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Quality of Canadian oilseed-type soybeans 2024

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Introduction

This report presents harvest quality data for Canadian oilseed-type soybeans grown in 2024. Soybean 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 by the Oilseeds program staff from the Grain Research Laboratory.

Summary

Soybean production in Canada has expanded in recent years and soybeans are now grown from the Maritimes through to Saskatchewan (Figure 1). Oilseed-type soybeans are used in the crushing industry and for animal feed. The oil is used in salad dressings, shortening, and margarine products, and the defatted meal, which is protein rich, is used to supplement livestock rations.

In 2024, 275 samples of oilseed-type soybeans were received by the Harvest Sample Program, much less than the 379 samples received in 2023. Soybean samples originated from Saskatchewan (6), Manitoba (90), Ontario (153), Quebec (20), and New Brunswick (6), with 30% graded as Soybeans, No. 1 Canada and 70% graded as Soybeans, No. 2 Canada.

Oil, protein, free fatty acid and chlorophyll content as well as fatty acid composition for oilseed-type soybeans were determined using composites of the No. 1 and No. 2 soybean samples. Oil and protein content were determined on a dry basis (historical reference) and on a 13% moisture basis (commercial reference). Table 1 compares the 2024 data, the 2023 data, and the 5-year means for the Canada-wide soybean composites. Table 3 and Table 4 contain the data for soybean composites according to their specific locations.

The mean oil content for the Canada-wide composite was 22.2% on a dry basis and 19.3% at 13% moisture. These oil values are higher than the 2023 means of 21.8% (dry basis) and 19.0% (at 13% moisture), and the 5-year means of 21.9% (dry basis) and 19.0% (at 13% moisture) (Table 1). The mean protein content for the Canada-wide composite was 38.0% on a dry basis and 33.1% at 13% moisture. These protein values are lower than the 2023 means of 38.6% (dry basis) and 33.6% (at 13% moisture), and the 5-year means of 38.6% (dry basis) and 33.6% (at 13% moisture) (Table 1). The mean oil and protein content varied between soybean composites from western and eastern Canada (Table 3). The western Canada composite (Manitoba and Saskatchewan) had a mean oil content of 22.0% (dry basis) and 18.8% (at 13% moisture), and a mean protein content of 37.5% (dry basis) and 32.47% (at 13% moisture). The eastern Canada composite (Ontario, Quebec and New Brunswick) had a mean oil content of 22.4% (dry basis) and 19.0% (at 13% moisture), and a mean protein content of 38.3% (dry basis) and 33.3% (at 13% moisture).

Table 1 Quality data for Soybeans, No. 1 Canada and Soybeans, No. 2 Canada composites in 2024 and 2023

Grade	Quality parameter	2024	2023	2019 to 2023 mean
Soybeans, No. 1 Canada and Soybeans, No. 2 Canada	Oil content, %, dry basis	22.2	21.8	21.8
	Oil content, %, 13% moisture	19.3	19.0	19.0
	Protein content ¹ , %, dry basis	38.0	38.6	38.6
	Protein content ¹ , %, 13% moisture	33.1	33.6	33.6
	Protein content of defatted meal, %, 13% moisture	42.5	42.9	43.0
	Chlorophyll content, mg/kg ² of seeds	0.3	0.3	0.4
	Free fatty acid content ³ , %	0.1	0.1	0.1
	Oleic acid, % in oil	20.4	20.4	20.0
	Linoleic acid, % in oil	54.2	54.1	54.6
	Alpha-linolenic acid, % in oil	9.0	9.3	9.0
	Total saturated fatty acids ⁴ , % in oil	15.5	15.4	15.3
	Iodine value, units	135.3	136.0	135.8

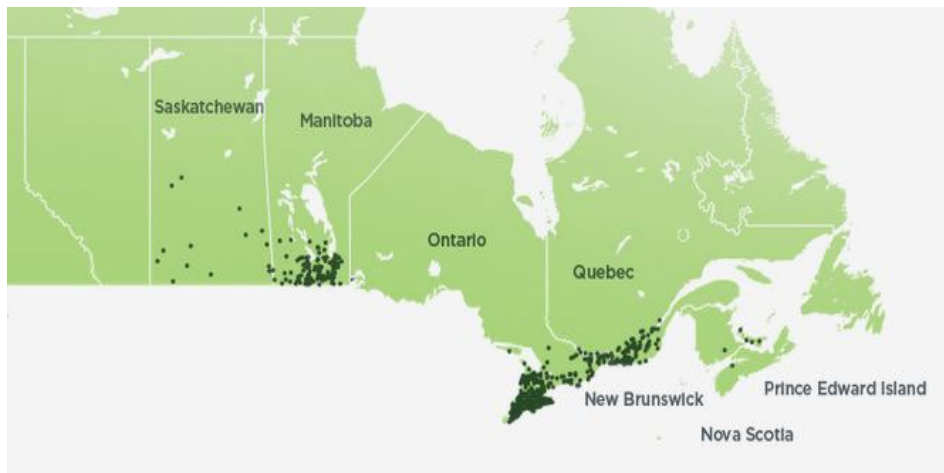
¹ Protein content calculated from nitrogen (N) content using N x 6.25.

² mg/kg = milligrams per kilogram.

³ Calculated as percentage of oleic acid.

⁴ Sum of all saturated fatty acids from C12:0 to C24:0.

Figure 1 Soybean production areas in Canada



Source: [Soy Canada](#)

Weather and production review

Seeding and growing conditions

In 2024, the greatest challenge for soybean seeding in eastern Canada was spring precipitation. In some areas, it was the wettest spring on record, which caused delays in seeding in certain regions. Despite these conditions, most of the soybean crop was planted by mid-June, with some additional reseeding required in areas with clay soil. Following the wet spring, the growing season was characterized by hot and humid conditions, which contributed to a relatively rapid maturation of the crop. As a result, harvest progressed quickly, with the majority of the soybean crop harvested by mid-October.

In Manitoba, spring seeding was marked by abundant precipitation. Between May 1 and June 2, all regions of the province received more than 100% of the normal accumulated precipitation. Although this caused some delays in seeding, soil moisture conditions were overall improved. By mid-May, approximately 70% of the soybean crop had been seeded, and seeding was completed by mid-June. The first half of the growing season was characterized by cooler temperatures and abundant rain. However, temperatures increased drastically later in the growing season. The majority of the soybean crop was harvested by mid-October.

Source: [Prograin | Crop reports](#)

Production

The data for seeded area and production in 2024 and 2023 are given in Table 2. In 2024, the area seeded with soybeans increased to 2,285,300 hectares (ha) from 2,257,000 ha in 2023.

Soybean production in Canada has increased steadily from 2000 to 2024, primarily due to increased production in Ontario. In 2024, production in eastern Canada was 5,741,560 metric tonnes (MT). While production in western Canada peaked in 2017 at 2,742,300 MT. Production in western Canada has been slowly decreasing in recent years, mainly due to poor weather conditions and uncertainty in the market. In 2024, however, production increased to 1,742,258 MT, making 2024 the highest production year in western Canada since 2018.

Approximately 65% of Canadian soybeans were produced in eastern Canada and 35% in western Canada.

Table 2 Seeded area and production for Canadian soybeans in 2024 and 2023¹

Location	Seeded area (thousand hectares)		Production (metric tonnes)		Production, 5-year mean (metric tonnes)
	2024	2023	2024	2023	2019 to 2023
Manitoba	576,900	645,600	1,696,770	1,566,858	1,237,254
Saskatchewan	27,100	27,500	45,488	44,656	60,408
Western Canada	604,000	673,100	1,742,258	1,611,514	1,297,662
Ontario	1,262,000	1,178,900	4,354,506	4,036,036	3,920,964
Quebec	419,300	405,300	1,387,054	1,268,813	1,149,540
Eastern Canada	1,681,300	1,584,200	5,741,560	5,304,849	5,070,504
Total Canada	2,285,300	2,257,300	7,483,818	6,916,363	6,368,166

¹ Statistics Canada Table 32-10-0359-01 - [Estimated areas, yield, production and average farm price of principal field crops, in metric units and imperial units](#)

Harvest samples

In 2024, the Canadian Grain Commission's Harvest Sample Program received 275 oilseed-type soybean samples. The distribution of samples was:

- 179 from eastern Canada and Maritimes (231 in 2023)
- 96 from western Canada (148 in 2023)

Canadian Grain Commission inspectors graded the samples according to the [Official Grain Grading Guide](#). In 2024, almost all of the submitted samples were graded as Soybeans, No. 1 Canada or Soybeans, No. 2 Canada. The distribution of grades was similar in eastern and western Canada.

Key quality factors for oilseed-type soybeans are oil, protein, free fatty acid, chlorophyll and the composition of fatty acids. Oil and protein content give quantitative estimates of the quality of soybean oil and of the defatted meal used for protein in animal feed. Fatty acid composition provides information about the nutritional, physical and chemical characteristics of soybean oil.

Individual samples were analyzed for oil and protein content using a FOSS DS2500 near-infrared (NIR) spectrometer, which was calibrated and verified against appropriate samples analyzed by reference methods. Composite samples were analyzed for oil, protein, free fatty acid, chlorophyll and fatty acid composition using reference methods. All [oilseed method and test procedures](#) are available on our website.

Oil and protein content

Mean oil content for the Canada-wide No. 1 and No. 2 soybean composite was 22.2% on a dry basis and 19.3% at 13% moisture (Table 1). These values are higher than the 2023 means (21.8% on a dry basis, 19.0% at 13% moisture) and the 5-year means (21.9% on a dry basis, 19.0% at 13% moisture). The oil content of individual samples ranged from 19.0% to 24.0% on a dry basis (Table 3) and 16.5% to 20.9% at 13% moisture. Oil content in the composite from western Canada was 22.0% on a dry basis and 19.1% at 13 % moisture. Oil content in the composite from eastern Canada was 22.4% on a dry basis and 19.5% at 13 % moisture. Figure 4 shows the oil content trends for eastern Canada, western Canada, and all of Canada since 2006.

Mean protein content for the Canada-wide No. 1 and No. 2 soybean composite was 38.0% on a dry basis and 33.1% at 13% moisture (Table 1). These values are lower than the 2023 means (38.6% on a dry basis, 33.6% at 13% moisture) and the 5-year means (38.6% on a dry basis, 33.6% at 13% moisture). The protein content of individual samples ranged from 32.1% to 41.1% on a dry basis (Table 3) and 27.9% to 35.8% at 13% moisture. Protein content for the composite from western Canada was 37.5% (dry basis) and 32.5% (13 % moisture), which was lower than the values for the composite from eastern Canada (38.3% on a dry basis and 34.3% at 13 % moisture) (Table 3). Figure 2 shows the protein content trends for eastern Canada, western Canada, and all of Canada since 2006. Mean protein content in western Canadian samples has been consistently lower and has slightly more yearly variability than the mean protein content in eastern Canadian samples.

Figure 3 gives the trends in protein content for fully defatted soybean meal since 2006. In 2024, the protein content for defatted soybean meal from western Canada (48.1%) was lower than that from eastern Canada (49.3%).

Growing conditions are usually responsible for variations in oil and protein content from year to year, whereas genetics or varietal differences are usually responsible for trends over several years. A combination of genetics and growing conditions is responsible for differences observed between eastern and western soybeans. Breeding programs currently focus primarily on yield and other agronomic factors. Quality factors, such as oil or protein content, are not considered when registering new soybean varieties in Canada.

Fatty acid composition

Table 4 contains the 2024 fatty acid composition data for the No. 1 and No. 2 soybean composites according to location. Linoleic acid (C18:2), the main fatty acid found in soybean oil, had a mean content value of 54.2% in the Canada-wide composite, similar to 2023 (54.1%). Oleic acid (C18:1), the second most important fatty acid in soybeans, had a mean content value of 20.4%, identical to 2023. The unsaturated fatty acid, alpha-linolenic acid (C18:3), had a mean content value of 9.0%, compared to 9.3% in 2023. The mean content value of total saturated fatty acids was 15.5% in 2024.

The iodine value of oil is an estimation of the degree of unsaturation of its fatty acids. The higher the number of double bonds in the oil, the higher the iodine value and degree of unsaturation. In 2024, the mean alpha-linolenic acid content was slightly lower than in 2023, while the mean linoleic acid content was similar to 2023 (Table 1). As a result, the iodine value in 2024 (135.3 units) was slightly lower than in 2023 (136.0 units). Figure 5 shows the iodine value trends since 2006 for eastern Canada, western Canada, and all of Canada. The yearly variations reflect the environmental differences, including geographic factors and climatic factors, such as temperature and precipitation.

There is no requirement to control the fatty acid composition in Canadian oilseed-type soybeans, which leads to important variations between varieties. Weather also plays an important role in the variability of fatty acid composition between years. In hot and dry years, soybeans tend to produce oil with less polyunsaturated fatty acids, such as alpha-linolenic and linoleic acids, more total saturated fatty acids, and more oleic acid. The opposite is observed if seeds are grown in cool conditions.

Free fatty acid content

The Canada-wide No. 1 and No. 2 soybean composite in 2024 had a mean free fatty acid content of 0.1%, identical to 2023 (Table 1). The composite sample from eastern Canada had a free fatty acid content of 0.10 %, while the composite sample from western Canada had a free fatty acid content of 0.12% (Table 3). The consistency between samples suggests that this quality of oilseed-type soybeans is stable across regions and years.

Chlorophyll content

Chlorophyll content is an indicator of maturity in soybeans: the lower the chlorophyll, the more mature the seed. In 2024, the chlorophyll content for the soybean composite from western Canada was 0.32 milligrams per kilogram (mg/kg), similar to the chlorophyll content for the composite from eastern Canada (0.29 mg/kg) (Table 3).

Figure 2 Protein content (% dry basis) for Canadian oilseed-type soybeans from 2006 to 2024

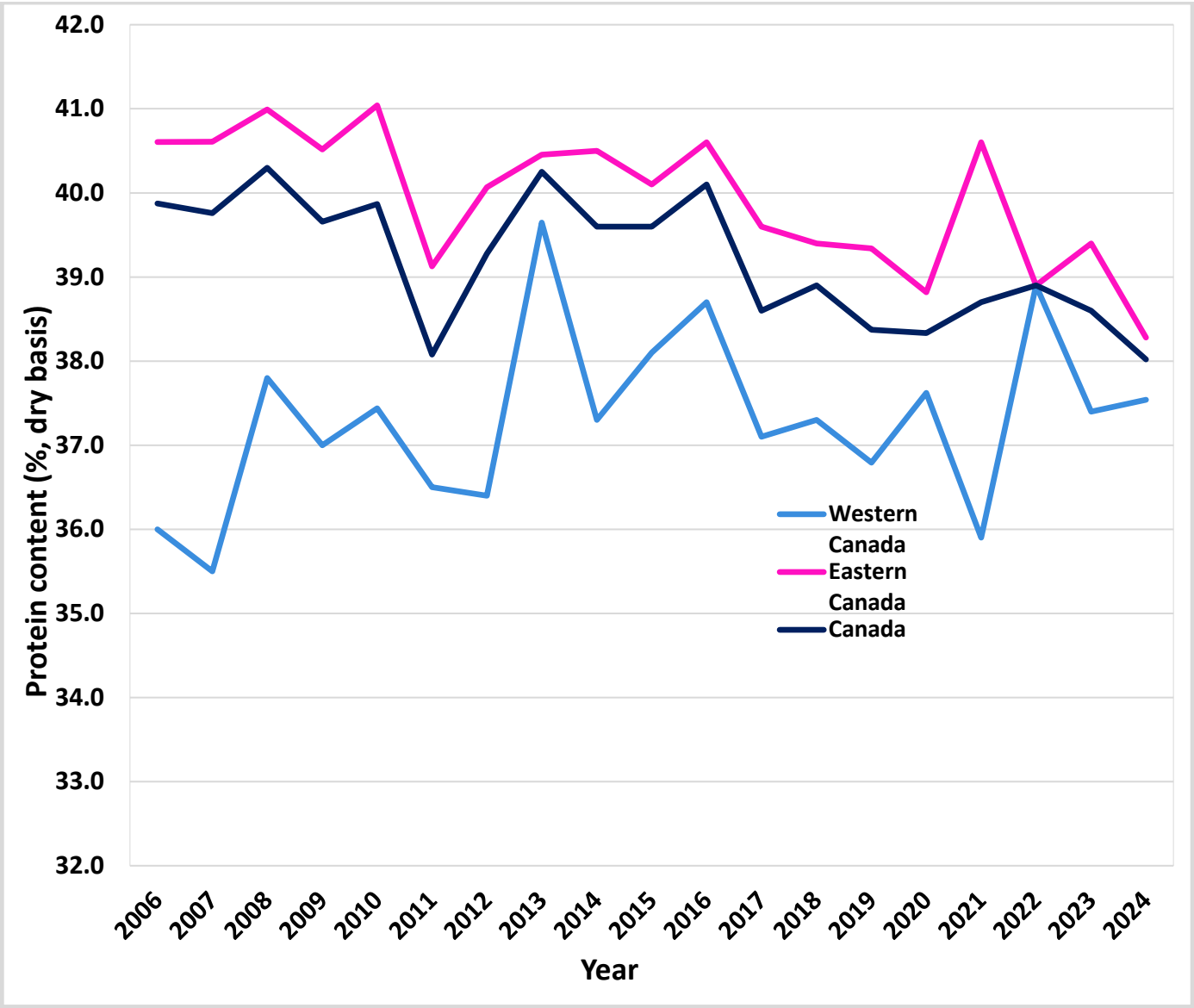


Figure 3 Protein content (% dry basis) of defatted meal for Canadian oilseed-type soybeans from 2006 to 2024

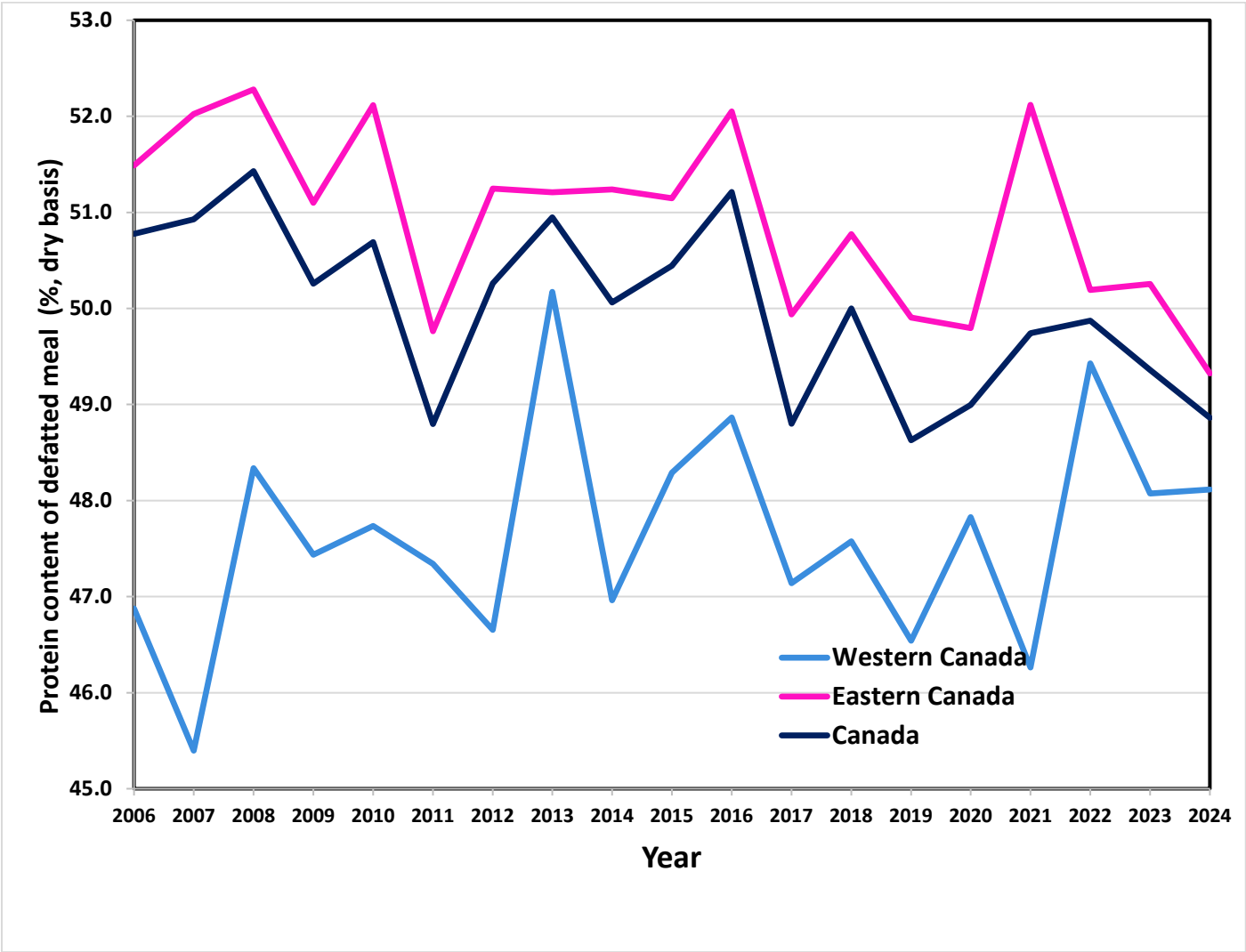


Figure 4 Oil content (% , dry basis) for Canadian oilseed-type soybeans from 2006 to 2024

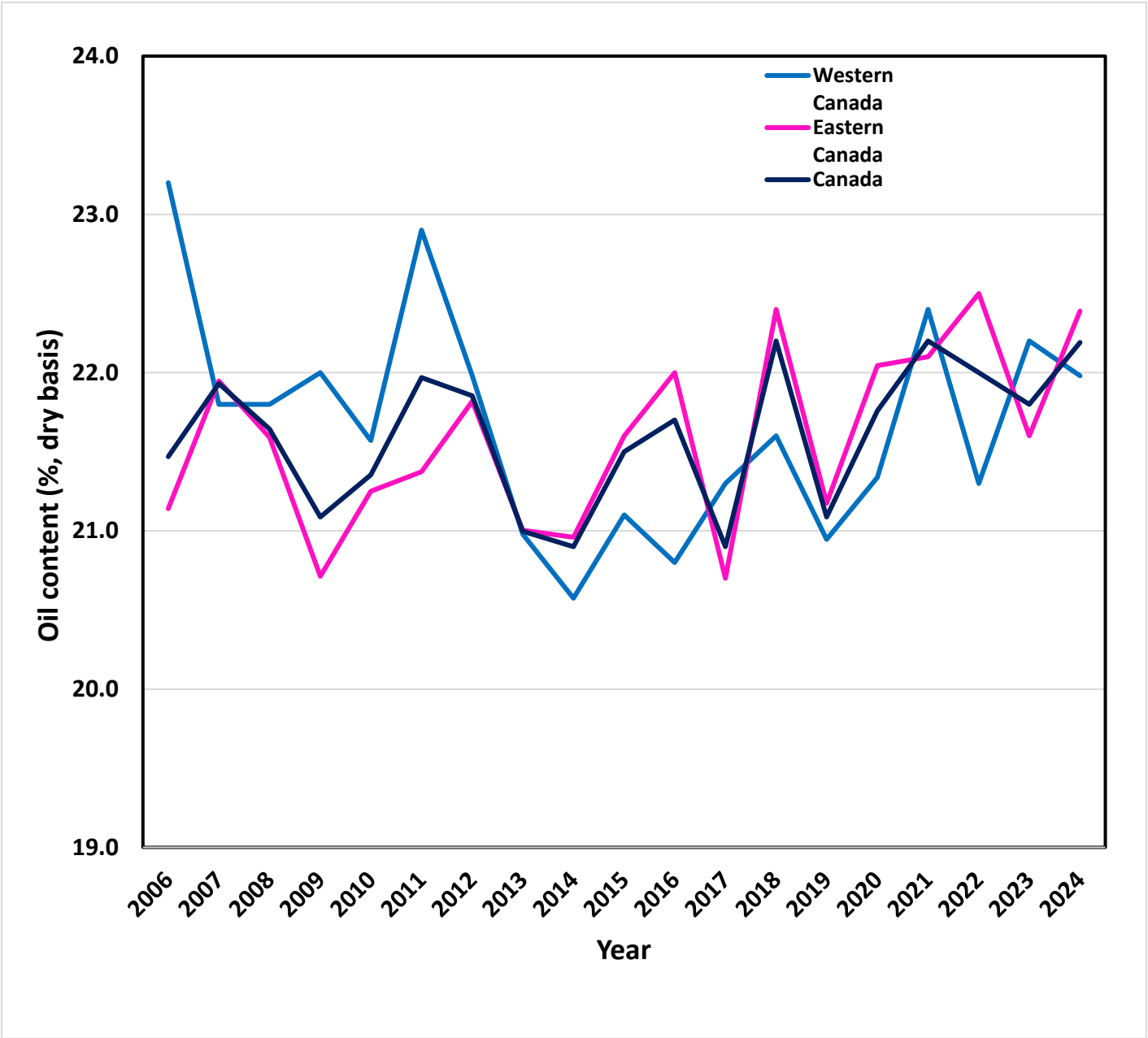


Figure 5 Iodine value of oil (units) for Canadian oilseed-type soybeans from 2006 to 2024

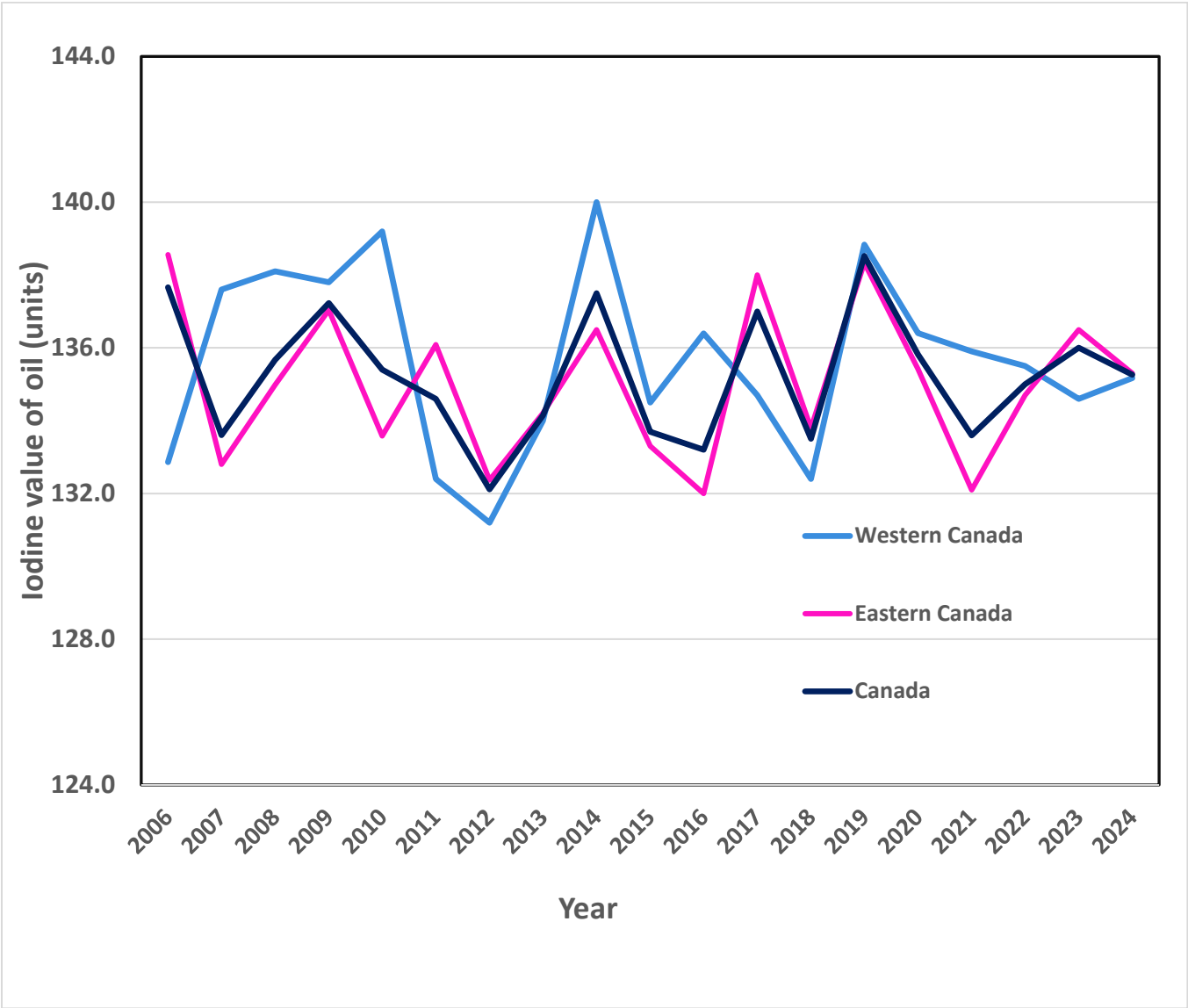


Table 3 Oil, protein, chlorophyll and free fatty acid content for composites of No. 1 and No. 2 Canadian oilseed-type soybeans in 2024

Location	Number of samples	Oil content, %, dry basis			Protein content ¹ , %, dry basis			Chlorophyll content, mg/kg ²	Free fatty acid content ³ , %
		Mean	Min ⁴	Max ⁵	Mean	Min	Max		
Manitoba	90	22.0	20.1	24.0	37.6	33.7	40.9	0.33	0.04
Saskatchewan	6	21.7	19.0	22.9	36.4	34.2	39.5	0.90	0.07
Western Canada	96	22.0	19.0	24.0	37.5	33.7	40.9	0.32	0.09
Ontario	153	22.4	20.9	24.0	38.4	32.1	41.1	0.28	0.12
Quebec	20	22.3	21.4	23.6	37.9	35.0	39.8	0.38	0.10
New Brunswick	6	22.5	22.0	23.5	36.9	34.9	38.4	0.38	0.03
Eastern Canada	179	22.4	20.9	24.0	38.3	32.1	41.1	0.29	0.12
Canada	275	22.2	19.0	24.0	38.0	32.1	41.1	0.32	0.10

¹ Protein content is calculated from nitrogen (N) content using N x 6.25.

² mg/kg = milligrams per kilogram.

³ Calculated as percentage of oleic acid.

⁴ Min = minimum.

⁵ Max = maximum.

Table 4 Main fatty acid content and iodine value of oil for composites of No. 1 and No. 2 Canadian oilseed-type soybeans in 2024

Location	Number of samples	C16:0	C18:0	C18:1	C18:2	C18:3	Total SFA ¹	Iodine value ² , units
		Fatty acid composition, % in oil						
Manitoba	90	10.7	4.1	20.1	54.2	9.2	15.8	135.3
Saskatchewan	6	10.5	4.8	20.8	53.4	8.5	16.4	133.0
Western Canada	96	10.7	4.2	20.2	54.1	9.1	15.8	135.2
Ontario	153	10.5	4.2	20.9	53.8	9.0	15.6	134.9
Quebec	20	10.5	3.7	18.5	56.8	8.9	15.0	137.9
New Brunswick	6	10.6	3.8	18.7	55.8	9.4	15.3	137.5
Eastern Canada	179	10.5	4.1	20.6	54.2	9.0	15.4	135.3
Canada	275	10.6	4.1	20.4	54.2	9.0	15.5	135.3

¹ Total SFA = total saturated fatty acids, which is the sum of all saturated fatty acids from C12:0 to C24:0.

² Calculated from the fatty acid composition.

Acknowledgments

The Grain Research Laboratory acknowledges the cooperation of the soybean producers, grain handling facilities and oilseed crushing plants in eastern and western Canada for supplying the samples of newly harvested soybeans. We also acknowledge Canadian Grain Commission grain inspectors for grading the soybean samples, and staff from the Oilseeds program for their technical assistance.