



Canadian Grain  
Commission

Commission canadienne  
des grains

ISSN 1700-2087

# Quality of western Canadian flaxseed

## 2017

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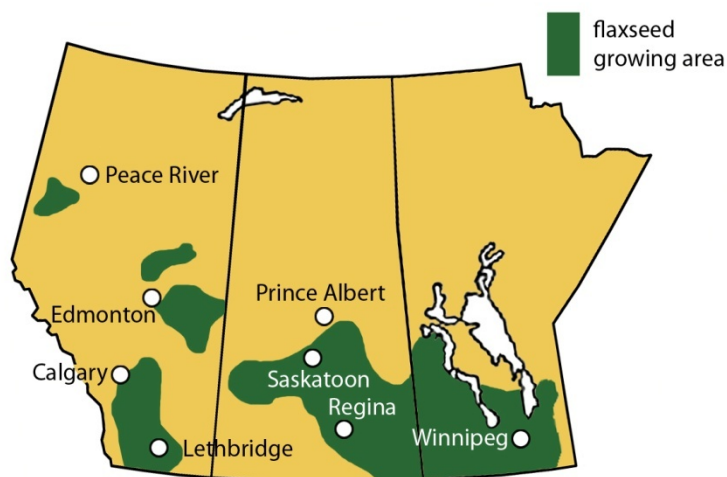
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# Introduction

This report presents quality data and information based on samples of western Canadian flaxseed from the Canadian Grain Commission's 2017 Harvest Sample Program. The quality data includes oil, protein, free fatty acids, fatty acid composition and iodine values of harvest samples submitted to the Grain Research Laboratory. Producers and grain companies submitted the samples throughout the harvest period. The map shows the Prairie provinces, the traditional growing areas for flaxseed in western Canada.

**Figure 1 – Map of Prairie provinces showing traditional growing areas for flaxseed**



Source: Flax Council of Canada

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# Summary

The Canadian Grain Commission's Harvest Sample Program of western Canadian flaxseed shows that the 2017 crop contains higher oil content and protein content and slightly higher iodine values when compared to the 2016 harvest.

Table 1 shows data for Flaxseed, No. 1 Canada Western. Oil content is 46.1%, which is higher than the 2016 mean (45.6%) and the 10-year mean (45.5%). Protein content is 23.2% and is higher than the 2016 mean (21.9%) and the 10-year mean (22.2%). Iodine value is 192.5 units, which is slightly higher than the 2016 value of 192.2 units. Oil and protein values are reported on a dry matter basis.

**Table 1 - Flaxseed, No. 1 Canada Western Quality data for 2017 harvest**

Quality parameter	2017	2016	2007-16 Mean
Oil content <sup>1</sup> , %	46.1	45.6	45.5
Protein content <sup>2</sup> , %	23.2	21.9	22.1
Free fatty acids, %	0.18	0.19	0.17
Iodine value	192.5	192.2	190.9

<sup>1</sup> Dry matter basis

<sup>2</sup> N x 6.25; Dry matter moisture basis

**Table 2 - Flaxseed, No. 1 Canada Western Fatty acid composition for 2017 harvest**

Fatty acid <sup>1</sup> , % in oil	2017	2016	2007-16 Mean
Palmitic acid (C16:0)	5.0	5.2	5.0
Stearic acid (C18:0)	3.5	3.5	3.4
Oleic acid (C18:1)	17.8	18.1	18.5
Linoleic acid (C18:2)	15.0	14.7	15.4
$\alpha$ -Linolenic acid(C18:3)	57.7	57.8	56.8

<sup>1</sup> Percentage of total fatty acids in the oil including palmitic (C16:0), stearic (C18:0), oleic (C18:1), linoleic (C18:2), and linolenic (C18:3)

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# Weather and production review

## Weather review, seeding and growing conditions

The 2017 growing season started well with good soil moisture and growing conditions. With only a few weather delays, nearly 80% of the crop was seeded by the end of May. Good crop development continued in June in spite of low precipitation in some regions. The weather in July and August was generally hot and dry, particularly in the southern flaxseed growing regions of Saskatchewan, which affected the normal development of the crop. The warm dry conditions allowed the flaxseed harvest to begin at the end of August or early September in most provinces. There were some delays in harvesting in mid-September but the flaxseed harvest was basally complete by mid-October in all provinces. The generally dry harvest conditions allowed for a crop with minimal physical damage.

Source: <https://www.saskatchewan.ca/business/agriculture-natural-resources-and-industry/agribusiness-farmers-and-ranchers/agricultural-programs-and-services/statistics-for-farmers-and-agribusiness/crops-statistics/crop-report/2017-previous-weeks-crop-reports> ;  
<http://www.gov.mb.ca/agriculture/crops/seasonal-reports/crop-report-archive/>,  
[http://www1.agric.gov.ab.ca/\\$Department/deptdocs.nsf/All/sdd4191](http://www1.agric.gov.ab.ca/$Department/deptdocs.nsf/All/sdd4191)

Temperature and precipitation patterns for the 2017 western Canadian growing season are located on Agriculture and Agri-Food Canada's web site (<http://www.agr.gc.ca/DW-GS/historical-historiques.jsp?lang=eng&jsEnabled=true>).

## Production and grade information

Western Canadian farmers seeded 420,900 hectares of flaxseed in 2017 (Table 3), which is an increase compared to 2016 (384,500 hectares). The 2017 yield estimate of 1,300 kilograms per hectare (kg/ha) was lower than the yield reported in 2016 (1,700 kg/ha) and lower than the 10-year mean of 1,430 kg/ha. Flaxseed production decreased by 39,200 metric tonnes from last year's 588,000 metric tonnes. Manitoba and Saskatchewan saw a decrease in production while in Alberta it increased. Saskatchewan accounted for 82% of flaxseed production while Manitoba and Alberta had 7% and 11%, respectively. The hot, dry conditions are considered responsible for the decrease in production.

Over 97% of the samples received for the Canadian Grain Commission's 2017 Harvest Sample Program graded as Flaxseed, No. 1 Canada Western at the time of our quality analysis. The primary reason for grade reduction was weed admixtures.

**Table 3 - Seeded area and production for western Canadian flaxseed<sup>1</sup>**

	Seeded area		Production		Average production
	2017	2016	2017	2016	2007-16
	thousand hectares		thousand tonnes		thousand tonnes
Manitoba	22.3	40.5	38.4	59.7	92.4
Saskatchewan	364.2	315.7	447.6	473.7	542.1
Alberta	34.4	28.3	62.2	54.6	50.5
<b>Western Canada</b>	<b>420.9</b>	<b>384.5</b>	<b>548.2</b>	<b>588.0</b>	<b>684.9</b>

<sup>1</sup> **Source:** Statistics Canada. *Table 001-0010 - Estimated areas, yield and production of principal field crops in metric* (<http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=0010010&paSer=&pattern=&stByVal=1&p1=1&p2=-1&tabMode=dataTable&csid>)

## Harvest samples

Flaxseed samples for the Canadian Grain Commission's Harvest Sample Program are collected and cleaned to remove dockage prior to testing. The samples are analyzed for oil, protein and iodine value using a Foss NIR Systems 6500 scanning near-infrared spectrometer, calibrated to and verified against the appropriate reference method. Composite samples are used for free fatty acids and fatty acid composition analyses. Composites are prepared by combining brown-seeded flax samples by province for Flaxseed, No.1 Canada Western. Composites of Flaxseed, No. 2 Canada Western, Flaxseed, No. 3 Canada Western and Sample Grade combine all samples from western Canada by grade.

This year's harvest report includes 262 flax samples compared to 224 in 2016. Manitoba contributed 30 samples of Flaxseed, No. 1 Canada Western, Saskatchewan 191 samples, and Alberta 33 samples. There were five samples graded as Flaxseed, No. 2 Canada Western, two as No. 3 Canada Western and one graded Sample.

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## Quality data by province and western Canada

Tables 4 and 5 show detailed information on the quality of top grade western Canadian (CW) flaxseed harvested in 2017. The number of harvest samples collected from each province may not represent the actual production or grade distribution. However, there were sufficient samples to provide good quality information for each province and the samples received followed the provincial trends in production.

Oil and protein content give quantitative estimates of the value of the seed as a source of oil and of the resulting meal as a source of protein for animal feed. Alpha-linolenic acid is an omega-3 fatty acid which literature has shown can play an important role in maintaining good health in humans and animals ([www.flaxcouncil.ca](http://www.flaxcouncil.ca)). It is the main factor in the increased use of whole and ground flaxseed in cereals and baked goods. Flaxseed is also used in animal feeds, for example in chicken to produce omega-3 eggs.

Iodine value is a measure of the overall unsaturation of the oil and can be calculated from the fatty acid composition. Oils with higher iodine values, i.e., with more unsaturation, polymerize more rapidly in the presence of air. In flaxseed, iodine value is directly related to the amount of alpha-linolenic acid present in the oil. Alpha-linolenic acid is one of the most important quality factors for industrial use as it is responsible for most of flaxseed oil's drying properties.

**Table 4 - Quality data for 2017 western Canadian flaxseed**

Province/Grade	Number of samples	Oil content <sup>1</sup> , %			Protein content <sup>2</sup> , %			Iodine value		
		Mean	Min.	Max.	Mean	Min.	Max.	Mean	Min.	Max.
<b>No. 1 CW</b>	<b>254</b>	<b>46.1</b>	<b>40.3</b>	<b>50.3</b>	<b>23.2</b>	<b>17.7</b>	<b>29.0</b>	<b>192.5</b>	<b>179.2</b>	<b>202.4</b>
Manitoba	30	46.2	43.4	49.5	21.9	17.7	24.9	193.8	187.5	202.4
Saskatchewan	191	46.2	42.5	50.3	23.2	17.9	28.7	192.8	180.6	201.4
Alberta	33	45.2	40.3	49.2	24.9	19.7	29.0	189.5	179.2	199.4
No. 2 CW	5	46.0	44.5	46.4	21.1	19.1	23.0	192.5	188.6	195.5
No. 3 CW	2	46.3	44.7	47.8	22.6	22.3	22.9	193.7	187.0	200.3
Sample	1	43.6	-	-	21.6	-	-	191.4	-	-

<sup>1</sup> Dry matter basis

<sup>2</sup> N x 6.25; dry matter basis.

**Table 5 – Fatty acid composition and free fatty acids content of 2017 Canadian flaxseed**

Province/Grade	Number of samples	Fatty acid composition, % <sup>1</sup>					Free fatty acids
		C16:0	C18:0	C18:1	C18:2	C18:3	
<b>No. 1 CW</b>	<b>254</b>	<b>5.0</b>	<b>3.5</b>	<b>17.8</b>	<b>15.0</b>	<b>57.7</b>	<b>0.18</b>
Manitoba	30	5.0	3.5	16.9	15.2	58.4	0.16
Saskatchewan	191	4.9	3.5	17.9	14.7	58.0	0.19
Alberta	33	5.0	3.8	18.4	16.2	55.6	0.12
No. 2 CW	5	5.0	3.3	18.3	14.7	57.8	0.35
No. 3 CW	2	4.7	3.3	17.7	15.2	58.1	0.22
Sample	1	5.0	3.5	18.7	14.5	57.3	0.32

<sup>1</sup> Percentage of total fatty acids in the oil including palmitic (C16:0), stearic (C18:0), oleic (C18:1), linoleic (C18:2), and linolenic (C18:3)

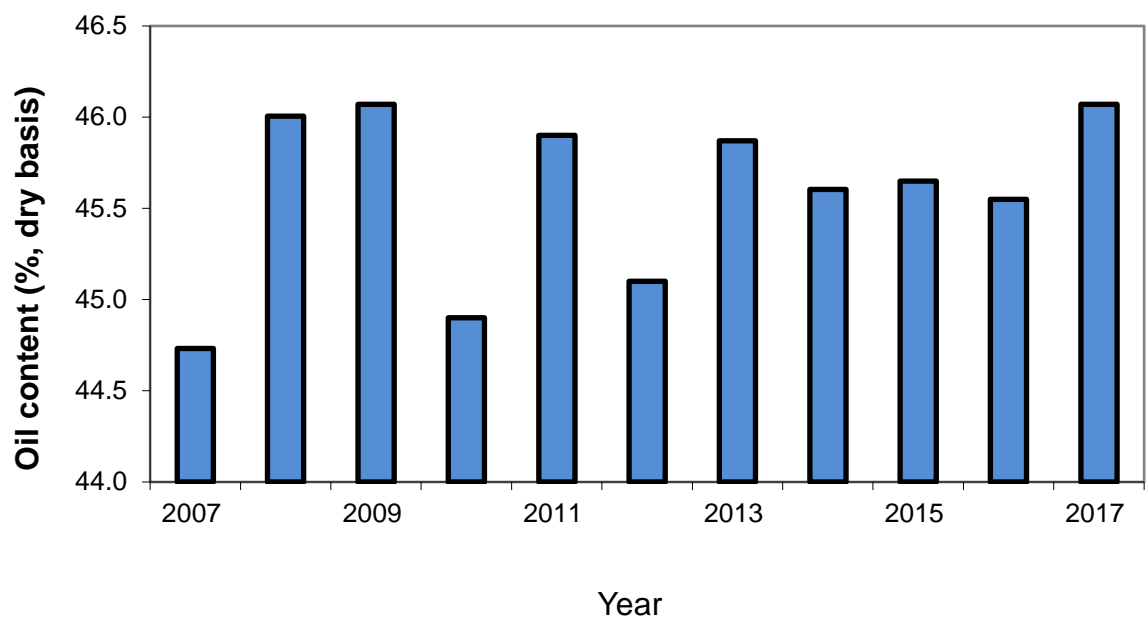


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## Oil content

Average oil content (46.1%) in Flaxseed, No. 1 Canada Western is slightly higher than the 2016 average (45.6%) and the 10-year mean (45.5%) (Figure 2). Average oil content for Manitoba and Saskatchewan (46.2%) is higher than the average in Alberta (45.2%) (Table 4). Oil content for Flaxseed, No. 1 Canada Western samples from producers across western Canada ranged from 40.3 to 50.3% (Table 4).

**Figure 2 – Flaxseed, No. 1 Canada Western  
Oil content of harvest samples, 2007-17**



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2017 average .....	46.1%
2016 average .....	45.6%
2007–16 mean .....	45.5%

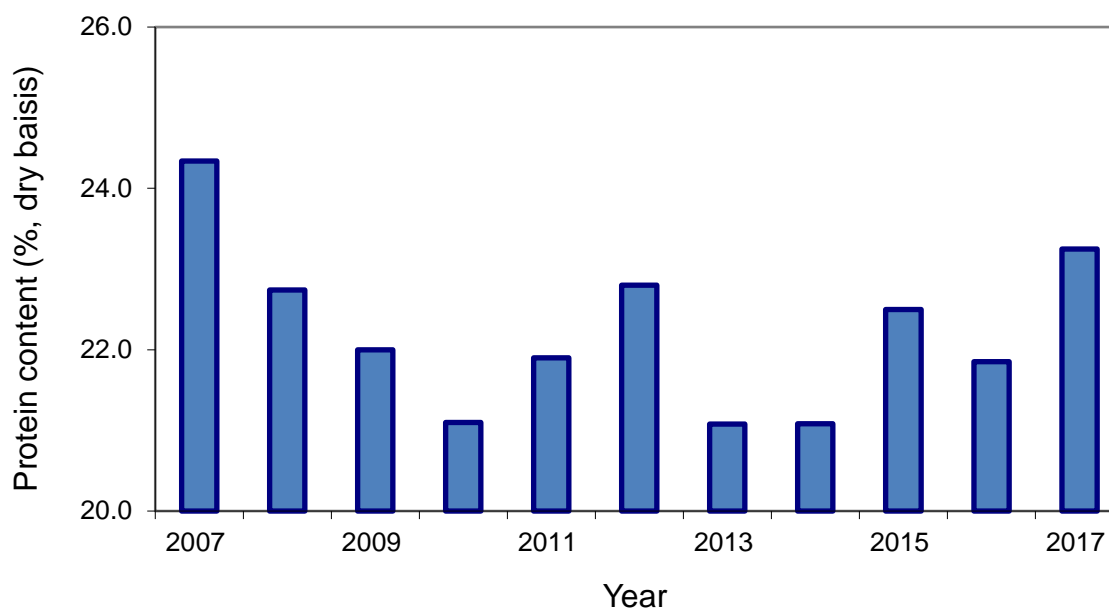
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## Protein content

Average protein content (23.2%) for Flaxseed, No.1 Canada Western is higher than the 2016 harvest average (21.9%) and to the 10-year mean (22.2%) (Figure 3). The average in Manitoba (21.9%) is lower than the average in Saskatchewan (23.2%) and Alberta (24.9%). Protein content for Flaxseed, No. 1 Canada Western samples from producers across western Canada ranged from 17.7 to 29.0% (Table 4).

**Figure 3 – Flaxseed, No. 1 Canada Western  
Protein content of harvest samples, 2007-17**



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2017 average .....	23.2%
2016 average .....	21.9%
2007–16 mean .....	22.2%

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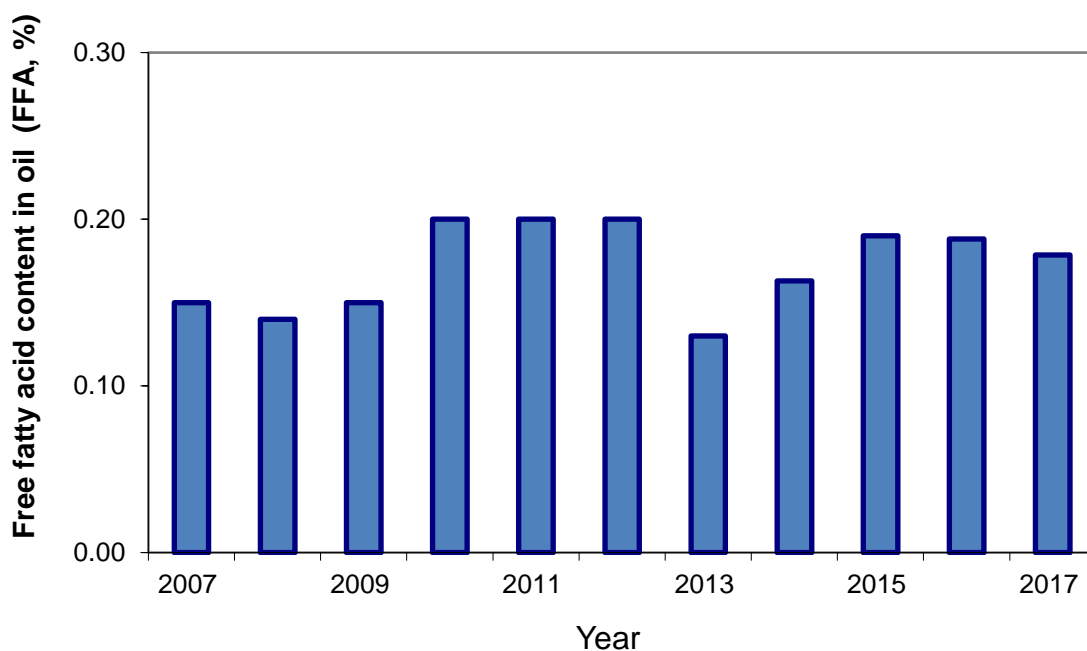
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## Free fatty acids content

Average free fatty acids content (0.18%) in Flaxseed, No. 1 Canada Western is similar to the average in 2016 (0.19%) and to the 10-year mean (0.17%) (Figure 4). The average in Manitoba (0.16%) is lower than the average in Saskatchewan (0.19%) but higher than the Alberta average (0.12%) (Table 5).

Samples that graded No. 2 and No. 3 Canada Western had an average free fatty acids content of 0.31%.

**Figure 4– Flaxseed, No. 1 Canada Western  
Free fatty acid content of harvest samples, 2007-17**



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2017 average .....	0.18%
2016 average .....	0.19%
2007–16 mean .....	0.17%

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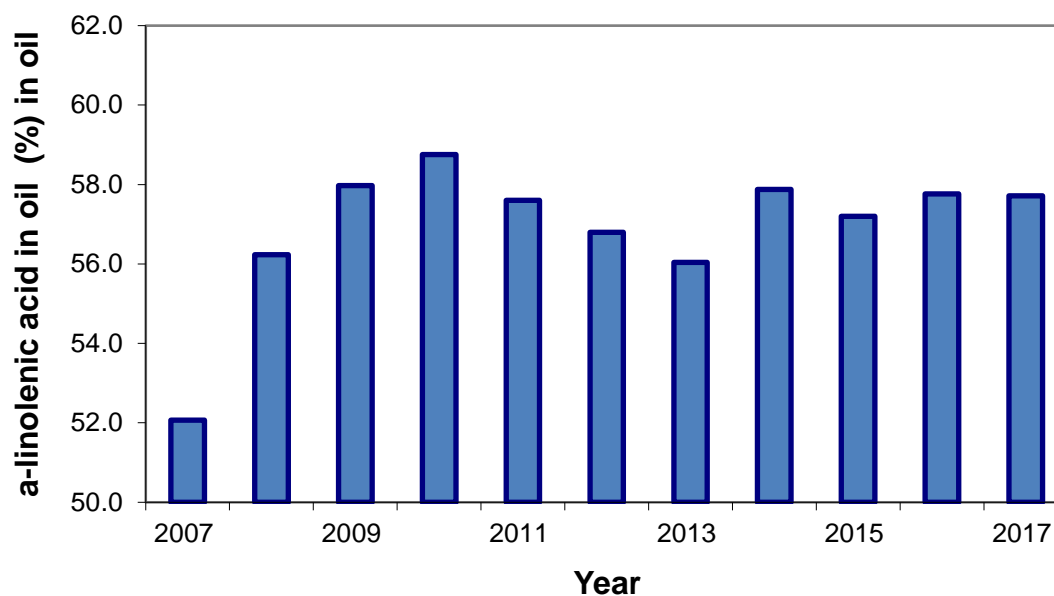
## Fatty acid composition

Average alpha-linolenic acid (C18:3) content (57.7%) in Flaxseed, No. 1 Canada Western is similar to the average in 2016 (57.8 %) and higher than the 10-year mean (56.8%) (Figure 5).

The average iodine value of the oil from Flaxseed, No. 1 Canada Western samples is 192.5 units. Iodine value is a measure of the total degree of unsaturation of the oil and, in flaxseed, is heavily influenced by the alpha-linolenic acid content of the oil. The 2017 iodine value is slightly higher than in 2016 and 1.6 units higher than the 10-year mean of 190.9 units (Figure 6). Iodine values for Flaxseed, No. 1 Canada Western samples from producers across western Canada varied from 179.2 to 202.4 units.

Usually oils with iodine values greater than 188 units are desired by the coatings industry for products such as paints, varnishes and inks, while oils with iodine values around 183 units are preferred by the linoleum industry. Iodine value, like oil content, is influenced by growing temperatures and length of photoperiod.

**Figure 5 – Flaxseed, No. 1 Canada Western  
Percent  $\alpha$ -Linolenic acid content of harvest samples, 2007-17**

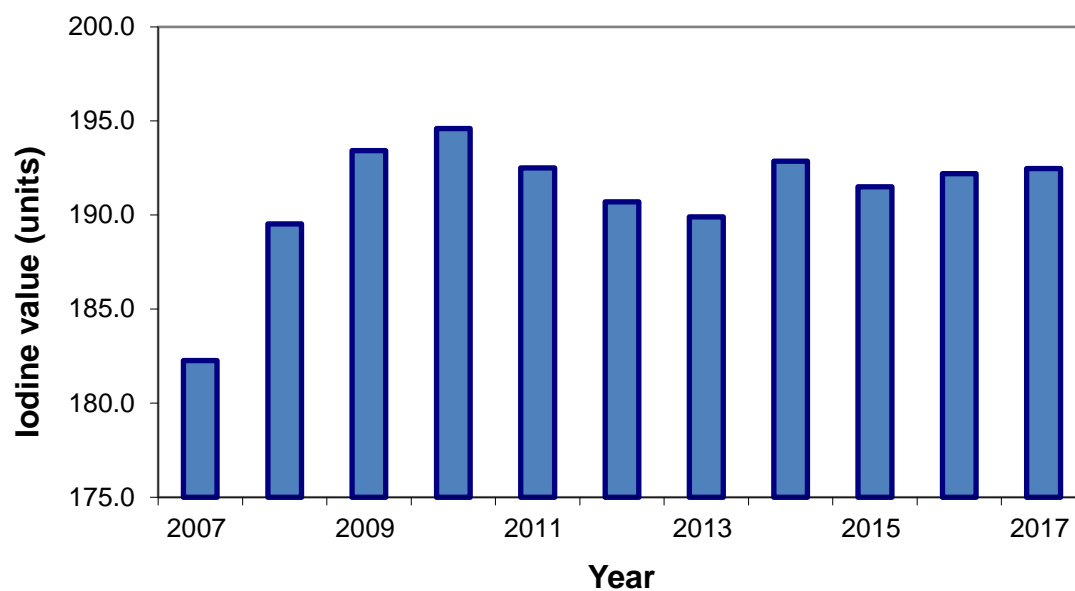


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2017 average.....	57.7%
2016 average.....	57.8%
2007–16 mean.....	56.8%

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**Figure 6 – Flaxseed, No. 1 Canada Western  
Iodine value of harvest samples, 2007-17**



2017 average .....	192.5
2016 average .....	192.2
2007–16 mean .....	190.9