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Quality of western Canadian Canola 2013

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Acknowledgments

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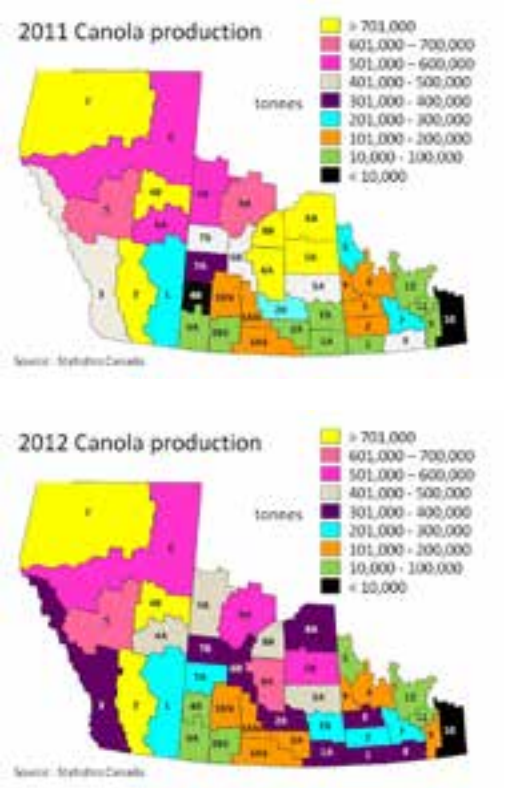
Introduction

This report presents quality data and information based on the Canadian Grain Commission's 2013 harvest survey 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 2011 and 2012 production data.

Figure 1 –Map of prairie provinces showing the 2011 and 2012 production for canola per crop district



Source: Statistics Canada

Summary

The 2013 harvest had a high percentage of samples that graded Canola, No. 1 Canada (93.7%). This percentage is much higher than the percentage for the 2012 harvest (82.0%) (Figure 4) and is the highest percentage since 2005. The 2008 harvest is the only other year with comparable results (94.7%). Some variations in grade distribution, however, were observed in 2013. Less than 65% of samples from some areas of Alberta graded Canola, No. 1 Canada (Figure 5).

The western Canadian canola crop (Canola, No.1 Canada) was characterized by a significant increase in oil (44.8 versus 43.5%) and lower protein content (19.7 versus 21.3%), compared to the 2012 crop (Table 1). Average chlorophyll content was lower in 2013 than in 2012 and 2011 (12.0 mg/kg versus 17.4 and 15.9 mg/kg, respectively) (Table 1). The crop had a higher oleic acid content and lower linoleic acid and α-linolenic acid content when compared to the 2012 crop (63.4 versus 62.5, 18.5 versus 19.2 and 9.1 versus 9.6% for oleic, linoleic acid, and α-linolenic acid respectively). Total saturated fatty acid content was slightly higher than what was observed in 2012 (6.8 versus 6.6%). This resulted in much lower iodine value, compared to 2012 (111.7 versus 113.3 units). Mean free fatty acid levels in Canola, No.1 Canada seed was similar than what was observed in 2012 (0.13 versus 0.14%) (Table 1).

Table 1 – Canola, No. 1 Canada: Quality data for 2013 harvest survey

Quality parameter	2013	2012	2011	2008-2012 Mean
Number of received samples	1676	2108	1749	
Number of Canola, No. 1 Canada samples	1569	1716	1492	1487
Oil content [1] (%)	44.8	43.5	45.2	44.4
Protein content [2] (%)	19.7	21.3	19.6	20.3
Oil-free protein[2] (%)	37.5	40.6	38.8	40.3
Chlorophyll content (mg/kg in seed)	12.0	17.4	15.9	14.5
Total glucosinolates[1] (μmol/g)	10	11	10	10
Free fatty acids (%)	0.13	0.14	0.12	0.13
Oleic acid (% in oil)	63.4	62.5	62.1	62.5
Linoleic acid (% in oil)	18.5	19.2	19.1	18.9
α-Linolenic acid (% in oil)	9.1	9.6	9.9	9.7
Erucic acid (% in oil)	0.01	0.01	0.01	0.01
Total saturated fatty acids[3] (% in oil)	6.8	6.6	6.8	6.8
Iodine value	111.7	113.3	113.6	113.2
Total mono-unsaturated fatty acids (MUFA)[4] (% in oil)	65.1	61.7	61.4	64.1
Total poly-unsaturated fatty acids (PUFA)[5] (% in oil)	27.7	31.4	31.5	28.6

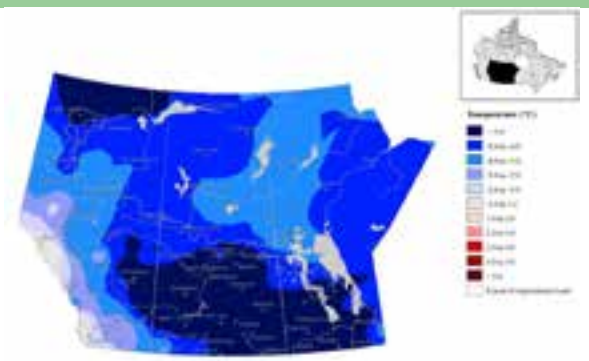
[1] 8.5% moisture basis
[2] N x 6.25, 8.5% moisture basis
[3] Total saturated fatty acids are the sum of palmitic (C16:0), stearic (C18:0), arachidic (C20:0), behenic (C22:0), and lignoceric (C24:0).
[4] Total mono-unsaturated fatty acids are the sum of palmitoleic (C16:1), oleic (C18:1), eicosenoic (C20:1), erucic (C22:1), and nervonic (C24:1) acids.
[5] Total poly-unsaturated fatty acids are the sum of linoleic (C18:2),linolenic (C18:3) and eicosadienoic (C20:2) acids.
Results were calculated using western Canadian averages for each grade; provincial averages were weighted using Statistics Canada production estimate and of the grade distribution for each crop district.

Weather and production review

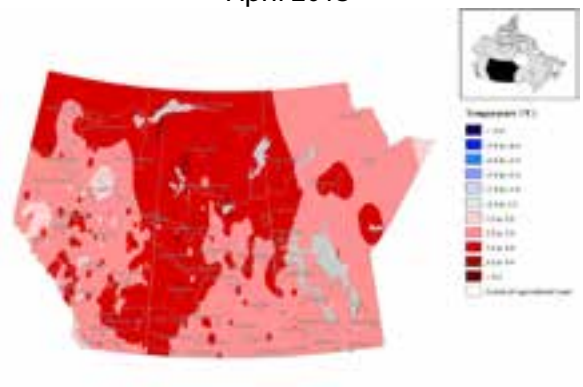
Weather review

As in 2011 and 2012, extreme conditions seemed to be the norm for the 2013 growing season – cool in April and a lot warmer in September. The mean temperature difference from normal for April 2013 was approximately -4º to -5ºC in the growing area (Figure 2a). The mean temperature difference from normal for September 2013 was 2.0º to 4.0ºC in the growing area (Figure 2b). Winter produced heavy snow fall, and the snow melted slowly due to cooler than normal temperatures in April. Seeding was delayed by 2 to 3 weeks, compared to 2012 (Figure 3). Temperatures in early June were normal to slightly below normal averages, but late June and early July were warmer than normal. During the last 2 weeks of July and the first week of August, temperatures were also below normal. During the night, temperatures were close to freezing in some areas. In late August, temperatures rose and were higher than normal in September. Harvest was delayed one to 2 weeks compared to 2012, but proceeded at a faster pace due to warmer than normal conditions in September.

Figure 2 Maps – Monthly mean temperature difference from normal (Prairies) in Canada during the 2013 growing season



April 2013



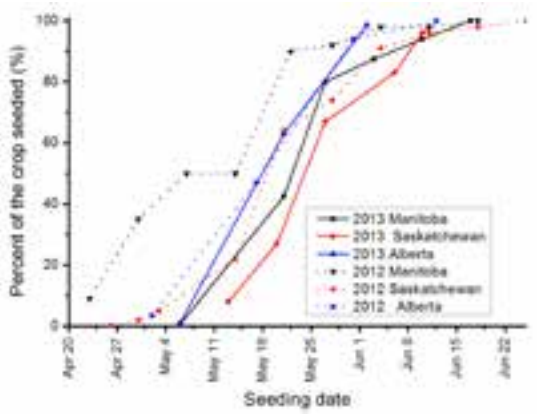
September 2013

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

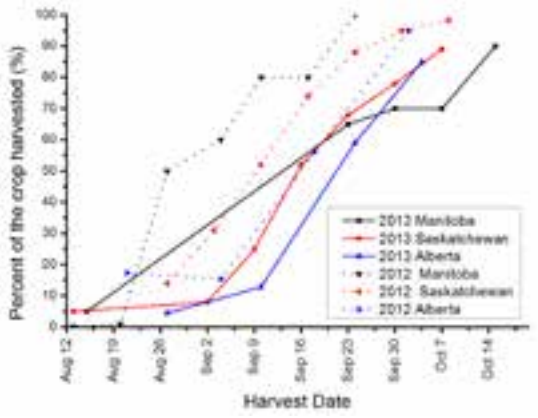
Cooler temperatures and normal precipitation during the development of the crop, followed by warmer than normal temperatures at harvest without any frost, were ideal environmental conditions for canola production in 2013.

Seeding and harvest progress for each province is 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/index.html. Saskatchewan: http://www.agriculture.gov.sk.ca/crop-report Alberta: http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/sdd4191

Figure 3 – Seeding and harvest progress in Manitoba, Saskatchewan and Alberta for the 2013 and 2012 growing seasons (Source: Data reported by provincial crop reports)



Seeding progress – 2013 growing season



Harvest progress – 2013 growing season

Production

Western Canadian farmers planted just over 8.0 million hectares of canola in 2013, about 10% less than in 2012 (Table 2). Statistics Canada reported that the 2013 western Canada mean yield was 2,200 kg/ha.This is well above the 1,600 kg/ha mean observed in 2012, the 1,900 kg/ha mean in 2011 (then considered as a record yield), and the 5-year mean of 1,860 kg/ha. Production (17.876 million metric tonnes) is the highest recorded in Canada, about a 20% increase compared to production in 2012 and above the 5-year production average (13.266 million tonnes).

Production in Manitoba, Saskatchewan and Alberta/British Columbia accounted for 16.0, 49.9, and 34.0% (12.0, 50.7 and 37.3% in 2012) of total canola production, respectively (Table 2). Observed yields in all the western provinces (Manitoba: 2,300 kg/ha, Saskatchewan: 2,100 kg/ha and Alberta/British Columbia: 2,500 kg/ha) were much higher than the previous record in western Canada of 1,900 kg/ha in 2011.

Table 2 - Seeded area and production for western Canadian canola

	Seeded area			Production[1]		
	thousand hectares			thousand tonnes		
	2013	2012	2008-2012	2013	2012	2008-2012
Manitoba	1,276.8	1,446.8	1,297.0	2,871.2	2,100.1	2,306.1
Saskatchewan	4,249.2	4,694.4	3,711.0	8,917.6	6,486.4	6,280.2
Alberta[2]	2,501.0	2,719.5	2,336.3	6,087.5	5,180.0	4,679.6
Western Canada	**8,027.0**	**8,860.7**	**7,344.3**	**17,876.3**	**13,766.5**	**13,265.9**

[1] For all production data please consult Statistics Canada's website at: http://www5.statcan.gc.ca/cansim/a26;jsessionid=B55793B90E933D944C2FBD3D8EEF92C0?lang=eng&retrLang=eng&id=0010010&tabMode=dataTable&srchLan=-1&p1=-1&p2=9

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

Harvest survey samples and grade distribution

Samples for the Canadian Grain Commission canola harvest survey were collected from producers, crushing plants and grain handling offices across western Canada. The samples were cleaned to remove dockage prior to testing. Individual harvest survey samples were analyzed for oil, protein, chlorophyll and total glucosinolates using a NIRSystems 6500 scanning near-infrared spectrometer. Canadian Grain Commission grain inspectors assigned grade levels based on the Official Grain Grading Guide for Canola and Rapeseed (Chapter 10): http://www.grainscanada.gc.ca/oggg-gocg/ggg-gcg-eng.htm .

This report is based on the analyses 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 Canada and Sample Canada samples by western Canada.

For this report, 1676 canola samples from the harvest survey were analysed. Specialty oil samples such as high oleic acid, low linolenic acid, and high erucic acid, were excluded from this report. Fewer canola samples were received than in 2012 (2,108), but the number was similar to what was collected in 2010 and 2011 (1,641 and 1,749 respectively).

Exports of commercially clean canola (from September to November 2013) contained, on average, 1.95% dockage. Dockage levels ranged from 0.90 to 2.00%, which will affect quality factors such as oil content, chlorophyll and free fatty acid content. Canola exports containing over 2.5% dockage are considered not commercially clean and will have even greater reductions in measured quality components. The composition of harvest survey samples from 2013 was compared to 2012 results and to long-term harvest survey means (Tables 3, 4 and 5). Comparison with the quality of Canadian canola export shipments is provided in Table 6. Tables 7, 8 and 9 present quality parameters for crop districts in Manitoba, Saskatchewan and Alberta (plus the Peace River area of British Columbia).

In 2013, 93.7% of samples graded Canola, No. 1 Canada. This number is higher than the percentage observed in 2012 (82.0%) (Figure 4) and the 5-year average (85.0%). Grade distribution varied from crop district to crop district (Figure 5). Saskatchewan had the highest percentage of samples that graded Canola, No. 1 Canada (96.9%), followed by Manitoba (94.9%). Alberta had the lowest percentage of samples that graded Canola, No. 1 Canada (88.5%), but this number is still higher than the percentage of Canola, No. 1 Canada observed overall last year. Alberta crop district No. 6 had the highest percentage of downgraded samples, where only 64.7% of samples were graded Canola, No. 1 Canada.

The main degrading factor in 2013 for Canola, No. 1 to Canola, No. 2. was high green seed count (distinctly green seed). Distinctly green seed values were 0.44, 2.29, 3.38 and 0.44% in samples graded Canola, No. 1 Canada, No. 2 Canada, No. 3 Canada and Sample, respectively. Most samples that were graded as Sample were downgraded because of admixture and not green seed count. Conspicuous admixture is material found in the sample after cleaning and is easily distinguished from canola without the use of magnification, as defined in the Official Grain Grading Guide.

Figure 4 – Canola samples received in harvest survey and the historical grade distribution, 2004-2013

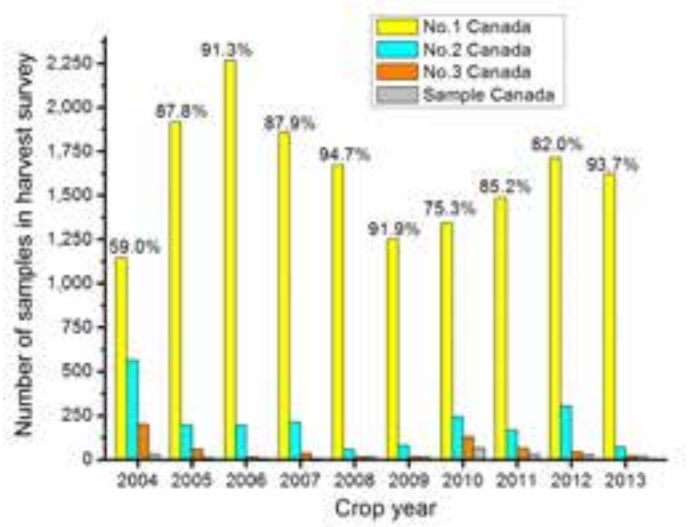
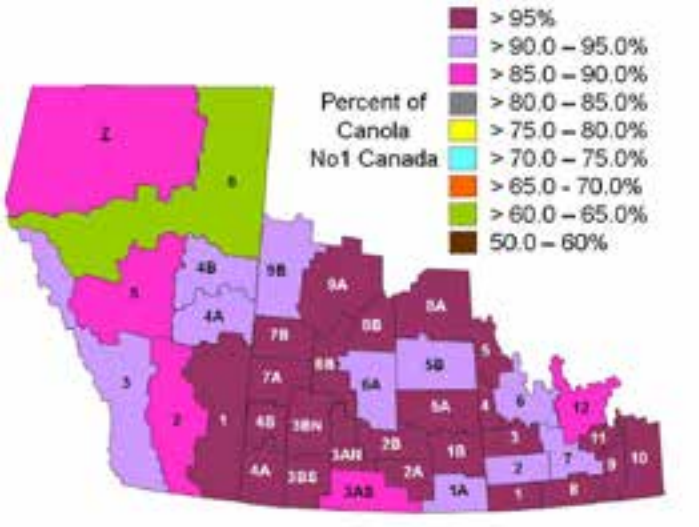


Figure 5 – Distribution of Canola, No. 1 Canada by crop district in prairie provinces, samples received in 2013



Comparisons to export shipment data

Tables 3 to 5 show detailed information on the quality of western Canadian canola harvested in 2013, whereas Table 6 compares the quality of the 2013 harvest to the quality of recent canola exports. It is important to note that the number 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 means were calculated from results for each crop district weighted by the averages of 2010-12 total production (Statistic Canada) and the estimate of grade distribution from crop reports (Figure 5).

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.

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 and will have even greater reductions in measured quality components.

Oil content

Mean oil content (44.8%) of Canola No.1 Canada was higher than the 2012 average (43.5%) (Table 1). This mean is very close to the record mean observed in 2011 (45.2%) (Figure 6)and is higher than the 5-year (2008-12) mean of 44.4% (Table 1, Figure 6). Mean oil content in Manitoba (43.8%) was lower than in Saskatchewan (45.4%) and Alberta (45.0%) (Table 3, 7, 8 and 9). The oil content of individual Canola No.1 Canada samples harvested in 2013 by producers across western Canada ranged from 37.9 to 49.1% in Manitoba; 39.1 to 51.2% in Saskatchewan; and 38.3 to 51.0% in Alberta (Table 3).

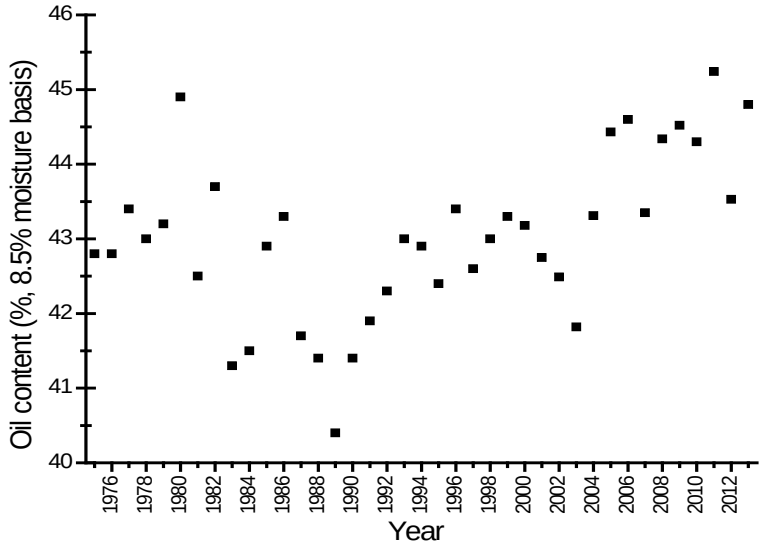
Mean oil content for Canola, No. 2 Canada (44.0%) was lower than the mean for, No. 1 Canada, (44.8%); the oil content for No. 2 Canada samples ranged from 37.8 to 49.5% (Table 3).

Oil content is influenced by both genetics and environment. For any known canola variety, cool growing conditions will give higher oil content, compared to hot growing conditions. During the summer of 2013, temperatures in most parts of the prairies were cool from May to approximately the second week of August, except for during late June and early July (Figure 2).

Mean oil content of commercially clean canola exports of Canola No.1 Canada was 43.9% for November 2013 exports and 44.0% for August-October 2013 exports (Table 6). Oil content averages were lower in non-commercially clean exports (43.4 % for August-October 2013 exports). Mean oil content for the actual shipping season is higher than what was observed for last shipping season (43.2%). Mean oil content of exports since October is slightly lower than the 2013 harvest mean, but is up by 0.7% from the 2012-13 shipping season. The increase from the 2012-13 shipping season reflects the increase in the 2013 harvest. (Tables 1 & 6).

It is expected that the mean oil content of Canadian exports will be in the 44.0-45.0% range for most of the 2013-14 shipping season.

Figure 6 – Canola, No. 1 Canada
Oil content mean of harvest survey samples, 1975 - 2013



Protein content

Mean crude protein content was 19.7, 20.5, 20.1 and 18.8 for Canola, No.1 Canada, No. 2 Canada, and No. 3 Canada and Sample, respectively (Table 3). Mean protein content for Canola, No.1 Canada was lower in 2013 (19.7%) than in 2012 (21.3%) and similar to what was observed in 2011 (19.6%). This is lower than the 5-year mean (20.3%) by 0.6% (Table 1). Mean protein content was 20.6, 19.3 and 19.9% in Manitoba, Saskatchewan and Alberta, respectively with protein content of individual producer samples ranging from 14.7 to 26.3% for Canola, No. 1 Canada samples and from 14.8 to 25.1% for No. 2 samples (Table 3, 7, 8 and 9).

Figure 7 – Canola, No. 1 Canada
Protein content of harvest survey samples, 1975 – 2013

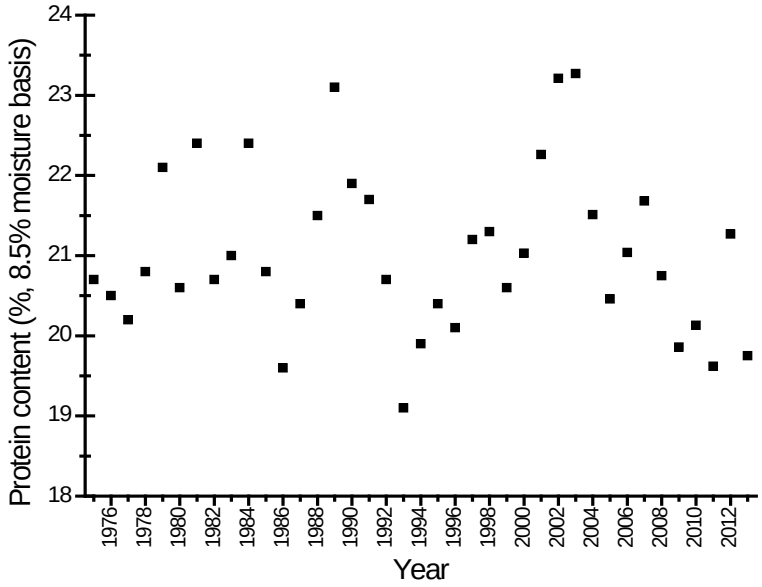
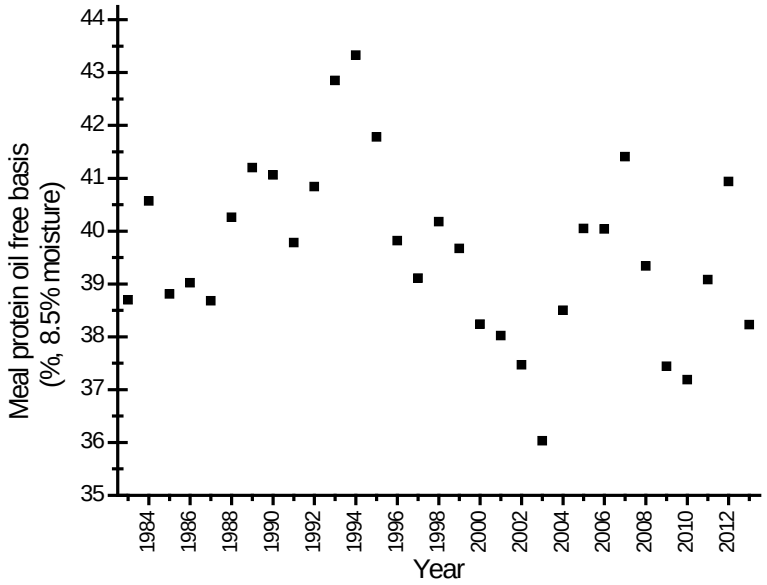


Figure 8 – Canola, No. 1 Canada
Meal protein content (oil-free basis) of harvest survey samples, 1983 – 2013



Protein content calculated to an oil-free meal at 8.5% moisture basis was 37.5%, which is significantly lower than what was observed in 2012 (40.6%) and in 2011 (38.8%) and well below 40.3%, which was calculated for the 5-year average (Table 1, Figure 8). The calculated protein content of the oil-free meal (100% defatted) was much higher in Manitoba (39.5%) than in Saskatchewan (38.2%) and Alberta (35.4%).

In canola, it is known that oil and protein content follow an inverse relationship – the lower the oil, the higher the protein content. Higher oil content was observed in 2013 compared to 2012. Lower protein content was expected in the 2013 canola harvest when compared to the 2012 averages.

Mean protein of Canola, No. 1 Canada commercially clean exports was 19.9%, both in November 2013 and August to October 2013 (Table 6). Protein content averages for the actual shipping season are lower than what was observed for last shipping season (21.0% for August 2012 to July 2013). The decrease in protein mean observed in the 2013 harvest is reflected in lower mean protein content observed for August-November 2013 exports when compared to the 2012 shipping season (Tables 6).

The average calculated protein content of the meal was 38.3% for the November 2013 commercially clean exports of Canola, No. 1 Canada.This result is about 1.4% lower than what was observed during last shipping season (averaged 39.7% for commercially clean exports of Canola, No. 1 from August 2012 to July 2013) (Table 6).

It is expected that the protein content of the Canadian exports will remain in the 19.5 to 20.0% range for most of the 2013-14 shipping season.

Chlorophyll content

Chlorophyll content averages of producer samples that graded Canola, No. 1 Canada were 11.1, 11.4 and 14.1 mg/kg in Manitoba, Saskatchewan and Alberta, respectively (Table 3). The overall average for Canola, No. 1 Canada was 12.0 mg/kg, significantly lower than 17.5 mg/kg and 15.9 mg/kg observed in 2012 and 2011, respectively (Table 3, Figure 9). Individual producer samples of Canola, No.1 Canada had chlorophyll levels ranging from 4.0 to 32.5 mg/kg (Manitoba), 4.0 to 41.3 mg/kg (Saskatchewan) and 4.0 to 44.1 mg/kg (Alberta) (Table 3). The mean chlorophyll content of each western province varies greatly from year to year (Figure 9) due to environmental conditions. Once again, location had an important effect on chlorophyll levels in samples (Tables 7, 8 and 9). In 2013, compared to 2012, September was warmer than normal (Figure 2), and no frost was observed in September in most of the prairies, allowing the maturation of swathed canola.

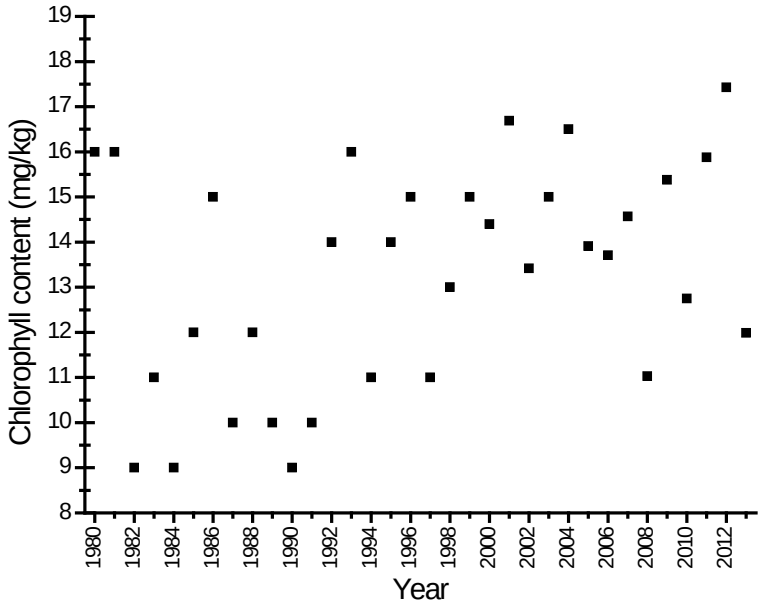
Chlorophyll levels (Table 3) for Canola, No. 2 Canada samples averaged 26.6 mg/kg, lower than what was observed in 2012 (34.5 mg/kg). Samples that graded Canola, No. 3 Canada had an average chlorophyll content of 25.0 mg/kg, which was much lower than 49.6 mg/kg, the average observed in 2012 http://www.grainscanada.gc.ca/canola/harvest-recolte/2012/hqc12-qrc12-eng.htm .

To be graded Canola, No. 1 Canada samples must contain no more than 2% distinctly green seed. Distinctly green seed averages were, 0.44% in Manitoba (0.78% in 2012); 0.38% in Saskatchewan (1.02% in 2012); and 0.51% in Alberta (0.80% in 2012) for Canola, No. 1 Canada samples.

The chlorophyll content of Canadian canola exports is affected by distinctly green seed and dockage content, which must be no more than 2.5% for commercially clean exports. Dockage averages for Canola, No. 1 Canada were 1.93% for commercially clean cargoes for exports from August to November 2013 and 2.92% for the not-commercially clean exports from August to October 2013.

Since August 1st, 2013, distinctly green seed content for individual cargoes of Canola, No. 1 Canada ranged from 0.3 to 1.3%. Chlorophyll content averages of Canola, No. 1 Canada exports ranged from 9 to 24 mg/kg, with commercially clean exports having similar chlorophyll content than the not commercially clean exports (Table 6).

Figure 9 – Canola, No. 1 Canada
Chlorophyll content of harvest survey samples, 1980 – 2013

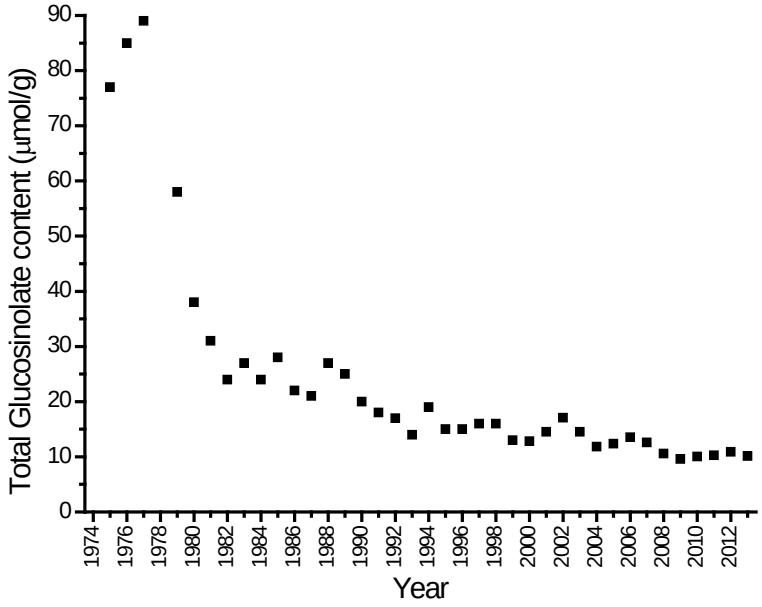


Chlorophyll content in the 2013 export data is lower than the 2012 chlorophyll content for Canola, No. 1 Canada. Distinctly green seed averages are higher for the export shipments than for harvest samples (Table 6). As exports also contain dockage (harvest survey samples contain no dockage), it is expected that chlorophyll content in the export data will be higher than in harvest data. It is also expected that the chlorophyll content in the export data will be lower than what was observed in 2012.

Glucosinolate content

Total glucosinolate content averaged 10 μmoles/gram, similar to what was observed in 2012 and 2011 (10 and 11 μmoles/gram, respectively). Since 2008, total glucosinolate content averages have remained in the 10 μmoles/gram range (Table 1, Figure 10). There were no real differences in total glucosinolates content among the various crop districts (Table 7, 8 and 9). This is a direct result of efforts by various breeding programs to maintain low glucosinolate content, and it is also linked to the Canadian canola registration program (Western Canadian Canola Rapeseed Registration Committee).

Figure 10 – Canola, No. 1 Canada
Total seed glucosinolate content of harvest survey samples, 1974 - 2013



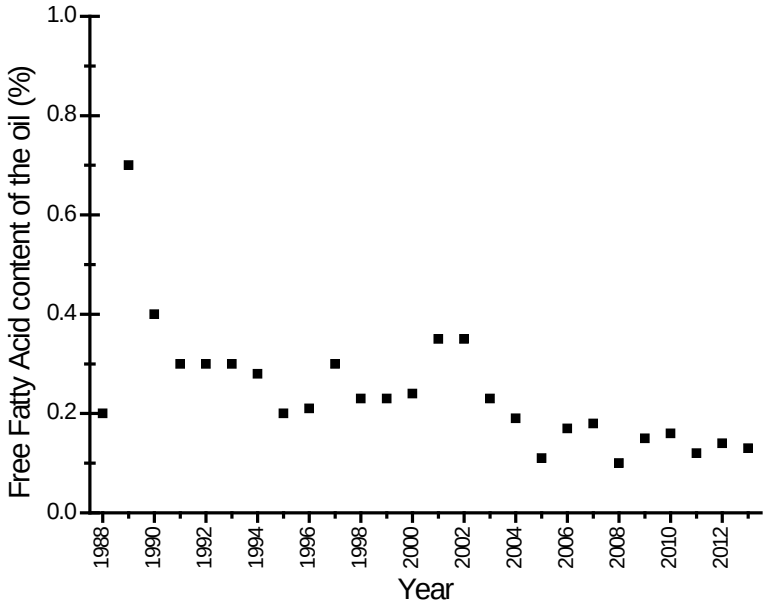
The average level of total seed glucosinolates in the November 2013 canola exports was 12 μmol/g of seed, similar to the average of the 2012-13 shipping season (14 μmol/g of seed) (Table 6). Glucosinolate content of canola exports for the 2013-2014 shipping season will remain similar to the averages observed during the 2012-2013 shipping season (Table 6).

Free fatty acid content

The average free fatty acid content of oil was 0.13%, comparable to what was observed in 2012 (0.14%) (Tables 1 and 4, Figure 11). This level is also similar to the five-year average of 0.13 (Table 1).

We have observed that free fatty acid in canola can be high if temperatures are high during the growing season, causing field heat stress; cool growing temperatures associated with no frost or precipitation in September are likely responsible for low free fatty acid levels in the 2013 canola harvest. Average free fatty acid levels in Canola, No.1 Canada samples from Manitoba (0.19%) and Alberta (0.16%) were slightly higher than in Saskatchewan (0.09%) (Tables 4, 7, 8 and 9). Free fatty acid levels may change after harvest if seeds are subjected to improper storage conditions.

Figure 11 – Canola, No. 1 Canada
Free fatty acid content of harvest survey samples, 1988 – 2013



In November, the average free fatty acid level for commercially clean Canola, No.1 Canada exports was 0.25% (0.27% for the August to October 2013 exports). These averages are similar to the averages for not commercially clean exports (0.22% for the August to October 2013 exports). Last year's average (0.31%) was also similar (Table 6). Little to no weather-related damage was observed in canola samples from the 2013 harvest survey (example: sprouting and water damage), resulting in low free fatty acid levels in the seeds.

Fatty acid composition

The average level of erucic acid in the 2013 crop was 0.01%, which is identical to what was observed for the last 3 years (0.01%) and to the five-year average of 0.01% (Tables 1, 5, 7, 8, and 9, Figure 12). Similar to total glucosinolate content, these low values are a direct result of breeding efforts of the Canadian canola industry.

For Canola, No.1 Canada samples, the mean α-linolenic acid (C18:3) was 9.1% lower that the mean observed in 2012 (9.6%) and the five-year average (9.7%) (Table 1, Figure 13). The α-linolenic acid mean in Manitoba (9.4%) was similar the α-linolenic acid mean observed in Alberta (9.3%), whereas the Saskatchewan mean (8.9%) was the lowest (Table 5, 7, 8 and 9). Hot conditions observed in the prairies in late August and in September were responsible for the decrease in α-linolenic acid content observed in 2013. The level of unsaturation, e.g. α-linolenic acid, is affected by temperature; high temperatures lead to lower levels of unsaturation (therefore lower α-linolenic acid) in the oil of canola seeds.

Figure 12 – Canola, No. 1 Canada
Erucic acid content of harvest survey samples, 1974 – 2013

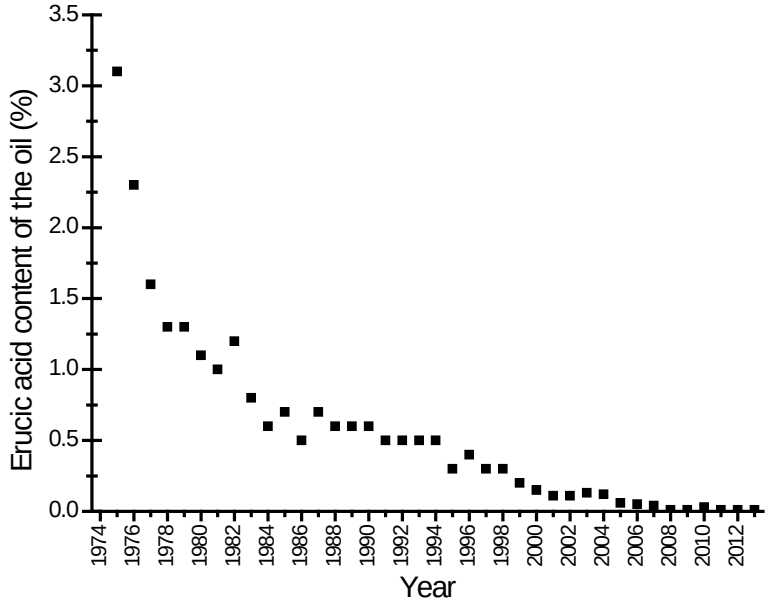
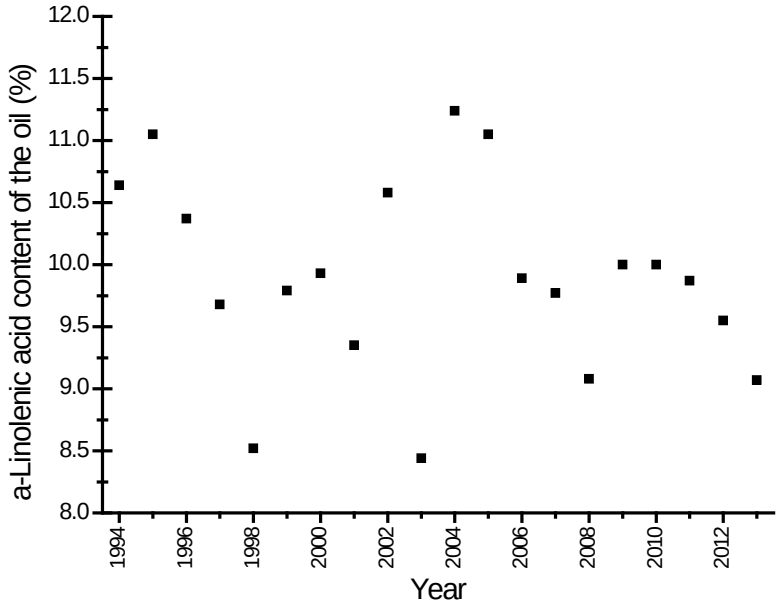


Figure 13 – Canola, No. 1 Canada
α-Linolenic acid content of harvest survey samples, 1994 - 2013



For Canola, No.1 Canada samples, the mean oleic acid (C18:1) content was 63.4%, about 1% higher than what was observed in 2012 (62.5%) (Table 1, Figure 14). The mean is also higher than the five-year mean (62.5%) by 1% (Table 1). On average, oleic acid content was lower in Manitoba (62.8%) than in Alberta (63.3%) and Saskatchewan (63.7%) (Tables 5, 7, 8, and 9). These results are somewhat unusual; in previous years, Manitoba was the province with the highest oleic acid content.

The linoleic acid (C18:2) average was lower than the 2012 average (18.5 versus 19.2%) for Canola, No. 1 Canada samples (Table 1).

Fatty acid composition (oleic acid, linoleic acid and α-linolenic acid) was very different when compared to 2012 results and led to very different iodine value averages. Iodine value was much lower than the 2012 observed iodine value (111.7 units in 2013 versus 113.3 units in 2012) (Table 1, Figure 15). For Canola, No.1 Canada, the lowest iodine value average was found in Saskatchewan (111.3 units), whereas Manitoba and Alberta had similar iodine value, 112.5 and 112.1 units, respectively (Table 5). Samples that graded Canola, No.2 Canada showed higher iodine value averages, with higher linoleic and α-linolenic acid content (Table 5).

Figure 14 – Canola, No. 1 Canada
Oleic acid content of harvest survey samples, 1994 - 2013

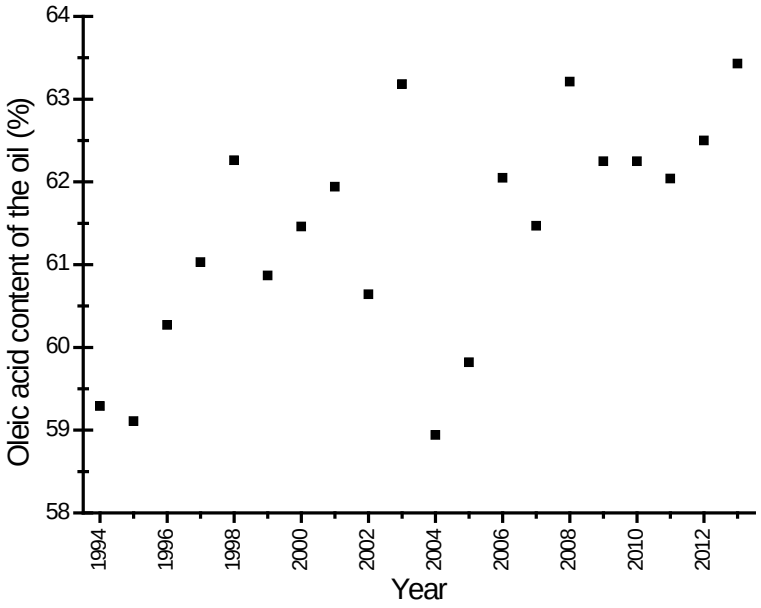
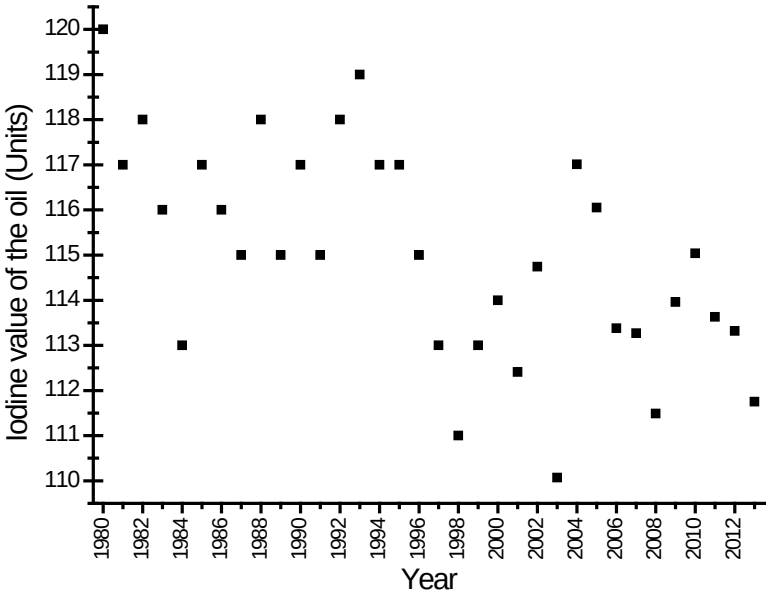
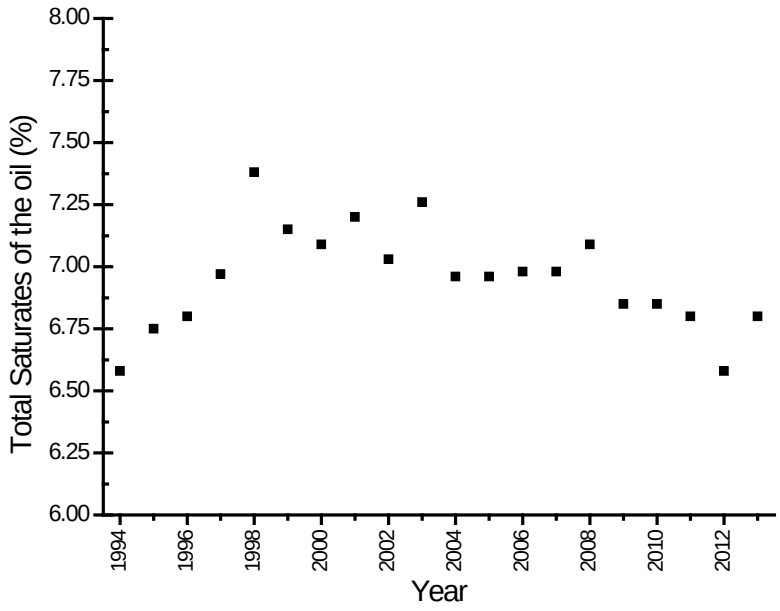


Figure 15 – Canola, No. 1 Canada
Iodine value of harvest survey samples, 1980 – 2013



The mean level of saturated fatty acids was 6.8% (Table 1). The overall average was slightly higher than 2012 average (6.6%) and similar to what was observed in 2009, 2010 and 2011 (6.8 - 6.9%) (Table 1, Figure 16). Mean saturated fatty acid levels were similar for the 3 provinces, (6.8, 6.9 and 6.7% for Manitoba, Saskatchewan and Alberta, respectively). However, crop district averages showed very different results, with some areas averaging levels very close to 7.0% and as high as 7.3% (Tables 7, 8 and 9). Total saturated fatty acids are usually affected by temperature.High temperatures lead to higher oil saturation. It is usually expected that total saturated fatty acid content varies among the 3 provinces, the southern part of the prairies having significantly higher temperatures than northern regions. It seems that this year, there was a relationship between the increase of saturate levels and the decrease of α-linolenic acid levels.

Figure 16 – Canola, No. 1 Canada
Total Saturated fatty acid content of harvest survey samples, 1994 - 2013



For the first 2 of months of the 2013-14 shipping season, α-linolenic acid averages for clean and not commercially clean samples were 9.3 to 9.1%, respectively (Table 6). This is lower than what was observed during last shipping season (9.7%). When compared to last year's average, iodine value averages were lower this year (111.6 to 111.8 units) until November 2013 than what was observed last year (113.4 units). The level of saturated fatty acids in the November 2013 canola exports remained very similar to the 2012-13 means (6.8% versus 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 content was very low in the 2013 harvest survey.

Table 3 – 2013 Harvest survey
Canola quality data by grade and province – Oil, protein and chlorophyll contents

	Number of samples	Oil content[1] %			Protein content[2] %			Chlorophyll content mg/kg		
		mean	min.	max.	mean	min.	max.	Mean	min.	max.
Canola, No. 1 Canada										
Manitoba	321	43.8	37.9	49.1	20.6	16.3	25.5	11.1	4.0	32.5
Saskatchewan	757	45.4	39.1	51.2	19.3	14.7	25.3	11.4	4.0	41.3
Alberta[3]	491	45.0	38.3	51.0	19.9	15.3	26.3	14.1	4.0	44.1
Western Canada[4]	**1569**	**44.8**	**37.9**	**51.2**	**19.7**	**14.7**	**26.3**	**12.0**	**4.0**	**44.1**
Canola, No. 2 Canada										
Manitoba	17	43.0	37.8	46.0	21.1	18.3	25.1	17.5	4.0	32.6
Saskatchewan	7	45.3	39.7	49.5	18.6	14.8	22.7	27.3	6.0	58.4
Alberta[3]	42	44.3	38.3	48.0	20.4	17.0	24.1	30.2	6.0	69.2
Western Canada[4]	**66**	**44.0**	**37.8**	**49.5**	**20.5**	**14.8**	**25.1**	**26.6**	**4.0**	**69.2**
Canola, No. 3 Canada										
Western Canada[4]	**22**	**44.1**	**40.5**	**46.6**	**20.1**	**16.9**	**23.3**	**25.0**	**4.0**	**63.1**
Canola, Sample Canada										
Western Canada[4]	**19**	**43.4**	**38.3**	**47.5**	**18.8**	**14.1**	**21.4**	**14.7**	**6.0**	**31.5**

[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

Table 4 – 2013 Harvest survey
Canola quality data by grade and province – glucosinolate and free acid acid contents

	Number of samples	Glucosinolates[1] µmol/g			Free fatty acids (%)
		mean	min.	max.	Mean
Canola, No. 1 Canada					
Manitoba	321	10.4	4.0	14.7	0.19
Saskatchewan	757	10.0	3.0	16.9	0.09
Alberta[2]	491	10.2	3.3	26.0	0.16
Western Canada[3]	**1569**	**10.1**	**3.0**	**26.0**	**0.13**
Canola, No. 2 Canada					
Manitoba	17	10.3	6.8	13.2	0.23
Saskatchewan	7	10.0	7.2	13.1	0.15
Alberta[2]	42	10.1	5.1	13.8	0.39
Western Canada[3]	**66**	**10.1**	**5.1**	**13.8**	**0.33**
Canola, No. 3 Canada					
Western Canada[3]	**22**	**9.9**	**6.1**	**13.8**	**0.27**
Canola, Sample Canada					
Western Canada[3]	**19**	**12.3**	**9.6**	**16.8**	**0.38**

[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 – 2013 Harvest survey
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)
Canola, No. 1 Canada							
Manitoba	1.8	62.8	18.8	9.4	0.02	6.8	112.5
Saskatchewan	1.9	63.7	18.5	8.9	0.01	6.9	111.3
Alberta[1]	1.7	63.3	18.5	9.3	0.02	6.7	112.1
Western Canada[2]	**1.8**	**63.4**	**18.5**	**9.1**	**0.01**	**6.8**	**111.7**
Canola, No. 2 Canada							
Manitoba	1.8	62.2	19.0	9.7	0.00	6.9	113.8
Saskatchewan	1.9	62.9	18.9	9.2	0.00	6.9	112.2
Alberta[1]	1.7	61.9	19.2	9.6	0.00	6.9	113.2
Western Canada[2]	**1.8**	**62.3**	**19.2**	**9.6**	**0.00**	**6.9**	**113.1**
Canola, No. 3 Canada							
Western Canada[2]	**1.8**	**62.2**	**19.2**	**9.4**	**0.06**	**6.9**	**112.8**
Canola, Sample Canada							
Western Canada[2]	**1.9**	**63.5**	**18.2**	**9.1**	**0.04**	**6.9**	**111.4**

[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
Comparisons of quality data for 2013 harvest survey with recent export shipment data

Canola, No. 1 Canada - only	2013 survey	Exports				
		November 2013		August to October 2013		Previous year 2012-13
Quality parameter		**CC[4]**	**NCC[5]**	**CC**	**NCC**	**CC**
Oil content[1] (%)	44.8	43.9	NA	44.0	43.4	43.2
Protein content[2] (%)	19.7	19.9	NA	19.9	20.1	21.0
Oil-free protein content[2] (%)	37.5	38.3	NA	38.4	38.2	39.7
Chlorophyll (mg/kg seed)	12.0	15.9	NA	16.0	15.2	24.0
Total glucosinolates (µmol/g seed)	10	12	NA	13	13	14
Free fatty acids, %	0.13	0.25	NA	0.27	0.22	0.31
Erucic acid (% in oil)	0.01	0.03	NA	0.02	0.04	0.02
Oleic acid (% in oil)	63.4	63.2	NA	63.1	63.2	62.4
α-Linolenic acid (% in oil)	9.1	9.1	NA	9.3	9.1	9.7
Total saturated fatty acids[3] (% in oil)	6.8	6.8	NA	6.7	6.8	6.6
Iodine value	111.7	111.6	NA	112.2	111.8	113.4
Distinctly Green seed (DGR, %)	0.43	0.81	NA	0.72	0.41	1.04
Dockage (%)	NA	1.93	NA	1.93	2.92	1.99
Loading moisture (%)	NA	7.8	NA	6.9	7.6	6.7
Number of export samples	NA	16	0	36	7	168
Tonnage	NA	650,760.0	NA	1,390,411.3	224,467.0	5,080,798.1

[1] 8.5% moisture basis
[2] N x 6.25; 8.5% moisture basis
[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

Table 7 – 2013 Harvest survey – Canola, No. 1 Canada quality data by crop district for Manitoba – oil, protein, meal protein (oil-free basis), total glucosinolates, free fatty acid (FFA), distinctly green seed (DGR) and fatty acid composition.

Crop District	Samples in Composite	Oil	Protein	Meal Protein	Chlorophyll	Glucosinolates	FFA	DGR	No. 1 Canada (%)
		%	%	%	mg/kg	µmol/g		%	
1	25	42.2	21.6	40.1	12	10	0.21	0.56	96.1
2	33	43.7	20.3	38.9	12	11	0.15	0.43	92.1
3	37	44.0	20.1	38.8	8	10	0.09	0.24	95.5
4	23	44.5	20.0	38.8	10	10	0.17	0.33	95.8
5	19	43.5	20.3	38.7	12	11	0.29	0.55	95.2
6	19	43.2	20.9	39.6	11	11	0.24	0.62	90.5
7	39	43.8	20.9	40.0	11	10	0.32	0.60	93.0
8	83	44.1	20.7	39.9	11	11	0.11	0.36	95.7
9&10	33	44.4	20.1	39.0	8	11	0.11	0.33	100.0
11	5	44.5	20.6	40.0	8	11	0.18	0.44	100.0
12	5	42.5	21.1	39.5	9	10	0.25	0.40	85.7
Manitoba	**321**	**43.8**	**20.6**	**39.5**	**11**	**10**	**0.19**	**0.44**	**94.9**

		Relative fatty acid composition of the oil (%)							
		C18:1	C18:2	C18:3	C22:1	SATS[1]	MUFA[2]	PUFA[3]	Iodine Value
									Units
1	25	63.4	18.3	9.4	0.00	7.0	65.1	27.5	111.3
2	33	63.3	18.6	8.8	0.00	7.0	64.9	27.5	111.2
3	37	62.7	18.5	9.7	0.00	6.8	64.5	28.3	112.9
4	23	63.5	18.2	8.6	0.34	7.0	65.6	27.0	110.5
5	19	63.6	18.4	9.0	0.00	6.9	65.2	27.4	111.3
6	19	63.2	18.8	8.9	0.00	7.0	64.8	27.7	111.4
7	39	62.8	18.9	9.4	0.00	6.7	64.5	28.3	112.7
8	83	62.2	19.1	9.7	0.00	6.7	63.9	29.0	113.8
9&10	33	61.7	19.2	10.5	0.00	6.5	63.3	29.7	115.0
11	5	62.3	19.5	9.7	0.00	6.4	63.9	29.2	113.9
12	5	63.0	18.9	8.7	0.00	7.3	64.7	27.6	111.0
Manitoba	**321**	**62.8**	**18.7**	**9.4**	**0.02**	**6.8**	**64.5**	**28.2**	**112.5**

[1] Total saturated fatty acids

[2] Total mono-unsaturated fatty acids

[3] Total poly-unsaturated fatty acids

Table 8 – 2013 Harvest survey - Canola, No. 1 Canada quality data by crop district for Saskatchewan – oil, protein, meal protein (oil-free basis), total glucosinolates, free fatty acid (FFA), distinctly green seed (DGR) and fatty acid composition.

Crop District	Samples in Composite	Oil	Protein	Meal Protein	Chlorophyll	Glucosinolates	FFA	DGR	No. 1 Canada (%)
		%	%	%	mg/kg	µmol/g		%	
1	43	43.8	20.3	38.9	14	11	0.11	0.54	95.8
2	79	45.4	19.4	38.5	10	10	0.05	0.39	97.6
3	44	45.4	19.3	38.3	11	10	0.06	0.36	97.9
4	15	45.7	18.8	37.6	10	11	0.02	0.33	100.0
5	154	45.1	19.7	38.8	11	10	0.12	0.35	96.3
6	126	45.2	19.1	37.8	11	10	0.06	0.31	95.6
7	106	45.9	18.6	37.3	11	9	0.02	0.32	98.2
8	97	44.7	19.4	37.9	11	10	0.11	0.36	98.0
9	93	45.5	19.1	38.0	11	9	0.11	0.48	95.9
Saskatchewan	**757**	**45.4**	**19.3**	**38.2**	**11**	**10**	**0.09**	**0.38**	**96.9**

		Relative fatty acid composition of the oil (%)							
		C18:1	C18:2	C18:3	C22:1	SATS[1]	MUFA[2]	PUFA[3]	Iodine Value
									Units
1	43	63.1	18.5	9.3	0.00	7.0	64.8	27.9	112.1
2	79	63.5	18.7	8.8	0.00	6.8	65.1	27.6	111.5
3	44	63.7	18.7	8.9	0.00	6.7	65.3	27.7	111.8
4	15	63.5	18.7	9.1	0.00	6.7	65.1	27.8	112.1
5	154	63.7	18.5	8.6	0.04	6.9	65.4	27.2	110.8
6	126	63.4	18.7	8.9	0.00	6.9	65.0	27.7	111.5
7	106	64.3	18.3	8.6	0.00	6.7	65.8	27.0	110.9
8	97	63.9	18.3	8.8	0.00	6.9	65.5	27.1	110.9
9	93	63.7	18.3	9.0	0.00	6.8	65.3	27.5	111.6
Saskatchewan	757	**63.7**	**18.5**	**8.9**	**0.01**	**6.9**	**65.3**	**27.4**	**111.3**

[1] Total saturated fatty acids

[2] Total mono-unsaturated fatty acids

[3] Total poly-unsaturated fatty acids

Table 9 – 2013 Harvest survey - Canola, No. 1 Canada quality data by crop district for Alberta – oil, protein, meal protein (oil-free basis), total glucosinolates, free fatty acid (FFA), distinctly green seed (DGR) and fatty acid composition.

Crop District	Samples in Composite	Oil	Protein	Meal Protein	Chlorophyll	Total Glucosinolates	FFA	DGR	No. 1 Canada (%)
		%	%	%	mg/kg	µmol/g		%	
1	17	46.2	18.7	37.9	9	10	0.06	0.34	100.0
2	72	45.5	19.5	35.0	10	10	0.17	0.54	89.2
3	43	44.7	19.8	34.2	16	10	0.17	0.64	90.0
4	184	44.9	20.1	35.7	13	11	0.12	0.39	91.8
5	70	44.2	20.7	35.7	20	10	0.17	0.72	87.8
6	21	43.1	21.4	36.4	18	10	0.26	0.85	64.7
7	84	45.1	19.3	34.6	14	10	0.18	0.33	86.8
Alberta	**491**	**45.0**	**19.9**	**35.4**	**14**	**10**	**0.16**	**0.51**	**88.5**

		Relative fatty acid composition of the oil (%)							
		C18:1	C18:2	C18:3	C22:1	SATS[1]	MUFA[2]	PUFA[3]	Iodine Value
									Units
1	17	63.5	18.5	9.1	0.00	6.7	65.1	27.7	111.9
2	72	64.0	18.3	8.9	0.00	6.7	65.6	27.2	111.3
3	43	64.2	18.1	8.6	0.00	6.9	65.9	26.8	110.4
4	184	63.8	18.3	9.1	0.00	6.7	65.4	27.5	111.7
5	70	62.7	18.7	9.5	0.00	6.8	64.5	28.3	112.7
6	21	62.4	18.6	9.8	0.00	6.9	64.1	28.5	113.1
7	84	62.2	18.9	9.9	0.11	6.6	64.0	28.9	113.7
Alberta	**491**	**63.3**	**18.5**	**9.3**	**0.02**	**6.7**	**65.0**	**27.8**	**112.1**

[1] Total saturated fatty acids

[2] Total mono-unsaturated fatty acids

[3] Total poly-unsaturated fatty acids