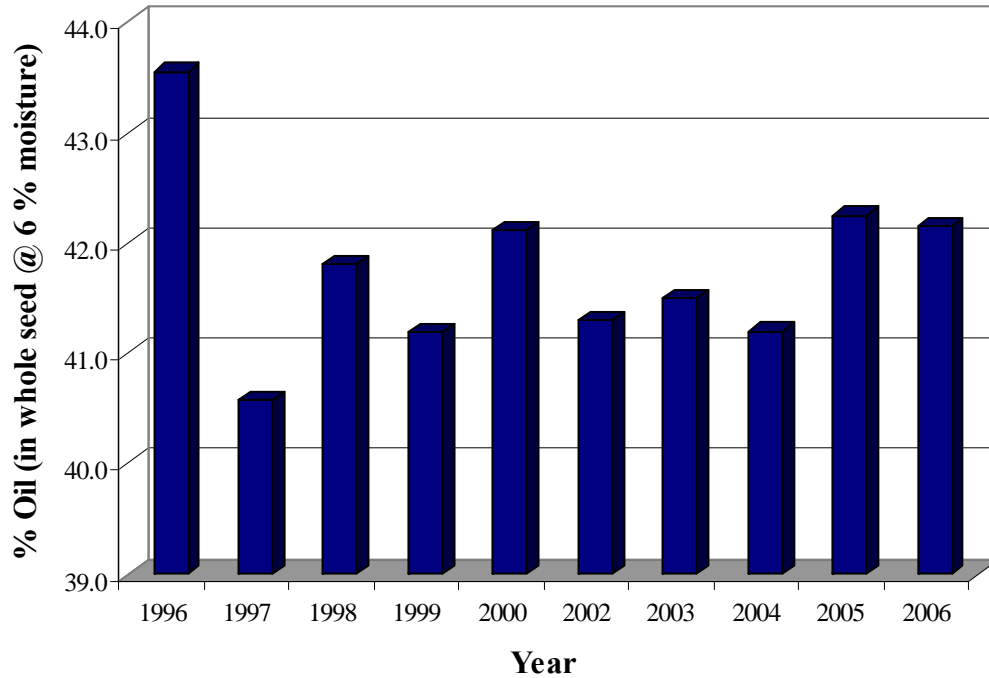


Figure 3: Average Australian oil content 1996 – 2006

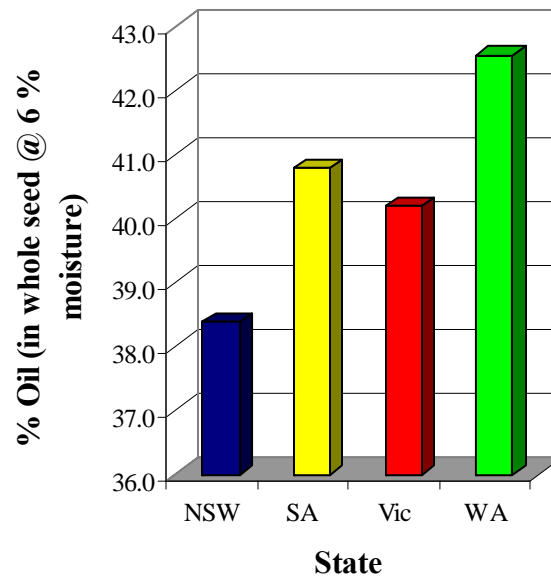
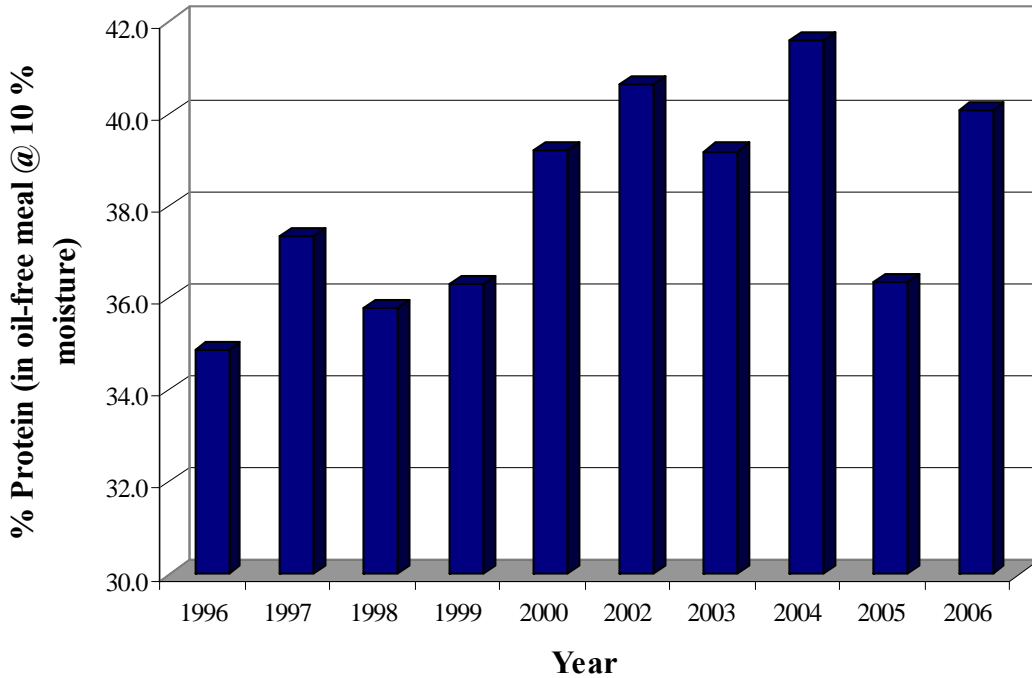


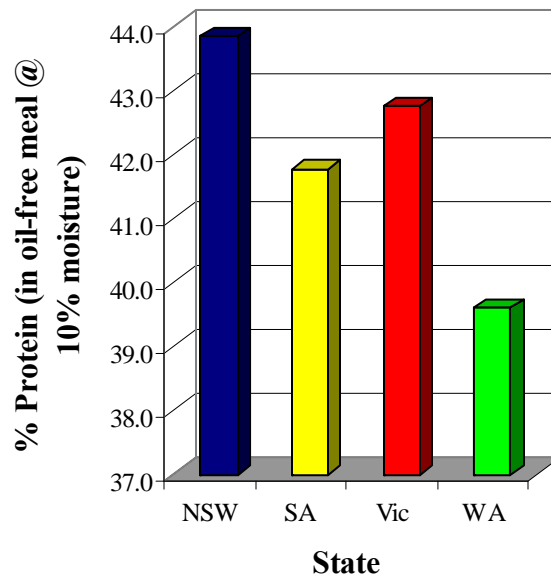
Figure 4: Average oil content by state 2006

## ***Protein Content***

The average protein content for the 2006 harvest was 40.1 % in oil free meal. This was an increase of 3.8 % from the 2005. Protein content ranged from 37.0 % at Ravensthorpe in Western Australia to 46.6 % at Temora Sub in New South Wales.



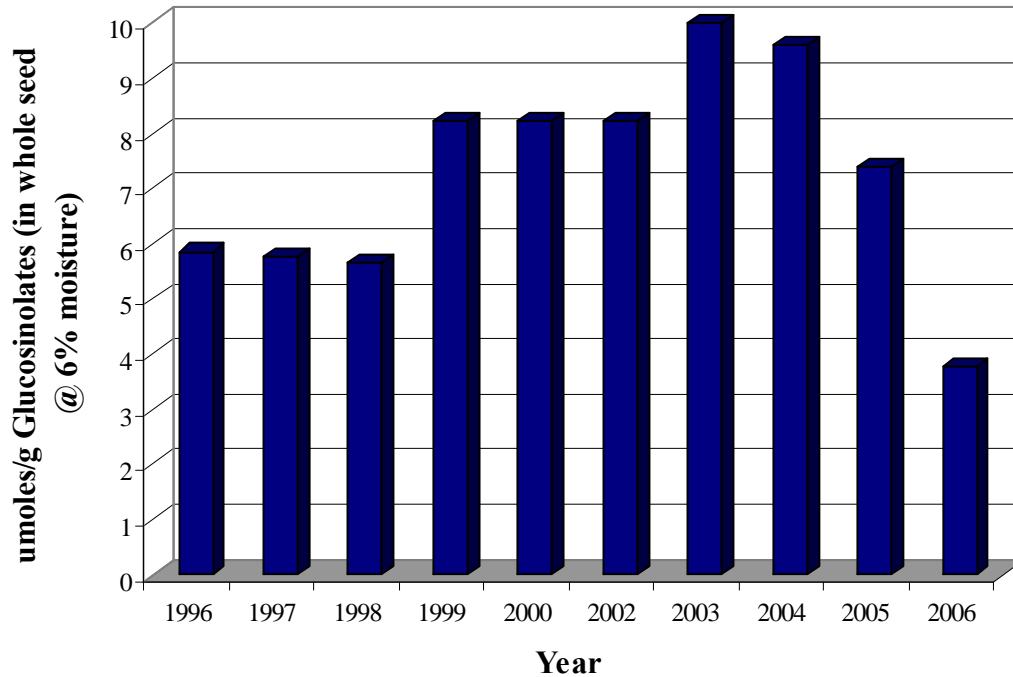
**Figure 5: Average Australian protein content 1996 – 2006**



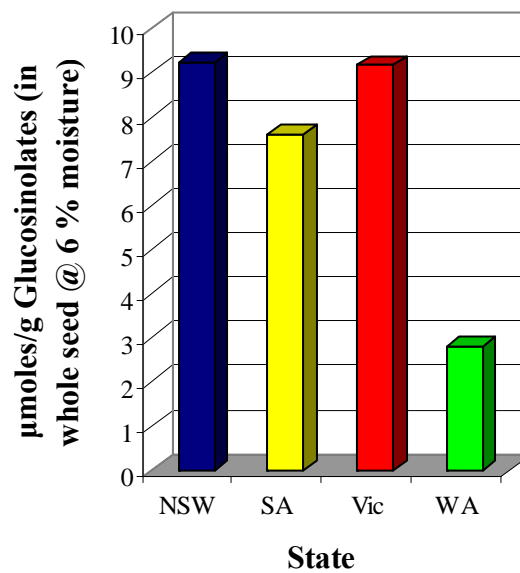
**Figure 6: Average protein content by state 2006**

### ***Glucosinolate Concentration***

The average glucosinolate content for the 2006 harvest was 4  $\mu\text{moles/g}$ . This was a decrease of 3  $\mu\text{moles/g}$  from the 2005 harvest and the lowest in the past 10 years. Glucosinolate content ranged from 1  $\mu\text{moles/g}$  at multiple sites in Western Australia to 15  $\mu\text{moles/g}$  at Junee Sub and Caragabal in New South Wales and Marmalake in Victoria.



**Figure 7: Average Australian glucosinolate content 1996 – 2006**

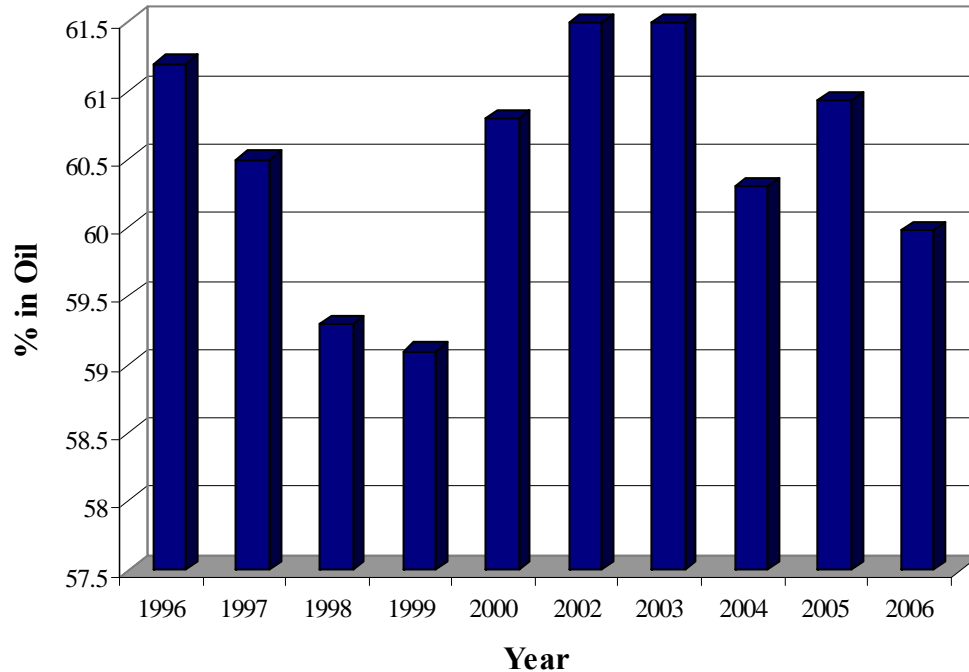


**Figure 8: Average glucosinolate content by state 2006**

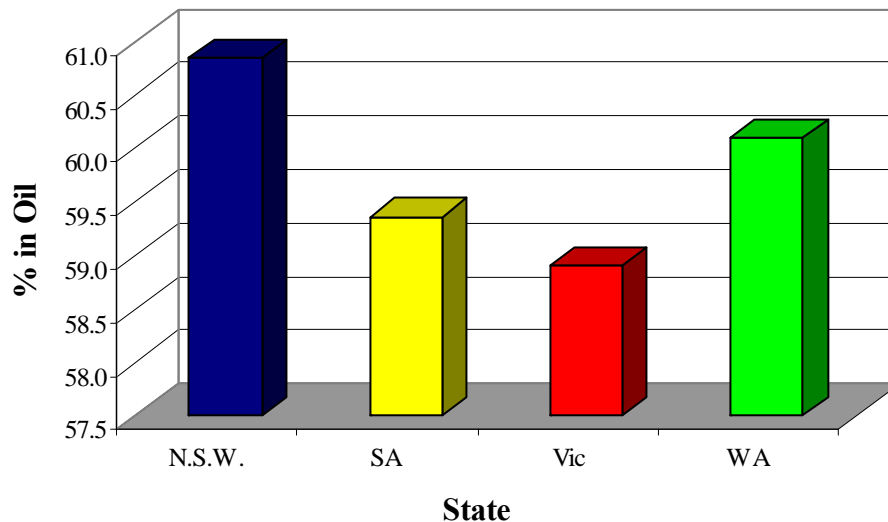
## *Fatty Acid Composition*

### **Oleic Acid**

The average oleic acid (C18:1) concentration in the oil produced from the 2006 harvest was 60.0 %. This was 0.9 % lower than 2005. The concentration ranged from 54.3 % at Mingenew in Western Australia to 61.8 % at Wickepin and Qualeup in Western Australia.



**Figure 9: Average Australian oleic acid concentration in canola oil 1996 – 2006**



**Figure 10: Average oleic acid concentration by state 2006**

## Fatty Acid Composition

### Linoleic Acid

The average linoleic acid (C18:2) concentration in oil produced from the 2006 harvest was 20.2 % this was 0.3 % higher than 2005. The concentration ranged from 18.4 % at Kojoneerup in Western Australia to 24.7 % at Mingenew in Western Australia.

### Linolenic Acid

There was an increase of 0.3 % in the linolenic acid (C18:3) concentration to 11.1 %. This was the highest since 2000 and the fourth successive increase. Linolenic acid concentrations ranged from 8.6 % Forbes in New South Wales to 13.5 % at Willaura in Victoria.

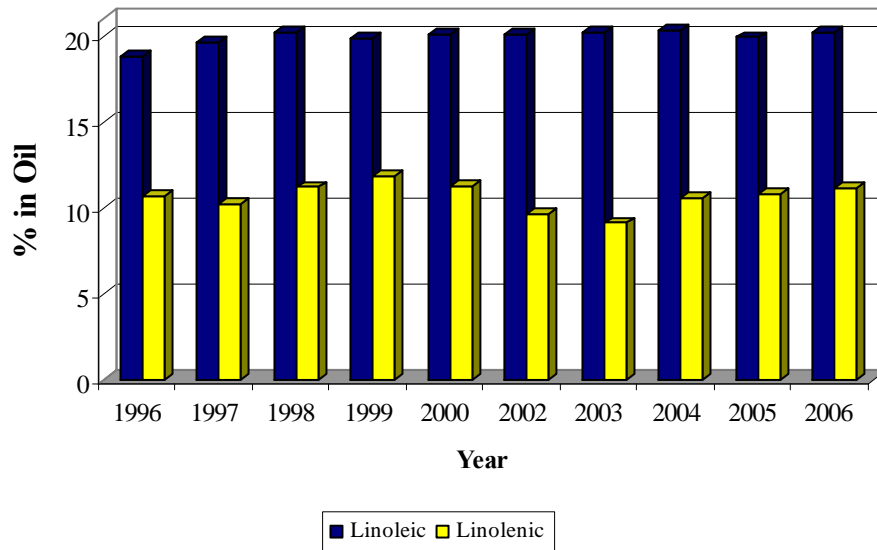


Figure 11: Average Australian linoleic acid and linolenic concentration in canola oil 1996 – 2006

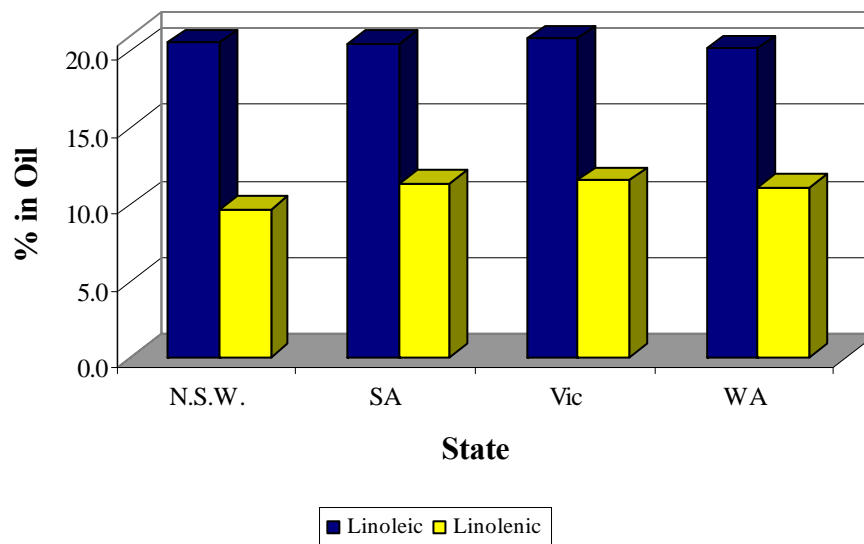
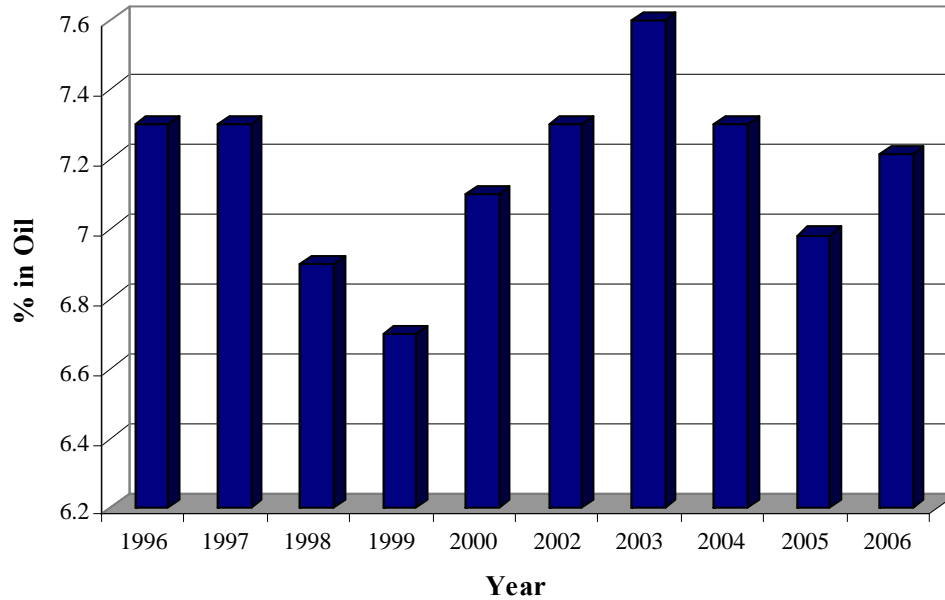


Figure 12: Average linoleic acid and linolenic acid concentration by state 2006

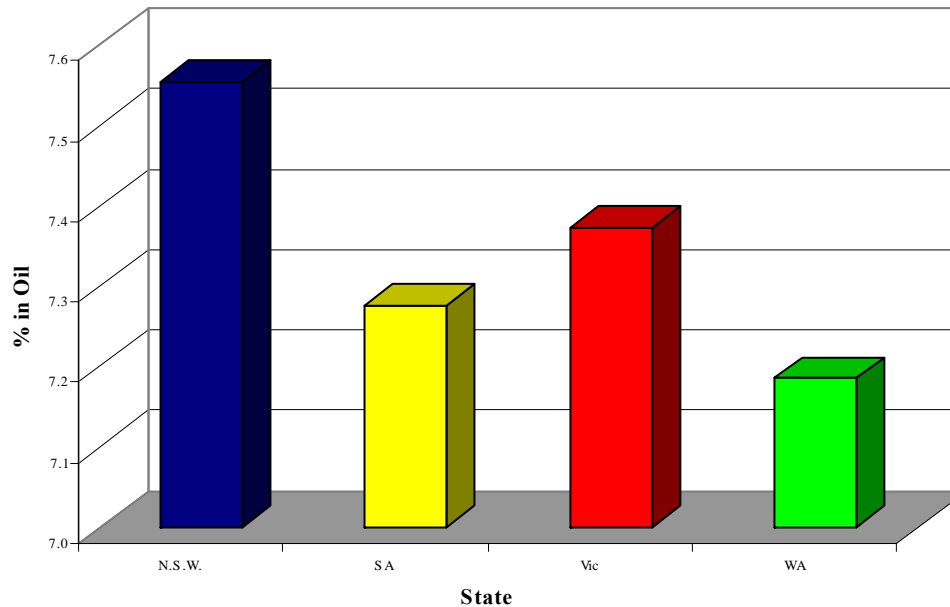
## *Fatty Acid Composition*

### **Saturated Fatty Acid**

The average saturated fatty acid concentration was 7.2 %. This was a 0.2 % increase from the 2005 harvest. Saturated fatty acid concentration ranged from 6.7 % at Frances (Grade – CANO) in South Australia to 8.0 % at Coomandook (Grade – CNLT) in South Australia and Boree Creek in New South Wales.



**Figure 13: Average Australian saturated fatty acid concentration in canola oil 1996 – 2006**



**Figure 14: Average saturated fatty acid concentration by state 2006**



# Quality Data by State

## Quality Data – New South Wales

Table 3: Quality Data – New South Wales

<u>Division/ Region/ Receiveal Site</u>	<sup>1</sup> Oil	<sup>2</sup> Protein	<sup>3</sup> Glucosinolates	<sup>4</sup> Grain Weight	
				lbs/b	kg/hL
<b><u>Central</u></b>					
<b>Dubbo</b>					
Balladoran	37.8	44.9	11	55.4	69.0
<b>Parkes</b>					
Bribbaree	36.0	44.1	13	54.6	68.0
Caragabal	35.0	46.2	15	55.0	68.5
Forbes	41.6	45.3	10	53.0	66.0
Milvale	37.3	44.6	10	55.0	68.5
<b>Wagga Wagga</b>					
Boree Creek	35.0	44.2	11	54.6	68.0
Cootamundra	36.4	45.2	9	55.0	68.5
Grong Grong	35.5	44.5	14	54.6	68.0
Harden	39.4	45.6	10	53.4	66.5
Henty West	34.7	45.2	14	54.6	68.0
Junee Sub	35.1	45.1	15	54.6	68.0
<b>Wyalong</b>					
Barellan	39.3	42.9	9	53.8	67.0
Temora Sub	35.6	46.6	13	54.6	68.0
Wyalong	36.4	44.9	5	55.0	68.5
<b><u>Central Mean</u></b>	<b>38.3</b>	<b>44.0</b>	<b>10</b>	<b>54.1</b>	<b>67.5</b>
<b><u>Northern</u></b>					
<b>Moree</b>					
Moree	38.7	43.8	5	53.8	67.0
<b>Narrabri</b>					
Burren Junction	35.0	42.7	11	56.6	70.5
Willow Tree	40.7	43.9	7	54.2	67.5
<b><u>Northern Mean</u></b>	<b>38.7</b>	<b>43.6</b>	<b>8</b>	<b>54.7</b>	<b>68.1</b>
<b><u>NSW Mean</u></b>	<b>38.4</b>	<b>43.8</b>	<b>9</b>	<b>54.3</b>	<b>67.7</b>

<sup>1</sup> % in whole seed @ 6% moisture, <sup>2</sup> % in oil free meal @10% moisture, <sup>3</sup> µmoles/g in whole seed @ 6% moisture

<sup>4</sup> Volumetric Grain Weights- lbs/b: Pounds per bushel, kg/hL: Kilograms per hectolitre

## Quality Data – South Australia

Table 4: Quality Data – South Australia

<u>Division/ Region/</u> Receiveal Site (Grade)	<sup>1</sup> Oil	<sup>2</sup> Protein	<sup>3</sup> Glucosinolates	<sup>4</sup> Grain Weight	
				lbs/b	kg/hL
<b>Adelaide</b>					
Port Adelaide (CANO)	40.5	42.4	5	54.3	67.7
<b>Eyre Peninsula</b>					
Lock (CANO)	37.6	46.0	9	53.8	67.0
<b>Lower North</b>					
Bowmans (CANO)	40.3	42.8	11	54.8	68.3
Roseworthy (CANO)	43.5	38.6	4	54.3	67.7
Roseworthy (CNLT)	38.7	41.5	8	51.7	64.5
<b>Mid North</b>					
Andrews (CANO)	39.2	43.4	4	55.2	68.8
<b>NSW</b>					
Tatyoan (CANO)	39.9	41.8	1	54.0	67.3
<b>South East</b>					
Coomandook (CANO)	39.4	41.9	12	53.6	66.8
Coomandook (CNLT)	37.9	41.8	11	49.7	62.0
Frances (CANO)	41.7	45.8	9	52.1	65.0
Keith (CANO)	41.7	41.4	7	54.2	67.5
Keith (CNLT)	38.9	42.8	10	52.1	65.0
Wolseley (CANO)	39.0	45.7	11	53.8	67.0
Wolseley (CNLT)	39.5	46.2	10	53.8	67.0
<b>Yorke Peninsula</b>					
Ardrossan (CANO)	40.1	43.0	8	54.2	67.5
Ardrossan (CNLT)	37.8	42.8	7	52.1	65.0
<b>SA Mean</b>	<b>40.8</b>	<b>41.8</b>	<b>8</b>	<b>54.2</b>	<b>67.6</b>

<sup>1</sup> % in whole seed @ 6% moisture, <sup>2</sup> % in oil free meal @10% moisture, <sup>3</sup> µmoles/g in whole seed @ 6% moisture

<sup>4</sup> Volumetric Grain Weights- lbs/b: Pounds per bushel, kg/hL: Kilograms per hectolitre

## Quality Data – Victoria

Table 5: Quality Data – Victoria

<u>Division/ Region/</u> Receiveal Site	<sup>1</sup> Oil	<sup>2</sup> Protein	<sup>3</sup> Glucosinolates	<sup>4</sup> Grain Weight	
				lbs/b	kg/hL
<b><u>Southern</u></b>					
<b>Horsham</b>					
Berrybank	40.8	43.0	9	53.8	67.0
Beulah	38.7	43.3	4	54.2	67.5
Donald	41.7	42.5	9	53.8	67.0
Goroke	44.9	39.4	9	53.4	66.5
Hamilton	43.1	41.7	7	53.4	66.5
Lillimur	40.0	45.5	9	53.8	67.0
Marmalake	38.1	44.9	15	53.8	67.0
Natimuk	38.7	45.2	10	53.8	67.0
Nhill	38.7	44.7	11	54.6	68.0
Warracknabeal	36.0	43.5	10	54.6	68.0
Westmere	41.4	44.1	7	54.6	68.0
Willaura	37.3	44.0	13	55.0	68.5
<b>Marong</b>					
Borong	40.4	42.7	2	52.6	65.5
Deniliquin	44.3	39.8	10	53.0	66.0
Dookie	37.5	42.8	11	53.0	66.0
Dunolly	38.1	43.9	12	53.4	66.5
Echuca	40.3	42.7	12	53.4	66.5
Elmore	38.1	43.0	5	53.4	66.5
Murchison East	39.5	42.0	13	52.6	65.5
St. James	37.0	43.7	13	53.8	67.0
Tocumwal	42.0	41.7	9	54.2	67.5
Yarawonga	38.9	44.0	13	54.2	67.5
<b>Swan Hill</b>					
Quambatook	38.4	41.3	10	54.2	67.5
<b><u>Vic Mean</u></b>	<b><u>40.2</u></b>	<b><u>42.7</u></b>	<b><u>9</u></b>	<b><u>53.6</u></b>	<b><u>66.8</u></b>

<sup>1</sup> % in whole seed @ 6% moisture, <sup>2</sup> % in oil free meal @10% moisture, <sup>3</sup> μmoles/g in whole seed @ 6% moisture

<sup>4</sup> Volumetric Grain Weights- lbs/b: Pounds per bushel, kg/hL: Kilograms per hectolitre

## Quality Data – Western Australia

Table 6: Quality Data – Western Australia

<u>Division/ Region/</u>	<sup>4</sup> Grain Weight				
Receival Site	<sup>1</sup> Oil	<sup>2</sup> Protein	<sup>3</sup> Glucosinolates	lbs/b	kg/hL
<b>Albany</b>					
Albany	42.8	39.9	4	56.4	70.3
Bokal	42.4	39.9	1	55.0	68.5
Cranbrook	43.2	40.2	4	55.0	68.5
Gairdner	43.4	38.9	3	55.6	69.3
Hyden	41.8	38.9	7	55.6	69.3
Jacup	42.9	38.1	6	55.2	68.8
Katanning	41.4	42.2	1	55.6	69.3
Kojoneerup	42.9	41.8	4	54.4	67.8
Kojonup	41.7	39.7	7	55.0	68.5
Newdegate	42.5	37.1	7	55.4	69.0
Qualeup	42.4	39.4	5	54.4	67.8
Tambellup	40.8	41.7	5	55.0	68.5
Wagin	41.5	41.6	1	55.4	69.0
Wellstead	43.6	40.8	1	55.2	68.8
<b>Esperance</b>					
Beaumont	41.8	40.1	8	55.8	69.5
Cascades	42.6	38.5	3	56.0	69.8
Esperance	42.7	39.5	1	55.8	69.5
Lake Varley	41.7	39.3	7	54.8	68.3
Mount Madden	42.6	37.1	2	55.6	69.3
Munglinup	44.3	38.7	1	55.4	69.0
Ravensthorpe	44.3	37.0	6	55.4	69.0
West River	43.0	37.2	3	55.6	69.3
<b>Geraldton</b>					
Mingenew	35.8	38.8	13	55.2	68.8
<b>Kwinana</b>					
Avon	41.8	38.2	5	55.4	69.0
Dale	41.6	38.8	7	55.2	68.8
Kellerberrin	39.7	38.6	13	56.4	70.3
Merredin	39.6	37.4	12	55.2	68.8
MGC	41.7	39.2	5	55.2	68.8
Moora	40.4	39.1	9	55.6	69.3
Narrakine	41.2	41.0	2	55.2	68.8
Quairading	40.3	39.6	9	55.8	69.5
Wickepin	41.8	40.3	6	55.0	68.5
Yerrecoin	41.1	39.5	8	55.2	68.8
York	41.9	39.9	5	55.2	68.8
<b>WA Mean</b>	<b>42.6</b>	<b>39.6</b>	<b>3</b>	<b>55.5</b>	<b>69.2</b>

<sup>1</sup> % in whole seed @ 6% moisture, <sup>2</sup> % in oil free meal @10% moisture, <sup>3</sup> µmoles/g in whole seed @ 6% moisture

<sup>4</sup> 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

<u>Division/ Region/ Receival Site</u>	<u>14:0</u>	<u>16:0</u>	<u>16:1</u>	<u>18:0</u>	<u>18:1</u>	<u>18:2</u>	<u>18:3</u>	<u>20:0</u>	<u>20:1</u>	<u>22:0</u>	<u>22:1</u>	<u>24:0</u>	<u>24:1</u>	<u>Total</u>	<sup>1</sup> <u>Sat.</u>	<sup>2</sup> <u>Iodine Value</u>
<b><u>Central</u></b>																
<b>Dubbo</b>																
Balladoran	0.1	4.3	0.3	2.0	61.1	21.1	9.3	0.5	0.9	0.3	0.0	0.2	0.1	100.0	7.2	114.3
<b>Parkes</b>																
Bribbaree	0.1	4.5	0.3	2.2	59.6	20.9	10.3	0.5	1.0	0.3	0.1	0.2	0.1	100.0	7.7	115.5
Caragabal	0.1	4.7	0.3	2.2	58.7	20.9	10.6	0.4	1.3	0.3	0.1	0.2	0.1	100.0	7.9	115.9
Forbes	0.0	4.6	0.3	2.0	61.2	21.2	8.6	0.5	1.1	0.3	0.0	0.2	0.1	100.0	7.6	112.9
Milvale	0.1	4.4	0.3	2.1	61.1	20.3	9.6	0.5	1.0	0.3	0.1	0.1	0.1	100.0	7.6	113.9
<b>Wagga Wagga</b>																
Boree Creek	0.1	4.9	0.3	2.0	56.6	23.5	10.5	0.5	0.9	0.3	0.1	0.2	0.1	100.0	8.0	117.9
Cootamundra	0.1	4.5	0.3	2.1	59.6	21.1	10.4	0.5	1.0	0.3	0.0	0.2	0.1	100.0	7.6	115.9
Grong Grong	0.1	4.6	0.3	2.0	58.4	22.6	10.3	0.5	0.5	0.3	0.0	0.2	0.1	100.0	7.6	117.2
Harden	0.1	4.3	0.3	2.0	59.2	21.0	10.8	0.6	1.1	0.3	0.1	0.2	0.1	100.0	7.5	116.7
Henty West	0.1	4.8	0.4	2.0	56.3	23.1	11.2	0.5	1.0	0.3	0.1	0.2	0.1	100.0	7.9	118.9
Junee Sub	0.1	4.8	0.4	2.0	58.6	21.9	10.1	0.5	1.0	0.3	0.1	0.0	0.1	100.0	7.7	116.1
<b>Wyalong</b>																
Barellan	0.1	4.3	0.3	2.2	60.7	20.0	10.4	0.5	1.0	0.3	0.0	0.2	0.1	100.0	7.6	115.0
Temora Sub	0.1	4.4	0.4	2.0	59.5	21.2	10.4	0.5	1.0	0.2	0.0	0.2	0.1	100.0	7.4	116.2
Wyalong	0.1	4.4	0.3	2.2	60.2	20.7	10.0	0.5	1.0	0.2	0.1	0.1	0.1	100.0	7.6	115.0
<b><u>Central Mean</u></b>	<b><u>0.1</u></b>	<b><u>4.4</u></b>	<b><u>0.3</u></b>	<b><u>2.1</u></b>	<b><u>60.2</u></b>	<b><u>20.7</u></b>	<b><u>10.1</u></b>	<b><u>0.5</u></b>	<b><u>1.0</u></b>	<b><u>0.3</u></b>	<b><u>0.0</u></b>	<b><u>0.2</u></b>	<b><u>0.1</u></b>	<b><u>100.0</u></b>	<b><u>7.6</u></b>	<b><u>115.2</u></b>
<b><u>Northern</u></b>																
<b>Moree</b>																
Moree	0.1	4.3	0.3	2.1	63.4	20.0	8.2	0.4	0.9	0.2	0.0	0.1	0.1	100.0	7.2	111.4
<b>Narrabri</b>																
Burren Junction	0.1	4.5	0.3	2.6	63.6	19.3	7.1	0.8	1.0	0.3	0.0	0.2	0.1	100.0	8.5	108.0
Willow Tree	0.1	4.2	0.3	2.0	61.2	20.5	9.5	0.5	1.1	0.3	0.1	0.1	0.1	100.0	7.2	114.2
<b><u>Northern Mean</u></b>	<b><u>0.1</u></b>	<b><u>4.3</u></b>	<b><u>0.3</u></b>	<b><u>2.2</u></b>	<b><u>62.4</u></b>	<b><u>20.1</u></b>	<b><u>8.5</u></b>	<b><u>0.6</u></b>	<b><u>1.0</u></b>	<b><u>0.3</u></b>	<b><u>0.0</u></b>	<b><u>0.2</u></b>	<b><u>0.1</u></b>	<b><u>100.0</u></b>	<b><u>7.5</u></b>	<b><u>111.9</u></b>
<b><u>NSW Mean</u></b>	<b><u>0.1</u></b>	<b><u>4.4</u></b>	<b><u>0.3</u></b>	<b><u>2.2</u></b>	<b><u>60.8</u></b>	<b><u>20.5</u></b>	<b><u>9.7</u></b>	<b><u>0.5</u></b>	<b><u>1.0</u></b>	<b><u>0.3</u></b>	<b><u>0.0</u></b>	<b><u>0.2</u></b>	<b><u>0.1</u></b>	<b><u>100.0</u></b>	<b><u>7.6</u></b>	<b><u>114.2</u></b>

<sup>1</sup>Sat - Sum of the saturated fatty acids including 14:0, 16:0, 18:0, 20:0 and 24:0

<sup>2</sup> Iodine Value - Calculated from the fatty acid composition

## *Fatty Acid Composition – South Australia*

**Table 8: Fatty Acid Composition – South Australia**

Region/ Receiving Site (Grade)	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	<sup>1</sup> Sat.	<sup>2</sup> Iodine Value
<b>Adelaide</b>																
Port Adelaide (CANO)	0.1	4.5	0.4	2.1	58.0	21.3	11.8	0.3	1.0	0.2	0.0	0.2	0.2	100.0	7.4	118.8
<b>Eyre Peninsula</b>																
Lock (CANO)	0.1	4.5	0.3	2.1	58.5	21.3	11.0	0.3	1.0	0.2	0.3	0.2	0.1	100.0	7.4	117.3
<b>Lower North</b>																
Bowmans (CANO)	0.1	4.3	0.3	2.1	60.1	20.1	11.0	0.3	1.0	0.2	0.1	0.2	0.2	100.0	7.1	116.6
Roseworthy (CANO)	0.1	4.3	0.3	2.2	60.3	19.7	11.2	0.4	1.0	0.3	0.1	0.1	0.2	100.0	7.3	116.4
Roseworthy (CNLT)	0.1	4.6	0.3	2.1	59.0	20.7	11.5	0.3	0.9	0.2	0.0	0.2	0.1	100.0	7.4	117.6
<b>Mid North</b>																
Andrews (CANO)	0.1	4.4	0.3	2.1	60.3	20.1	10.8	0.3	1.0	0.2	0.1	0.2	0.1	100.0	7.3	116.0
<b>NSW</b>																
Tatyoan (CANO)	0.1	4.6	0.3	1.9	57.8	21.5	11.9	0.3	1.0	0.3	0.0	0.1	0.2	100.0	7.4	119.0
<b>South East</b>																
Coomandook (CANO)	0.1	4.7	0.3	2.0	58.4	21.1	11.5	0.3	1.0	0.3	0.1	0.1	0.2	100.0	7.4	118.0
Coomandook (CNLT)	0.1	5.0	0.4	2.2	59.3	20.5	10.5	0.3	1.0	0.2	0.1	0.2	0.2	100.0	8.0	115.1
Frances (CANO)	0.1	4.2	0.3	1.9	59.8	19.9	12.1	0.3	1.0	0.2	0.0	0.1	0.1	100.0	6.7	118.6
Keith (CANO)	0.1	4.4	0.3	2.1	59.9	20.7	10.4	0.4	1.1	0.3	0.1	0.2	0.2	100.0	7.3	115.8
Keith (CNLT)	0.1	4.5	0.4	2.2	56.5	21.5	12.5	0.4	1.0	0.3	0.1	0.2	0.3	100.0	7.7	119.8
Wolseley (CANO)	0.1	4.4	0.3	2.0	58.0	20.7	12.6	0.3	1.0	0.2	0.0	0.1	0.2	100.0	7.2	119.7
Wolseley (CNLT)	0.1	4.7	0.3	2.1	59.3	19.9	11.8	0.3	1.0	0.3	0.0	0.1	0.2	100.0	7.5	117.4
<b>Yorke Peninsula</b>																
Ardrossan (CANO)	0.1	4.4	0.3	2.0	58.5	21.2	11.8	0.3	1.0	0.2	0.0	0.1	0.1	100.0	7.1	118.8
Ardrossan (CNLT)	0.1	4.6	0.3	2.1	56.7	22.5	11.7	0.3	0.9	0.3	0.1	0.2	0.2	100.0	7.6	119.5
<b>SA Mean</b>	<b>0.1</b>	<b>4.4</b>	<b>0.3</b>	<b>2.1</b>	<b>59.4</b>	<b>20.5</b>	<b>11.4</b>	<b>0.3</b>	<b>1.0</b>	<b>0.3</b>	<b>0.1</b>	<b>0.1</b>	<b>0.2</b>	<b>100.0</b>	<b>7.3</b>	<b>117.4</b>

<sup>1</sup>Sat - Sum of the saturated fatty acids including 14:0, 16:0, 18:0, 20:0 and 24:0

<sup>2</sup> Iodine Value - Calculated from the fatty acid composition

## *Fatty Acid Composition – Victoria*

**Table 9: Fatty Acid Composition – Victoria**

<u>Division/ Region/ Receival Site</u>	<u>14:0</u>	<u>16:0</u>	<u>16:1</u>	<u>18:0</u>	<u>18:1</u>	<u>18:2</u>	<u>18:3</u>	<u>20:0</u>	<u>20:1</u>	<u>22:0</u>	<u>22:1</u>	<u>24:0</u>	<u>24:1</u>	<u>Total</u>	<sup>1</sup> <u>Sat.</u>	<sup>2</sup> <u>Iodine Value</u>
<b>Horsham</b>																
Berrybank	0.1	4.5	0.2	1.8	57.8	21.4	12.4	0.4	0.9	0.2	0.0	0.1	0.1	100.0	7.1	120.1
Beulah	0.1	4.3	0.3	2.0	59.3	20.8	11.6	0.4	0.9	0.2	0.0	0.1	0.1	100.0	7.1	118.3
Donald	0.1	4.3	0.3	2.0	61.2	19.8	10.2	0.5	1.0	0.2	0.1	0.2	0.1	100.0	7.3	114.7
Goroke	0.1	4.4	0.3	1.8	60.0	18.9	12.6	0.5	0.9	0.3	0.0	0.1	0.1	100.0	7.2	118.2
Hamilton	0.1	4.6	0.3	1.9	58.3	21.0	12.1	0.4	1.0	0.2	0.0	0.1	0.1	100.0	7.2	119.2
Lillimur	0.1	4.3	0.3	1.9	59.7	19.9	11.8	0.5	1.0	0.2	0.1	0.1	0.1	100.0	7.1	117.9
Marmalake	0.1	4.4	0.3	2.0	58.4	20.6	12.0	0.5	1.1	0.3	0.1	0.2	0.1	100.0	7.5	118.4
Natimuk	0.1	4.4	0.3	1.9	58.7	20.4	12.1	0.5	1.0	0.2	0.1	0.1	0.1	100.0	7.3	118.6
Nhill	0.1	4.5	0.3	2.0	58.9	20.3	12.1	0.4	1.0	0.2	0.0	0.1	0.1	100.0	7.4	118.4
Warracknabeal	0.1	4.5	0.3	2.1	58.5	20.9	11.6	0.5	0.9	0.3	0.1	0.2	0.1	100.0	7.6	117.8
Westmere	0.1	4.6	0.4	1.7	56.8	21.6	12.8	0.5	1.0	0.3	0.1	0.1	0.1	100.0	7.3	120.9
Willaura	0.1	4.6	0.3	1.8	56.7	20.9	13.5	0.5	1.0	0.3	0.1	0.1	0.1	100.0	7.4	121.5
<b>Marong</b>																
Borong	0.1	4.3	0.3	2.2	58.5	20.9	11.5	0.5	1.0	0.2	0.1	0.1	0.1	100.0	7.5	117.9
Deniliquin	0.1	4.3	0.3	2.1	61.7	19.3	10.1	0.5	1.1	0.3	0.1	0.1	0.1	100.0	7.3	114.1
Dookie	0.1	4.7	0.3	1.9	57.9	22.1	10.9	0.5	1.0	0.3	0.1	0.2	0.1	100.0	7.7	117.6
Dunolly	0.1	4.6	0.3	1.9	57.8	20.9	12.3	0.5	1.1	0.3	0.1	0.1	0.1	100.0	7.5	119.2
Echuca	0.1	4.4	0.3	2.1	59.7	20.4	11.0	0.5	0.9	0.2	0.1	0.1	0.1	100.0	7.5	116.5
Elmore	0.1	4.7	0.3	2.1	57.7	21.2	11.9	0.5	0.9	0.2	0.1	0.2	0.1	100.0	7.7	118.7
Murchison East	0.1	4.6	0.3	1.9	57.8	21.7	11.7	0.4	0.9	0.3	0.0	0.1	0.1	100.0	7.4	119.0
St. James	0.1	4.6	0.3	2.0	58.9	21.5	10.4	0.5	1.0	0.3	0.1	0.2	0.1	100.0	7.6	116.3
Tocumwal	0.1	4.3	0.3	2.0	61.5	19.7	10.1	0.5	1.0	0.2	0.0	0.1	0.1	100.0	7.3	114.5
Yarawonga	0.1	4.6	0.4	2.0	58.6	21.5	10.8	0.5	1.0	0.3	0.1	0.1	0.1	100.0	7.6	117.1
<b>Swan Hill</b>																
Quambatook	0.1	4.3	0.3	2.1	59.5	20.6	11.4	0.4	0.9	0.2	0.0	0.1	0.1	100.0	7.2	117.6
<b><u>Vic Mean</u></b>	<b><u>0.1</u></b>	<b><u>4.5</u></b>	<b><u>0.3</u></b>	<b><u>2.0</u></b>	<b><u>58.9</u></b>	<b><u>20.8</u></b>	<b><u>11.5</u></b>	<b><u>0.5</u></b>	<b><u>1.0</u></b>	<b><u>0.3</u></b>	<b><u>0.1</u></b>	<b><u>0.1</u></b>	<b><u>0.1</u></b>	<b><u>100.0</u></b>	<b><u>7.4</u></b>	<b><u>117.9</u></b>

<sup>1</sup>Sat - Sum of the saturated fatty acids including 14:0, 16:0, 18:0, 20:0 and 24:0

<sup>2</sup> 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	<sup>1</sup> Sat.	<sup>2</sup> Iodine Value
<b>Albany</b>																
Albany	0.1	4.3	0.3	2.0	60.6	19.7	11.2	0.3	1.0	0.2	0.1	0.1	0.1	100.0	7.0	116.6
Bokal	0.1	4.4	0.3	2.2	61.4	19.1	10.3	0.4	1.1	0.3	0.1	0.1	0.2	100.0	7.4	114.1
Cranbrook	0.1	4.3	0.3	2.1	61.1	19.4	10.9	0.3	1.0	0.2	0.1	0.1	0.1	100.0	7.2	115.7
Gairdner	0.1	4.3	0.3	2.0	60.2	19.8	11.5	0.3	0.9	0.2	0.0	0.1	0.1	100.0	7.0	117.3
Hyden	0.1	4.5	0.3	1.9	58.4	21.3	11.7	0.3	0.9	0.2	0.0	0.1	0.2	100.0	7.2	118.7
Jacup	0.1	4.4	0.3	2.1	59.9	19.9	11.7	0.3	0.9	0.2	0.0	0.1	0.1	100.0	7.2	117.6
Katanning	0.1	4.4	0.3	2.1	59.9	20.0	11.2	0.4	1.0	0.2	0.1	0.1	0.1	100.0	7.3	116.7
Kojoneerup	0.0	4.0	0.3	2.1	61.6	18.4	11.3	0.4	1.2	0.3	0.0	0.1	0.2	100.0	7.0	115.8
Kojonup	0.1	4.3	0.3	2.2	61.5	19.3	10.4	0.3	1.0	0.2	0.0	0.1	0.1	100.0	7.3	114.7
Newdegate	0.1	4.5	0.3	1.8	58.7	21.2	11.5	0.3	0.9	0.3	0.0	0.1	0.2	100.0	7.2	118.3
Qualeup	0.1	4.3	0.3	2.2	61.8	19.0	10.3	0.3	1.0	0.2	0.2	0.1	0.2	100.0	7.2	114.3
Tembellup	0.1	4.3	0.3	2.1	59.7	19.8	11.6	0.4	1.1	0.2	0.2	0.1	0.1	100.0	7.1	117.3
Wagin	0.1	4.4	0.3	2.1	60.0	20.0	11.2	0.4	1.0	0.2	0.1	0.1	0.1	100.0	7.3	116.7
Wellstead	0.1	4.2	0.3	2.0	60.4	19.5	11.8	0.3	1.0	0.2	0.0	0.1	0.1	100.0	6.9	117.7
<b>Esperance</b>																
Beaumont	0.1	4.4	0.3	2.0	59.3	20.6	11.4	0.4	1.1	0.3	0.0	0.1	0.1	100.0	7.2	117.5
Cascades	0.1	4.5	0.3	2.0	60.0	20.5	10.8	0.3	0.9	0.2	0.0	0.1	0.1	100.0	7.3	116.4
Esperance	0.1	4.4	0.4	2.0	59.8	20.4	11.2	0.3	0.9	0.2	0.1	0.1	0.1	100.0	7.2	117.1
Lake Varley	0.1	4.4	0.3	2.0	59.3	20.3	11.5	0.4	1.0	0.2	0.2	0.2	0.1	100.0	7.2	117.4
Mount Madden	0.1	4.5	0.3	1.9	58.7	21.0	11.4	0.3	1.0	0.3	0.1	0.1	0.2	100.0	7.2	117.9
Munglinup	0.1	4.4	0.3	2.0	60.5	20.0	11.0	0.3	0.9	0.2	0.0	0.1	0.1	100.0	7.1	116.5
Ravensthorpe	0.1	4.4	0.3	2.0	59.2	20.4	11.9	0.3	0.9	0.2	0.1	0.1	0.1	100.0	7.1	118.4
West River	0.1	4.4	0.3	2.0	59.7	20.4	11.2	0.3	0.9	0.2	0.0	0.1	0.2	100.0	7.2	117.1
<b>Geraldton</b>																
Mingenew	0.1	5.2	0.4	1.8	54.3	24.7	11.5	0.4	1.0	0.3	0.0	0.1	0.1	100.0	7.8	121.0
<b>Kwinana</b>																
Avon	0.1	4.7	0.4	1.9	59.1	21.4	10.5	0.4	1.0	0.3	0.0	0.1	0.2	100.0	7.5	116.5
Dale	0.1	4.5	0.3	1.9	60.4	21.0	9.9	0.3	1.0	0.3	0.0	0.1	0.1	100.0	7.2	115.4
Kellerberrin	0.1	4.9	0.3	1.8	55.5	23.1	12.3	0.3	1.0	0.3	0.0	0.2	0.2	100.0	7.5	121.2
Merredin	0.1	4.8	0.3	1.8	56.7	22.7	11.6	0.3	1.0	0.3	0.0	0.2	0.2	100.0	7.4	119.6
MGC	0.1	4.5	0.4	2.0	60.0	20.5	10.7	0.3	1.0	0.2	0.1	0.1	0.2	100.0	7.2	116.2
Moora	0.1	4.6	0.3	1.9	58.0	22.0	11.3	0.4	1.0	0.3	0.0	0.1	0.1	100.0	7.4	118.4
Narrakine	0.1	4.3	0.3	2.2	61.5	19.0	10.7	0.4	1.0	0.2	0.1	0.1	0.1	100.0	7.3	114.8
Quairadin	0.1	4.8	0.3	1.8	57.4	22.3	11.3	0.4	1.0	0.3	0.0	0.1	0.1	100.0	7.5	118.7
Wickepin	0.1	4.3	0.3	2.2	61.8	18.9	10.6	0.3	0.9	0.2	0.0	0.1	0.1	100.0	7.3	114.7
Yerrecoin	0.1	4.5	0.3	2.0	60.6	20.6	10.0	0.3	1.0	0.2	0.0	0.1	0.1	100.0	7.4	115.0
York	0.1	4.6	0.3	2.0	59.9	20.8	10.5	0.3	0.9	0.2	0.0	0.1	0.1	100.0	7.3	116.2
<b>WA Mean</b>	<b>0.1</b>	<b>4.4</b>	<b>0.3</b>	<b>2.0</b>	<b>60.1</b>	<b>20.1</b>	<b>11.1</b>	<b>0.3</b>	<b>1.0</b>	<b>0.2</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>100.0</b>	<b>7.2</b>	<b>116.7</b>

<sup>1</sup>Sat - Sum of the saturated fatty acids including 14:0, 16:0, 18:0, 20:0 and 24:0

<sup>2</sup> Iodine Value - Calculated from the fatty acid composition



# National Brassica Improvement Project – Quality Data

## Oil Content for 2006 Early Canola Breeding Trials

Table 11: Percentage oil content for 2006 early canola breeding trials (in whole seed at 6 % moisture)

S2 Early Conventional Trials						S2 Early Triazine Trials						S2 Clearfield Trials					
Variety	B	H	L	W	Mean	Variety	B	H	L	M	Mean	Variety	B	H	L	M	Mean
AG-OUTBACK	*	*	*	37.7	<b>37.7</b>	ATR507	38.6	38.3	37.6	37.4	<b>38.0</b>	44C73	39.7	38.5	36.4	38.8	<b>38.4</b>
AV-JADE	40.9	38.8	38.3	40.6	<b>39.7</b>	ATR510	39.1	38.4	37.0	36.6	<b>37.8</b>	45Y77	39.7	37.8	36.9	40.9	<b>38.8</b>
AV-OPAL	41.3	38.8	38.2	39.1	<b>39.3</b>	ATR511	38.5	38.5	37.8	36.9	<b>37.9</b>	46C76	*	*	*	38.2	<b>38.2</b>
BLN2026*SL902	41.6	40.2	38.5	42.2	<b>40.6</b>	ATR512	37.5	36.8	36.7	37.3	<b>37.0</b>	BLN3852CL	41.6	40.4	38.7	38.7	<b>39.8</b>
BLN3224-04W1	42.5	39.7	38.2	40.5	<b>40.2</b>	ATR513	38.2	36.0	36.4	36.1	<b>36.7</b>	BLN3853CL	40.1	40.7	39.2	38.6	<b>39.6</b>
BLN3346-04M8	40.8	40.0	38.2	41.2	<b>40.0</b>	ATR514	38.8	37.8	37.1	35.5	<b>37.3</b>	BLN3854CL	39.0	38.5	35.3	38.5	<b>37.8</b>
BLN3868	43.3	41.5	39.6	41.8	<b>41.5</b>	ATR-BANJO	38.5	39.9	38.3	36.0	<b>38.2</b>	BLN3855CL	39.1	39.3	36.8	39.6	<b>38.7</b>
BLN3869	40.3	39.8	38.5	39.8	<b>39.6</b>	ATR-STUBBY	37.5	38.2	37.2	35.4	<b>37.1</b>	BLN3856CL	39.9	41.6	40.2	38.7	<b>40.1</b>
BLN3870	39.3	40.1	38.8	39.6	<b>39.5</b>	BLN3356TT-04M3	38.2	38.9	37.7	37.0	<b>37.9</b>	BLN3857CL	40.5	40.4	37.7	39.1	<b>39.4</b>
BLN3871	41.3	41.1	39.0	41.3	<b>40.7</b>	BLN3835TT	40.4	40.4	39.0	38.5	<b>39.6</b>	BLN3858CL	40.5	39.6	36.7	37.8	<b>38.7</b>
BLN3872	40.7	40.1	38.1	40.4	<b>39.8</b>	BLN3836TT	39.5	40.0	39.3	37.8	<b>39.2</b>	BLN3859CL	41.1	42.5	39.8	38.9	<b>40.5</b>
BLN3873	39.9	39.5	38.2	40.5	<b>39.5</b>	BLN3837TT	39.4	40.5	40.1	38.0	<b>39.5</b>	WARRIORCL	38.9	38.3	36.5	38.1	<b>38.0</b>
BLN3874	41.1	39.3	38.2	40.5	<b>39.8</b>	BLN3838TT	39.0	40.0	39.0	37.7	<b>39.0</b>						
BLN3875	41.0	39.2	38.6	40.0	<b>39.7</b>	BLN3839TT	39.9	39.1	38.9	37.1	<b>38.7</b>						
CC05001	40.2	39.6	38.8	40.3	<b>39.7</b>	BLN3840TT	39.4	38.0	36.6	36.6	<b>37.7</b>						
CC05002	40.4	39.2	38.0	41.0	<b>39.6</b>	BLN3841TT	39.2	38.8	37.6	37.1	<b>38.2</b>						
CC05004	41.1	40.7	39.7	39.8	<b>40.4</b>	BLN3842TT	39.7	39.1	38.8	37.8	<b>38.8</b>						
CC05006	40.4	39.1	38.9	40.5	<b>39.7</b>	BRAVOTT	38.6	37.3	37.0	36.1	<b>37.3</b>						
CC05015	40.5	39.3	38.4	40.5	<b>39.7</b>	SARDI609TT	39.8	39.7	38.3	36.6	<b>38.6</b>						
CC05016	40.7	39.3	38.2	39.9	<b>39.5</b>	SARDI610TT	40.5	*	38.9	*	<b>39.7</b>						
CC05018	39.7	39.0	38.1	38.1	<b>38.7</b>	SARDI611TT	40.0	37.9	37.0	36.8	<b>37.9</b>						
RT008-04M3	42.8	40.6	39.9	42.2	<b>41.4</b>	SARDI612TT	39.8	39.5	39.1	37.9	<b>39.1</b>						
SARDI601	40.9	39.7	39.4	40.6	<b>40.2</b>	SARDI613TT	39.9	39.6	39.3	38.3	<b>39.2</b>						
SARDI602	41.2	39.8	39.2	40.1	<b>40.1</b>	SARDI614TT	40.5	39.3	38.7	37.2	<b>38.9</b>						
SARDI603	41.0	40.0	39.2	41.5	<b>40.5</b>	SARDI615TT	39.5	38.6	38.2	37.7	<b>38.5</b>						
SARDI604	41.4	40.4	40.2	41.8	<b>41.0</b>	SARDI616TT	39.7	38.3	37.7	36.3	<b>38.0</b>						
SARDI605	41.2	38.1	38.9	40.6	<b>39.7</b>	SARDI617TT	40.4	38.8	37.8	36.6	<b>38.4</b>						
SARDI606	41.3	38.7	38.3	40.4	<b>39.7</b>	TORNADOTT	39.8	39.2	39.0	37.3	<b>38.8</b>						
SARDI607	42.1	39.6	39.0	40.9	<b>40.4</b>												
SARDI608	41.5	39.1	38.5	40.4	<b>39.9</b>												

B = Bellata - NSW, H = Horsham - Vic, L = Lameroo - SA, W = Wongan Hills - WA, M = Merredin - WA

## Oil Content for 2006 Mid Canola Breeding Trials

Table 12: Percentage oil content for 2006 mid canola breeding trials (in whole seed at 6 % moisture)

S2 Mid Conventional Trials					S2 Mid Triazine Trials					S2 Mid Clearfield Trials				
Variety	K	Ta	Tu	Mean	Variety	K	Ta	Tu	Mean	Variety	K	Ta	Tu	Mean
AV-JADE	46.9	40.1	41.3	<b>42.8</b>	ATR517	42.4	40.2	39.9	<b>40.8</b>	44C73	44.9	*	*	<b>44.9</b>
BLN3876	47.5	42.3	42.1	<b>44.0</b>	ATR518	43.2	39.5	40.0	<b>40.9</b>	46C76	45.1	38.8	40.7	<b>41.5</b>
BLN3877	47.4	41.6	42.1	<b>43.7</b>	ATR519	43.0	38.8	39.6	<b>40.5</b>	BLN3642CL-MO502	*	*	41.3	<b>41.3</b>
BLN3878	47.2	41.6	42.4	<b>43.7</b>	ATR520	43.6	40.2	41.3	<b>41.7</b>	BLN3860CL	47.4	40.0	43.5	<b>43.6</b>
BLN3879	47.2	43.3	42.5	<b>44.4</b>	ATR523	44.4	39.9	40.3	<b>41.5</b>	BLN3861CL	47.0	39.3	41.3	<b>42.5</b>
BLN3880	46.8	43.1	42.9	<b>44.3</b>	ATR524	45.1	39.7	40.0	<b>41.6</b>	BLN3862CL	46.7	40.5	41.8	<b>43.0</b>
BLN3881	47.2	42.3	42.4	<b>44.0</b>	ATR531	45.8	39.8	41.7	<b>42.4</b>	BLN3863CL	46.3	40.4	42.6	<b>43.1</b>
BLN3882	47.3	42.9	41.8	<b>44.0</b>	ATR539	43.0	38.2	37.3	<b>39.5</b>	BLN3864CL	46.4	41.9	42.5	<b>43.6</b>
BLN3883	46.6	42.6	41.5	<b>43.6</b>	ATR-BANJO	46.2	*	36.7	<b>41.5</b>	BLN3865CL	45.8	40.7	41.8	<b>42.8</b>
CC05021	45.9	42.6	41.7	<b>43.4</b>	ATR-SUMMITT	44.2	39.3	38.9	<b>40.8</b>	BLN3866CL	47.1	41.4	41.8	<b>43.4</b>
CC05024	46.9	42.4	41.8	<b>43.7</b>	BLN3357TT-04W6	44.5	39.4	40.4	<b>41.4</b>	BLN3867CL	45.9	39.5	42.1	<b>42.5</b>
CC05031	47.9	43.3	43.7	<b>45.0</b>	BLN3780TT	44.6	39.3	41.4	<b>41.7</b>	CI06005	47.1	38.1	41.7	<b>42.3</b>
CC05032	48.3	44.7	43.2	<b>45.4</b>	BLN3843TT	44.8	39.1	40.0	<b>41.3</b>	CI06006	46.7	40.0	42.6	<b>43.1</b>
CC05040	48.0	42.7	41.8	<b>44.1</b>	BLN3844TT	47.5	42.2	43.0	<b>44.2</b>	CI06007	46.9	39.2	41.0	<b>42.4</b>
CC05051	46.8	42.3	43.3	<b>44.1</b>	BLN3845TT	46.1	39.1	42.4	<b>42.5</b>	CI06008	46.8	40.5	41.0	<b>42.8</b>
CC05055	46.7	41.9	41.5	<b>43.3</b>	BLN3846TT	47.0	43.0	43.7	<b>44.6</b>	CI06009	44.8	37.7	38.5	<b>40.4</b>
HYOLA 75	44.6	38.8	39.6	<b>41.0</b>	BLN3847TT	44.4	37.8	39.9	<b>40.7</b>	CI06010	46.0	37.5	42.3	<b>42.0</b>
SKIPTON	47.1	42.8	42.7	<b>44.2</b>	BLN3848TT	44.7	39.2	40.2	<b>41.4</b>	CI06011	45.5	36.6	37.0	<b>39.7</b>
					BLN3849TT	46.2	41.0	40.5	<b>42.6</b>	ROCKETCL	45.5	39.4	41.8	<b>42.2</b>
					BRA VOTT	43.7	37.8	39.8	<b>40.4</b>	SURPASS603CL	48.0	*	*	<b>48.0</b>
					SARDI618TT	45.4	39.7	40.4	<b>41.8</b>	WARRIORCL	46.0	39.0	40.8	<b>41.9</b>
					SARDI619TT	45.6	40.3	40.1	<b>42.0</b>					
					SARDI620TT	45.3	41.0	39.9	<b>42.1</b>					
					SARDI621TT	45.2	40.1	40.2	<b>41.8</b>					
					SARDI622TT	45.1	39.5	41.5	<b>42.0</b>					
					SARDI623TT	44.1	39.4	38.9	<b>40.8</b>					
					SARDI624TT	46.5	38.6	40.2	<b>41.8</b>					
					SARDI625TT	45.8	39.4	40.1	<b>41.8</b>					
					THUNDERTT	44.2	38.5	40.9	<b>41.2</b>					
					TORNADOTT	45.3	39.2	40.8	<b>41.8</b>					

K = Katanning - WA, Ta = Tamworth - NSW, Tu = Turretfield - SA

**Protein Content for 2006 Early Canola Breeding Trials**

**Table 13: Percentage protein content for 2006 early canola breeding trials (in oil-free meal at 10 % moisture)**

S2 Early Conventional Trials						S2 Early Triazine Trials						S2 Clearfield Trials					
Variety	B	H	L	W	Mean	Variety	B	H	L	M	Mean	Variety	B	H	L	M	Mean
AG-OUTBACK	*	*	*	43.7	<b>43.7</b>	ATR507	44.9	44.6	43.5	42.7	<b>43.9</b>	44C73	44.4	44.0	43.5	46.6	<b>44.6</b>
AV-JADE	48.1	47.0	45.9	45.8	<b>46.7</b>	ATR510	47.5	46.0	44.8	45.5	<b>45.9</b>	45Y77	46.5	45.5	45.6	45.2	<b>45.7</b>
AV-OPAL	48.5	48.1	46.5	46.9	<b>47.5</b>	ATR511	46.3	45.7	44.3	44.1	<b>45.1</b>	46C76	*	*	*	43.7	<b>43.7</b>
BLN2026*SL902	47.0	47.3	46.4	43.4	<b>46.0</b>	ATR512	43.8	46.2	46.0	45.1	<b>45.3</b>	BLN3852CL	46.0	46.0	46.8	45.0	<b>46.0</b>
BLN3224-04W1	47.5	48.7	47.2	44.1	<b>46.9</b>	ATR513	47.1	45.5	44.3	44.8	<b>45.4</b>	BLN3853CL	48.7	46.5	46.5	44.5	<b>46.5</b>
BLN3346-04M8	44.7	45.2	43.9	42.9	<b>44.2</b>	ATR514	46.6	45.6	44.4	43.3	<b>45.0</b>	BLN3854CL	45.6	44.6	44.8	44.1	<b>44.8</b>
BLN3868	47.6	47.9	46.2	45.9	<b>46.9</b>	ATR-BANJO	45.5	46.6	46.3	45.6	<b>46.0</b>	BLN3855CL	46.8	45.0	45.5	45.4	<b>45.7</b>
BLN3869	44.5	46.0	44.3	42.9	<b>44.4</b>	ATR-STUBBY	44.2	44.1	42.5	41.9	<b>43.2</b>	BLN3856CL	46.2	44.5	44.7	43.7	<b>44.8</b>
BLN3870	45.0	46.7	45.4	42.9	<b>45.0</b>	BLN3356TT-04M3	47.1	48.7	46.9	44.8	<b>46.9</b>	BLN3857CL	45.8	45.3	45.4	43.7	<b>45.1</b>
BLN3871	49.5	48.0	47.0	45.8	<b>47.6</b>	BLN3835TT	47.2	46.1	45.7	45.2	<b>46.0</b>	BLN3858CL	46.0	45.0	45.2	43.8	<b>45.0</b>
BLN3872	45.6	46.6	46.3	42.2	<b>45.2</b>	BLN3836TT	46.4	45.6	44.0	44.1	<b>45.0</b>	BLN3859CL	46.2	45.4	45.3	44.9	<b>45.5</b>
BLN3873	46.2	45.2	45.0	43.7	<b>45.0</b>	BLN3837TT	46.8	46.6	44.7	44.0	<b>45.5</b>	WARRIORCL	46.9	46.3	47.0	44.2	<b>46.1</b>
BLN3874	45.8	44.6	45.0	43.2	<b>44.6</b>	BLN3838TT	45.2	47.0	45.5	44.8	<b>45.6</b>						
BLN3875	46.2	45.3	44.6	45.1	<b>45.3</b>	BLN3839TT	45.6	45.8	44.9	43.6	<b>45.0</b>						
CC05001	47.1	47.3	46.0	45.5	<b>46.5</b>	BLN3840TT	47.0	46.7	45.9	45.6	<b>46.3</b>						
CC05002	44.7	44.7	43.2	43.0	<b>43.9</b>	BLN3841TT	47.2	46.4	45.6	45.3	<b>46.1</b>						
CC05004	45.8	45.8	44.8	44.2	<b>45.2</b>	BLN3842TT	46.5	46.7	45.9	45.8	<b>46.2</b>						
CC05006	46.7	45.8	45.2	44.5	<b>45.6</b>	BRAVOTT	47.0	47.1	45.9	45.1	<b>46.3</b>						
CC05015	46.8	46.6	45.0	44.5	<b>45.7</b>	SARDI609TT	46.3	47.4	45.9	44.8	<b>46.1</b>						
CC05016	48.0	47.4	45.7	46.5	<b>46.9</b>	SARDI610TT	46.8	*	45.3	*	<b>46.0</b>						
CC05018	44.9	45.4	43.8	43.3	<b>44.4</b>	SARDI611TT	46.6	46.4	45.1	45.2	<b>45.8</b>						
RT008-04M3	47.1	47.4	46.1	41.5	<b>45.5</b>	SARDI612TT	47.1	47.0	46.0	45.7	<b>46.4</b>						
SARDI601	48.9	48.7	48.2	46.0	<b>48.0</b>	SARDI613TT	46.0	45.2	44.7	43.9	<b>44.9</b>						
SARDI602	46.7	47.9	46.2	42.3	<b>45.8</b>	SARDI614TT	46.6	46.7	45.6	43.9	<b>45.7</b>						
SARDI603	47.5	46.7	46.1	42.7	<b>45.7</b>	SARDI615TT	46.4	48.0	46.4	44.7	<b>46.4</b>						
SARDI604	47.3	47.4	46.3	44.0	<b>46.2</b>	SARDI616TT	46.8	47.9	45.9	45.3	<b>46.5</b>						
SARDI605	48.5	47.1	45.9	47.1	<b>47.1</b>	SARDI617TT	46.4	47.8	47.2	45.5	<b>46.7</b>						
SARDI606	47.8	47.9	46.3	47.4	<b>47.3</b>	TORNADOTT	46.9	46.3	45.1	45.2	<b>45.9</b>						
SARDI607	46.9	47.5	45.7	44.9	<b>46.3</b>												
SARDI608	48.1	47.0	46.2	46.5	<b>46.9</b>												

B = Bellata - NSW, H = Horsham - Vic, L = Lameroo - SA, W = Wongan Hills - WA, M = Merredin - WA

### *Protein Content for 2006 Mid Canola Breeding Trials*

**Table 14: Percentage protein content for 2006 mid canola breeding trials (in oil-free meal at 10 % moisture)**

S2 Mid Conventional Trials					S2 Mid Triazine Trials					S2 Mid Clearfield Trials				
Variety	K	Ta	Tu	Mean	Variety	K	Ta	Tu	Mean	Variety	K	Ta	Tu	Mean
AV-JADE	39.4	46.5	45.8	<b>43.9</b>	ATR517	38.9	44.8	44.7	<b>42.8</b>	44C73	37.3	*	*	<b>37.3</b>
BLN3876	38.6	47.4	46.7	<b>44.2</b>	ATR518	37.7	44.9	44.4	<b>42.4</b>	46C76	37.3	46.9	43.5	<b>42.6</b>
BLN3877	39.5	47.3	47.2	<b>44.6</b>	ATR519	37.7	43.4	44.1	<b>41.7</b>	BLN3642CL-MO502	*	*	44.8	<b>44.8</b>
BLN3878	40.9	47.3	47.6	<b>45.3</b>	ATR520	38.4	43.3	43.7	<b>41.8</b>	BLN3860CL	38.5	48.9	47.9	<b>45.1</b>
BLN3879	38.8	46.0	44.9	<b>43.2</b>	ATR523	39.0	45.2	46.0	<b>43.4</b>	BLN3861CL	39.3	46.9	45.6	<b>43.9</b>
BLN3880	37.0	44.7	43.8	<b>41.8</b>	ATR524	39.3	45.7	45.7	<b>43.6</b>	BLN3862CL	37.6	45.9	45.1	<b>42.9</b>
BLN3881	36.7	44.4	43.3	<b>41.4</b>	ATR531	39.6	45.1	45.5	<b>43.4</b>	BLN3863CL	39.0	48.2	47.5	<b>44.9</b>
BLN3882	37.1	44.9	45.6	<b>42.5</b>	ATR539	38.3	44.5	44.6	<b>42.5</b>	BLN3864CL	38.4	48.0	46.5	<b>44.3</b>
BLN3883	37.9	45.1	45.2	<b>42.7</b>	ATR-BANJO	40.0	*	42.9	<b>41.5</b>	BLN3865CL	38.8	46.9	44.9	<b>43.5</b>
CC05021	36.1	44.2	43.4	<b>41.2</b>	ATR-SUMMITT	38.2	45.6	45.7	<b>43.2</b>	BLN3866CL	40.5	48.5	46.7	<b>45.2</b>
CC05024	37.4	43.2	44.5	<b>41.7</b>	BLN3357TT-04W6	38.9	45.5	46.3	<b>43.6</b>	BLN3867CL	38.2	47.2	45.3	<b>43.6</b>
CC05031	38.7	45.0	45.8	<b>43.2</b>	BLN3780TT	40.2	46.1	47.3	<b>44.5</b>	CI06005	37.2	45.8	43.7	<b>42.2</b>
CC05032	38.9	45.2	45.8	<b>43.3</b>	BLN3843TT	40.6	47.7	47.6	<b>45.3</b>	CI06006	38.9	46.0	46.4	<b>43.7</b>
CC05040	38.2	43.5	45.5	<b>42.4</b>	BLN3844TT	41.9	47.7	48.7	<b>46.1</b>	CI06007	36.8	47.2	46.0	<b>43.3</b>
CC05051	39.5	45.1	45.7	<b>43.4</b>	BLN3845TT	41.6	46.1	47.7	<b>45.2</b>	CI06008	38.2	45.6	44.4	<b>42.7</b>
CC05055	37.2	45.0	43.7	<b>42.0</b>	BLN3846TT	38.6	45.2	45.8	<b>43.2</b>	CI06009	38.0	47.0	44.9	<b>43.3</b>
HYOLA 75	37.1	44.2	45.5	<b>42.3</b>	BLN3847TT	39.4	48.0	47.1	<b>44.8</b>	CI06010	38.4	46.2	45.0	<b>43.2</b>
SKIPTON	39.6	46.5	46.9	<b>44.4</b>	BLN3848TT	38.8	44.7	45.9	<b>43.1</b>	CI06011	36.8	44.3	41.0	<b>40.7</b>
					BLN3849TT	38.1	45.0	46.3	<b>43.1</b>	ROCKETCL	38.8	47.1	45.6	<b>43.8</b>
					BRA VOTT	37.8	45.0	45.1	<b>42.6</b>	SURPASS603CL	39.9	*	*	<b>39.9</b>
					SARDI618TT	39.1	45.9	47.1	<b>44.1</b>	WARRIORCL	38.5	47.1	45.9	<b>43.8</b>
					SARDI619TT	39.8	47.2	46.8	<b>44.6</b>					
					SARDI620TT	38.7	45.3	45.3	<b>43.1</b>					
					SARDI621TT	39.9	47.0	46.6	<b>44.5</b>					
					SARDI622TT	40.9	46.6	46.7	<b>44.7</b>					
					SARDI623TT	40.7	45.6	46.5	<b>44.3</b>					
					SARDI624TT	38.3	46.3	46.7	<b>43.8</b>					
					SARDI625TT	39.4	47.4	48.5	<b>45.1</b>					
					THUNDERTT	39.5	45.0	46.3	<b>43.6</b>					
					TORNADOTT	40.1	45.6	46.2	<b>44.0</b>					

K = Katanning - WA, Ta = Tamworth - NSW, Tu = Turretfield - SA

## Glucosinolate Concentration for 2006 Early Canola Breeding Trials

Table 15: Glucosinolate concentration for 2006 early canola breeding trials ( $\mu\text{moles/g}$  in whole seed at 6 % moisture)

S2 Early Conventional Trials						S2 Early Triazine Trials						S2 Clearfield Trials					
Variety	B	H	L	W	Mean	Variety	B	H	L	M	Mean	Variety	B	H	L	M	Mean
AG-OUTBACK	*	*	*	9	9	ATR507	12	8	5	7	8	44C73	10	9	7	9	9
AV-JADE	12	10	6	7	9	ATR510	15	12	9	11	12	45Y77	12	11	8	8	10
AV-OPAL	9	8	6	10	8	ATR511	11	11	12	10	11	46C76	*	*	*	10	10
BLN2026*SL902	12	9	4	9	8	ATR512	13	6	3	9	8	BLN3852CL	12	6	7	10	9
BLN3224-04W1	13	9	12	8	10	ATR513	17	18	15	13	16	BLN3853CL	11	7	5	8	8
BLN3346-04M8	10	4	7	3	6	ATR514	14	13	11	12	13	BLN3854CL	8	6	8	8	7
BLN3868	12	1	8	7	7	ATR-BANJO	13	13	11	12	12	BLN3855CL	13	9	6	9	9
BLN3869	12	8	8	4	8	ATR-STUBBY	14	15	13	13	14	BLN3856CL	12	4	4	9	7
BLN3870	13	10	6	7	9	BLN3356TT-04M3	12	7	7	8	8	BLN3857CL	11	8	7	7	8
BLN3871	10	3	6	6	6	BLN3835TT	12	8	9	10	10	BLN3858CL	11	6	6	8	8
BLN3872	13	15	9	9	12	BLN3836TT	13	8	8	9	9	BLN3859CL	10	4	4	10	7
BLN3873	11	9	4	5	7	BLN3837TT	12	7	6	8	8	WARRIORCL	14	13	10	8	11
BLN3874	10	5	7	4	6	BLN3838TT	12	7	7	10	9						
BLN3875	12	6	6	3	7	BLN3839TT	9	7	8	7	8						
CC05001	11	10	7	8	9	BLN3840TT	13	9	10	10	11						
CC05002	12	9	7	4	8	BLN3841TT	13	9	9	11	11						
CC05004	10	8	5	7	7	BLN3842TT	14	9	9	9	11						
CC05006	11	9	10	5	9	BRAVOTT	14	16	14	14	14						
CC05015	10	12	9	7	9	SARDI609TT	12	6	6	9	8						
CC05016	12	6	7	6	8	SARDI610TT	11	*	10	*	11						
CC05018	12	13	10	10	11	SARDI611TT	10	8	10	8	9						
RT008-04M3	11	5	6	5	7	SARDI612TT	11	6	6	8	8						
SARDI601	11	8	6	8	8	SARDI613TT	15	10	5	9	10						
SARDI602	10	8	7	4	7	SARDI614TT	9	5	3	6	6						
SARDI603	11	7	6	7	8	SARDI615TT	12	6	6	8	8						
SARDI604	13	7	5	9	8	SARDI616TT	12	7	5	8	8						
SARDI605	11	9	8	6	9	SARDI617TT	14	9	9	9	10						
SARDI606	10	12	5	5	8	TORNADOTT	10	5	5	6	7						
SARDI607	9	9	8	9	9												
SARDI608	12	9	5	5	8												

B = Bellata - NSW, H = Horsham - Vic, L = Lameroo - SA, W = Wongan Hills - WA, M = Merredin - WA

## Glucosinolate Concentration for 2006 Mid Canola Breeding Trials

Table 16: Glucosinolate concentration for 2006 mid canola breeding trials ( $\mu\text{moles/g}$  in whole seed at 6 % moisture)

S2 Mid Conventional Trials					S2 Mid Triazine Trials					S2 Mid Clearfield Trials				
Variety	K	Ta	Tu	Mean	Variety	K	Ta	Tu	Mean	Variety	K	Ta	Tu	Mean
AV-JADE	7	8	6	7	ATR517	9	14	9	11	44C73	6	*	*	6
BLN3876	11	6	4	7	ATR518	10	13	9	11	46C76	8	14	8	10
BLN3877	10	8	5	7	ATR519	10	15	11	12	BLN3642CL-MO502	*	*	4	4
BLN3878	10	9	7	8	ATR520	12	16	9	13	BLN3860CL	7	11	1	6
BLN3879	9	7	3	6	ATR523	9	15	10	11	BLN3861CL	5	14	2	7
BLN3880	9	6	5	6	ATR524	9	15	11	11	BLN3862CL	5	12	4	7
BLN3881	10	5	5	7	ATR531	7	10	5	7	BLN3863CL	6	12	3	7
BLN3882	9	6	5	7	ATR539	8	11	6	8	BLN3864CL	7	11	2	7
BLN3883	8	8	7	8	ATR-BANJO	8	*	11	10	BLN3865CL	6	11	0	5
CC05021	5	7	5	6	ATR-SUMMITT	7	6	6	7	BLN3866CL	7	11	2	6
CC05024	9	6	3	6	BLN3357TT-04W6	9	10	9	9	BLN3867CL	7	14	3	8
CC05031	7	6	4	6	BLN3780TT	6	8	5	6	CI06005	6	16	7	10
CC05032	7	4	7	6	BLN3843TT	7	6	6	6	CI06006	10	32	9	17
CC05040	7	6	6	6	BLN3844TT	7	7	6	6	CI06007	9	12	4	8
CC05051	8	8	4	7	BLN3845TT	6	7	2	5	CI06008	8	12	3	8
CC05055	9	6	4	6	BLN3846TT	7	7	5	6	CI06009	9	18	9	12
HYOLA75	8	6	5	6	BLN3847TT	9	8	11	9	CI06010	7	16	1	8
SKIPTON	9	10	8	9	BLN3848TT	7	10	8	8	CI06011	9	16	10	12
					BLN3849TT	7	9	7	8	ROCKETCL	7	11	2	7
					BRAVOTT	10	16	9	11	SURPASS603CL	6	*	*	6
					SARDI618TT	8	8	6	7	WARRIORCL	7	15	5	9
					SARDI619TT	8	7	5	7					
					SARDI620TT	7	7	6	7					
					SARDI621TT	8	5	5	6					
					SARDI622TT	6	6	6	6					
					SARDI623TT	9	12	10	10					
					SARDI624TT	9	10	9	9					
					SARDI625TT	10	14	9	11					
					THUNDERTT	7	7	4	6					
					TORNADOTT	6	6	4	6					

K = Katanning - WA, Ta = Tamworth - NSW, Tu = Turretfield - SA

## 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. Ground seed is extracted on a Goldfische apparatus 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  $\mu$ moles glucosinolates/gram whole seed at 6 % moisture.

### ***Fatty Acid Composition:***

Fatty acid composition involves methylation of fatty acids with sodium methoxide, AOF 4-2.18: “Preparation of fatty acid methyl esters”. 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 chondrometer and reported as both pounds/bushel and kilograms/hectolitre.



