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Quality of western Canadian Canola 2017

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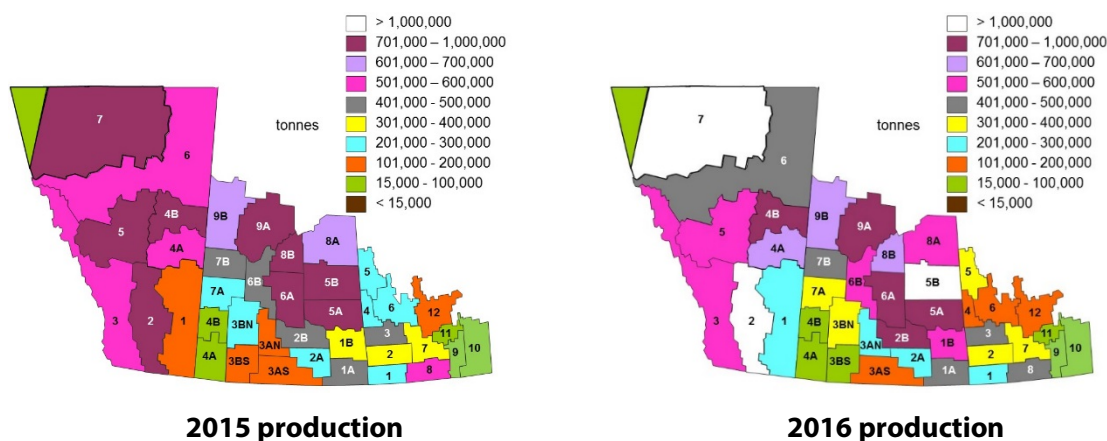
Note: Samples for the Canadian Grain Commission's canola harvest sample program were collected from producers, crushing plants and grain handling offices across western Canada. The samples were cleaned to remove dockage prior to grading and testing. Industry Services grain inspectors assigned grade level based on the Official Grain Grading Guide for Canola and Rapeseed (Chapter 10) which can be found at: <http://www.grainscanada.gc.ca/oggg-gocg/ggg-gcg-eng.htm> . Individual harvest samples were analyzed for oil, protein, chlorophyll and total glucosinolates using a NIRSystems 6500 scanning near-infrared spectrometer. This report is based on the analyses by references methods of composite samples made of same grade samples per crop district and province. Composites were prepared by combining Canola, No. 1 Canada samples by provincial crop district; Canola, No. 2 by province, and Canola, No. 3 Canola and Sample Canada samples by western Canada.

Seed oil, protein and glucosinolates contents are reported on a 8.5% moisture basis. Meal protein content is reported on a 12% moisture basis whereas meal glucosinolates content is reported on dry basis.

Introduction

This report presents quality data and information based on the Canadian Grain Commission's 2017 harvest sample program of western Canadian canola. Quality parameters included are oil, protein, chlorophyll, glucosinolates, free fatty acids and the fatty acid composition of harvest samples. Quality data are from analyses of canola samples submitted to the Canadian Grain Commission throughout the harvest period by producers, grain companies and oilseed crushing companies. The map (Figure 1) shows traditional growing areas for canola in western Canada with 2015 and 2016 production data. Samples received from the Peace River area of British Columbia were combined with Alberta Crop District No. 7 samples. Alberta averages of these samples will be referred to as Alberta-Peace River.

Figure 1 – Maps of western Canada showing 2015 and 2016 canola production per crop district



Summary

The 2017 harvest showed a lower percentage of samples graded Canola, No. 1 Canada (94.4%) than the 2016 harvest (95.4%), although this number is much higher than the 10-year average (87.8%) (Figure 4). Alberta-Peace River area showed the lowest percent of samples graded Canola, No. 1 Canada (88.5%) when compare to Manitoba (> 99.0%) and Saskatchewan (96.7%) (Figure 4). The crop district 4 of Alberta showed the lowest percent of samples graded Canola, No. 1 Canada (83.7%).

The 2017 western Canadian canola (Canola, No.1 Canada) crop was characterized by an oil content average higher than what was observed for the 2016 crop (45.0% in 2017 versus 44.3% in 2016) and a similar protein content average (20.1% in 2017 versus 20.0% in 2016) for samples graded Canola, No.1 Canada (Table 1). The chlorophyll content average were identical in 2017 and in 2016 (11 mg/kg) (Table 1) with some areas showing averages higher than 20 mg/kg (Table 3). Samples from Manitoba

had the lowest chlorophyll content (9 mg/kg) while samples from Alberta-Peace River exhibited the highest average (13 mg/kg). Total seed glucosinolate averages were very similar to last year (10 µmol/g in 2017 versus 11 µmol/g in 2016).

Table 1 – Canola, No. 1 Canada: Quality data for 2017 and 2016 harvest plus the 5-year means

Quality parameter	2017	2016	2012-16 Mean
Number of received samples	2309	1915	1885
Number of Canola, No. 1 Canada samples	2180	1827	1632
Oil content ¹ (% , 8.5% moisture)	45.0	44.3	44.4
Protein content ¹ (% , 8.5% moisture)	20.1	20.0	20.2
Oil-free protein of the meal ¹ (% , 12% moisture)	38.0	37.4	37.7
Chlorophyll content (mg/kg in seed)	11	11	14
Total seed glucosinolates (µmol/g, 8.5% moisture)	10	10	10
Oil-free total glucosinolates of the meal (µmol/g, dry basis)	23	22	21
Free fatty acids (%)	0.15	0.20	0.15
Oleic acid (% in oil)	62.9	62.6	62.7
Linoleic acid (% in oil)	18.9	18.9	18.8
α-Linolenic acid (% in oil)	9.5	9.6	9.5
Erucic acid (% in oil)	0.01	0.01	0.02
Total saturated fatty acids ² (% in oil)	6.5	6.7	6.7
Iodine value	113.1	113.1	112.8
Total mono-unsaturated fatty acids (MUFA) ³ (% in oil)	64.6	64.2	64.4
Total poly-unsaturated fatty acids (PUFA) ⁴ (% in oil)	28.5	28.6	28.4

¹ Protein content calculated from nitrogen content using N x 6.25

² Total saturated fatty acids are the sum of palmitic (C16:0), stearic (C18:0), arachidic (C20:0), behenic (C22:0), and lignoceric (C24:0).

³ Total mono-unsaturated fatty acids are the sum of palmitoleic (C16:1), oleic (C18:1), eicosenoic (C20:1), erucic (C22:1), and nervonic (C24:1) acids.

⁴ Total poly-unsaturated fatty acids are the sum of linoleic (C18:2), linolenic (C18:3) and eicosadienoic (C20:2) acids.

The 2017 canola crop had a very similar oleic acid content, linoleic acid and α-linolenic acid contents when compared to the 2016 crop (62.9, 18.9 and 9.5% versus 62.6, 18.9 & 9.6% for oleic, linoleic acid,

and a linolenic acid respectively). Total saturated fatty acid content for the 2017 canola crop was slightly lower than what was observed in 2016 (6.5% versus 6.7%). This resulted in an identical iodine value for both the 2017 and the 2016 canola crops (113.1 units). Mean free fatty acids average levels in 2017 Canola, No.1 Canada seed was similar to what was observed in 2016 (0.15% in 2017 versus 0.20% in 2016) (Table 1), however in Alberta, some crop district averages were much higher than the western Canadian average (Table 4).

Weather and production review

Weather review and effects on seeding and harvest

The weather maps presented in Figures 2a and 2b were obtained from Agriculture and Agri-Food Canada (<http://www.agr.gc.ca/DW-GS/current-actuelles.aspx?lang=eng&jsEnabled=true>). Seeding and harvest progress for each provinces are presented in Figure 3. The graphs were done using the crop reports for each province. Manitoba: <http://www.gov.mb.ca/agriculture/crops/seasonal-reports/crop-report-archive/>; Saskatchewan: <http://www.publications.gov.sk.ca/deplist.cfm?d=20&c=4549> and Alberta: [http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/sdd4191](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/sdd4191).

Figure 2a – Maps - Monthly mean temperature difference from normal in Canada (Prairies) during the 2016 growing season (June and July 2017).

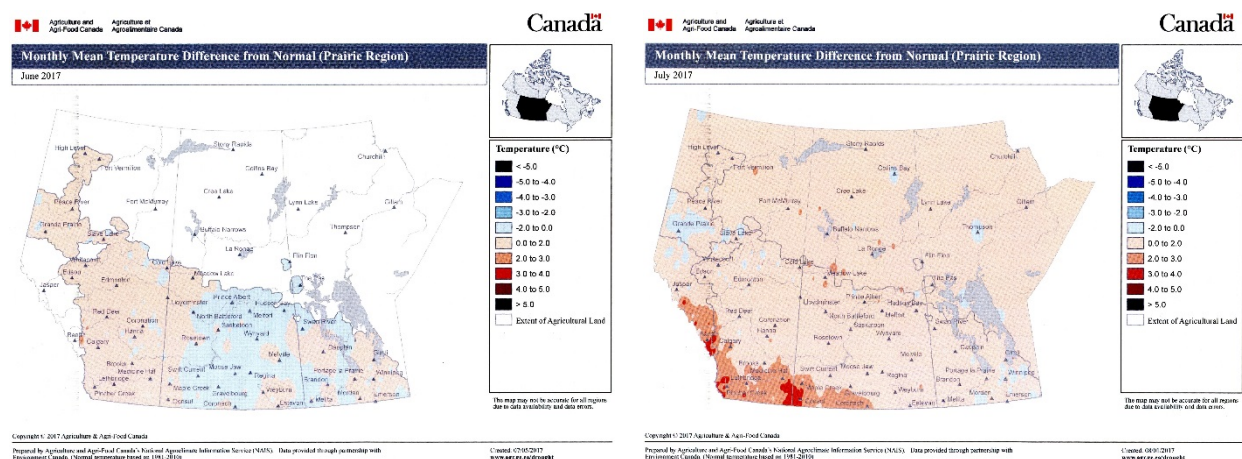
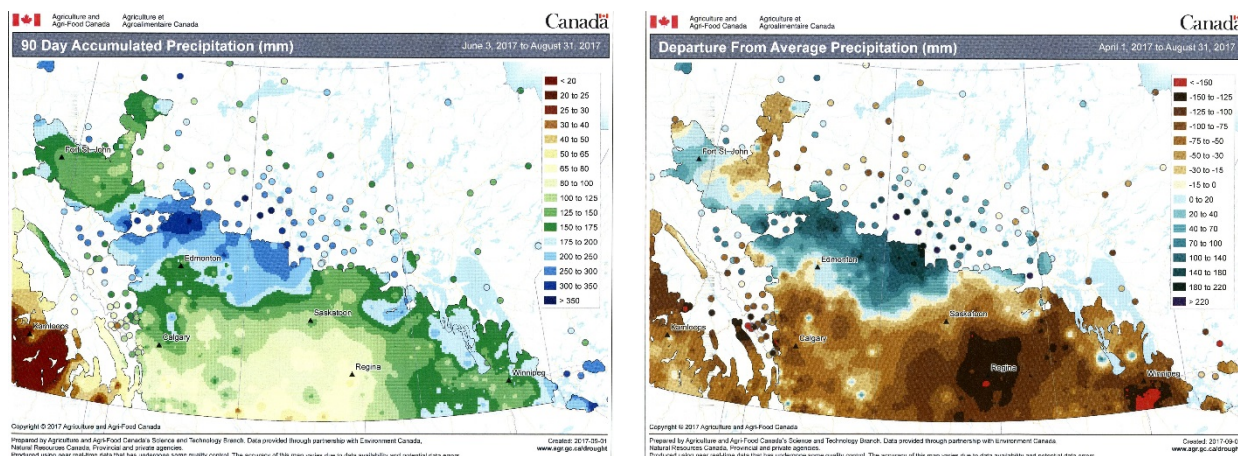


Figure 2b – Map - Accumulated precipitation and departure from normal in Canada (Prairies) during the 2017 growing season (June 3rd to August 31st and April 1st to August 31st, 2017).



Source: <http://www4.agr.gc.ca/DW-GS/historical-historiques.aspx?lang=eng&jsEnabled=true>

2017 weather was very favourable to grow canola in Manitoba. Seeding started early May and was 95% completed by June 5th. Cool weather and precipitations were the norm in June throughout Manitoba. This was followed by a hot and dry July allowing the crop develop. By end of July, most areas in Manitoba needed rain and some stress damage was reported on canola. End of August, canola swathing started and good weather conditions allowed good harvest progress throughout the province. Mid-September, some rain delayed harvest, but resumed once the conditions allowed. By October 10th harvest was considered done in Manitoba.

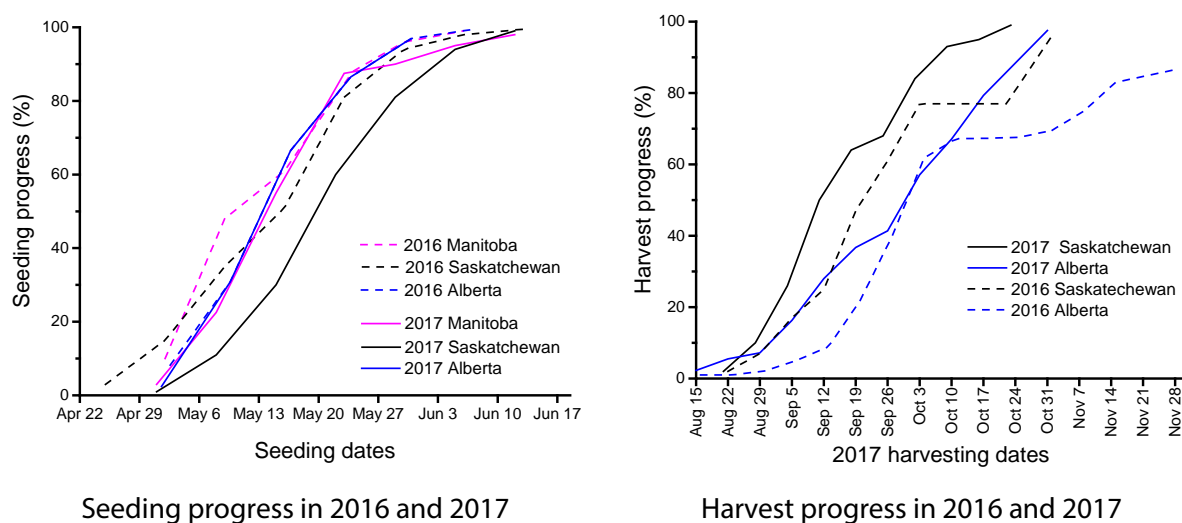
In 2017, seeding started later than usual in Alberta and Saskatchewan. Cool temperatures did not allow fields to dry down properly delaying the start of the seeding by at least week compare to last year. Moreover, in the northern part of Alberta, but also some Saskatchewan areas, spring canola harvest had to happen before any crop could be seeded, further delaying seeding.

After a slow start, canola crop was developing normally in Saskatchewan until mid-July. The July 18th to 24th Saskatchewan crop report stated that rain was needed to replenish the top soil and allow the crop to fill out. This lack of water was especially noticed in the southern part of the province. Harvest operations started the first week of August in southwestern Saskatchewan. By August 14th, 15 and 14% of the canola crop was swathed in the southwest and the southeast part of the province, respectively, whereas swathing barely started in the north. The Saskatchewan harvest progressed slowly at first until end of August, and then the pace picked up so by mid-September 50% of the canola crop was harvested. Rain delayed harvest from September 12th to 25th. Harvest started again once dry and warm weather returned, by October 23, 2017, about 99% of the canola crop was harvested (Figure 3). In Saskatchewan canola harvest was finished about 2 weeks earlier than in 2016.

Early July, the southern part of Alberta was affected by drought like conditions; this affected the development of the crop. By mid-July only about 43% of the crop in the south were reported as being

in good to excellent condition compared to 81% in the northeast. The crop condition rating continued to decrease during July due to hot and dry weather. Early August only 56.8% of the crop was judged in excellent or good conditions (28% in the south versus 78.5% in the northeast) as hot and dry weather continued to develop throughout the province. By August 15th, about 29% of the canola crop was combined or swathed in the southern part of Alberta, representing about 5% of the total Alberta canola crop. During the second half of August, hot and dry weather broadened to the whole province allowing better crop development in the northern regions and harvest advanced in the central part of the province. Overall, the 2017 Alberta harvest was ahead in the south part of the province by about 2 weeks and delayed by about 2 weeks in the north parts (northeast and northwest) as well as in the Peace River area. As in Saskatchewan, precipitations and cool weather delayed harvest around mid to end of September and some frost was registered in most of Alberta. Significant snowfall was reported on October 3rd according to the Alberta crop report and the harvest was almost brought to a halt in the northern regions of the province whereas the harvest was complete in the south. By the end of October, despite less than ideal conditions, producers were able finish the canola harvest with 98.5% of the canola crop harvested (Figure 3).

Figure 3 – Seeding and harvest progress in Saskatchewan and Alberta for the 2017 and 2016 growing seasons



Production

Since 2012, Western Canadian farmers have planted over 8.0 million hectares of canola, in 2017, they seeded 9,273.3 thousand hectares, about 13% more than what was seeded in 2016 and about 10% more than the 5-year average (Table 2). Only 39.6 thousand hectares were not harvest in 2017.

Statistics Canada reported that the 2017 western Canada average yield was 2,300 kg/hectare, lower than what was observed in 2016 (2,400 kg/hectare) but higher than the 5-year yield average of 2,100 kg/hectare. In

2017, the highest yield average was observed in Manitoba at 2,500 Kg/hectare, followed by Alberta (2,400 kg/hectare), Saskatchewan (2,200 Kg/hectare) and British Columbia (2,000 Kg/hectare).

As of January 2018, Statistics Canada reported that the 2017 production for western Canada was 21.231 million metric tonnes, this is the highest production recorded in Western Canada. It is 1.7 million metric tonnes higher than the 2016 record production of 19.529 million metric tonnes and well above the 5-year average production (17,285,040 tonnes). In 2017, the provincial production for Manitoba, Saskatchewan, Alberta and British Columbia accounted for 14.8, 52.7, 32.2 and 0.4% (13.4, 54.7, 31.5 and 0.4% in 2016) of the total canola production in western Canada, respectively (Table 2).

Table 2 - Seeded area and production for western Canadian canola

	Seeded area			Harvested area			Production ¹		
	thousand hectares			thousand hectares			thousand tonnes		
	2017	2016	2012-16	2017	2016	2012-16	2017	2016	2012-16
Manitoba	1,278.8	1,214.1	1,296.2	1,276.8	1,256.5	1,285.3	3,147.9	2,608.2	2,620.4
Saskatchewan	5,151.6	4,532.5	4,479.9	5,131.4	4,224.9	4,439.4	11,181.1	10,682.1	8,771.1
Alberta	2,804.5	2,420.0	2,569.7	2,788.3	2,225.8	2,548.3	6,826.6	6,157.5	5,814.4
British Columbia	38.4	38.4	41.3	37.2	34.8	40.5	75.7	81.6	79.2
Western Canada	9,273.3	8,205.0	8,387.1	9,233.7	7,742.0	8,313.5	21,231.3	19,529.4	17,285.0
Canada	9,306.5	8,235.9	8,422.9	9,265.8	7,768.8	3,348.4	21,313.2	19,600.5	17,361.3

¹ For all production data please consult Statistics Canada's website at:

<http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=0010010&tabMode=dataTable&srchLan=-1&p1=1&p2=9>

Harvest sample program samples and grade distribution

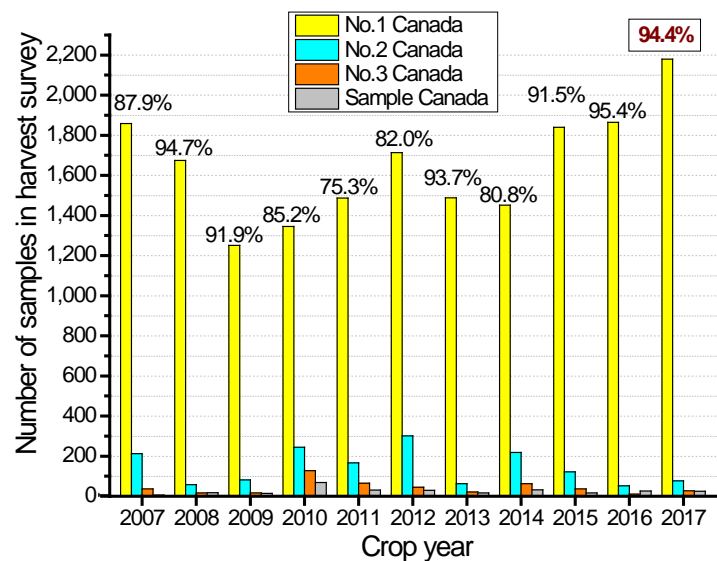
This report of quality data for the 2017 harvest is based on analyses of 2,309 individual canola samples. Composites of various grades from various crop districts composites from each province were made using these samples. Specialty oil samples, such as high oleic acid, low linolenic acid, and high erucic acid, were excluded from this report. In 2017, we received close to 400 more samples than in 2016 (2309 versus 1915). Crop district composites of Canola, No.1 Canada samples were prepared using 2113 samples.

Exports of commercially cleaned canola exports (from August 2017 to December 2017) contained on average 1.9% dockage, ranging from 0.90 to 2.5%, which affects quality factors such as oil content, chlorophyll and free fatty acid (<https://www.grainscanada.gc.ca/canola/export-exportation/ceqd->

[dgc-eng.htm](#)). Canola exports containing over 2.5% dockage are considered not commercially clean (NCC) and usually have even greater reductions in measured quality components. The composition of 2017 samples was compared to 2016 results and to long-term sample program means (Table 1). Comparison with the quality of Canadian canola exports shipments is provided in Table 6.

In 2017, 94.4% of the samples were graded Canola, No. 1 Canada, compared to 95.8 in 2016 and 80.8% in 2014 (Figure 4). This is much higher than the 5-year average of percentage of Canola, No. 1 Canada (83.4%). The grade distribution of the 2017 canola crop varied slightly between crop districts, however the differences were less important than what was notes the previous year. The lowest percent of samples graded Canola, No. 1 Canada was found in the crop district 4 of Alberta (83.7 %).

Figure 4 – Canola samples received in harvest sample program and the historical grade distribution, 2007-17



In 2017, the main degrading factor for Canola, No. 1 to Canola, No. 2 was distinctly green seed counts. Distinctly green seed counts (DGR) were 0.41% in Canola, No. 1 Canada, 3.29% in Canola, No. 2 Canada, 8.51% in Canola, No. 3 Canada and 7.17% in Sample. Most of samples with grades lower than Canola No. 2 were downgraded because of admixtures and sprouting, not because of DGR counts. The Official Grain Grading Guide defines conspicuous admixture as material found in the sample after cleaning and is easily distinguished from canola without the use of magnification.

Quality of western Canadian canola 2017

Tables 3 to 5 show detailed information on the quality of western Canadian canola harvested in 2017 whereas Table 6 compares the quality of 2017 harvest to the quality of recent canola exports. It is important to note that the numbers of samples in each grade or province may not be representative of the total production or grade distribution. However, there were sufficient samples to provide good quality information for each province and each grade. Provincial and western Canadian averages were calculated from results for each crop district, weighted by a combination of production by crop district using a 5-year average production (Statistics Canada production estimate) combined with an estimate of grade distribution per crop district.

All oil and protein content values discussed below are presented using the Canadian Grain Commission's historical 8.5% moisture basis in order to permit annual and regional comparisons. Protein content of the oil-free-meal is presented at 12% moisture whereas the glucosinolate content of the oil-free-meal is reported on dry basis to reflect meal-trading rules established by the Canadian Oilseed Processors Association (COPA).

Exports of commercially cleaned canola contained up to 2.5% dockage, which will affect quality factors such as oil content, chlorophyll and free fatty acids. Canola exports containing over 2.5% dockage are considered not commercially clean (NCC) and will have even greater reductions in measured quality components.

Oil content

For Canola, No.1 Canada, the 2017 mean oil content (45.0%) is higher than the 2016 average (44.3%) (Table 1) and the 5-year average (2012-2016) of 44.2% (Table 1, Figure 5). The 2017 average is very close to the record average observed in 2011 (45.2%) (Figure 5).

The oil content mean in Alberta-Peace River (44.7%) was lower than in Manitoba (45.0%) and Saskatchewan (45.3%) (Table 3). The oil content of individual Canola, No.1 Canada samples harvested in 2017 by producers across western Canada ranged from 40.2% to 51.2% in Manitoba, 38.2% to 51.1% in Saskatchewan and 36.9% to 50.8% in Alberta-Peace River (Table 3).

Oil content for Canola, No. 2 Canada (43.9%) was lower than for Canola, No. 1 Canada (45.0%). Oil content for Canola, No. 2 Canada samples from western Canada ranged from 39.8% to 50.3% (Table 3).

Oil content is influenced by both genetics and environment. For any known canola variety, cool growing conditions will give higher oil content when compared to hot growing conditions. The dry and hot conditions observed during the 2017 growing seasons in the south part of Alberta were responsible for the lower oil content observed in Alberta compared to Manitoba.

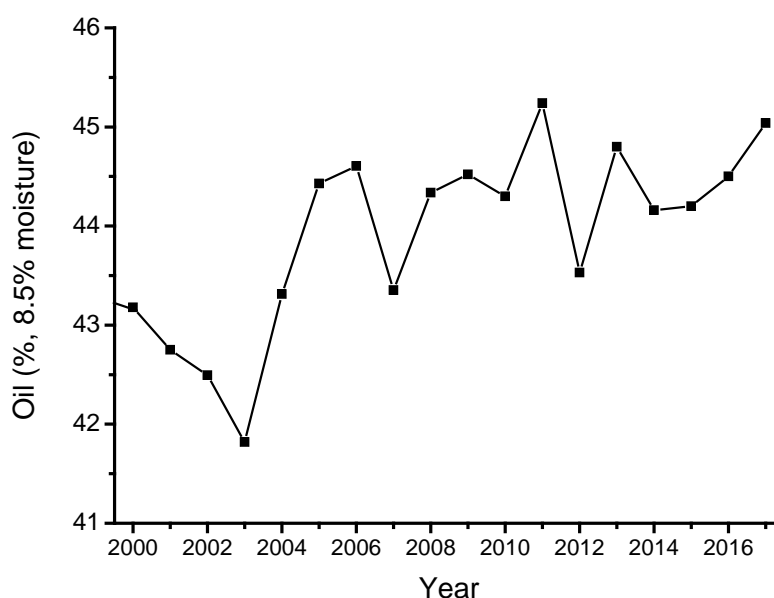
The oil content mean of commercially clean canola exports of Canola, No.1 Canada was 43.9% in December. They averaged 43.9% for the August-November 2017 exports (Table 6). Last year shipping season, commercially clean cargoes of canola averaged 43.7% for oil content.

When compared to oil content of the harvest samples, the commercially clean and the non-commercially clean exports of Canola, No.1 Canada had lower oil content averages due to the dilution of the dockage. Harvest samples are completely cleaned (0.00% dockage) whereas the dockage averages for the Commercially Clean August-to-November 2017 exports and December 2017 exports were 1.82 and 1.92% respectively. The dockage for the Non-Commercially Clean exports averaged 2.79% (Table 6).

The oil content average of the August-to December non-commercially clean canola exports of Canola, No.1 Canada was 43.9%. It is very unusual to have commercially and non-commercially exports have similar oil content averages as the higher dockage the higher the oil content dilution by non-oil containing material.

It is expected that the mean oil content of Canadian exports will be in the 44.0% range for most of the 2017-18 shipping season.

Figure 5 – Canola, No. 1 Canada - harvest samples, 2000–2017
Oil content of the seed (% at 8.5% moisture)



Protein content

Crude protein content averages were 20.1% for Canola, No.1 Canada, 20.7% for Canola, No. 2 Canada and 20.4% for Canola, No. 3 Canada. Average protein seed content observed for Canola, No.1 Canada in 2017 was similar to what was observed in 2016 (20.0%). This is slightly lower than the 5-year average (20.4%) (Table 1, Figure 6). Protein content of individual producer samples ranged from 14.7

to 29.3% for Canola, No. 1 Canada samples and from 14.7 to 26.7% for Canola, No. 2 Canada samples (Table 3).

Protein averages of Canola, No. 1 Canada commercially clean exports were 20.6% in December 2017 and 20.5% in November 2017. Protein average was 20.6% for commercially clean Canola, No. 1 Canada exports from August to October 2017 (Table 6). Protein content averages for the actual shipping season are higher than what was observed for last shipping season (20.2% for August 2016 to July 2017).

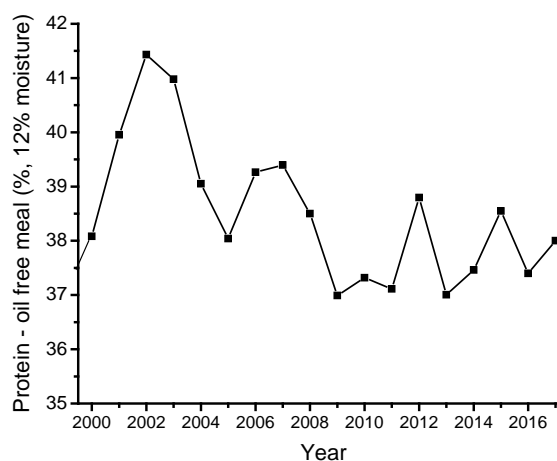
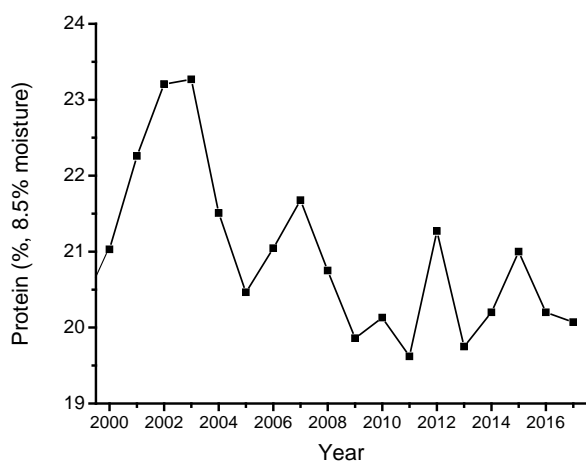
2017 protein content calculated to an oil-free meal at 12% moisture basis is 38.0%, which is significantly higher than what was observed in 2016 (37.4%) and similar to the 37.9% calculated for the 5-year average (Table 1, Figure 7). The calculated protein content of the oil-free meal (100% defatted at 12% moisture) was much higher in Alberta-Peace River (38.8%) than in Manitoba (37.6%) and in Saskatchewan (37.7%). Trading rules for the North American sale of canola meal requires that calculations for protein claims must be reported on a 12% moisture basis. To enable comparison according to the Canadian Oilseed Processors Association's meal trading rules, the Canadian Grain Commission only is reporting the protein of oil-free meal at 12% moisture (Table 1, Figure 7). It is to be understood that the reported value is only an indication since this is the maximum meal protein content that could be obtained when a crushing plant is able to extract 100% of the oil from the seeds.

Commercially clean exports of Canola, No. 1 Canada, had a calculated protein content average for the oil-free meal of 38.0 (12.0% moisture) in December 2017. The meal protein content average for the August-November 2017 exports was also 38.0% (12% moisture). These results are higher than what was observed during last shipping season, the average being 37.2% (12% moisture) for commercially clean exports of Canola, No. 1 from August 2016 to July 2017 (Table 6). The August to December 2017, average for the Non Commercially exports was 37.6% (12% moisture) (Table 6).

It is expected that the protein content of Canadian exports will be higher than what was observed during last year shipping season.

Figure 6 – Canola, No. 1 Canada - harvest samples, 2000–2017
Protein content of the seed (% , at 8.5% moisture)

Figure 7 – Canola, No. 1 Canada - harvest samples, 2000–2017
Protein content of the meal (% , at 12% moisture)

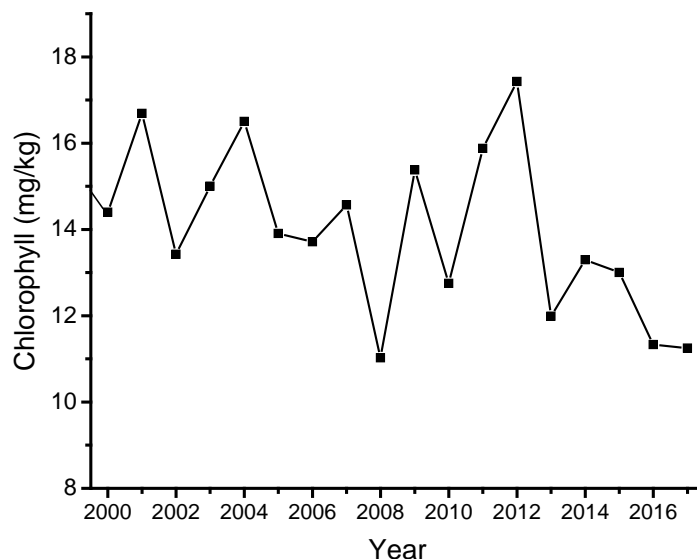


Chlorophyll content

Chlorophyll content averages of producer samples graded Canola, No. 1 Canada were 9, 11 and 13 mg/kg in Manitoba, Saskatchewan and Alberta-Peace River, respectively (Table 3). The overall average for Canola, No. 1 Canada was 11 mg/kg, identical to what was observed for the 2016 harvest (11 mg/kg) (Figure 8). This is slightly lower than the calculated 5-year average (13 mg/kg). Individual producer samples of Canola, No. 1 Canada from Manitoba, Saskatchewan and Alberta-Peace River had chlorophyll levels ranging from 4 to 26 mg/kg, 4 to 27 mg/kg and 4 to 40 mg/kg, respectively (Table 3). The mean chlorophyll content varies greatly from year to year (Figure 8) due to environmental conditions. Once again, location had an important effect on chlorophyll levels in the analyzed samples. Crop Districts 4, 5 and 6 from Alberta had the highest chlorophyll content averages for samples graded Canola, No.1 Canada, 14, 14 and 20 mg/kg, respectively.

Chlorophyll levels (Table 3) for Canola, No. 2 Canada samples averaged 34 mg/Kg, much higher than what was observed for the 2016 harvest (23 mg/kg). Samples graded Canola, No. 3 Canada showed an average chlorophyll content of 61 mg/kg, much higher than what was observed in 2016 (15 mg/kg), confirming that in 2017, the down grading from Canola, No. 2 Canada to Canola, No. 3 Canada was mainly due to seed immaturity.

Figure 8 – Canola, No. 1 Canada - harvest samples, 2000–2017
Chlorophyll content of the seed (mg/Kg, as is moisture content)



To be graded Canola, No. 1 Canada, samples must contain no more than 2.00% distinctly green seeds. Distinctly green seed averages were 0.26, 0.38 and 0.52% in Manitoba (0.57% in 2016), Saskatchewan (0.37% in 2016) and Alberta-Peace River (0.60% in 2016) for Canola, No. 1 Canada samples, respectively.

The chlorophyll content of Canadian canola exports is affected by distinctly green seeds and dockage content (no more than 2.5% for commercially clean exports). Dockage averages for Canola, No. 1 Canada was 1.92 and 1.82 for commercially clean cargoes for December and August to December 2017 exports, respectively, whereas the dockage average for the non-commercially clean August to December 2017 exports was 2.79%. Since August 1st, 2017, the distinctly green seed contents for individual Commercially Clean cargoes of Canola, No. 1 Canada ranged from 0.2 to 1.1% and the chlorophyll content averages ranged from 9 to 19 mg/kg (Table 6). These chlorophyll content variations reflected the distinctly green seed variations within the exports (0.2 to 1.1%) and between harvest DGR averages and export DGR averages (0.4 versus 1.0%) (Table 6); the higher distinctly green seeds content and the higher chlorophyll content in exports (Table 6).

It is expected that chlorophyll data for the 2017-18 exports will be similar to the chlorophyll average reported for the 2016-2017 shipping season.

Glucosinolate content

The 2017 total glucosinolate content of the seeds (Figure 9) averaged 10 μ moles/g, identical to what was observed in 2016 (10 μ moles/g). Since 2009, total glucosinolate content averages remained in the 10 μ moles/gram range (Table 1, Figure 9). There was no real difference in total glucosinolates content

between various crop districts or provinces. This is a direct result of breeding efforts from various breeding programs to maintain low glucosinolate contents and linked to the Canadian canola registration program (Western Canadian Canola Rapeseed Registration Committee).

The average level of total seed glucosinolates for the December 2017 Commercially Clean canola exports was 11 $\mu\text{mol/g}$ of seed, similar to what was observed in the 2017 harvest survey (Table 6). Glucosinolate contents of canola exports for the 2017-18 shipping season will remain similar to the averages observed during the 2016-17 shipping season (Table 6).

Figure 9 – Canola, No. 1 Canada - harvest samples, 2000–17

Total glucosinolate content of the seed ($\mu\text{mol/g}$ seed, at 8.5% moisture)

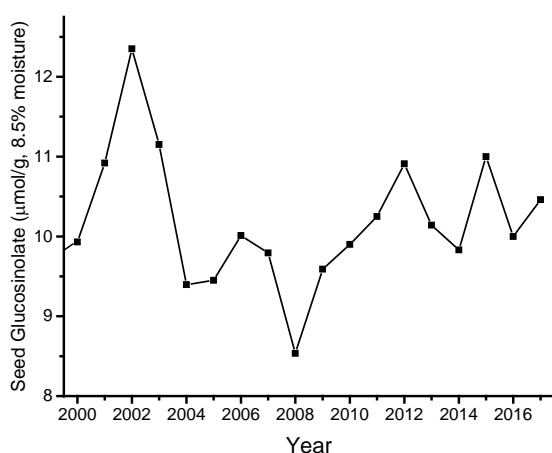
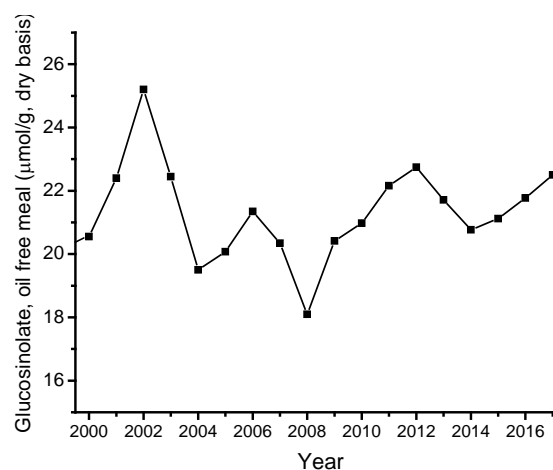


Figure 10 – Canola, No. 1 Canada - harvest samples, 2000–17

Total glucosinolate content of oil-free meal ($\mu\text{mol/g}$ seed, dry basis)



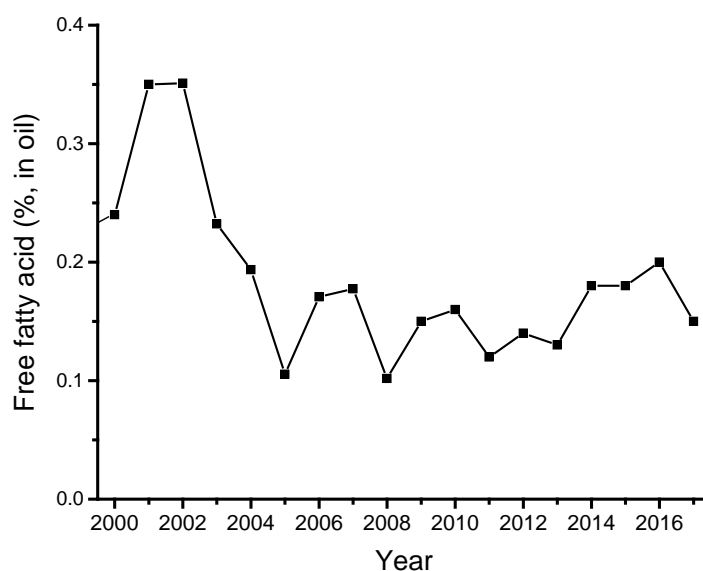
In 2017, 10 $\mu\text{mol/g}$ of total glucosinolates in the seed corresponded to 23 $\mu\text{mol/g}$ in oil-free meal on dry basis, very similar to the 5-year average (22 $\mu\text{mol/g}$ dry basis) and the 2016 harvest average (22 $\mu\text{mol/g}$ dry basis) (Figure 10). This calculated value agrees to the canola definition (less than 30 μmol of total glucosinolates per g of oil-free meal on dry basis). However, it gives an overestimation of total glucosinolate in canola meal obtained from Canadian conventional crushing plants (expeller press followed by solvent extraction) since it assumes that 100% of the oil was recovered from the seed during crushing and that no glucosinolate was destroyed during processing, which is not the case.

Free fatty acids content

The average free fatty acids (FFA) content of the oil for the 2017 canola is 0.15%, slightly lower than what was observed in 2016 (0.20%) (Tables 1 and 4, Figure 11). This level is similar to the 5-year average of 0.17% (Table 1). FFA average in Canola, No. 1 Canada samples from Alberta-Peace River (0.18%) was slightly higher than what was found in Manitoba (0.15%) and Saskatchewan (0.13%) (Table 4). Manitoba FFA average contents were much lower in 2017 (0.15%) than in 2016 (0.34%) due to the very good harvest conditions observed in Manitoba in 2017 when compared to 2016. The large variations observed in the 2016 crop for the FFA averages were not seen for the 2017 Canola, No. 1 Canada crop; FFA averages ranged from 0.08% (Saskatchewan Crop District 7) to 0.24 % (Alberta-Peace River Crop District 7).

Samples graded Canola, No. 2 Canada presented FFA levels much higher than samples graded Canola No. 1, Canada, 0.35% versus 0.15% (Table 4). There was no significant difference between Saskatchewan and Alberta-Peace River averages regarding the FFA averages. We had only one sample from Manitoba that was graded Canola, No. 2 Canada, the downgrading was due to seed damage as the seeds presented an orange tint. Usually, that orange tint is an indication of seed degradation and oxidation; this was confirmed by the very high FFA content obtained for that sample (0.75%) (Table 4).

Figure 11 – Canola, No. 1 Canada - harvest samples, 2000–17
Free fatty acid content (in % as oleic acid)



In December (2017), free fatty acids level of commercially clean Canola, No.1 Canada exports averaged 0.15% (0.27% for the 2017 August to November exports). The free fatty acids level of individual commercially clean Canola, No.1 Canada exports ranged from 0.13 to 1.19%. The FFA average of the

August to December 2017 non-commercially clean Canola, No.1 Canada exports was 0.72%, individual exports ranged from 0.18 to 2.04% (Table 6).

Over the year, it has also been noticed that FFA levels can increase during the shipping season as storage condition can affect the activation of the seed hydrolytic enzymes leading to FFA production. We also observed that free fatty acids in canola seed can be high due to field heat stress (high temperatures during the growing season) or to high seed moisture and sprouting due to precipitations at harvest and they could vary from load to load.

Fatty acid composition

The average level of erucic acid in the 2017 crop was 0.01%, which is identical to what was observed for the last 5 years (0.01%) (Tables 1, 5, Figure 12). Similar to the total glucosinolate content, these low values are a direct result of breeding efforts of the Canadian canola industry.

For Canola, No.1 Canada samples, mean α -linolenic acid (C18:3) was 9.5%, similar to what was observed in 2016 (9.6%) and similar to the 5-year average (9.5%) (Table 1, Figure 13). This year, the α -linolenic acid averages were lower in Manitoba (9.3%) than in Saskatchewan (9.5%). Alberta-Peace River had the highest average (9.7%) (Table 5).

The total content of poly-unsaturated fatty acids or PUFA was 28.4, 28.4 and 28.5% in Manitoba, Saskatchewan and Alberta-Peace River, for a western Canada average of 28.5%. For canola, the PUFA contents are directly related to the contents α -linolenic acid (C18:3) and linoleic acid (C18:2). This year, the ratio omega-6/omega-3 (linoleic acid/ α -linolenic acid) was 1.94 compared to 1.97 in 2016.

For Canola, No.1 Canada samples, mean oleic acid (C18:1) content of the 2017 crop is 62.9%, slightly higher than what was observed in 2015 (62.6%) and identical to the 5-year mean (62.9%) (Table 1, Figure 14). Oleic acid contents were similar in Manitoba (62.9%), Saskatchewan (63.0%) and Alberta-Peace River (62.8%) (Table 5). The total content of mono-unsaturated fatty acids (MUFA) was 64.5, 64.6 and 64.5% in Manitoba, Saskatchewan and Alberta-Peace River, for a Western Canada average of 64.6%.

The fatty acid composition (oleic acid, linoleic acid and α -linolenic acid) of the 2017 crop presented little to no difference when compared to the 2016 fatty acid composition (+0.3%, +0.0% and -0.1% for oleic, linoleic and linolenic fatty acid contents). This led to an identical iodine value average for 2017 and 2016, 113.1 units (Table 1, Figure 16). For Canola, No. 1 Canada, the iodine value averages were 112.8, 113.1 and 113.3 units for Manitoba, Saskatchewan and Alberta-Peace River, respectively, reflecting the similar contents in both α -linolenic acid (C18:3) and linoleic acid (C18:2) (Table 5). This year, iodine value of individual samples ranged from 106.5 to 118.8 units.

Samples graded Canola, No. 2 Canada showed higher iodine value averages, with higher linoleic and α -linolenic acid contents and lower oleic acid contents than the samples Canola, No. 1 Canada (Table 5).

Average of saturated fatty acid content was 6.5% in 2017, slightly lower than the 2016 average (Tables 1 and 5). Since 2009, the saturated fatty acid content averages varied from 6.6 - 6.9% (Table 1, Figure 17). In 2017, the saturated fatty acid content averages were similar for the 3 provinces, (6.6, 6.5 and 6.5% for Manitoba, Saskatchewan and Alberta-Peace River, respectively). Total saturated fatty acids are usually affected by temperature, high temperatures lead to higher oil saturation.

For the first 5 months of the 2017-18 shipping season, α -linolenic acid averages for clean samples ranged from 8.6 to 10.1%, averaging 9.7 and 9.5% in December and in August-November respectively for commercially clean exports (Table 6). This is similar to what was observed during last shipping season (9.6%). When compared to last year's average, iodine value averages ranged from 111.3 to 114.1 units (until December 2017) similar to what was observed during the last shipping season (average 113.3 units). It is likely that the iodine value will remain similar to what was observed last year. The level of saturated fatty acids until December 2017 canola (6.5%) exports remained very similar to 2016-17 means (6.6%). It is expected that levels of erucic acid will remain very low for the new shipping season (below 0.1%) since erucic acid contents were very low in the 2017 harvest.

Figure 12 – Canola, No. 1 Canada, erucic acid content of harvest samples, 2000-17

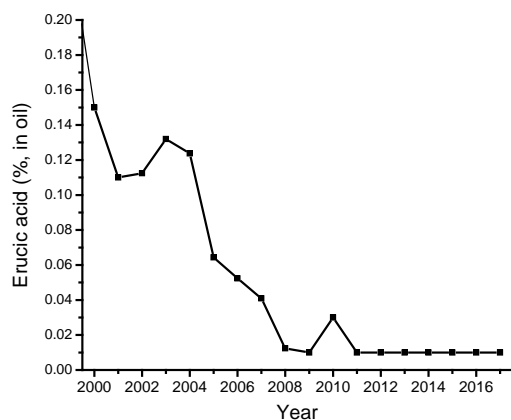


Figure 13 – Canola, No. 1 Canada, α -linolenic acid content of harvest samples, 2000-17

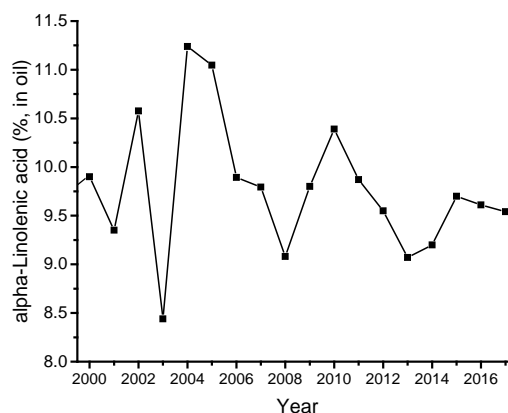


Figure 14 – Canola, No. 1 Canada, oleic acid content of harvest samples, 2000-17

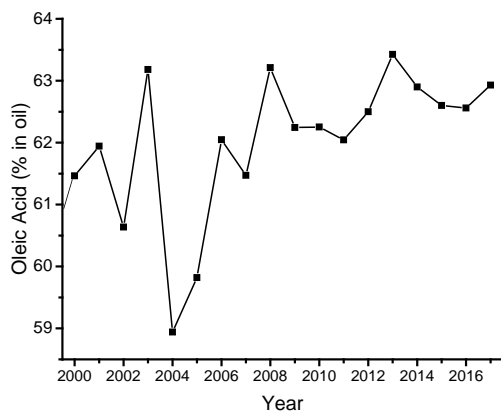


Figure 15 – Canola, No. 1 Canada, linoleic acid content of harvest samples, 2000-17

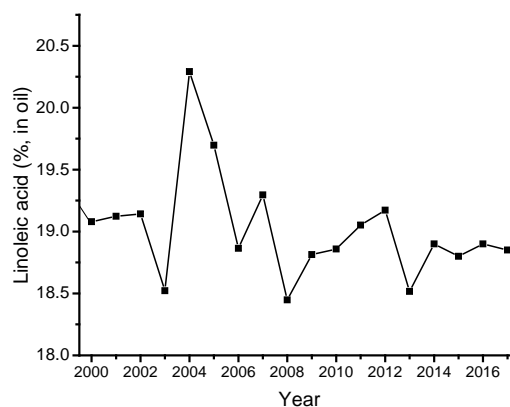


Figure 16 – Canola, No. 1 Canada, iodine value of harvest samples, 2000-17

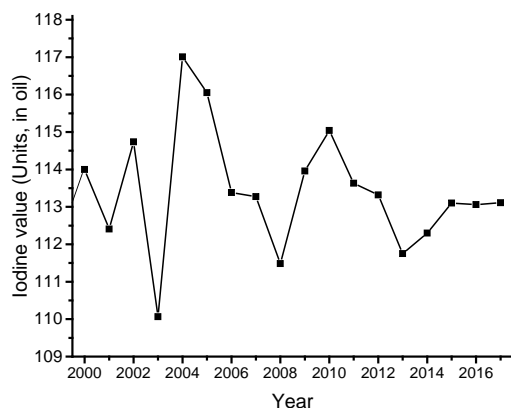


Figure 17 – Canola, No. 1 Canada, total Saturated fatty acid content of harvest samples, 2000-17

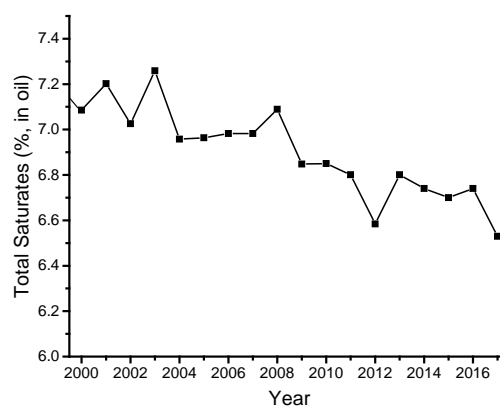


Table 3 – 2017 Harvest sample program
Canola quality data by grade and province – Oil, protein and chlorophyll contents

	Number of samples	Oil content ¹			Protein content ²			Chlorophyll content ⁵		
		%			%			mg/kg		
		mean	min.	max.	mean	min.	max.	Mean	min.	max.
Canola, No. 1 Canada										
Manitoba	428	45.0	40.2	51.2	19.9	14.8	24.5	9	4	26
Saskatchewan	994	45.3	38.2	51.1	19.8	15.8	27.9	11	4	27
Alberta-Peace River ³	691	44.7	36.9	50.8	20.7	14.7	29.3	13	4	40
Western Canada⁴	2113	45.0	36.9	51.2	20.1	14.7	29.3	11	4	40
Canola, No. 2 Canada										
Manitoba	1	39.8			24.0			10		
Saskatchewan	16	43.7	40.5	47.6	21.4	17.7	26.7	28	4	48
Alberta-Peace River ³	60	44.0	40.2	50.3	20.5	14.7	24.1	36	4	61
Western Canada⁴	77	43.9	39.8	50.3	20.7	14.7	26.7	34	4	61
Canola, No. 3 Canada										
Western Canada⁴	27	43.7	38.0	48.7	20.4	16.6	23.7	61	4	95
Canola, Sample Canada										
Western Canada⁴	21	43.0	35.9	47.5	19.3	15.5	22.6	47	4	124

¹ 8.5% moisture basis

² N x 6.25; 8.5% moisture basis

³ Includes part of the Peace River area that is in British Columbia

⁴ Values are weighted averages based on production by province as estimated by Statistics Canada

⁵ Individual canola samples are analyzed by Near-InfraRed Spectroscopy, the accurate limit of quantification for chlorophyll is 4 mg/kg

Table 4 – 2017 Harvest sample program
Canola quality data by grade and province – glucosinolate and free fatty acid contents

	Number of samples	Glucosinolates ¹ μmol/g			Free fatty acids (%)
		mean	min.	max.	Mean
Canola, No. 1 Canada					
Manitoba	428	10	5	14	0.15
Saskatchewan	994	10	5	19	0.13
Alberta –Peace River ²	691	11	6	19	0.18
Western Canada ³	2113	10	5	19	0.15
Canola, No. 2 Canada					
Manitoba	1	10			0.75
Saskatchewan	16	11	6	14	0.31
Alberta-Peace River ²	60	11	6	16	0.36
Western Canada ³	77	11	6	16	0.35
Canola, No. 3 Canada					
Western Canada ³	27	12	6	14	0.55
Canola, Sample Canada					
Western Canada ³	21	12	7	16	0.48

¹ 8.5% moisture basis

² Includes part of the Peace River area that is in British Columbia

³ Values are weighted averages based on production by province as estimated by Statistics Canada

Table 5 – 2017 Harvest sample program

Canola quality data by grade and province – fatty acid composition, total saturate content and iodine value of the oil

	Relative fatty acid composition of the oil (%)					Total saturates ³	Iodine value ⁴
	C18:0	C18:1	C18:2	C18:3	C22:1	(%)	(Units)
<u>Canola, No. 1 Canada</u>							
Manitoba	1.7	62.9	19.1	9.3	0.00	6.6	112.8
Saskatchewan	1.7	63.0	18.8	9.5	0.02	6.5	113.1
Alberta-Peace River ¹	1.7	62.8	18.8	9.7	0.01	6.5	113.3
Western Canada²	1.7	62.9	18.9	9.5	0.01	6.5	113.1
<u>Canola, No. 2 Canada</u>							
Manitoba	2.0	62.4	20.2	7.2	0.11	7.1	109.2
Saskatchewan	1.6	61.4	19.6	10.3	0.00	6.4	115.2
Alberta-Peace River ¹	1.7	61.8	19.2	10.0	0.00	6.6	114.0
Western Canada²	1.7	61.7	19.4	10.0	0.01	6.6	114.3
<u>Canola, No. 3 Canada</u>							
Western Canada²	1.6	61.4	19.3	9.9	0.12	6.7	113.7
<u>Canola, Sample Canada</u>							
Western Canada²	1.7	61.8	19.2	9.8	0.12	6.7	113.5

¹ Includes part of the Peace River area that is in British Columbia

² Values are weighted averages based on production by province as estimated by Statistics Canada

³ Total saturated fatty acids are the sum of palmitic (C16:0), stearic (C18:0), arachidic (C20:0), behenic (C22:0), and lignoceric (C24:0)

⁴ Calculated from fatty acid composition

Table 6 – Canola, No. 1 Canada
Comparison of the quality data of 2017 harvest sample averages with export shipment average

Canola, No. 1 Canada - only	2017 Harvest program	Export			
		Commercially Clean			Non Commercially Clean
		December 2017	August to October 2017	Previous shipping year 2016-17	August to December 2017
Quality parameter					
Oil content¹ (%)	45.0	43.9	43.9	43.7	43.9
Protein content² (%)	20.1	20.6	20.6	20.2	20.3
Oil-free protein content² (%) at 12% moisture (%)	38.0	38.0	38.0	37.2	37.6
Chlorophyll (mg/kg seed)	11	17	13	14	14
Total glucosinolates¹ of the seed (µmol/g seed)	10	11	11	12	13
Free fatty acids, %	0.15	0.27	0.41	0.36	0.72
Erucic acid (% in oil)	0.01	0.01	0.01	0.02	0.02
Oleic acid (% in oil)	62.9	62.7	63.0	62.4	62.7
α-Linolenic acid (% in oil)	9.5	9.7	9.5	9.7	9.6
Total saturated fatty acids³ (% in oil)	6.5	6.6	6.6	6.7	6.6
Iodine value	113.1	113.3	112.9	113.3	113.3
MUFA	64.6	64.4	64.7	64.1	64.4
PUFA	28.5	28.5	28.2	28.6	28.5
Distinctly green seed (DGR, %)	0.41	0.99	0.53	0.51	0.55
Dockage (%)	0.00	1.92	1.82	1.85	2.79
Loading moisture (%)	NA	8.2	7.7	8.12	7.88
Number of export samples	NA	27	82	265	16
Tonnage (tonnes)	NA	961,155	2,947,302	9,581,235	580,372

¹ 8.5% moisture basis

² Calculated using N x 6.25

³ Total saturated fatty acids are the sum of palmitic (C16:0), stearic (C18:0), arachidic (C20:0), behenic (C22:0), and lignoceric (C24:0).

⁴ CC = Commercially Clean

⁵ NCC = Not commercially clean
NA = Non applicable