



Department of
Primary Industries

Quality of Australian canola

2018–19



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Department of
Primary Industries

Quality of Australian canola 2018–2019

KG Graham

NSW Department of Primary Industries
Wagga Wagga

DW McCaffery

NSW Department of Primary Industries
Orange

LM Groves

NSW Department of Primary Industries
Wagga Wagga



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Cover

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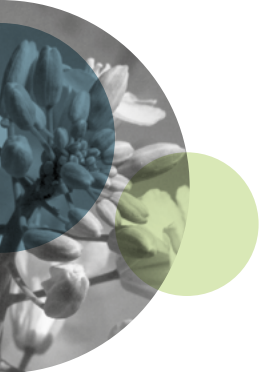
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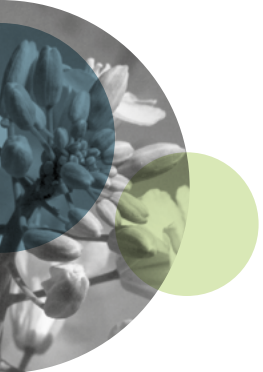
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Introduction

Sample analysis

Canola samples representing the 2018 harvest were received from GrainCorp Operations Limited (New South Wales and Victoria), Viterro Pty Ltd (South Australia) and CBH Group (Western Australia). These samples represent the seed collected at each receival point and have been taken to cumulatively represent the Australian harvest. Samples were received per site from New South Wales, South Australia and Victoria. Samples representing each of the four port zones were received from Western Australia. The NSW Department of Primary Industries (DPI) Oil Testing Service (OTS) has no control over sample collection and all data reported derives from analysing the provided samples.

All averages reported are weighted, based on the tonnage represented.

Each sample was analysed for oil, protein and glucosinolate content; fatty acid profiles and volumetric grain weights according to the standard Australian Oilseeds Federation (AOF) methods outlined in the methods section at the back of this book. The DPI OTS performed all analyses on the samples. Oil content is reported at 6% moisture in whole seed, protein content is reported in oil-free meal at 10% moisture, and glucosinolate content is reported in oil-free meal at 10% moisture.

The DPI OTS at Wagga Wagga prepared composite samples to determine chlorophyll content. Composite samples were prepared to represent GrainCorp's northern and southern New South Wales, and Victorian regions and Viterro's Adelaide, Central, Eastern and Western regions in South Australia. Western Australia's four port zone samples were analysed as received from CBH. Composite samples were created on a per weight basis to proportionally represent each site.

Units of measurement

Unless otherwise stated, units of measurement are as follows:

Oil content – % oil, whole seed at 6% moisture

Protein content – % protein, oil-free meal at 10% moisture

Glucosinolate content – $\mu\text{moles/g}$, oil-free meal at 10% moisture

Oleic acid (18:1) content – % of total fatty acids

Linoleic acid (18:2) content – % of total fatty acids

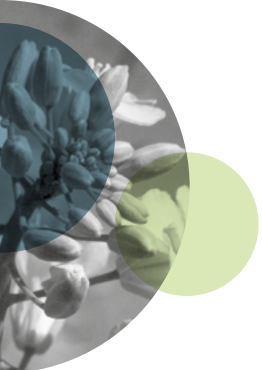
Linolenic acid (18:3) content – % of total fatty acids

Saturated fatty acids content – % of total fatty acids

Monounsaturated fatty acids content – % of total fatty acids

Polyunsaturated fatty acids content – % of total fatty acids

Chlorophyll content – mg/kg in whole seed, as received



Weather and production review

Growing conditions in 2018 were similar, but generally drier than 2017. Rainfall for the first half of the season (Figure 1) was decile 1–3 (well below average to below average) for most of south-eastern Australia, which was similar to the start of 2017. The seasonal break was late for many regions, arriving mid–late May, and into June in some areas. Western Australia rainfall was similar to south-eastern Australia, but received more rain in 2018 than 2017. From July through to the end of September, rainfall was decile 1 (lowest 10% of years) for most of NSW, decile 2–5 for Victoria and decile 1–3 for most of South Australia (Figure 2), and generally lower than 2017. Rainfall in Western Australia for the same period was mostly decile 2–6 and better than the eastern states. Severe rainfall deficiencies through spring, in combination with severe frosts in late August and above average temperatures, reduced yield potential.

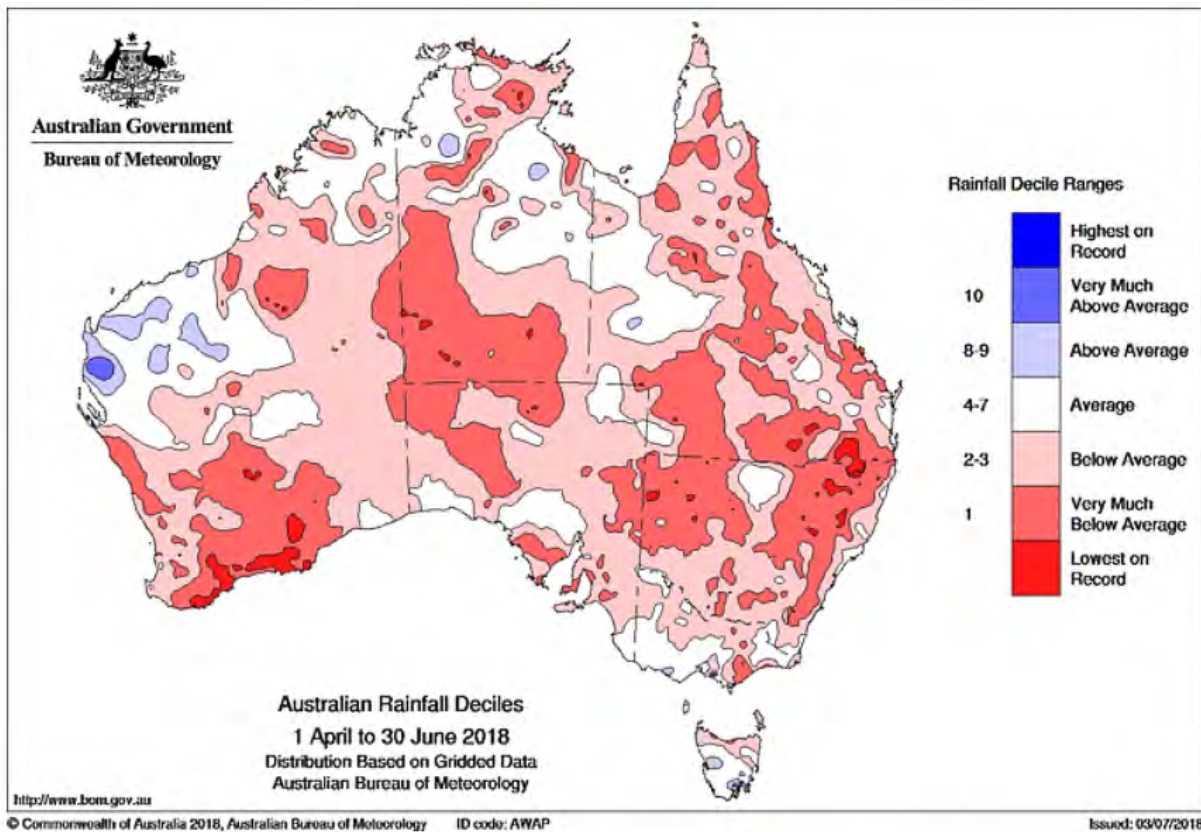


Figure 1. Australian rainfall deciles 1 April to 30 June 2018. (Source: Bureau of Meteorology)

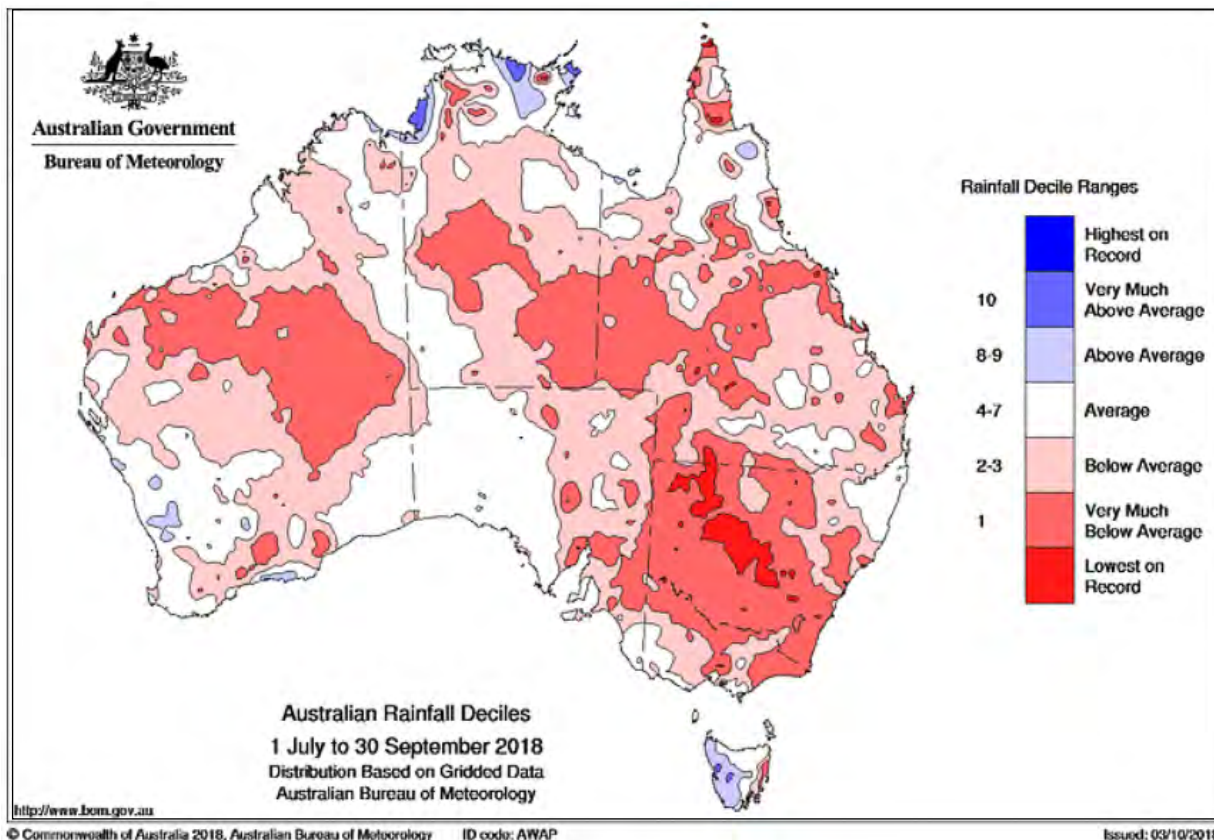


Figure 2. Australian rainfall deciles 1 July to 30 September 2018. (Source: Bureau of Meteorology)

New South Wales

The area sown to canola fell by 31% from the 2017 crop. The majority of the decline was west of the Newell Highway, especially in central NSW, and most of the north. Only parts of the South West Slopes and eastern Riverina had deep subsoil moisture reserves, stored from 100–150 mm rain in early December 2017. Following the patchy seasonal break, establishment was also patchy and staggered over 4–5 weeks. As a result, growth was well behind the usual growth by the end of July, exacerbated by low soil moisture and severe frosts.

A very dry winter and spring followed a similar pattern to 2017. Decisions on best options for crops were being made from late July onwards; with high livestock prices some growers were able to recover some costs by grazing crops – poorer crops were spray fallowed. Severe frosts damaged crops on 29–30 August (–3 to –7 °C) and again on 17 September (–2 to –4 °C), coincidentally, the same major frost days as 2017. The severe drought in NSW made decisions on grazing or cutting crops for silage or hay much less risky and in some cases the most profitable option.

An estimated 57% of the sown crop area was abandoned, grazed or cut for fodder. Crop disease was generally low due to the dry and warm season. Late season pest pressure was high and the majority of harvested crops were sprayed for aphids and/or heliothis.

Oil contents were surprisingly good considering the very dry season, but slightly lower than 2017.

Final estimated production for NSW was 200,000 t from an estimated 190,000 ha for an average yield of 1.05 t/ha.

Victoria

The canola area was down 8% in 2018 compared with 2017. Seasonal conditions in Victoria were very similar to NSW except in the south west, which had a rainfall decile of 4–7 (April–September). Multiple light rain falls of 5–10 mm through May and early June resulted in staggered and patchy establishment in many areas, similar to NSW. Crops were well behind in growth by the end of July, with little subsoil moisture reserves for the spring. Similar to NSW, frosts affected crops in late August and again in mid-September.

Large areas of crop in the northern Mallee failed, whilst parts of the northern Wimmera and the north and north east were cut for hay and silage. An estimated 28% of the sown crop area was not harvested. Most of the harvest tonnes came from the southern Wimmera and the South West.

The final estimated production for Victoria was 400,000 t from an estimated 300,000 ha for an average yield of 1.33 t/ha.

South Australia

The area sown to canola was 8% lower than in 2017. The seasonal break in early May was earlier and more general than in NSW and Victoria. The earlier break aided earlier crop establishment, but conditions turned dry and were similar to southern NSW and northern Victoria for the first half of the season. The exception was the Lower South East and the Lower Eyre Peninsula that received average early season rainfall. By July moisture stress was evident on the Upper Eyre Peninsula and across the Mallee regions, with moisture reserves on the Yorke Peninsula and the Mid-North generally low.

Rainfall was average to well above average through July and August in the Lower South East and the Lower Eyre Peninsula that set up crop yield potential in those regions, as September was very dry.

An estimated 17% of the sown crop area failed, was grazed or cut for hay in the Mallee, Upper Eyre Peninsula and the Mid-North.

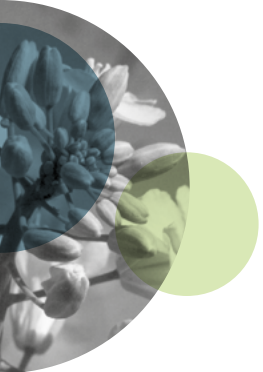
The final estimated production for South Australia was 260,000 t from an estimated 200,000 ha for an average yield of 1.30 t/ha.

Western Australia

Sown canola area declined by 6% to 1.30 million hectares in 2018. The opening rains did not arrive until late May and as a result crops were slow to develop in the cooler weather. Wind damage and sand blasting damaged establishing crops on around 100,000 ha that were subsequently sown over with barley. Wind otherwise thinned plant stands in crops in the Midlands, and the Albany and Esperance port zones.

Rainfall was generally below average through to the end of June, but highly variable between regions and very dry in the Albany and Esperance port zones. Rainfall picked up in July and August, consolidating yield potential, but was then followed by a dry September. Further rain in early October and a spring without any major heat events and generally mild temperatures resulted in close to average yields overall, but highly variable and below average in the Albany and Esperance port zones. Heliothis, aphids and diamondback moth required late control in these port zones.

The final estimated production for Western Australia was 1.45 million tonnes from an estimated 1.20 million hectares for an average yield of 1.21 t/ha.



Yield

Australia produced an estimated 2.31 million tonnes of canola in 2018 from a harvested area of 1.89 million hectares for an average yield of 1.22 t/ha. The average yield ranged from 1.05 t/ha in New South Wales to 1.33 t/ha in Victoria.

The area sown to canola fell by 16% compared with 2017, while production fell by 37%, reflecting the effects of widespread drought and frost damage to crops in eastern Australia. National production is the lowest since the drought-affected 2009 eastern Australia crop. The area sown and harvested, and production, in each state is shown in Table 1.

Table 1. Estimated Australian canola production by state in 2018.

(Source: ABARES Crop Report February 2019; GIWA Crop Report February 2019; industry estimates)

State	Area sown (hectares)	Area harvested (hectares)	Production (tonnes)	Average yield (tonnes/hectare)
New South Wales	440,000	190,000	200,000	1.05
South Australia	240,000	200,000	260,000	1.30
Victoria	415,000	300,000	400,000	1.33
Western Australia	1,300,000	1,200,000	1,450,000	1.21
Australia	2,395,000	1,890,000	2,310,000	1.22

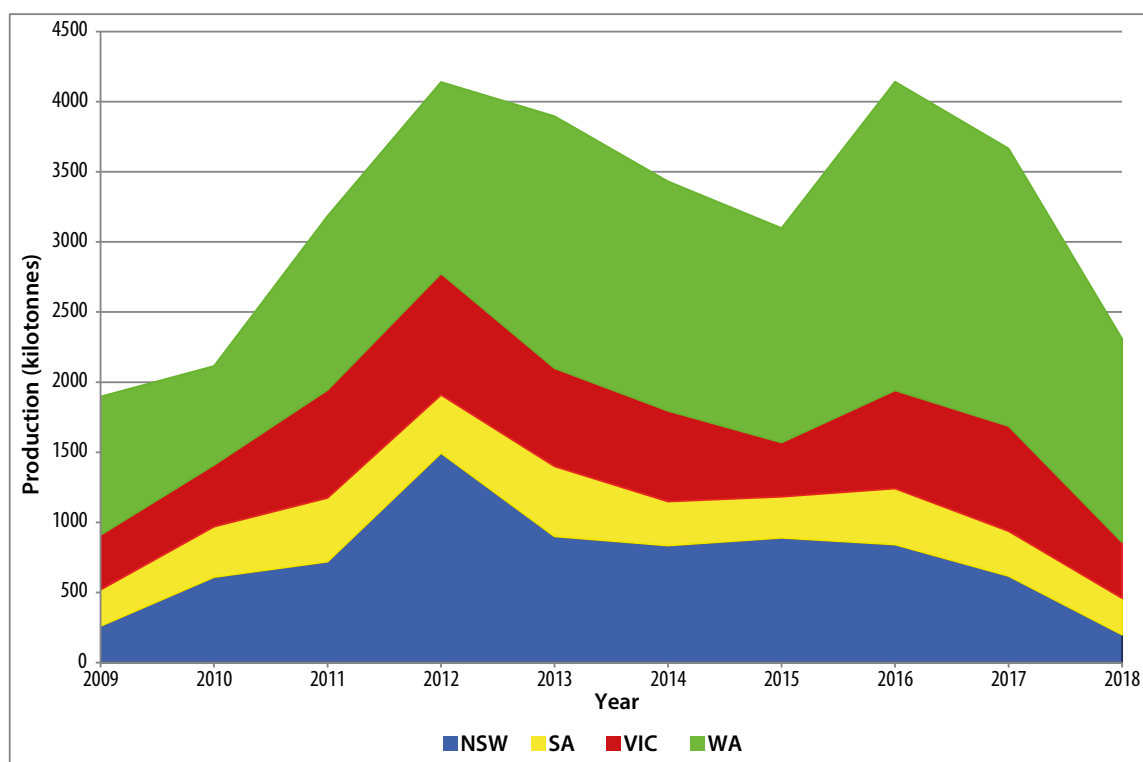
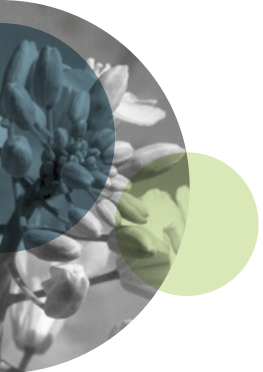


Figure 3. Canola Production in Australia 2009–2018



Australian quality parameter summary

A weighted average of each region and state was calculated based on the tonnages each site and grade represents.

The Australian national weighted average was calculated using the production figures for each state.

Due to tonnages being confidential information, individual site tonnages cannot be reported.

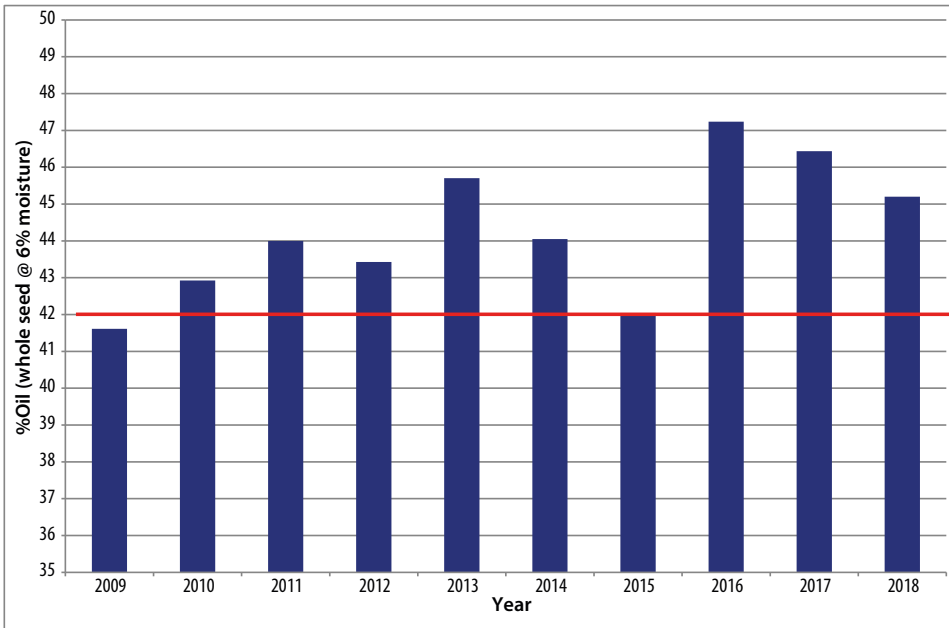
Table 2. Average quality of Australian canola 2018.

Quality parameter	Australian weighted average
Oil content, % in whole seed @ 6% moisture	45.2
Protein content, % in oil-free meal @ 10% moisture	38.2
Glucosinolates, μ moles/g in oil-free meal @ 10% moisture	15
Test weight, kg/hL	67.23
Oleic acid (C18:1), % ¹	61.5
Linoleic acid (C18:2), % ¹	19.8
Linolenic acid (C18:3), % ¹	9.9
Erucic acid (C22:1), % ¹	<0.1
Polyunsaturated fatty acids, % ¹	29.7
Monounsaturated fatty acids, % ¹	63.1
Saturated fatty acids, % ¹	7.2
Iodine value	114.2
Chlorophyll content, mg/kg in whole seed as received	5

¹Fatty acids are reported as a % of total fatty acids.

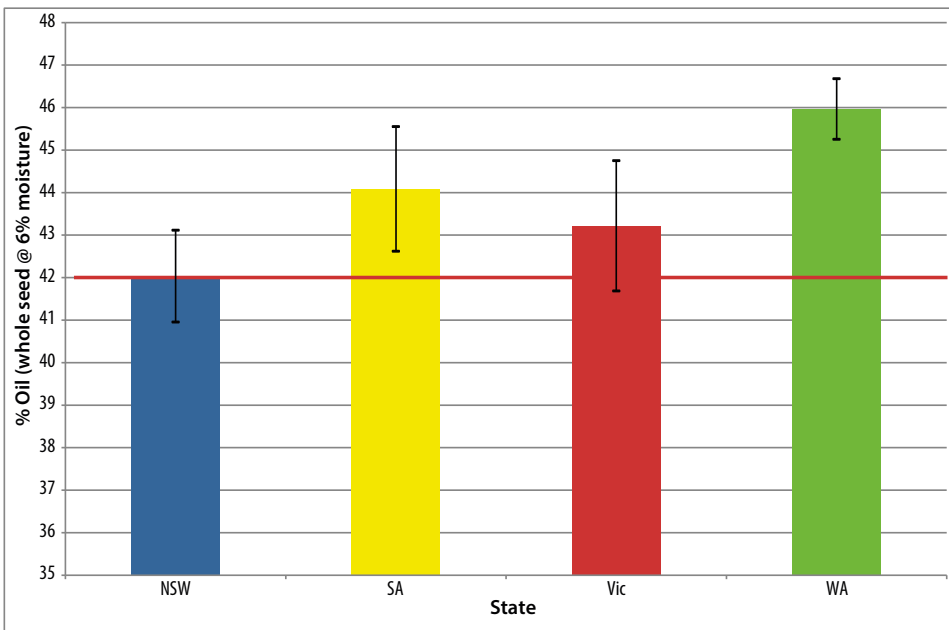
Oil content

The average oil content for the Australian harvest in 2018 was 45.2%. This was 1.2 percentage points lower than the 2017 harvest. The receival site oil content ranged from 40.1% at Beulah in Victoria to 47.5% at Millicent in South Australia. The port zone oil content ranged from 44.8% at Geraldton in Western Australia to 46.6% at Esperance in Western Australia.



2015 average was determined with NSW, SA and Vic results only.

Figure 4. Average Australian oil content 2009–2018.



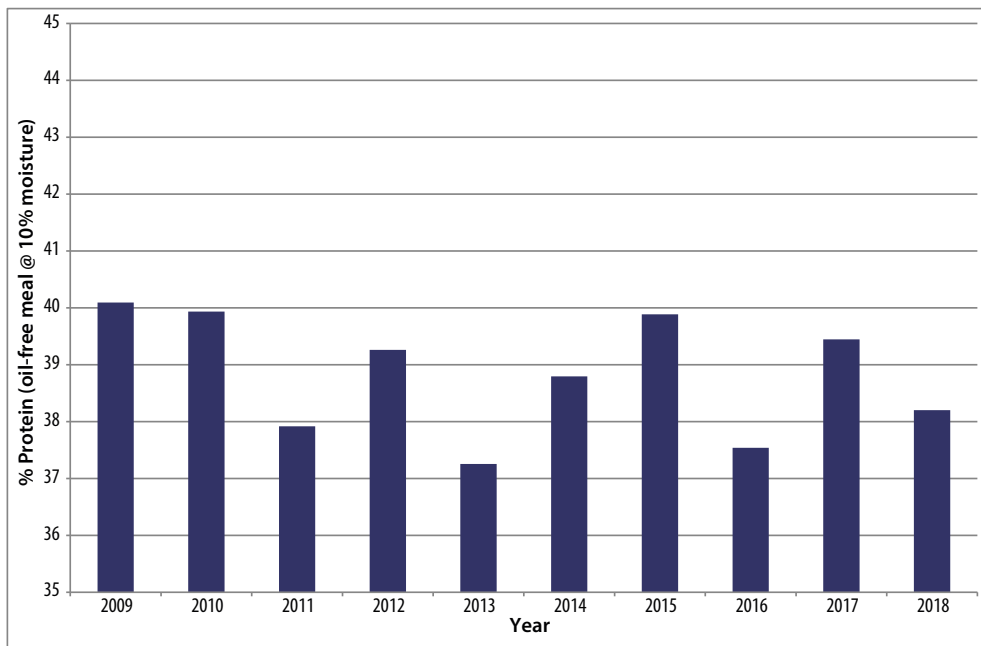
Bars indicate the standard deviation for each state

Red line indicates the AOF base level oil content of 42%.

Figure 5. Average oil content by state 2018.

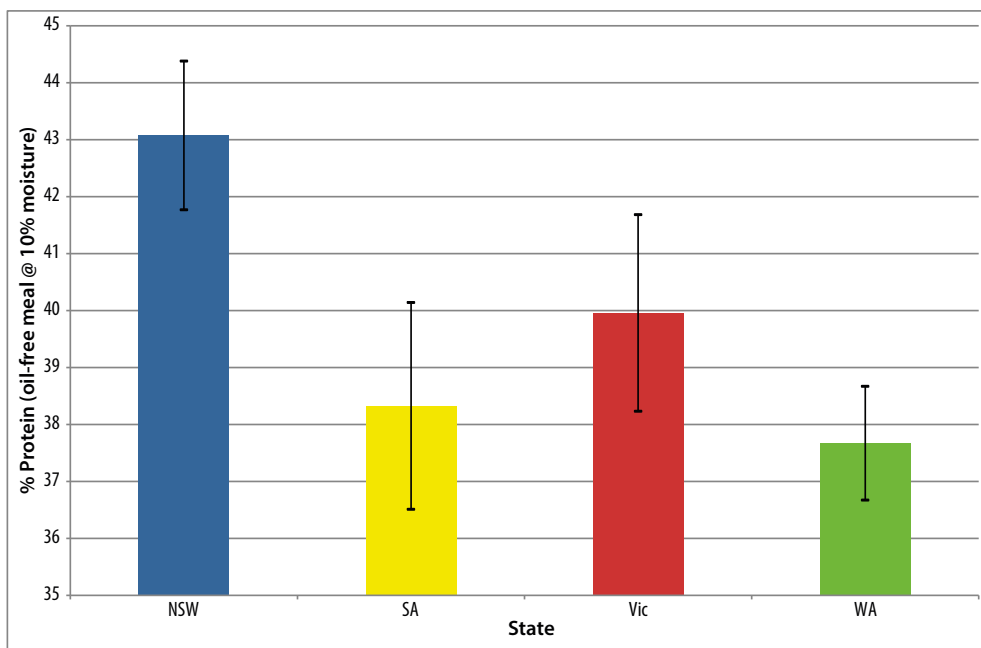
Protein content

The average protein content for the 2018 Australian canola harvest was 38.2% – a decrease of 1.2 percentage points from the 2017 harvest. Protein ranged from 36.2% at Albany in Western Australia to 44.4% at Bribbaree and Moree in New South Wales.



2015 average was determined with NSW, SA & Vic results only.

Figure 6. Average Australian protein content 2009–2018.



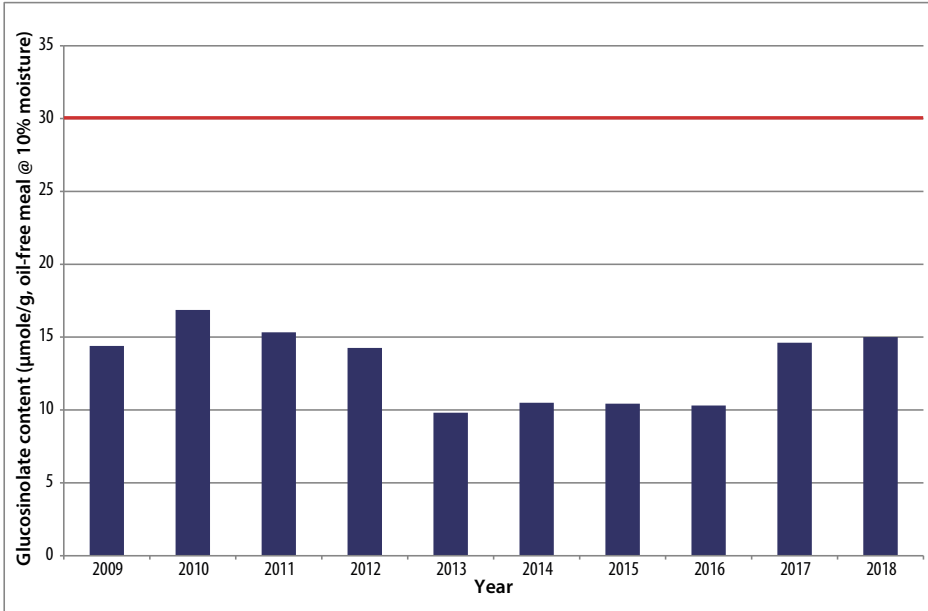
Bars indicate the standard deviation for each state.

Figure 7. Average protein content by state 2018.

Glucosinolate content – meal

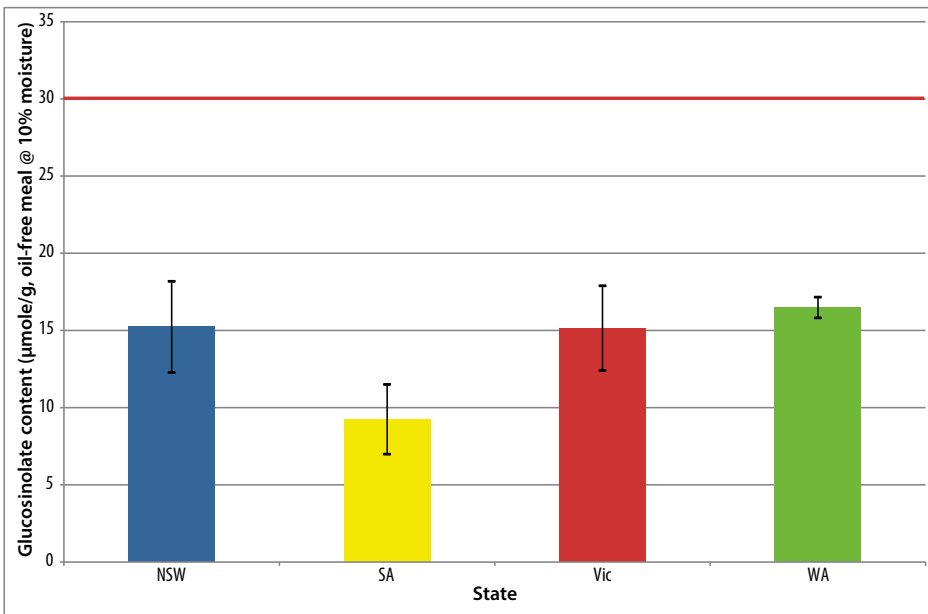
The AOF Trade Standard sets the limit for glucosinolate content at 30 $\mu\text{moles/g}$, oil-free meal. This is the third year glucosinolate content has been reported as $\mu\text{moles/g}$, oil-free meal at 10% moisture to allow comparison with the AOF Trade Standard.

The average glucosinolate content for the Australian harvest in 2018 was 15 $\mu\text{moles/g}$. The receival site glucosinolate content ranged from 4 $\mu\text{moles/g}$ at Millicent in South Australia to 23 $\mu\text{moles/g}$ at Bribbaree in New South Wales.



2014 and 2015 averages were determined with NSW, SA & Vic results only.

Figure 8. Average Australian glucosinolate content in meal 2009–2018.



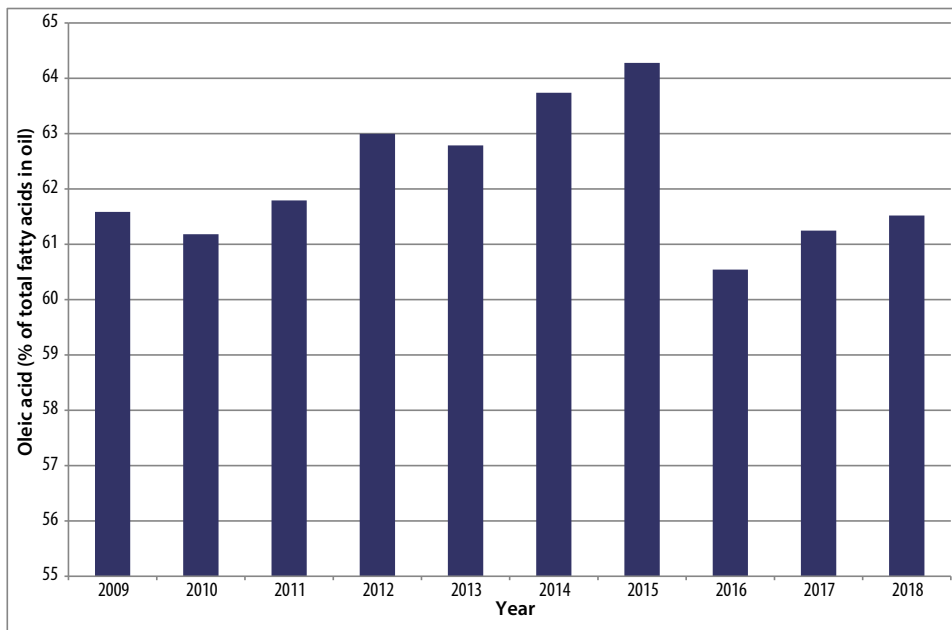
Bars indicate the standard deviation for each state.

Red line indicates the AOF limit of 30 $\mu\text{moles/g}$ in oil-free meal.

Figure 9. Average glucosinolate content in meal by state 2018.

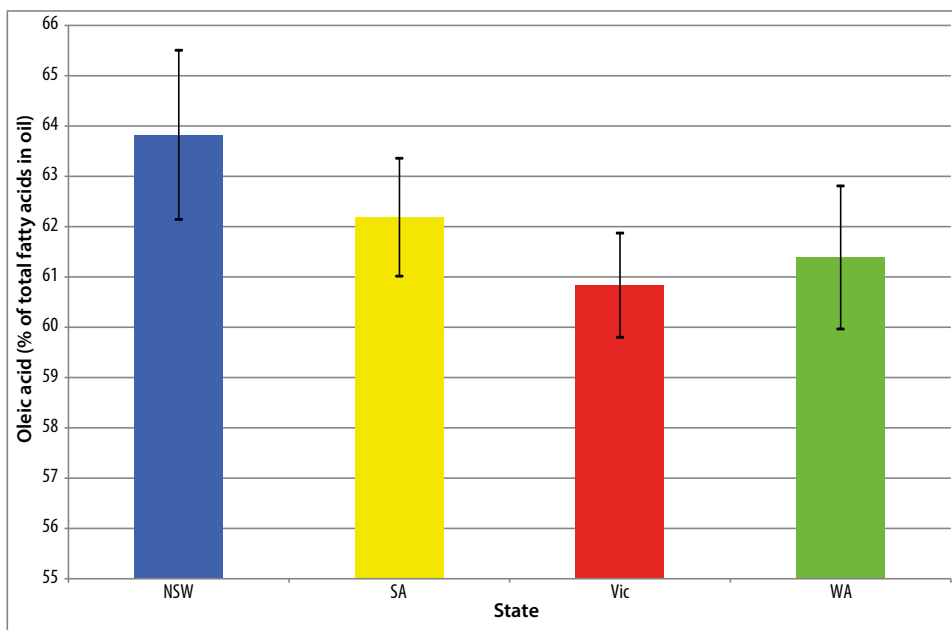
Oleic acid

The average Australian oleic acid (C18:1) content from the 2018 harvest was 61.5%. This was an increase of 0.3 percentage points from the 2017 season. Oleic acid ranged from 59.0% at Berrybank in Victoria to 66.7% at Moree in New South Wales.



2014 and 2015 averages were determined with NSW, SA & Vic results only.

Figure 10. Average Australian percentage of oleic acid in canola oil 2009–2018

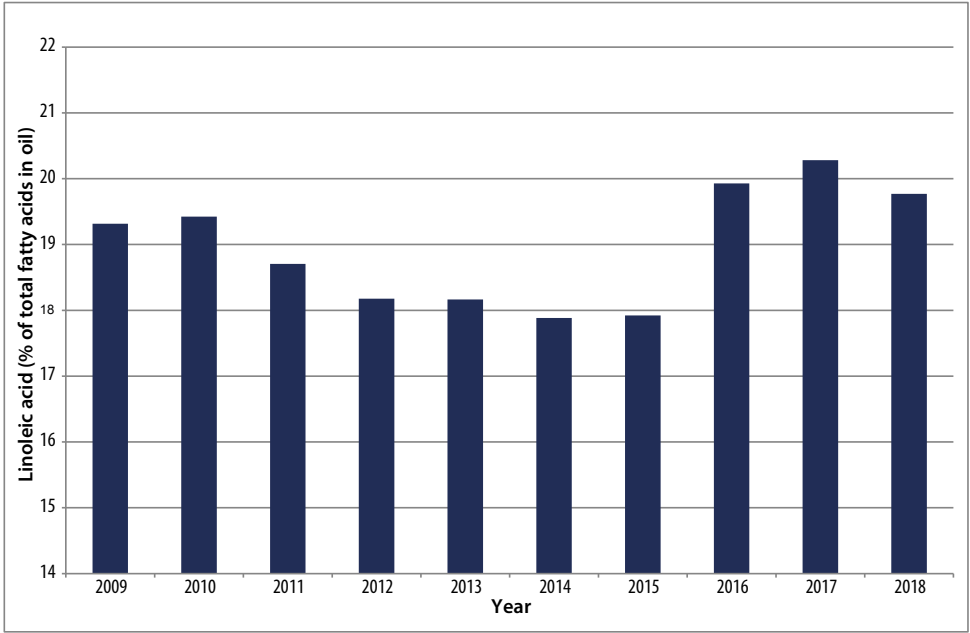


Bars indicate the standard deviation for each state.

Figure 11. Average percentage of oleic acid in canola oil by state 2018.

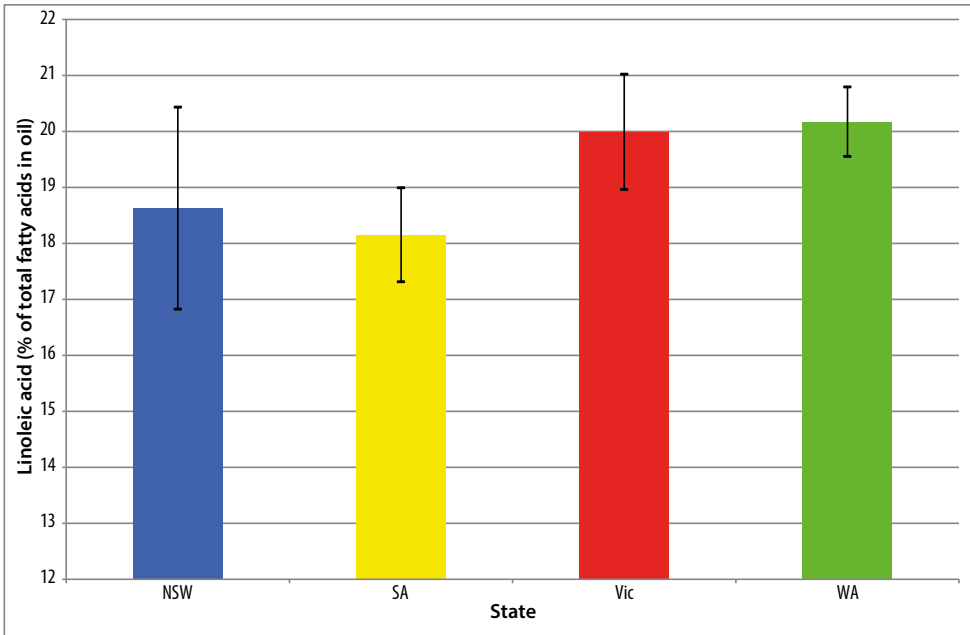
Linoleic acid

The average Australian linoleic acid (C18:2) content from the 2018 harvest was 19.8%. This was a decrease of 0.5 percentage points from the 2017 season. Linoleic acid ranged from 15.3% at Moree in New South Wales to 22.2% at Coolamon in New South Wales.



2014 and 2015 averages were determined with NSW, SA and Vic results only.

Figure 12. Average Australian percentage of linoleic acid in canola oil 2009–2018.

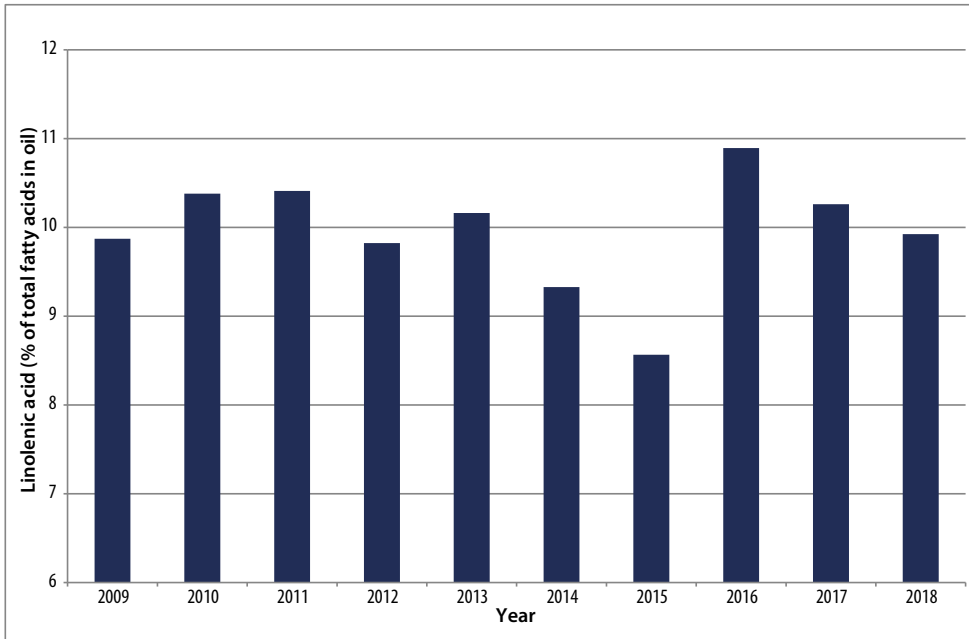


Bars indicate the standard deviation for each state.

Figure 13. Average percentage of linoleic acid in canola oil by state 2018.

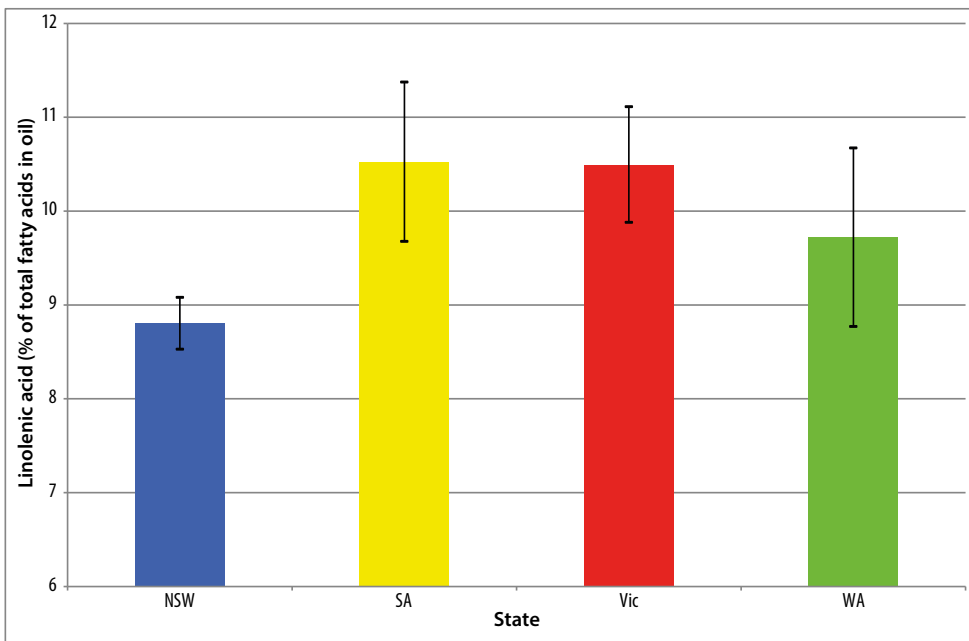
Linolenic acid

The average Australian linolenic acid (C18:3) content from the 2018 harvest was 9.9%. This was a decrease of 0.4 percentage points from the 2017 season. Linolenic acid ranged from 8.1% at Cowra in New South Wales to 13.2% at Millicent in South Australia.



2014 and 2015 averages were determined with NSW, SA & Vic results only.

Figure 14. Average Australian percentage of linolenic acid in canola oil 2009–2018.

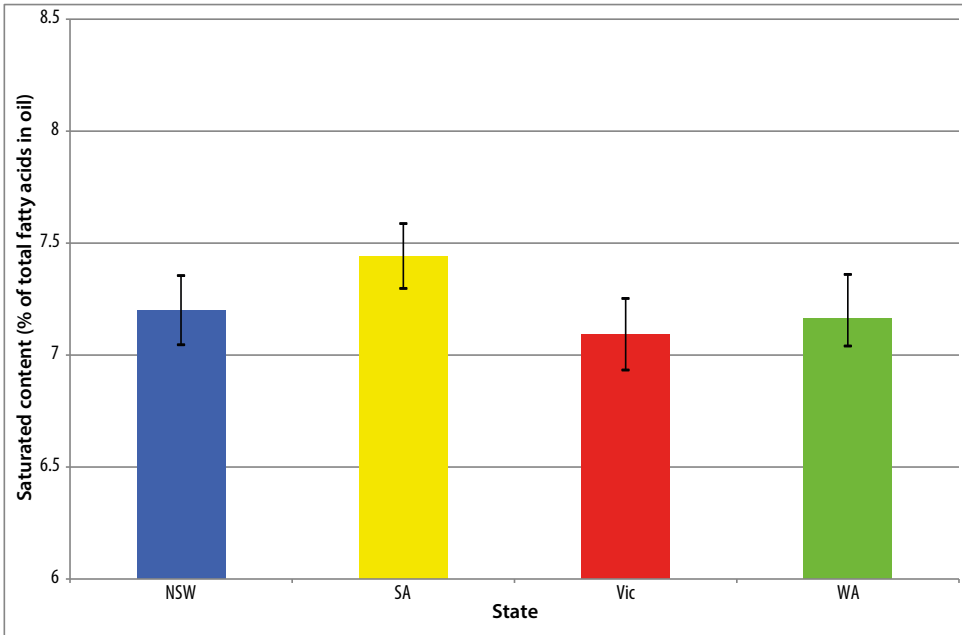


Bars indicate the standard deviation for each state.

Figure 15. Average percentage of linolenic acid in canola oil by state 2018.

Saturated fatty acids

The average Australian saturated fatty acids content from the 2018 harvest was 7.2%. This was an increase of 0.4 percentage points from the 2017 season. Saturated fatty acids ranged from 6.8% at Yarrawonga in Victoria to 7.6% at Bowmans and Cummins in South Australia.

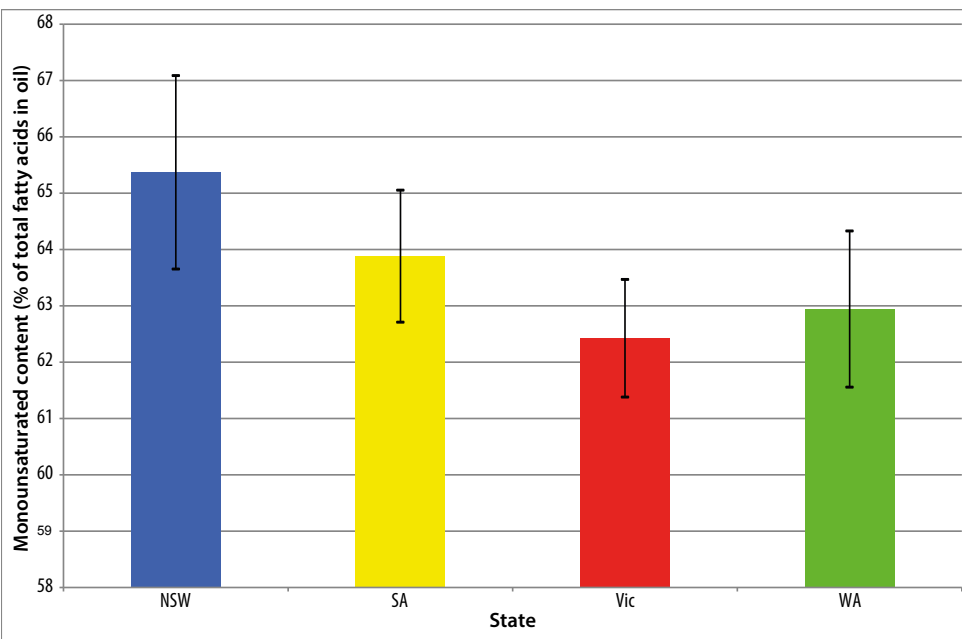


Bars indicate the standard deviation for each state.

Figure 16. Average percentage of saturated fatty acids in canola oil by state 2018.

Monounsaturated fatty acids

The average Australian monounsaturated fatty acids content from the 2018 harvest was 63.1%. This was an increase of 0.4 percentage points from the 2017 harvest. Monounsaturated fatty acids ranged from 60.6% at Berrybank in Victoria to 68.4% at Moree in New South Wales.

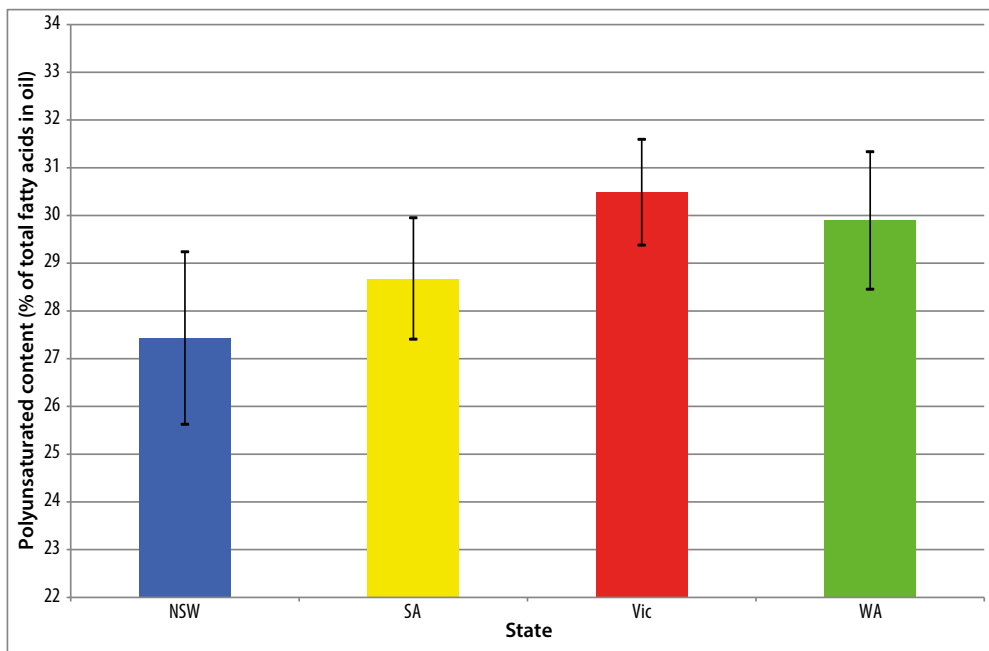


Bars indicate the standard deviation for each state.

Figure 17. Average percentage of monounsaturated fatty acids in canola oil by state 2018.

Polyunsaturated fatty acids

The average Australian polyunsaturated fatty acids content from the 2018 harvest was 29.7%. This was a decrease of 0.8 percentage points from the 2017 harvest. Polyunsaturated fatty acids ranged from 24.4% at Moree in New South Wales to 32.3% at Berrybank in Victoria.

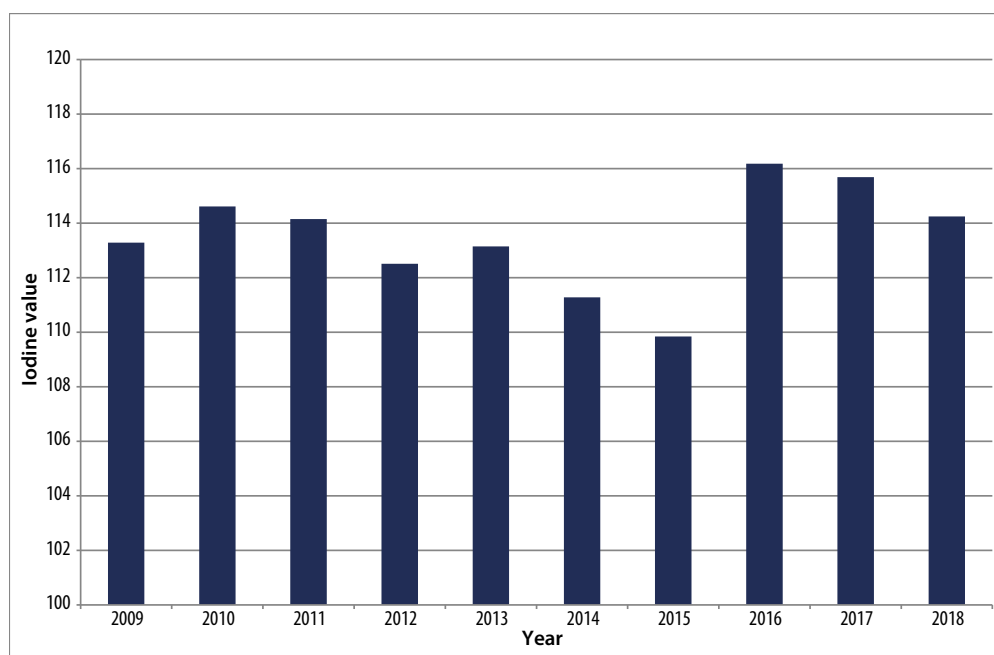


Bars indicate the standard deviation for each state.

Figure 18. Average percentage of polyunsaturated fatty acids in canola oil by state 2018.

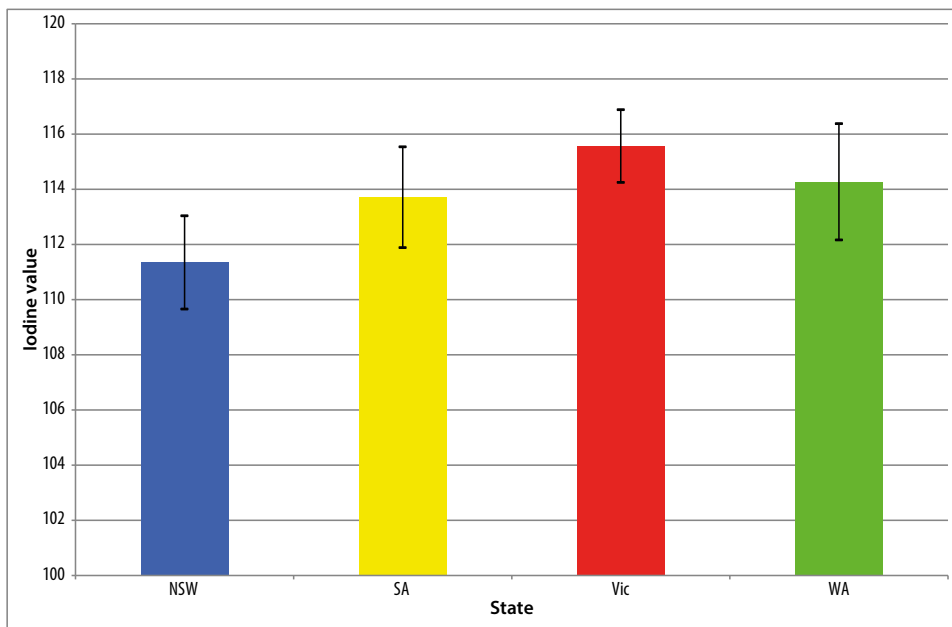
Iodine value

The average Australian iodine value in the oil portion of the seed from the 2018 harvest was 114.2. This was a decrease of 1.5 from the 2017 harvest of 115.7. The iodine value ranged from 108.9 at Moree in New South Wales to 119.2 at Millicent in South Australia.



2014 and 2015 averages were determined with NSW, SA & Vic results only.

Figure 19. Average Australian iodine value in canola oil 2009–2018.



Bars indicate the standard deviation for each state.

Figure 20. Average iodine value in canola oil by state 2018.

Quality data by state

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



Figure 21. 2018–2019 GrainCorp Country Network map of Northern NSW regions. (Source: <http://www.graincorp.com.au>)



Figure 22. 2018–2019 GrainCorp Country Network map of Southern NSW regions. (Source: <http://www.graincorp.com.au>)



Figure 23. 2018–2019 GrainCorp Country Network map of Victorian regions. (Source: <http://www.graincorp.com.au>)



Figure 24. Viterra storage and handling network map. (Source: <http://www.viterra.com.au/wp-content/uploads/2017/07/Map.pdf>)

RECEIVAL SITE MAP

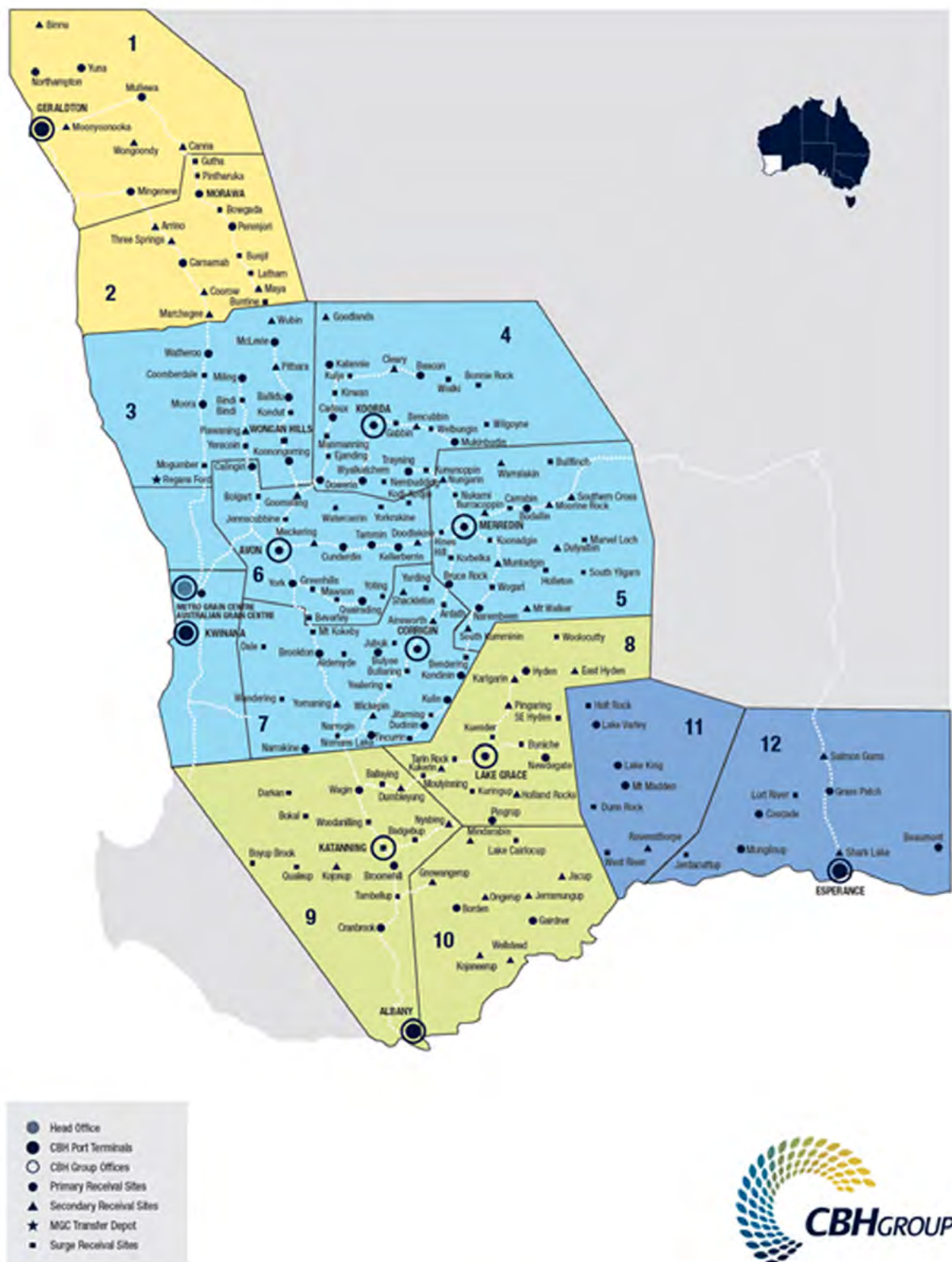


Figure 25. CBH Group receival site map.
 (Source: <https://www.cbh.com.au/~/-/media/files/cbh%20website/documents/growers/growers%20-%20harvest%20information/receival%20site%20map.ashx>)

Table 3. Quality data – New South Wales.

Region/zone/site	Grade	Oil	Protein	Glucosinolates	Test weight
		% ¹	% ²	µmoles/g ³	kg/hL ⁴
Northern NSW					
Moree North					
Moree	CAN	40.7	44.4	15	67.85
Northern NSW weighted average		40.7	44.4	15	67.85
Southern NSW					
Boree Creek					
Boree Creek	CAN	41.2	40.8	19	68.50
Henty West	CAN	43.8	40.9	12	68.00
Milbrulong	CAN	42.5	43.4	15	68.00
Rand	CAN	41.7	41.4	12	67.75
Cunningar					
Cootamundra	CAN	42.6	43.3	17	68.38
Cowra	CAN	43.7	42.7	14	68.00
Cunningar	CAN	42.3	43.1	15	68.25
Greenethorpe	CAN	43.3	42.6	17	68.00
Maimuru	CAN	41.8	44.3	13	68.50
Griffith					
Barellan	CAN	42.2	42.7	16	67.25
Junee					
Coolamon	CAN	43.0	41.9	11	67.88
Temora					
Ardlethan	CAN	41.3	41.8	18	67.50
Bribbaree	CAN	40.4	44.4	23	68.00
Milvale	CAN	40.3	43.4	15	68.00
Temora Sub	CAN	41.1	43.2	13	68.38
Southern NSW weighted average		42.0	43.1	15	68.15
NSW weighted average		42.0	43.1	15	68.15
NSW minimum		40.3	40.8	11	67.25
NSW maximum		43.8	44.4	23	68.50

¹ % in whole seed @ 6% moisture

² % in oil-free meal @ 10% moisture

³ µmoles/g in oil-free meal @ 10% moisture

⁴ kilograms/ hectolitre.

Table 4. Quality data – South Australia.

Region/zone/site	Grade	Oil	Protein	Glucosinolates	Test weight
		% ¹	% ²	µmoles/g ³	kg/hL ⁴
Adelaide					
Port Adelaide	CANO	42.9	39.7	7	67.50
Adelaide weighted average		42.9	39.7	7	67.50
Central					
Bowmans	CANO	43.7	40.3	6	68.25
Gladstone	CANO	41.5	41.4	11	68.33
Port Giles	CANO	45.5	38.4	5	67.50
Roseworthy	CANO	41.9	40.7	11	68.38
Central weighted average		43.2	40.3	8	68.19
Eastern					
Bordertown	CANO	43.4	40.7	9	68.75
Dooen	CANO	42.9	40.9	10	68.00
Frances	CANO	45.4	37.0	7	67.38
Keith	CANO	42.3	40.5	7	68.63
Millicent	CANO	47.5	40.3	4	66.25
Tailem Bend	CANO	43.6	42.5	10	67.75
Wolseley	CANO	43.9	39.9	11	67.38
Eastern weighted average		43.6	41.0	9	67.82
Western					
Cummins	CANO	44.6	36.3	9	67.50
Pt Lincoln	CANO	44.5	36.7	11	67.50
Rudall	CANO	43.4	41.5	6	67.50
Tumby Bay	CANO	44.8	37.6	9	68.00
Western weighted average		44.5	36.8	10	67.55
SA weighted average		44.1	38.3	9	67.72
SA minimum		41.5	36.3	4	66.25
SA maximum		47.5	42.5	11	68.75

¹ % in whole seed @ 6% moisture

² % in oil-free meal @ 10% moisture

³ µmoles/g in oil-free meal @ 10% moisture

⁴ kilograms/ hectolitre.

Table 5. Quality data – Victoria.

Region/zone/site	Grade	Oil	Protein	Glucosinolates	Test weight
		% ¹	% ²	µmoles/g ³	kg/hL ⁴
Victoria					
Central Victoria					
Dunolly Sub	CAN	42.4	41.5	18	67.00
Elmore	CAN	43.0	41.3	17	67.75
Mitiamo	CAN	41.8	41.7	16	68.25
Murchison East	CAN	43.5	41.5	18	67.50
Westmere	CAN	44.4	39.0	11	66.00
Willaura	CAN	44.9	37.8	12	67.25
North east					
Deniliquin	CAN	42.2	38.3	16	68.00
Dookie	CAN	40.5	42.0	21	68.50
Oaklands	CAN	41.7	41.4	18	68.25
Oaklands	CANG	41.4	38.1	18	68.00
Yarrawonga	CAN	40.7	43.2	16	68.13
Southern Mallee					
Charlton	CAN	41.8	42.7	18	68.25
Beulah	CAN	40.1	42.5	19	68.25
Donald	CAN	41.5	42.8	22	68.50
Rainbow	CAN	41.5	41.5	15	68.25
Swan Hill					
Boort	CAN	42.5	38.8	16	68.00
Piangil	CAN	41.7	41.1	16	68.50
Quambatook	CAN	41.7	41.7	14	68.25
Wimmera					
Berrybank	CAN	43.1	38.9	14	67.00
Carpolac	CAN	44.3	39.2	14	67.00
Hamilton	CAN	46.1	37.4	17	66.50
Lillimur	CAN	42.7	38.9	14	68.25
Murtoa Sub	CAN	42.5	41.5	17	68.00
Naracoorte	CAN	46.1	38.2	11	66.25
Natimuk	CAN	43.1	41.7	16	67.25
Nhill	CAN	41.9	40.6	14	69.00
Warracknabeal	CAN	40.7	41.9	21	68.75
VIC weighted average		43.2	40.0	15	67.37
Vic minimum		40.1	37.4	11	66.00
Vic maximum		46.1	43.2	22	69.00

¹ % in whole seed @ 6% moisture

² % in oil-free meal @ 10% moisture

³ µmoles/g in oil-free meal @ 10% moisture

⁴ kilograms/ hectolitre.

Table 6. Quality data – Western Australia.

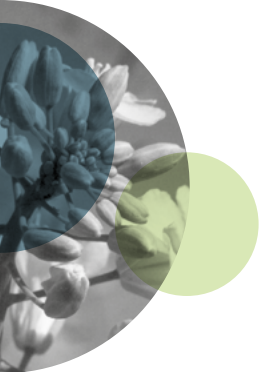
Port zone	Grade	Oil	Protein	Glucosinolates	Test weight
		% ¹	% ²	µmoles/g ³	kg/hL ⁴
Albany	N/A	45.6	36.2	16	67.50
Esperance	N/A	46.6	38.0	17	67.08
Geraldton	N/A	44.8	39.0	16	67.50
Kwinana	N/A	46.4	37.7	17	66.58
WA weighted average		46.0	37.7	16	67.06
WA minimum		44.8	36.2	16	66.58
WA maximum		46.6	39.0	17	67.50

¹ % in whole seed @ 6% moisture

² % in oil-free meal @ 10% moisture

³ µmoles/g in oil-free meal @ 10% moisture

⁴ kilograms/ hectolitre.



Fatty acid composition by state

Region/zone/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	Poly ¹	Mono ²	Sat ³	IV ⁴
Northern NSW																			
Moree North																			
Moree	0.07	3.9	0.3	0.1	0.2	2.1	66.7	15.3	9.1	0.6	1.1	0.3	<0.1	0.1	0.1	24.4	68.4	7.2	108.9
Northern NSW weighted average	0.07	3.9	0.3	0.1	0.2	2.1	66.7	15.3	9.1	0.6	1.1	0.3	<0.1	0.1	0.1	24.4	68.4	7.2	108.9
Southern NSW																			
Boree Creek																			
Boree Creek	0.08	4.5	0.3	<0.1	<0.1	1.7	60.2	22.0	9.1	0.5	1.0	0.2	<0.1	0.1	0.1	31.1	61.7	7.2	114.8
Henty West	0.07	4.3	0.3	<0.1	<0.1	1.8	62.0	20.6	8.9	0.5	1.0	0.3	<0.1	0.1	0.1	29.5	63.4	7.1	113.3
Milbrulong	0.07	4.2	0.3	<0.1	0.1	1.8	62.8	19.9	8.8	0.5	1.0	0.3	<0.1	0.1	0.1	28.7	64.4	6.9	112.7
Rand	0.07	4.0	0.3	<0.1	0.1	1.9	65.1	17.5	8.9	0.5	1.1	0.3	<0.1	0.1	0.1	26.4	66.6	7.0	110.7
Cunningar																			
Cootamundra	0.07	4.1	0.3	0.1	0.2	2.2	64.8	17.3	8.9	0.6	1.0	0.3	<0.1	0.1	0.1	26.1	66.4	7.5	110.0
Cowra	0.06	4.2	0.3	<0.1	<0.1	2.0	64.8	18.4	8.1	0.5	1.0	0.2	<0.1	0.1	0.1	26.6	66.3	7.1	110.1
Cunningar	0.07	4.3	0.3	<0.1	0.1	2.0	63.8	18.5	8.9	0.5	1.0	0.2	<0.1	0.1	<0.1	27.4	65.3	7.3	111.3
Greenthorpe	0.06	4.1	0.3	<0.1	0.1	2.0	63.8	18.5	9.1	0.5	1.0	0.2	<0.1	0.1	0.1	27.6	65.3	7.1	111.8
Maimuru	0.07	4.3	0.3	<0.1	<0.1	2.0	64.2	18.4	8.6	0.5	1.0	0.2	<0.1	0.1	0.1	27.0	65.7	7.3	110.8
Griffith																			
Barellan	0.07	4.2	0.3	<0.1	<0.1	1.7	61.9	21.0	8.8	0.5	1.0	0.2	<0.1	0.1	0.1	29.8	63.3	6.9	113.7
Junee																			
Coolamon	0.06	4.2	0.3	<0.1	<0.1	1.7	61.0	22.2	8.4	0.5	1.0	0.2	<0.1	0.1	0.1	30.6	62.5	6.9	114.0
Temora																			
Ardlethan	0.07	4.1	0.3	<0.1	0.1	2.0	64.3	17.9	8.9	0.6	1.1	0.3	<0.1	0.2	0.1	26.8	66.0	7.2	110.9
Bribbaree	0.07	4.1	0.3	<0.1	0.1	1.9	62.2	20.1	9.1	0.5	1.1	0.3	<0.1	0.1	0.1	29.2	63.8	7.0	113.3
Milvale	0.07	4.2	0.3	<0.1	0.1	1.9	64.3	18.5	8.5	0.5	1.1	0.2	<0.1	0.1	<0.1	27.1	65.8	7.1	110.9
Temora Sub	0.07	4.3	0.3	<0.1	<0.1	1.7	61.8	20.7	9.2	0.5	1.0	0.2	<0.1	0.1	0.1	29.8	63.3	6.9	114.0
Southern NSW weighted average	0.07	4.2	0.3	<0.1	0.1	2.0	63.8	18.6	8.8	0.5	1.0	0.2	<0.1	0.1	0.1	27.4	65.4	7.2	111.3
NSW weighted average	0.07	4.2	0.3	<0.1	0.1	2.0	63.8	18.6	8.8	0.5	1.0	0.2	<0.1	0.1	0.1	27.4	65.4	7.2	111.3
NSW minimum	0.06	3.9	0.3	<0.1	<0.1	1.7	60.2	15.3	8.1	0.5	1.0	0.2	<0.1	0.1	<0.1	24.4	61.7	6.9	108.9
NSW maximum	0.08	4.5	0.3	<0.1	0.2	2.2	66.7	22.2	9.2	0.6	1.1	0.3	<0.1	0.2	0.1	31.1	68.4	7.5	114.8

¹ Poly – sum of polyunsaturated fatty acids (18:2 & 18:3).

² Mono – sum of monounsaturated fatty acids (16:1, 17:1, 18:1, 20:1, 22:1 & 24:1).

³ Sat – sum of saturated fatty acids (14:0, 16:0, 17:0, 18:0, 20:0, 22:0 & 24:0).

⁴ IV – iodine value calculated from fatty acid composition.

Table 7. Fatty acid composition – South Australia.

Region/zone/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	Poly ¹	Mono ²	Sat ³	IV ⁴
Adelaide																			
Port Adelaide	0.07	4.4	0.3	<0.1	0.1	2.0	61.8	18.7	10.4	0.6	1.1	0.3	<0.1	0.1	0.1	29.1	63.4	7.5	113.9
Adelaide weighted average	0.07	4.4	0.3	<0.1	0.1	2.0	61.8	18.7	10.4	0.6	1.1	0.3	<0.1	0.1	0.1	29.1	63.4	7.5	113.9
Central																			
Bowmans	0.07	4.3	0.3	0.1	0.2	2.1	63.0	17.6	10.1	0.6	1.1	0.3	<0.1	0.2	0.1	27.7	64.7	7.6	112.3
Gladstone	0.07	4.4	0.3	<0.1	0.1	2.0	63.5	17.9	9.5	0.5	1.1	0.3	<0.1	0.1	0.1	27.4	65.1	7.5	111.7
Port Giles	0.06	4.2	0.3	0.1	0.2	2.0	62.3	17.8	10.6	0.6	1.1	0.3	<0.1	0.2	0.1	28.4	64.1	7.5	113.5
Roseworthy	0.07	4.4	0.3	<0.1	0.1	1.9	62.4	18.7	9.7	0.6	1.1	0.3	<0.1	0.1	0.1	28.5	64.1	7.4	112.8
Central weighted average	0.07	4.3	0.3	<0.1	0.1	2.0	62.8	18.0	10.0	0.6	1.1	0.3	<0.1	0.1	0.1	28.0	64.5	7.5	112.5
Eastern																			
Bordertown	0.07	4.3	0.3	<0.1	0.1	1.9	61.4	18.9	10.8	0.5	1.1	0.3	<0.1	0.1	0.1	29.7	63.0	7.3	115.0
Dooen	0.06	4.2	0.3	<0.1	0.1	1.8	60.5	20.1	10.7	0.5	1.0	0.3	<0.1	0.1	0.1	30.8	62.1	7.1	116.0
Frances	0.07	4.4	0.3	<0.1	0.1	1.7	59.8	19.3	12.0	0.6	1.1	0.3	<0.1	0.1	0.2	31.3	61.4	7.3	117.4
Keith	0.07	4.2	0.3	0.1	0.2	2.0	61.6	18.2	11.1	0.6	1.1	0.3	<0.1	0.1	0.1	29.3	63.3	7.4	114.7
Millicent	0.06	4.2	0.3	0.2	0.2	1.7	59.3	18.7	13.2	0.6	1.1	0.3	<0.1	0.1	0.1	31.9	61.0	7.1	119.2
Tailem Bend	0.06	4.1	0.3	<0.1	0.2	2.0	62.9	17.8	10.4	0.5	1.1	0.3	<0.1	0.1	0.1	28.2	64.6	7.2	113.5
Wolseley	0.07	4.3	0.3	<0.1	0.1	2.0	61.8	18.5	10.6	0.6	1.1	0.3	<0.1	0.1	0.1	29.1	63.6	7.3	114.3
Eastern weighted average	0.06	4.2	0.3	<0.1	0.1	1.9	61.7	18.5	10.9	0.6	1.1	0.3	<0.1	0.1	0.1	29.3	63.5	7.2	114.8
Western																			
Cummins	0.06	4.4	0.3	0.1	0.2	2.0	62.2	18.0	10.5	0.6	1.0	0.3	<0.1	0.1	0.1	28.6	63.8	7.6	113.5
Port Lincoln	0.06	4.3	0.3	0.1	0.2	2.0	62.5	17.6	10.7	0.6	1.1	0.3	<0.1	0.1	0.1	28.3	64.3	7.4	113.5
Rudall	0.07	4.5	0.3	<0.1	0.1	1.9	60.2	20.5	10.2	0.5	1.0	0.3	0.2	0.1	0.1	30.7	62.0	7.3	115.1
Tumby Bay	0.07	4.4	0.3	<0.1	0.1	1.9	61.2	19.3	10.5	0.5	1.0	0.3	<0.1	0.1	0.1	29.8	62.8	7.4	114.7
Western weighted average	0.06	4.3	0.3	0.1	0.2	2.0	62.2	18.1	10.6	0.6	1.0	0.3	<0.1	0.1	0.1	28.7	63.8	7.5	113.7
SA weighted average	0.06	4.3	0.3	0.1	0.2	2.0	62.2	18.2	10.5	0.6	1.1	0.3	<0.1	0.1	0.1	28.7	63.9	7.4	113.7
SA minimum	0.06	4.1	0.3	<0.1	0.1	1.7	59.3	17.6	9.5	0.5	1.0	0.3	<0.1	0.1	0.1	27.4	61.0	7.1	111.7
SA maximum	0.07	4.5	0.3	0.2	0.2	2.1	63.5	20.5	13.2	0.6	1.1	0.3	0.2	0.2	0.2	31.9	65.1	7.6	119.2

¹ Poly – sum of polyunsaturated fatty acids (18:2 & 18:3).
² Mono – sum of monounsaturated fatty acids (16:1, 17:1, 18:1, 20:1, 22:1 & 24:1).
³ Sat – sum of saturated fatty acids (14:0, 16:0, 17:0, 18:0, 20:0, 22:0 & 24:0).
⁴ IV – iodine value calculated from fatty acid composition.

Table 8. Fatty acid composition – Victoria.

Region/zone/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	Poly ¹	Mono ²	Sat ³	IV ⁴
Central Victoria																			
Berrybank	0.06	4.3	0.3	<0.1	<0.1	1.8	59.0	20.9	11.4	0.5	1.1	0.3	<0.1	0.1	0.1	32.3	60.6	7.1	117.9
Dunolly Sub	0.06	4.2	0.3	<0.1	0.1	1.8	61.3	20.0	10.0	0.5	1.1	0.3	<0.1	0.1	0.1	30.0	62.9	7.1	114.8
Elmore	0.06	4.4	0.3	<0.1	<0.1	1.8	60.7	21.4	9.3	0.5	1.0	0.2	<0.1	0.1	0.1	30.7	62.2	7.1	114.8
Mitiamo	0.06	4.3	0.3	<0.1	<0.1	1.8	61.4	20.5	9.6	0.5	1.0	0.2	<0.1	0.1	0.1	30.0	63.0	7.0	114.4
Murchison East	0.06	4.2	0.3	<0.1	<0.1	1.7	61.1	20.5	10.0	0.5	1.0	0.3	<0.1	0.1	0.1	30.5	62.6	6.9	115.3
Westmere	0.06	4.3	0.3	<0.1	<0.1	1.7	59.7	21.1	10.7	0.5	1.1	0.3	<0.1	0.1	0.1	31.7	61.3	7.0	116.9
Willaura	0.06	4.2	0.6	<0.1	<0.1	1.8	60.4	20.6	10.4	0.5	1.1	0.3	<0.1	0.1	0.1	31.0	62.0	7.0	116.0
North east																			
Deniliquin	0.06	4.2	0.3	<0.1	<0.1	1.8	62.0	19.5	9.7	0.5	1.1	0.3	<0.1	0.1	0.1	29.3	63.6	7.1	113.9
Dookie	0.07	4.2	0.3	<0.1	0.1	1.9	61.2	19.7	10.4	0.5	1.0	0.3	<0.1	0.1	0.1	30.1	62.8	7.1	115.1
Oaklands (CAN)	0.06	4.3	0.3	<0.1	<0.1	1.7	62.6	19.7	9.2	0.5	1.0	0.3	<0.1	0.1	0.1	28.9	64.1	7.0	113.2
Oaklands (CANG)	0.07	4.6	0.3	<0.1	<0.1	1.9	61.3	20.2	9.5	0.5	1.0	0.2	<0.1	0.1	0.1	29.7	62.8	7.5	113.7
Yarrowonga	0.06	4.1	0.3	<0.1	<0.1	1.6	61.6	20.6	9.4	0.5	1.1	0.3	<0.1	0.1	0.1	30.1	63.1	6.8	114.5
Southern Mallee																			
Beulah	0.07	4.1	0.3	<0.1	0.2	2.1	63.6	16.9	10.3	0.6	1.1	0.3	<0.1	0.1	0.1	27.3	65.3	7.4	112.4
Charlton	0.07	4.3	0.3	<0.1	<0.1	1.8	60.5	20.7	10.1	0.5	1.0	0.3	<0.1	0.1	0.1	30.8	62.1	7.1	115.4
Donald	0.07	4.4	0.3	<0.1	0.1	1.9	61.9	19.4	10.0	0.5	1.0	0.2	<0.1	0.1	0.1	29.4	63.4	7.2	114.4
Rainbow	0.07	4.4	0.3	<0.1	0.1	1.9	61.0	20.4	9.8	0.5	1.0	0.2	<0.1	0.1	0.1	30.2	62.6	7.2	114.6
Swan Hill																			
Boort	0.06	4.2	0.3	<0.1	0.1	2.1	63.8	18.0	9.3	0.5	1.0	0.2	<0.1	0.1	0.1	27.3	65.4	7.3	111.6
Piangil	0.07	4.2	0.3	<0.1	0.1	1.9	61.2	20.1	9.8	0.5	1.1	0.3	0.1	0.1	0.1	29.9	63.0	7.1	114.4
Quambatook	0.07	4.2	0.3	<0.1	0.1	2.0	62.3	18.9	10.1	0.5	1.0	0.2	<0.1	0.1	0.1	28.9	63.9	7.2	113.6
Wimmera																			
Carpolac	0.06	4.2	0.3	<0.1	<0.1	1.9	62.2	19.1	10.2	0.5	1.0	0.2	<0.1	0.1	0.1	29.3	63.7	7.0	114.3
Hamilton	0.06	4.3	0.3	<0.1	0.1	1.7	60.9	19.7	10.8	0.5	1.1	0.3	<0.1	0.1	0.1	30.4	62.6	7.0	115.8
Lillimur	0.07	4.2	0.3	<0.1	0.1	1.9	61.5	18.7	10.8	0.5	1.1	0.3	<0.1	0.1	0.1	29.6	63.1	7.3	114.9
Murtoa Sub	0.06	4.2	0.3	<0.1	0.1	1.8	62.2	19.0	10.3	0.5	1.1	0.3	<0.1	0.1	0.1	29.2	63.8	7.0	114.3
Naracoorte	0.06	4.3	0.3	0.1	0.2	1.8	60.8	18.4	12.0	0.6	1.0	0.3	<0.1	0.1	0.1	30.3	62.5	7.2	116.6
Natimuk	0.06	4.2	0.3	<0.1	<0.1	60.4	20.6	20.6	10.5	0.5	1.1	0.3	<0.1	0.1	0.1	31.1	61.9	7.0	116.2
Nhill	0.07	4.4	0.3	<0.1	0.1	1.9	61.3	19.4	10.4	0.5	1.0	0.3	<0.1	0.1	0.1	29.8	62.9	7.3	114.7
Warracknabeal	0.07	4.2	0.3	<0.1	0.2	2.1	62.4	18.4	10.2	0.5	1.0	0.2	<0.1	0.1	0.1	28.6	64.1	7.3	113.6
Victorian weighted average	0.06	4.2	0.3	<0.1	0.1	1.8	60.8	20.0	10.5	0.5	1.1	0.3	<0.1	0.1	0.1	30.5	62.4	7.1	115.6
Vic minimum	0.06	4.1	0.3	<0.1	<0.1	1.6	59.0	16.9	9.2	0.5	1.0	0.2	<0.1	0.1	0.1	27.3	60.6	6.8	111.6
Vic maximum	0.07	4.6	0.3	0.1	0.2	2.1	63.8	21.4	12.0	0.6	1.1	0.3	0.1	0.1	0.1	32.3	65.4	7.5	117.9

¹ Poly – sum of polyunsaturated fatty acids (18:2 & 18:3).

² Mono – sum of monounsaturated fatty acids (16:1, 17:1, 18:1, 20:1, 22:1 & 24:1).

³ Sat – sum of saturated fatty acids (14:0, 16:0, 17:0, 18:0, 20:0, 22:0 & 24:0).

⁴ IV – iodine value calculated from fatty acid composition.

Table 9. Fatty acid composition – Western Australia.

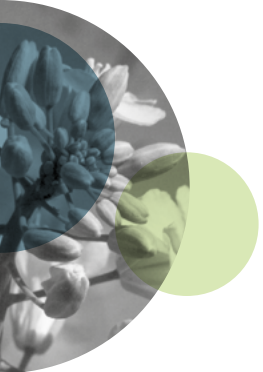
Region/zone/site	14:0	16:0	16:1	17:0	17:1	18:0	18:1	18:2	18:3	20:0	20:1	22:0	22:1	24:0	24:1	Poly ¹	Mono ²	Sat ³	IV ⁴
Albany	0.05	4.2	0.3	0.1	<0.1	1.8	60.2	20.4	10.6	0.6	1.1	0.3	<0.1	0.1	0.2	30.9	61.9	7.2	115.8
Esperance	0.05	4.1	0.2	0.1	<0.1	1.7	59.5	21.2	10.7	0.6	1.1	0.3	<0.1	0.1	0.2	31.9	61.1	7.0	117.0
Geraldton	0.05	4.0	0.2	0.1	<0.1	2.1	62.8	20.0	8.3	0.6	1.1	0.3	<0.1	0.2	0.1	28.4	64.3	7.3	111.6
Kwinana	0.05	4.0	0.2	0.1	<0.1	2.0	62.4	19.5	9.4	0.6	1.1	0.3	<0.1	0.1	0.2	28.9	64.0	7.1	113.2
WA weighted average	0.05	4.1	0.2	0.1	<0.1	1.9	61.4	20.2	9.7	0.6	1.1	0.3	<0.1	0.1	0.2	29.9	62.9	7.2	114.3
WA Minimum	0.05	4.0	0.2	0.1	<0.1	1.7	59.5	19.5	8.3	0.6	1.1	0.3	<0.1	0.1	0.1	28.4	61.0	7.0	111.6
WA Maximum	0.05	4.2	0.3	0.1	<0.1	2.1	62.8	21.2	10.7	0.6	1.1	0.3	<0.1	0.2	0.2	31.9	64.3	7.3	117.0

¹ Poly – sum of polyunsaturated fatty acids (18:2 & 18:3).

² Mono – sum of monounsaturated fatty acids (16:1, 17:1, 18:1, 20:1, 22:1 & 24:1).

³ Sat – sum of saturated fatty acids (14:0, 16:0, 17:0, 18:0, 20:0, 22:0 & 24:0).

⁴ IV – iodine value calculated from fatty acid composition.



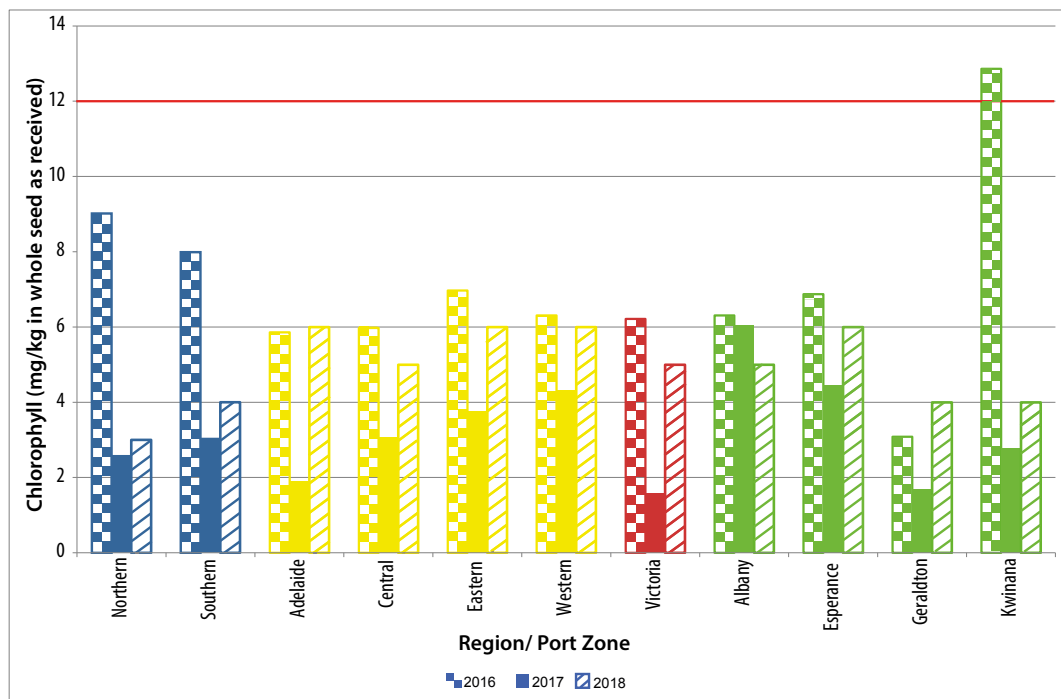
Chlorophyll

The average chlorophyll content for the Australian harvest in 2018 was 5 mg/kg (5 ppm) in whole seed as received. This was an increase of 1 mg/kg (1ppm) from the 2017 harvest.

Table 10. Chlorophyll by region/ port zone.

State	Region/port zone	Chlorophyll (mg/kg) ¹
NSW	Northern	3
NSW	Southern	4
SA	Adelaide	6
SA	Central	5
SA	Eastern	6
SA	Western	6
Vic	Victoria	5
WA	Albany	5
WA	Esperance	6
WA	Geraldton	4
WA	Kwinana	4
Australian weighted average		5

¹ mg/kg in whole seed as received



Red line indicates the AOF limit of 12 mg/kg in whole seed

Blue = NSW regions, Yellow = SA regions, Red = Victoria, Green = WA port zones

Figure 26. Average chlorophyll content by region/ port zone 2016–2018.



Definitions, methods and references

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 gram of oil-free, air-dry solids and not more than 2% erucic acid of total fatty acids in the oil component. The specified glucosinolates are any one or a mixture of 3-butenyl, 4-pentenyl, 2-hydroxy-3-butenyl and 2-hydroxy-4-pentenyl glucosinolates (Australian Oilseeds Federation (AOF) 2015, page 27).

Canola is traded under the grade 'CAN' by GrainCorp Operations Limited and 'CANO' by Viterro Pty Ltd.

The AOF *Quality Standards, Technical Information & Typical Analysis (2017)* Standard Reference for canola is CSO 1, Standard Reference for non-GM canola is CSO 1-a.

GM canola

The genetically modified (GM) canolas referred to in this publication are lines approved for commercial release in Australia by the Office of the Gene Technology Regulator (OGTR).

GM canola is traded under the grade 'CANG' by GrainCorp Operations Limited. GM canola is approved for commercial release in South Australia.

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 International Standards Organisation (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 two hours. The sample is again ground and extracted for a further two hours. The results are reported as a percentage of the whole 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 × 6.25) in oil-free meal at 10% moisture.

Glucosinolate content

Total glucosinolate content 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 high performance liquid chromatography methodology of the American Oil Chemists' Society (AOCS) with the added advantage of speed and economy. Results are reported as μmoles glucosinolates/ gram in oil-free meal at 10% moisture and μmoles glucosinolates/ gram in 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 International Olive Council, 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 in the oil portion of the seed.

Iodine values

Iodine values are calculated from the fatty acid profile using AOCS Cd 1c-85 'Calculated iodine value'.

Test weight

Test weight is a volumetric grain weight measured using a Franklin chondrometer and reported as kilograms/hectolitre.

Chlorophyll content

Chlorophyll content was determined using AOCS method Ak 2-92 'Determination of chlorophyll content in rapeseed/canola'. Ground canola seed is placed in a mechanical microgrinder with solvent for one hour. The sample is then filtered and the absorbance of the solution is determined on a UV-Vis spectrophotometer at 625 nm, 665 nm and 705 nm. Results are reported as mg/kg in whole seed as received.

References

Australian Oilseeds Federation *Section 1: Quality Standards, Technical Information & Typical Analysis 2018/19* Issue 17, 1 August 2018

