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# Quality of western Canadian flaxseed

## 2020

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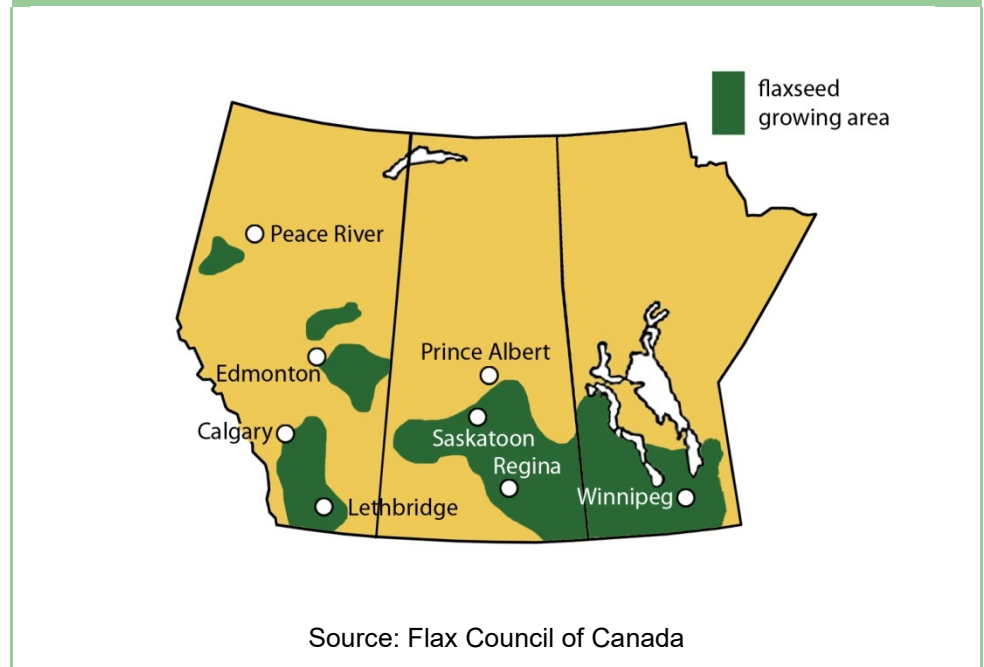
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# Introduction

This report presents quality data and information based on samples of western Canadian flaxseed from the Canadian Grain Commission’s 2020 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. A map of the three Prairie provinces in Figure 1 illustrates the traditional growing areas of flaxseed in western Canada.

**Figure 1 – Traditional flaxseed growing areas within the three Prairie provinces**



# Summary

The samples of western Canadian flaxseed the Canadian Grain Commission received through the Harvest Sample Program show that the 2020 crop contains lower oil content, similar protein content and lower iodine values when compared to the 2019 harvest.

Data for brown flaxseed graded No. 1 is presented in Table 1. Mean oil content is 45.6%, which is lower than the 2019 mean (46.7%) and similar to the 10-year mean (45.7%). Mean protein content is 23.0%, which is similar to the 2019 mean (22.6%) but higher than the 10-year mean (22.1%). This year's iodine value is 189.0 units, which is lower than both the 2019 value (194.9 units) and 10-year mean (192.1 units). Oil and protein values are reported on a dry matter basis.

**Table 1 – Flaxseed, No. 1 Canada Western  
Quality data for 2020 harvest**

Quality parameter	2020	2019	2010-19 mean
Oil content <sup>1</sup> , %	45.6	46.7	45.7
Protein content <sup>2</sup> , %	23.0	22.6	22.1
Free fatty acids, %	0.16	0.20	0.20
Iodine value	189.0	194.9	192.1

<sup>1</sup> Dry matter basis

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

**Table 2 – Flaxseed, No. 1 Canada Western  
Main fatty acid composition for 2020 harvest**

Fatty acid <sup>1</sup> , % in oil	2020	2019	2010-19 mean
Palmitic acid (C16:0)	5.3	5.0	5.1
Stearic acid (C18:0)	3.7	3.3	3.4
Oleic acid (C18:1)	18.7	16.5	18.1
Linoleic acid (C18:2)	15.5	15.5	15.3
$\alpha$ -Linolenic acid(C18:3)	55.8	58.8	57.4

<sup>1</sup> Percentage of total fatty acids in oil

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# Weather and production review

## Weather review, seeding and growing conditions

[According to the province's crop reports](#), Manitoba's seeding was delayed due to excess soil moisture, making it difficult for farmers to bring in their seeding equipment. Seeding was completed by the first week of June. There was adequate heat and moisture for the majority of the growing season. By the third week of October, 98% of the harvest was completed.

As stated in the [Saskatchewan crop reports](#), 94% of flax was seeded by the end of May - early June. The Saskatchewan growing season had adequate heat, but it struggled at times with precipitation. This resulted in the reduction of top soil moisture. The majority of flax was harvested by the first two weeks of October.

In the [Alberta crop reports](#), data shows 98% of flax was also seeded by the end of May - early June. Seeding was slightly delayed due to the overwintering of the 2019 crop as producers still had to harvest the crop from the previous summer. Excessive moisture throughout the growing season affected the quality of some of the crops. As of July 14, 82.9% of the flax crop was rated in good condition and by the third week in October, 98% of the flax was harvested in Alberta.

## Production and grade information

Western Canadian farmers seeded 376,000 hectares of flaxseed in 2020 (Table 3), which is the same seeded hectares as 2019. The 2020 yield was estimated to be 1,560 kilograms per hectare (kg/ha). Flaxseed production for the 2020 harvest was 577,000 metric tonnes, which is an increase from 2019 (483,200) metric tonnes). Manitoba and Saskatchewan saw an increase in production, while Alberta saw a slight decrease. Saskatchewan accounted for 78.5% of flaxseed production, while Manitoba and Alberta's production was 7.9% and 13.6%, respectively.

Over 95% of samples received through the Canadian Grain Commission's 2020 Harvest Sample Program graded as Flaxseed, No. 1 Canada Western at the time of the quality analysis. Lower grades were primarily due to weather damage, which contributed to low test weights.

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

	Seeded area		Production		Average production
	2020	2019	2020	2019	2010-19
	thousand hectares		thousand tonnes		thousand tonnes
Manitoba	26.5	35.2	46.0	42.3	59.1
Saskatchewan	310.0	294.4	453.1	359.2	474.4
Alberta	39.3	46.4	78.6	81.7	65.0
<b>Western Canada</b>	<b>376.0</b>	<b>376.0</b>	<b>577.7</b>	<b>483.2</b>	<b>598.5</b>

<sup>1</sup> **Source:** Statistics Canada. *Table 001-0010 - [Estimated areas, yield and production of principal field crops in metric units.](#)*

## Harvest samples

Flaxseed samples from the Harvest Sample Program are cleaned to remove dockage prior to testing. Individual samples are analyzed for oil content, protein content and iodine values using a Foss NIR Systems 6500 scanning near-infrared spectrometer, calibrated to and verified against the appropriate reference methods. Composite samples are used for more precise and detailed analyses that includes 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 combined all the samples from western Canada rather than by province.

This year's harvest report includes 276 brown flax samples compared to 237 in 2019. Manitoba contributed 39 samples of Flaxseed, No. 1 Canada Western, Saskatchewan 198 samples and Alberta 31 samples. There were six samples graded as Flaxseed, No. 2 Canada Western, one as No. 3 Canada Western and one as Sample.

The Canadian Grain Commission in 2020 received 14 samples of yellow flaxseed, compared to seven samples in 2019. Of the 14 samples, two were Sample grade and the remaining 12 samples were graded as Flaxseed, No. 1, Canada Western. The yellow flaxseed oil and protein content was 46.4% and 23.7%, respectively. The average free fatty acids in this year's yellow flax composite was 0.21%, while average  $\alpha$ -linolenic acid (C18:3) content and iodine value was 61.4% and 198.5 units, respectively.

## 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 2020. 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 historical provincial trends in production.

Oil and protein 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 can play an important role in maintaining good health in humans and animals. It is the main factor for the increased use of whole and ground flaxseed in cereals and baked goods. Flaxseed is also used in animal feeds. In chicken feed, it can help produce high omega-3 eggs.

Iodine value is a measure of the overall unsaturation of oil and is 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 2020 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>268</b>	<b>45.6</b>	<b>41.7</b>	<b>49.4</b>	<b>23.0</b>	<b>18.5</b>	<b>27.2</b>	<b>189.0</b>	<b>173.5</b>	<b>201.6</b>
Manitoba	39	46.1	41.7	48.3	22.9	19.7	25.5	191.9	182.8	196.3
Saskatchewan	198	45.5	41.8	49.4	23.1	18.5	27.2	188.2	173.5	201.1
Alberta	31	46.1	42.3	49.1	22.7	18.6	25.9	190.5	181.2	201.6
<b>No. 2 CW</b>	<b>6</b>	<b>46.0</b>	<b>43.8</b>	<b>48.2</b>	<b>21.4</b>	<b>19.5</b>	<b>25.8</b>	<b>195.3</b>	<b>191.1</b>	<b>208.0</b>
<b>No. 3 CW</b>	<b>1</b>	<b>43.4</b>	-	-	<b>22.4</b>	-	-	<b>201.1</b>	-	-
<b>Sample</b>	<b>1</b>	<b>45.6</b>	-	-	<b>20.8</b>	-	-	<b>194.1</b>	-	-

<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 2020 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>268</b>	<b>5.3</b>	<b>3.7</b>	<b>18.7</b>	<b>15.5</b>	<b>55.8</b>	<b>0.16</b>
Manitoba	39	5.2	3.5	17.8	14.8	57.6	0.18
Saskatchewan	198	5.3	3.8	18.9	15.7	55.3	0.50
Alberta	31	5.1	3.7	18.1	15.5	56.5	0.18
<b>No. 2 CW</b>	<b>6</b>	<b>4.8</b>	<b>3.6</b>	<b>16.2</b>	<b>14.8</b>	<b>59.5</b>	<b>0.39</b>
<b>No. 3 CW</b>	<b>1</b>	<b>5.4</b>	<b>3.2</b>	<b>12.9</b>	<b>14.5</b>	<b>63.0</b>	<b>0.38</b>
<b>Sample</b>	<b>1</b>	<b>5.1</b>	<b>3.6</b>	<b>17.7</b>	<b>13.0</b>	<b>59.7</b>	<b>0.14</b>

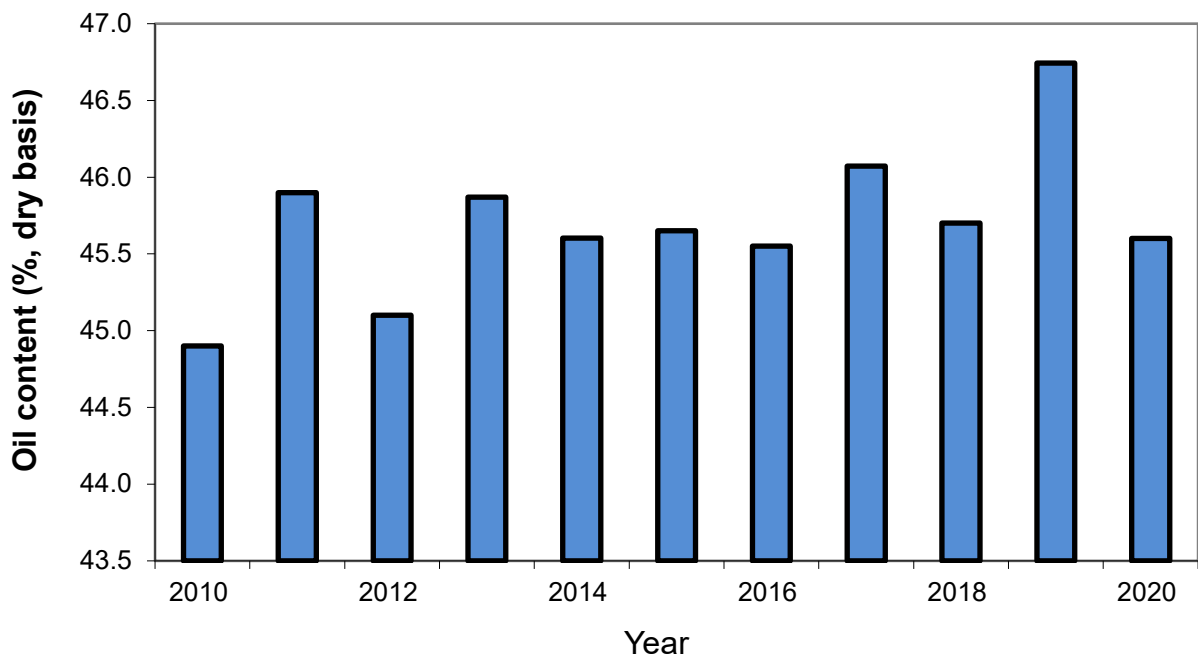
<sup>1</sup> Percentage of total fatty acids in the oil including palmitic (C16:0), stearic (C18:0), oleic (C18:1), linoleic (C18:2) and linolenic (C18:3)



## Oil content

Average oil content (45.6%) in Flaxseed, No. 1 Canada Western is lower than the 2019 average (46.7%) and similar to the 10-year mean (45.7%; Figure 2). Average oil content for Manitoba (46.1%) was the same as Alberta and higher than Saskatchewan (45.5%; Table 4). Oil content for Flaxseed, No. 1 Canada Western samples from producers across western Canada ranged from 41.7% to 49.5% (Table 4). Oil content usually increases with cooler temperatures and with adequate soil moisture.

**Figure 2 – Flaxseed, No. 1 Canada Western  
Oil content of harvest samples, 2010 to 2020**

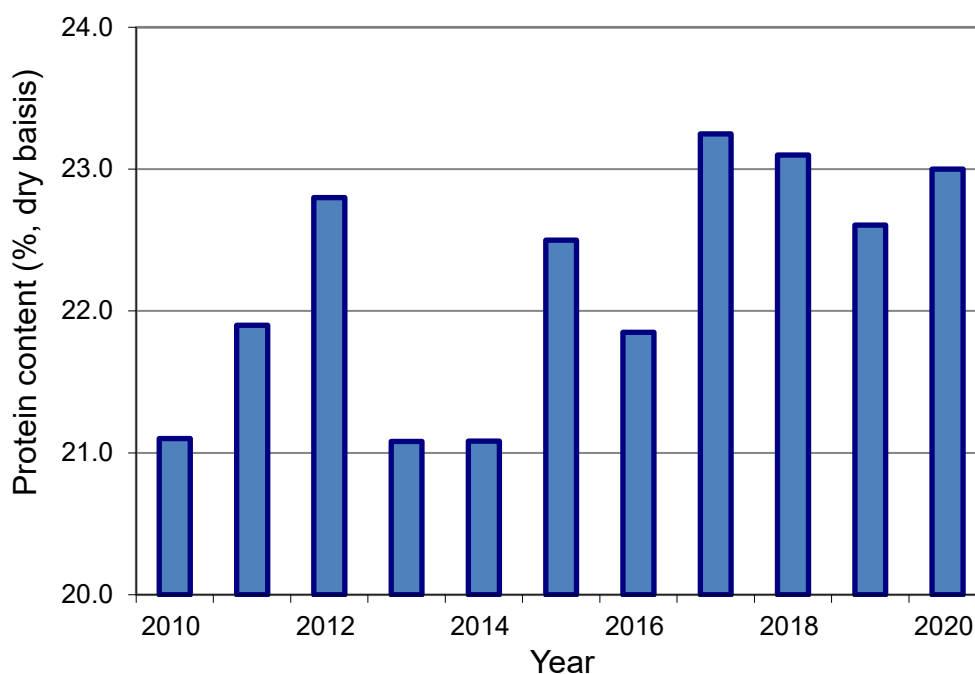


2020 average .....	45.6%
2019 average .....	46.7%
2010–19 average .....	45.7%

## Protein content

Average protein content (23.0%) for Flaxseed, No.1 Canada Western was similar to the 2019 harvest average (22.6%), but higher than the 10-year mean (22.1%; Figure 3). The average protein content in Manitoba (22.9%) was similar to the averages of Saskatchewan (23.1%) and Alberta (22.7%). Protein content for Flaxseed, No. 1 Canada Western samples from producers across western Canada ranged from 18.5% to 27.2% (Table 4).

**Figure 3 – Flaxseed, No. 1 Canada Western  
Protein content of harvest samples, 2010 to 2020**



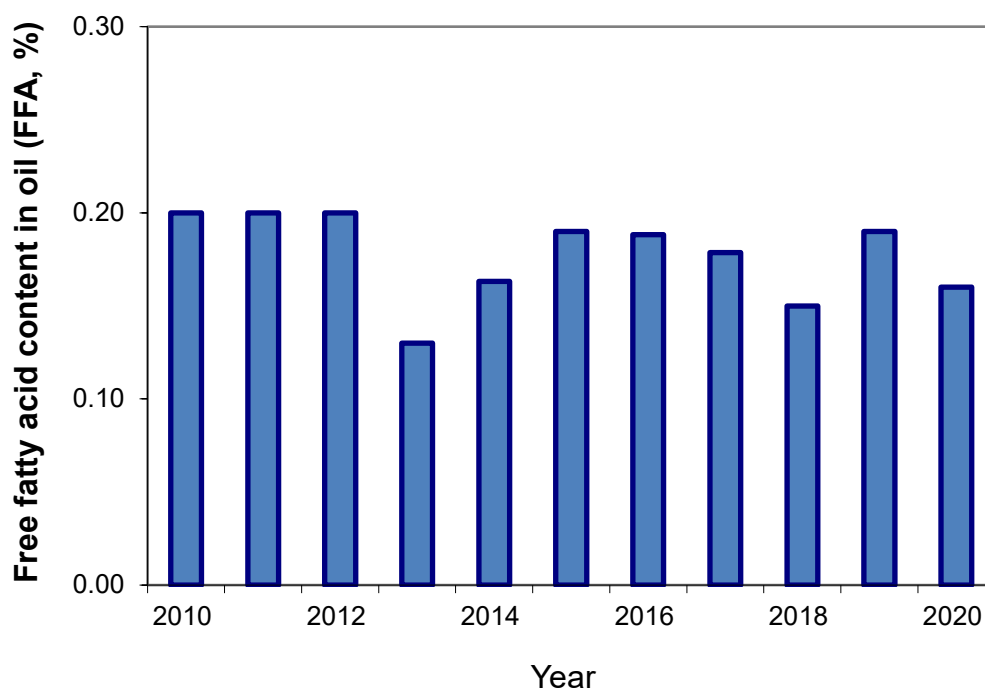
2020 average .....	23.0%
2019 average .....	22.6%
2010–19 average .....	22.1%

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## Free fatty acids content

Average free fatty acids content (0.16%) in Flaxseed, No. 1 Canada Western is slightly lower than the average in 2019 (0.19%) and the 10-year mean (0.18%; Figure 4). The average in Manitoba (0.18%) and Alberta (0.18%) was higher than the average in Saskatchewan (0.15%; Table 5). However, samples that graded Flaxseed No. 2 Canada Western and Flaxseed No. 3 Canada Western had an average free fatty acid content of 0.35%.

**Figure 4 – Flaxseed, No. 1 Canada Western  
Free fatty acid content of harvest samples, 2010 to 2020**



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2020 average .....	0.16%
2019 average .....	0.19%
2010–19 average .....	0.17%

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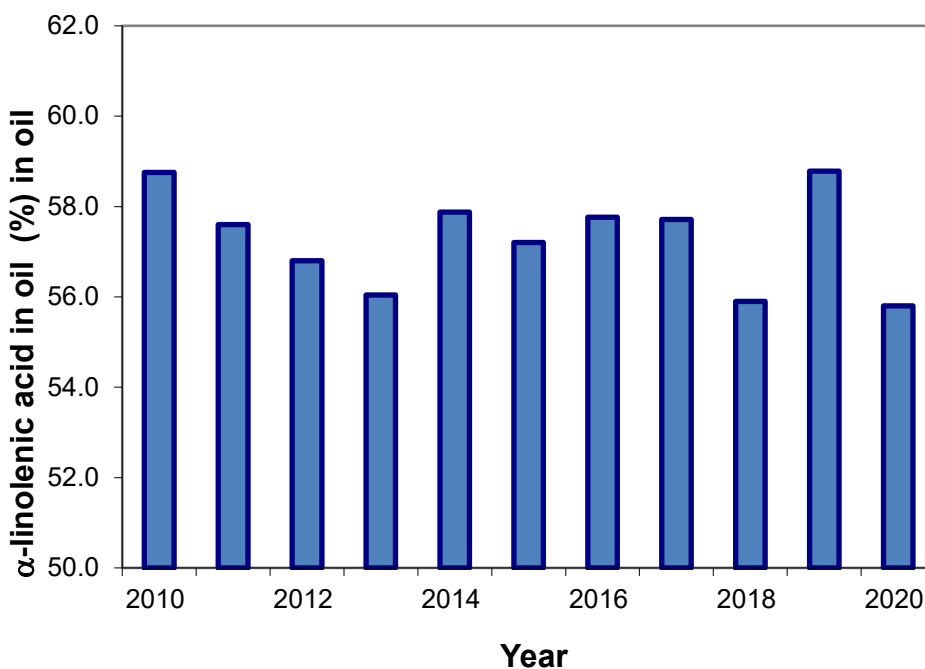
## Fatty acid composition

Average  $\alpha$ -linolenic acid (C18:3) content (55.8%) in Flaxseed, No. 1 Canada Western was lower than the 2019 average (58.8 %) and the 10-year mean (57.4%; Figure 5).

The average iodine value of oil from Flaxseed, No. 1 Canada Western samples is 189.0 units. The 2020 iodine value was lower than in 2019 (194.9) and the 10-year mean (192.1 units; Figure 6). Iodine values for Flaxseed, No. 1 Canada Western samples from producers across western Canada varied from 173.5 to 201.6 units.

Similar to the relationship of oil content and environmental conditions,  $\alpha$ -linolenic acid and iodine values tend to increase as temperatures decrease and when soil moisture conditions are adequate.

**Figure 5 – Flaxseed, No. 1 Canada Western  
Percentage of  $\alpha$ -linolenic acid content of harvest samples, 2010 to 2020**

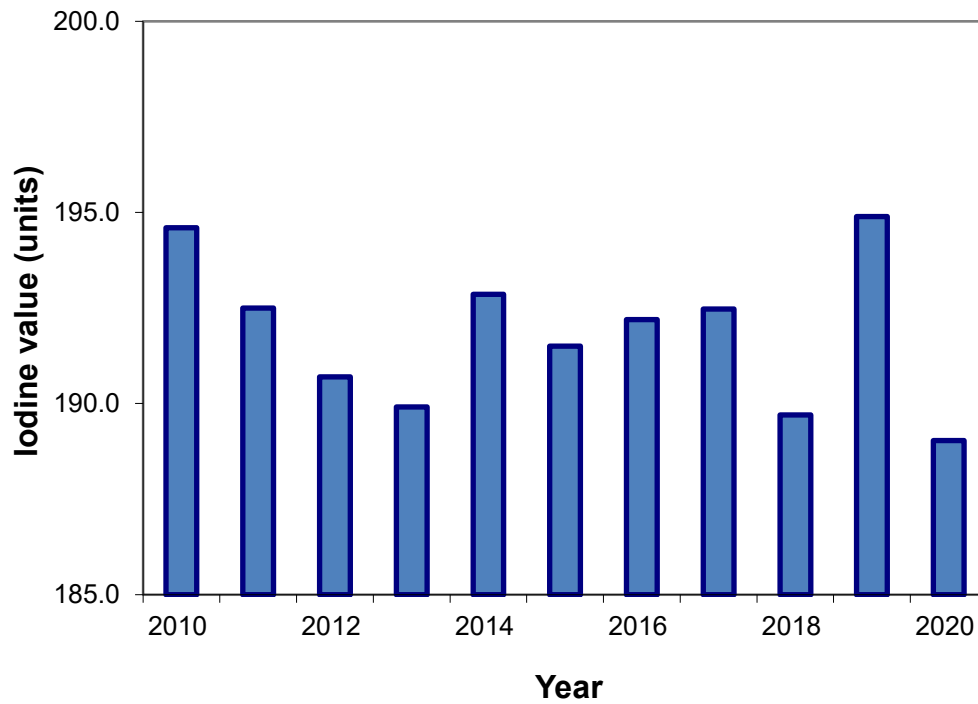



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2020 average .....	55.8%
2019 average .....	58.8%
2010–19 average .....	57.4%

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**Figure 6 – Flaxseed, No. 1 Canada Western  
Iodine value of harvest samples, 2010 to 2020**




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2020 average .....	189.0
2019 average .....	194.9
2010–19 average .....	192.1

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