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Quality of western Canadian flaxseed 2023

Véronique J. Barthet
Program Manager, Oilseeds

Ann Puvirajah
Chemist, Oilseeds

Tel.: 204-983-3354
Fax: 204-983-0724
Email: ann.puvirajah@grainscanada.gc.ca

Grain Research Laboratory
Canadian Grain Commission
1404-303 Main Street
Winnipeg, MB R3C 3G8
grainscanada.gc.ca

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Summary

The 2023 western Canadian flaxseed samples received by the Harvest Sample Program contained slightly higher oil and protein content and higher iodine values than the 2022 harvest samples.

Tables 1 and 2 contain the 2023 quality data for brown Flaxseed, No. 1 Canada Western harvest samples. Mean oil content was 44.8%, which is similar to the 2022 mean (44.7%) and lower than the 10-year mean (45.6%). Mean protein content was 24.5%, which is similar to the 2022 mean (24.4%) and higher than the 10-year mean (22.9%). Mean iodine value was 189.3 units, which is higher than the 2022 mean (186.8 units) and lower than the 10-year mean (190.6 units). Oil and protein values are reported on a dry matter basis.

Table 1 Quality data for brown Flaxseed, No. 1 Canada Western from 2023 harvest samples

Quality parameter	2023	2022	2013 to 2022 mean
Number of samples	107	174	n/a[1]
Oil content[2], %	44.8	44.7	45.6
Protein content[3], %	24.5	24.4	22.9
Free fatty acids, %	0.3	0.3	0.2
Iodine value, units in oil	189.3	186.8	190.6

Table 2 Main fatty acid composition for brown Flaxseed, No. 1 Canada Western from 2023 harvest samples

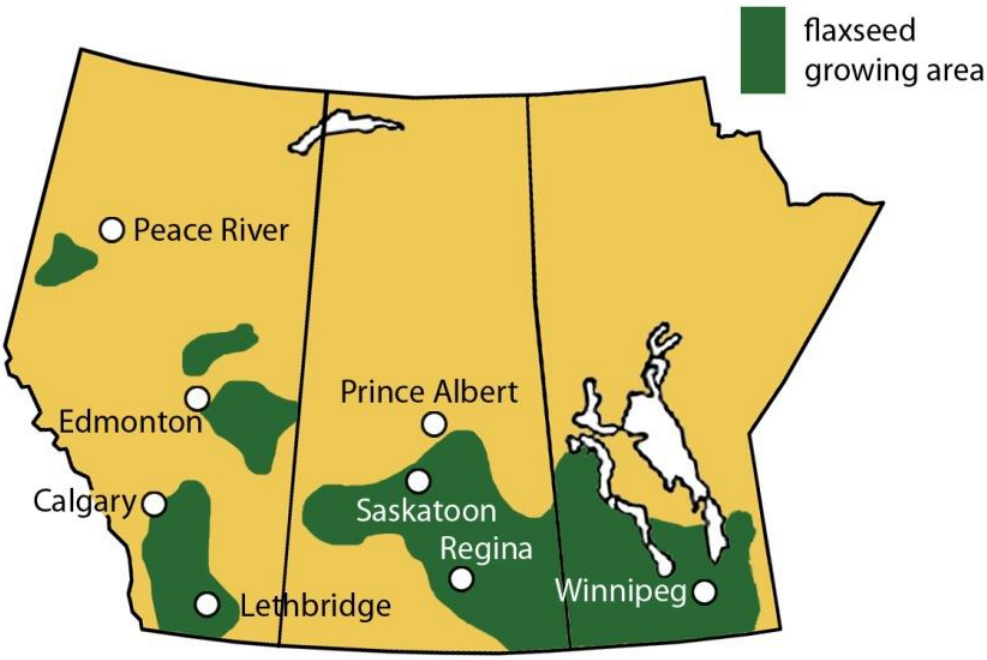
Fatty acid[4], % in oil	2023	2022	2013 to 2022 mean
Palmitic acid (C16:0)	5.0	5.2	5.1
Stearic acid (C18:0)	3.4	3.6	3.5
Oleic acid (C18:1)	19.2	20.0	18.6
Linoleic acid (C18:2)	15.4	15.4	15.2
Alpha-linolenic acid(C18:3)	55.8	54.6	56.6

[1] n/a = not applicable.
[2] Calculated on a dry matter basis.
[3] Protein content calculated from nitrogen (N) content using N x 6.25 on a dry matter basis.
[4] Relative fatty acid composition of the oil.

Introduction

This report presents harvest quality data for western Canadian flaxseed grown in 2023. Flaxseed samples were submitted to the Canadian Grain Commission's Harvest Sample Program by producers and grain companies. Quality data is compiled from the results of analytical tests performed in the Grain Research Laboratory

Figure 1 Traditional flaxseed growing areas in the Prairie provinces of Canada



Weather and production review

Seeding and growing conditions

Approximately 62% of the flaxseed crop had been seeded by mid-May in Manitoba, below the 5-year average of 81%. Seeding was mostly completed by the second week of June. Variable rainfall throughout the growing season in some areas helped improve yields, but crops struggled in areas with minimal rainfall and high temperatures. Most of the flaxseed crop was harvested by the end of October.

In Saskatchewan, a late snow melt and cool temperatures delayed much of the seeding. Only 38% of the flaxseed crop was seeded by mid-May, below the 5-year average of 53%. Seeding was mostly completed by the first week of June. Rainfall was inconsistent throughout the growing season, which greatly affected yields. Some areas had sufficient precipitation, while crops in other areas experienced heat stress and drought. By mid-October, 92% of the flaxseed crop had been harvested.

Unseasonably warm temperatures in May enhanced seeding progress in Alberta. By mid-May, 55% of the flaxseed crop had been seeded, which was only 3% below the 5-year average. Much needed precipitation in July increased soil moisture, improving yields in most areas. A warm fall allowed harvest to proceed without any delays. Most of the flaxseed crop was harvested by the second week of October.

Sources:

Manitoba crop reports
Saskatchewan crop reports
Alberta crop reports

Production and grade distribution

Western Canadian farmers seeded 246,200 hectares (ha) of flaxseed in 2023 (Table 3), which is lower than the area seeded in 2022 (314,400 ha). The yield in 2023 was estimated to be 1,144 kilograms per hectare (kg/ha). Flaxseed production in 2023 was 272,200 metric tonnes (MT), which is a decrease from 2022 (472, 600 MT). Average flaxseed production in Manitoba, Saskatchewan and Alberta was 26,500 MT (41,700 MT in 2022), 223,800 MT (347,700 MT in 2022) and 21,900 MT (83,200 MT in 2022), respectively.

Flaxseed samples were graded by Canadian Grain Commission grain inspectors according to the Official Grain Grading Guide. In 2023, 89% of the submitted flaxseed samples from western Canada were graded No. 1, 2% were graded No. 2 and the remaining 7% were graded No. 3.

The number of harvest samples collected from each province may not represent the actual production or grade distribution. There were, however, a sufficient number of samples to provide good quality information for each province. Samples followed the historical trends in provincial production.

Table 3 Area seeded and production for western Canadian flaxseed in 2023[1]

	Seeded area (thousand hectares)		Production (thousand metric tonnes)		Average production (thousand metric tonnes)
Location	**2023**	**2022**	**2023**	**2023**	**2013 to 2022**
Manitoba	17.4	20.7	26.5	41.7	52.1
Saskatchewan	209.8	241.7	223.8	347.7	480.9
Alberta	19.0	52.0	21.9	83.2	74.2
Western Canada	**246.2**	**314.4**	**272.2**	**472.6**	607.2

[1] Source: Statistics Canada. Estimated areas, yield, production, average farm price and total farm value of principal field crops, in metric and imperial units

Harvest samples

Flaxseed samples from the Harvest Sample Program were cleaned to remove dockage prior to testing. Individual samples were 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 were used for more precise and detailed analyses of free fatty acids and fatty acid composition. A brown flaxseed composite and a yellow flaxseed composite were prepared by combining samples graded No. 1 from each province.

The 2023 harvest report includes 107 brown flaxseed samples compared to 174 in 2022. For brown flaxseed graded No. 1, Manitoba contributed 13 samples, Saskatchewan 77 samples and Alberta 17 samples.

In 2023, the Harvest Sample Program received 8 samples of yellow flaxseed. All 8 samples of yellow flaxseed were graded No. 1. In yellow flaxseed, oil and protein content were 45.6% and 25.3%, respectively. The mean free fatty acid content in the 2023 yellow flaxseed composite was 0.23%, while the mean alpha-linolenic acid (C18:3) content and iodine value were 61.1% and 197.8 units, respectively.

Quality data by province

Tables 4 and 5 contain detailed information on the quality of No. 1 brown flaxseed from western Canada in 2023.

Flaxseed is an important source of oil. Alpha-linolenic acid, an omega-3 fatty acid found in flaxseed, can play a role in maintaining good health in humans and animals. It is the main reason for the increased use of whole and ground flaxseed in cereals and baked goods. Flaxseed is also used as a source of oil and protein in animal feed. For example, flaxseed incorporated into chicken feed can result in hens producing eggs that are high in omega-3 fatty acid.

Iodine value is a measure of the overall unsaturation of oil and is calculated from the fatty acid composition. Oils with higher iodine values (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 the industrial use of flaxseed oil as it is responsible for most of its drying properties.

Table 4 Quality data for 2023 western Canadian brown flaxseed

Grade	Location	Number of samples	Oil content[1], %			Protein content[2], %			Iodine value, units		
			Mean	Min[3]	Max[4]	Mean	Min	Max	Mean	Min	Max
Flaxseed, No. 1 CW	Western Canada	**107**	**44.8**	**41.5**	**48.1**	**24.5**	**19.9**	**29.3**	**190.9**	**178.7**	**201.4**
	Manitoba	13	44.6	42.1	48.1	24.3	20.2	26.5	192.4	187.4	198.6
	Saskatchewan	77	44.9	41.5	47.4	24.6	20.7	29.3	188.8	178.7	201.4
	Alberta	17	44.6	41.6	47.4	24.6	19.9	29.3	189.4	178.7	198.1

Table 5 Fatty acid composition and free fatty acid content for 2023 western Canadian brown flaxseed

Grade	Location	Number of samples	Fatty acid composition[5], %					Free fatty acid content %
			C16:0	C18:0	C18:1	C18:2	C18:3	
Flaxseed, No. 1 CW	Western Canada	**107**	**5.0**	**3.4**	**19.2**	**15.4**	**55.8**	**0.3**
	Manitoba	13	4.8	3.1	18.8	14.0	58.0	0.8
	Saskatchewan	77	5.0	3.5	19.4	15.6	55.4	0.2
	Alberta	17	5.0	3.6	19.0	15.5	55.8	0.2

[1] Calculated on a dry matter basis.
[2] Protein content calculated from nitrogen (N) content using N x 6.25 on a dry matter basis.
[3] Min = minimum.
[4] Max = maximum.
[5] Percentage of total fatty acids in the oil including palmitic (C16:0), stearic (C18:0), oleic (C18:1), linoleic (C18:2) and alpha-linolenic (C18:3).

Oil content

In 2023, the mean oil content of brown flaxseed graded No. 1 was 44.8%, similar to the 2022 mean (44.7%) and lower than the 10-year mean of 45.6% (Figure 2). The mean oil content in samples from Manitoba was 44.6%, similar to Saskatchewan (44.9%) and Alberta (44.6%) (Table 4). The mean oil content for No. 1 brown flaxseed from western Canada ranged from 41.8% to 48.1% (Table 4).

Protein content

In 2023, the mean protein content of brown flaxseed graded No. 1 was 24.5%, similar to the 2022 mean (24.4%), and higher than the 10-year mean of 22.9% (Figure 3). The mean protein content in samples from Manitoba was 24.3%, similar to both Saskatchewan (24.6%) and Alberta (24.6%). The mean protein content for No. 1 brown flaxseed from western Canada ranged from 19.9% to 29.3% (Table 4).

Free fatty acid content

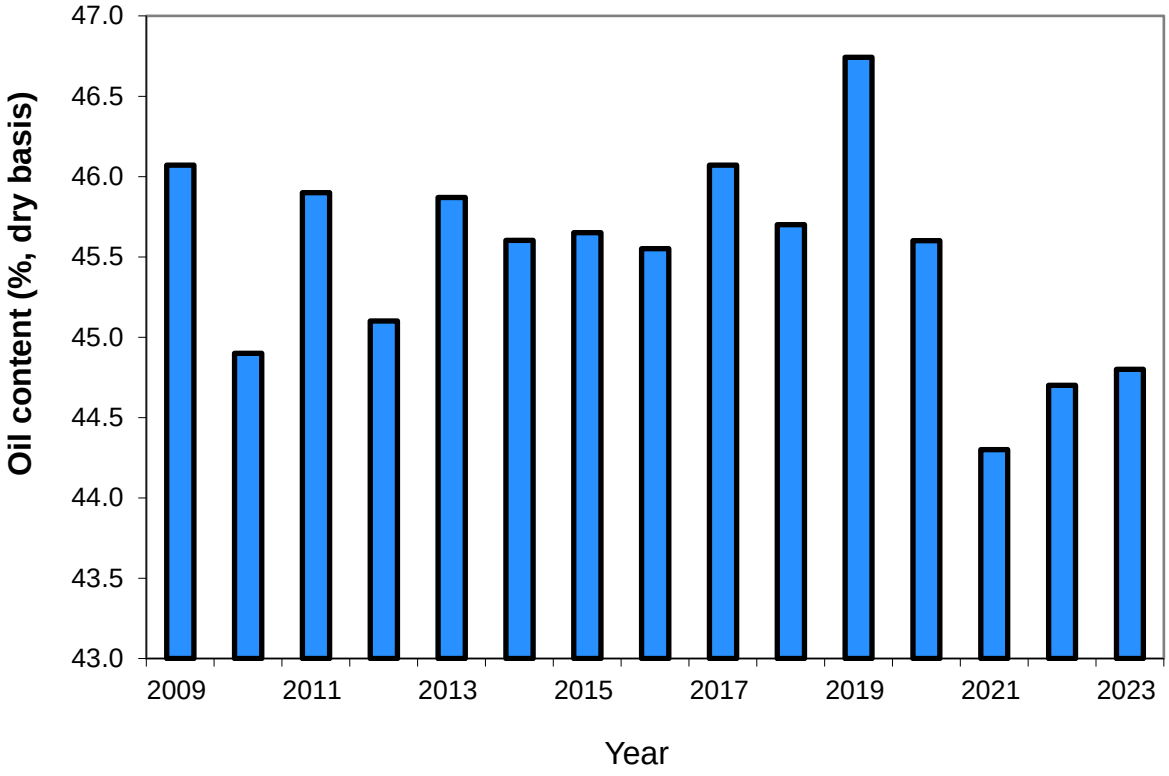
In 2023, the mean free fatty acid content in brown flaxseed graded No. 1 was 0.3%. This was similar to the mean in 2022 (0.3%) and the 10-year mean of 0.2% (Figure 4). The mean free fatty acid content in samples from Manitoba was 0.8%, higher than Alberta (0.2%) and Saskatchewan (0.2%) (Table 5).

Fatty acid composition

In 2023, the mean alpha-linolenic acid (C18:3) content in brown flaxseed graded No. 1 was 55.8%. This was slightly higher than the 2022 mean (54.6 %) but lower than the 10-year mean of 56.8% (Figure 5). The mean alpha-linolenic acid (C18:3) content in samples from Manitoba, Saskatchewan and Alberta was 58.0%, 55.4% and 55.8%, respectively.

In 2023, the mean iodine value for brown flaxseed graded No. 1 was 189.3 units. This was slightly higher than in 2022 (186.8 units) but lower than the 10-year mean (190.6 units) (Figure 6).

Figure 2 Oil content (%, dry basis) for brown Flaxseed, No. 1 Canada Western from 2009 to 2023 harvest samples

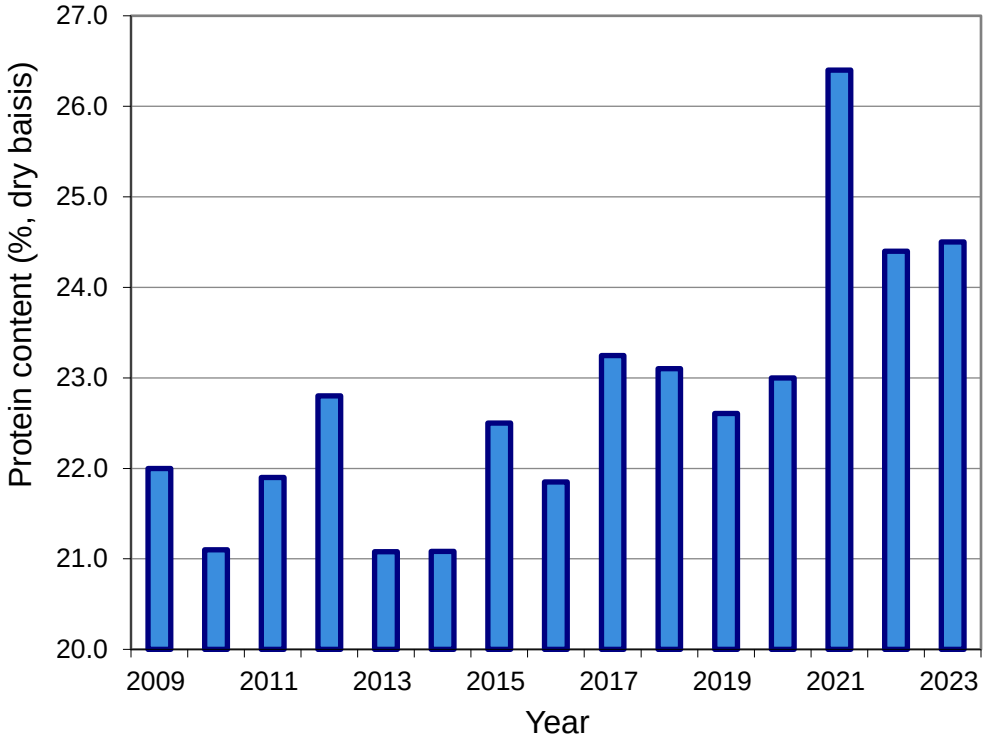


2023 mean 44.8%

2022 mean 44.7%

2013 to 2022 mean 45.6%

Figure 3 Protein content (%, dry basis) for brown Flaxseed, No. 1 Canada Western from 2009 to 2023 harvest samples

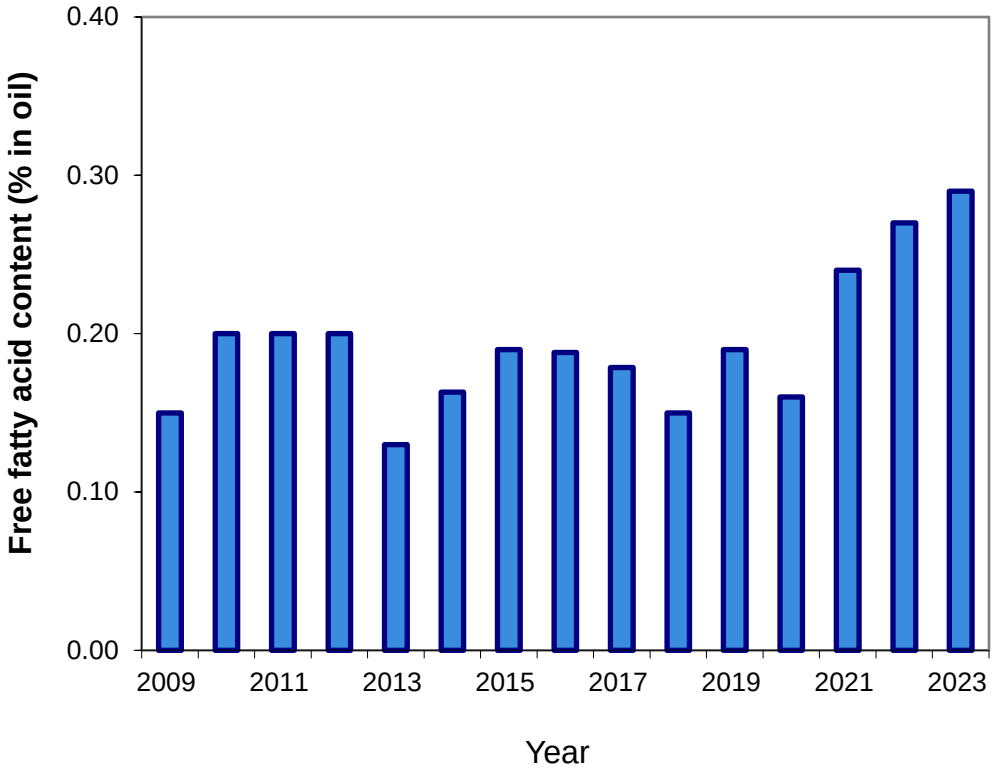


2023 mean 24.5%

2022 mean 24.4%

2013 to 2022 mean 23.1%

Figure 4 Free fatty acid content (% in oil) for brown Flaxseed, No. 1 Canada Western from 2009 to 2023 harvest samples

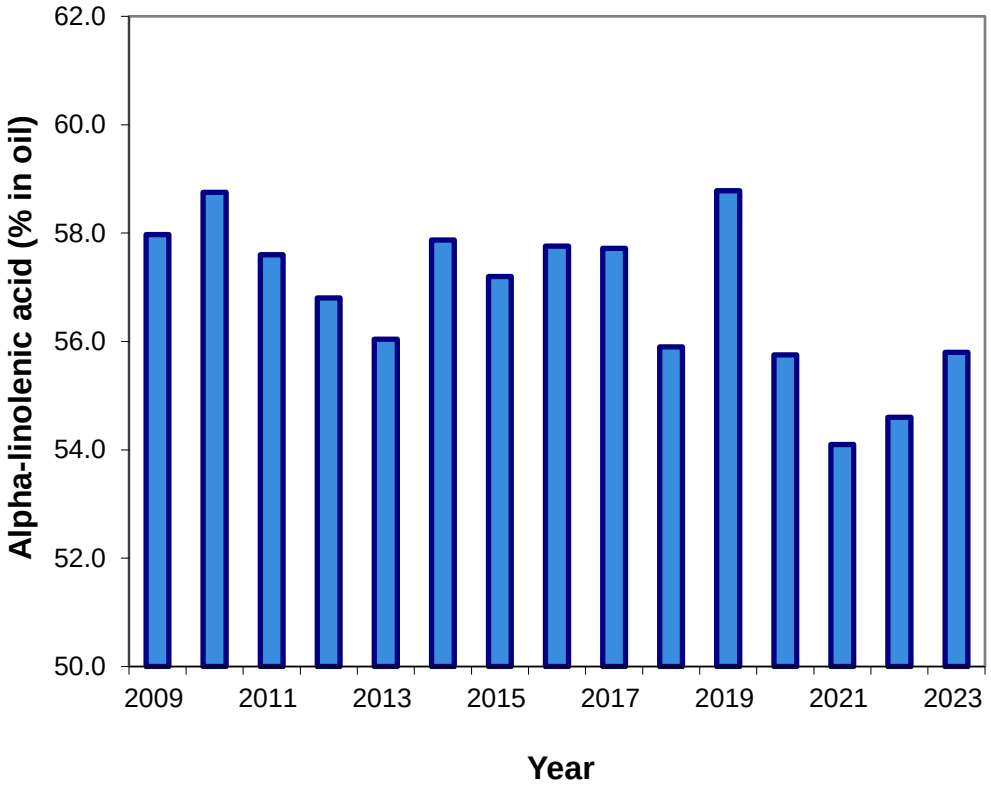


2023 mean 0.3%

2022 mean 0.3%

2013 to 2022 mean 0.2%

Figure 5 Alpha-linolenic acid content (% in oil) for brown Flaxseed, No. 1 Canada Western from 2009 to 2023 harvest samples

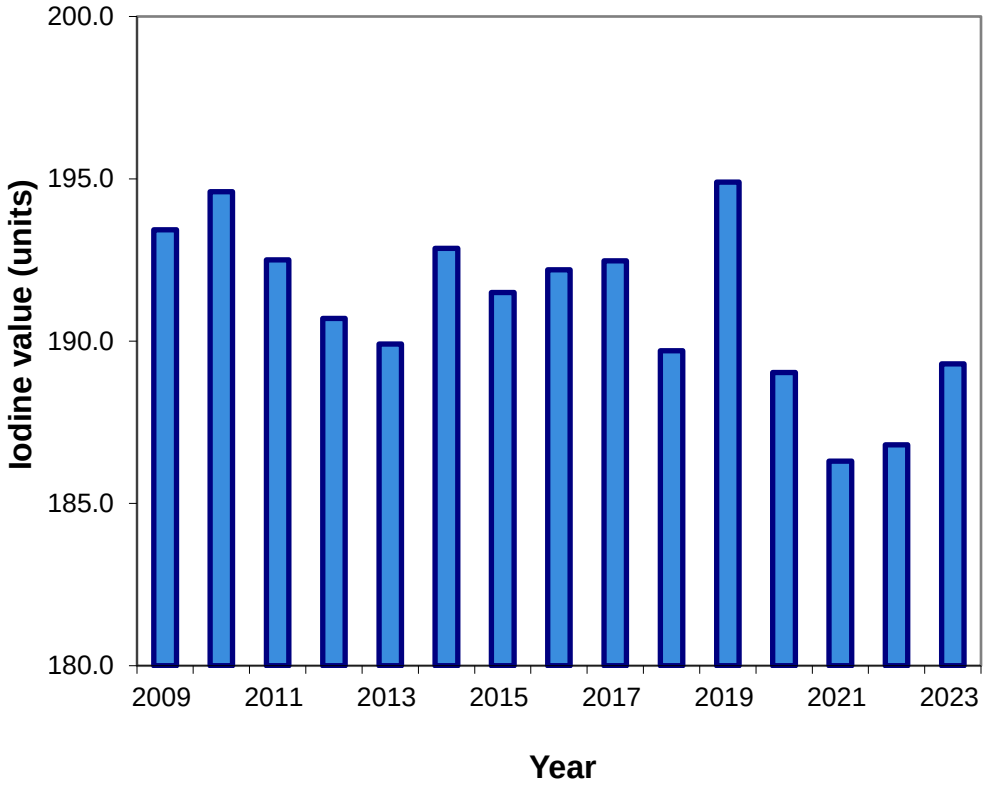


2023 mean 55.8%

2022 mean 54.6%

2013 to 2022 mean 56.6%

Figure 6 Iodine value (units) for brown Flaxseed, No. 1 Canada Western from 2009 to 2023 harvest samples



2023 mean 189.3

2022 mean 186.8

2013 to 2022 mean 190.5