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Quality of western Canadian peas 2023

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Table of Contents

Introduction.....	3
Growing and harvesting conditions.....	3
Production	6
Harvest samples	7
Quality of 2023 western Canadian peas.....	8
Protein content.....	8
Yellow peas.....	8
Green peas.....	8
Acknowledgements	10

Tables

Table 1 Production statistics for 2023 western Canadian peas	6
Table 2 Protein content (% dry basis) for 2023 western Canadian yellow peas by grade	11
Table 3 Protein content (% dry basis) for 2023 western Canadian green peas by grade	12
Table 4 Mean protein and mean starch content (% dry basis) for 2023 western Canadian yellow peas by crop region.....	14
Table 5 Mean protein and mean starch content (% dry basis) for 2023 western Canadian green peas by crop region.....	14
Table 6 Quality data for 2023 western Canadian yellow pea composites by grade	15
Table 7 Quality data for 2023 western Canadian green pea composites by grade	16

Figures

Figure 1 Mean temperature difference from normal in the Prairie region from June 1 to June 30, 2023.....	3
Figure 2 Mean temperature difference from normal in the Prairie region from July 1 to July 31, 2023.....	4
Figure 3 Total precipitation in the Prairie region from April 1 to October 31, 2023.....	4
Figure 4 Origin of 2023 pea samples received by the Canadian Grain Commission's Harvest Sample Program	7
Figure 5 Mean protein content (% dry basis) of western Canadian peas from 2013 to 2023	13
Figure 6 Crop regions in western Canada.....	13

Introduction

This report presents harvest quality data for yellow and green peas grown in western Canada in 2023. Pea 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.

Growing and harvesting conditions

Figures 1 and 2 show the monthly mean temperature differences from normal in the Prairie region during the 2023 growing season (June and July). Figure 3 shows the total precipitation in the Prairie region from April 1 to October 31, 2023.

Figure 1 Mean temperature difference from normal in the Prairie region from June 1 to June 30, 2023

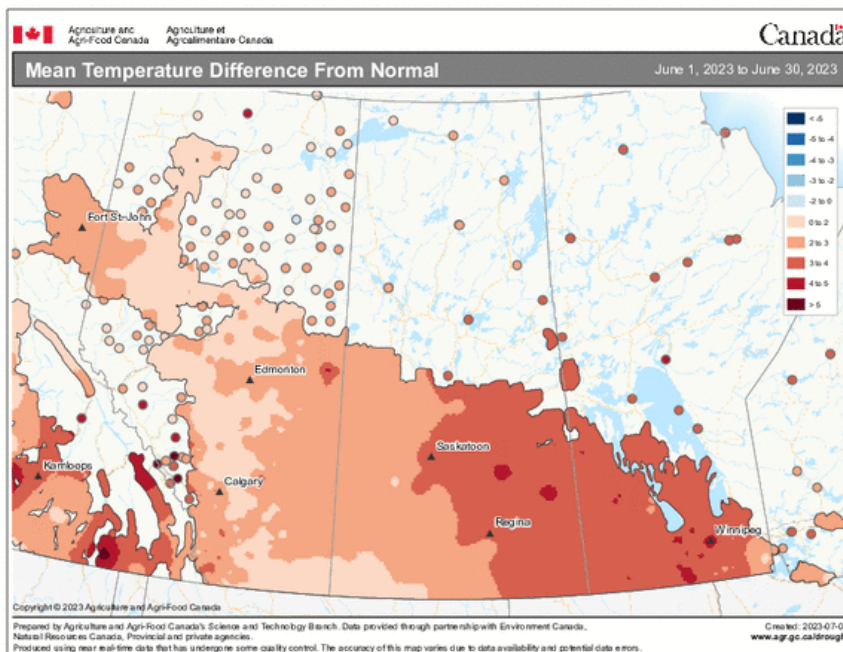


Figure 2 Mean temperature difference from normal in the Prairie region from July 1 to July 31, 2023

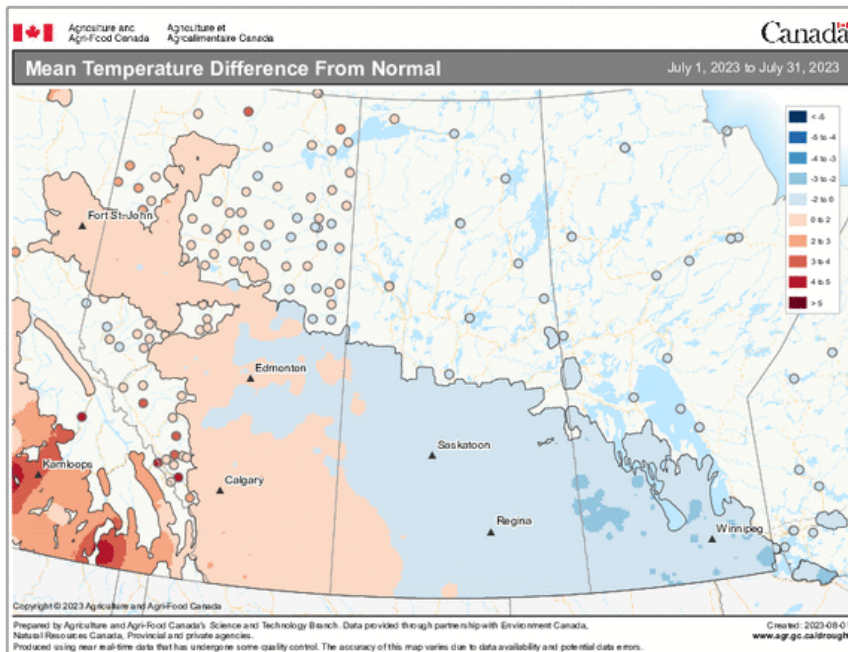
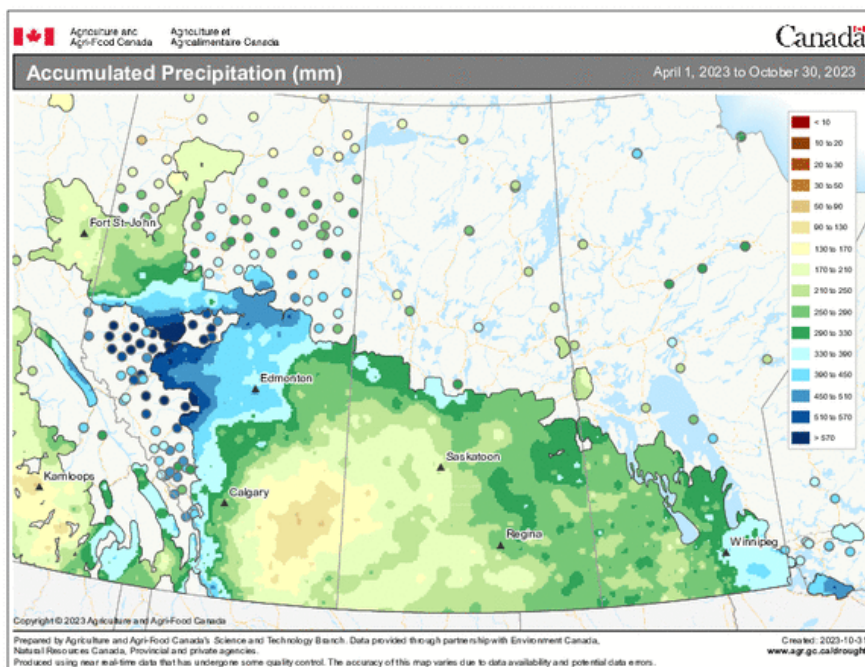


Figure 3 Total precipitation in the Prairie region from April 1 to October 31, 2023



In Manitoba, cold temperatures in early spring slowed the progress of seeding. Warmer than normal temperatures in May allowed seeding operations to advance and seeding was completed by early June. Warm conditions and inadequate moisture in June affected some crops in the central region of Manitoba (Figure 1). Rainfall was variable throughout the growing season (Figure 3). Growing conditions were good except for low topsoil moisture for crops seeded late. Cool temperatures in July helped crops in some areas thrive under dry conditions (Figure 2). By the end of July, crops started to ripen prematurely in some fields due to persistently warm and dry conditions. Harvest began in mid-August and was completed by mid-September. Pea yields varied, depending on precipitation.

In Saskatchewan, seeding began in early May and was completed by early June. Warm temperatures and timely rain in the southeast, east-central, northeast and northwest regions were beneficial for plant growth (Figures 1, 2 and 3). Warm and persistently dry conditions in the southwest and west-central regions, however, caused crops to mature early and resulted in an early harvest (Figure 3). Harvest progressed smoothly and all peas were in bins by mid-September. Pea yields also varied throughout Saskatchewan, depending on precipitation.

In Alberta, unseasonably warm temperatures allowed seeding to begin in early May and be completed by early June. Hot, dry and windy weather depleted soil moisture in June and July, stressing and maturing plants more quickly than normal (Figures 1 and 2). Harvest began in early August in the south and central regions due to dry conditions but was delayed due to wet and cool conditions in the northern parts of the province (Figure 3). By mid-September, the pea harvest was near completion. Pea yields were higher than the five-year provincial average in the northwest and northeast regions, but lower in the other regions.

Production

Pea production in 2023 was estimated to be 2.6 million tonnes, which is approximately 23.7% lower than in 2022, and 31.5% lower than the 10-year average of 3.8 million tonnes (Table 1). The lower production is due to a 16.7% decrease in yield and an 11.0% decrease in harvested area compared to 2022. Saskatchewan had the highest pea production (48.8 %), followed by Alberta (42.8 %) and Manitoba (8.4 %).

Table 1 Production statistics for 2023 western Canadian peas ¹

Location	Harvested area (thousand hectares)		Production (thousand tonnes)		Yield (kg/ha) ²		Mean production (thousand tonnes)
	2023	2022	2023	2022	2023	2022	2013–2022
Manitoba	65	76	218	256	3354	3375	142
Saskatchewan	633	727	1269	1570	2004	2160	2017
Alberta ³	497	540	1111	1581	2235	2930	1630
Western Canada	1195	1343	2598	3407	2113	2538	3790

¹ Source: Statistics Canada.

² kg/ha = kilograms per hectare.

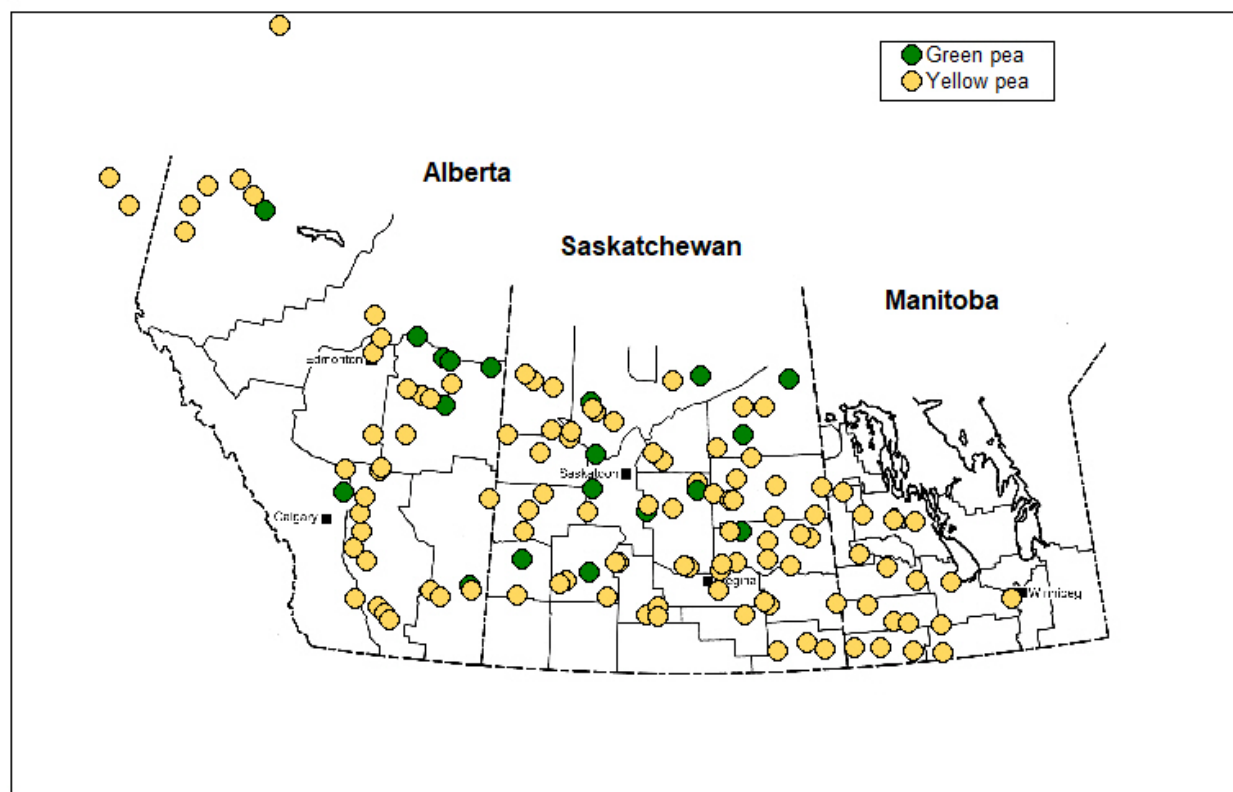
³ Includes the Peace River area of British Columbia.

Harvest samples

Samples were submitted to the Canadian Grain Commission's Harvest Sample Program by pea producers and grain companies across western Canada (Figure 4). The program received 446 pea samples, consisting of 390 yellow pea samples and 56 green pea samples.

All samples were graded and analyzed for protein content. Composite samples were prepared based on class (yellow or green), crop region and grade (No. 1 or No. 2 Canada). All composites were tested for chemical composition (moisture, protein, starch, crude fat, total dietary fiber and ash content), mineral content, functional properties (water holding capacity and emulsifying capacity) and physical and cooking characteristics (100-seed weight, water absorption, cooking time and firmness of cooked peas). Samples reported by grade do not necessarily represent the actual distribution of the grade across western Canada.

Figure 4 Origin of 2023 pea samples received by the Canadian Grain Commission's Harvest Sample Program



Quality of 2023 western Canadian peas

Protein content

The protein content ranged from 16.5% to 30.9% with a mean of 23.4% for yellow peas (Table 2) and ranged from 19.9% to 29.2% with a mean of 24.2% for green peas (Table 3). The mean protein content was lower for both types of peas than in 2022. The mean protein content of yellow and green peas combined was higher in 2023 than the 10-year mean of 23.1% (Figure 5). Tables 4 and 5 show the mean protein and starch content for yellow and green peas according to crop region (Figure 6).

Yellow peas

Table 6 contains the 2023 quality data for yellow pea composites by grade. No. 1 and No. 2 yellow peas were lower in mean protein (22.8% and 23.4%) but higher in mean starch (48.5% and 47.9%) than in 2022. Total dietary fiber of No. 1 yellow peas was lower than in 2022 but was similar for both years for No. 2 yellow peas. No. 1 and No. 2 yellow peas had higher crude fat content than in 2022, but the ash content was similar.

Potassium (K) was the most abundant macroelement present in yellow peas, followed by phosphorus (P), magnesium (Mg) and calcium (Ca). Among the microelements, iron (Fe) was the most abundant, followed by zinc (Zn), manganese (Mn) and copper (Cu). The majority of elements in No. 1 and No. 2 yellow peas were present at lower levels compared to 2022.

No. 1 and No. 2 yellow peas were higher in mean water holding capacity (0.91 and 0.92 grams of water per gram of sample) but were lower in oil emulsifying capacity (272.8 and 270.6 millilitres of oil per gram of sample) than in 2022.

The mean 100-seed weight for No. 1 and No. 2 yellow peas (22.5 and 22.1 grams per 100 seeds) was lower than in 2022. The water absorption values were similar to 2022 for both grades.

The cooking time of No. 1 yellow peas (25.4 min) was similar to that in 2022 but was longer for No. 2 yellow peas (29.8 min) compared to 2022 (Table 6). The cooked seed texture was firmer for No. 1 and No. 2 yellow peas (26.6 and 26.4 newtons per gram of cooked seeds) than in 2022.

Green peas

Table 7 contains the 2023 quality data for green pea composites by grade. The protein content was higher for No. 1 green peas (25.4%) but lower for No. 2 green peas (23.5%) compared to 2022. The starch content of No. 1 green peas (45.5%) and No. 2 green peas (45.9%) was higher compared to 2022. The total dietary fiber of No. 1 green peas (16.5%) and No. 2 green peas (17.2%) was lower than in 2022. The mean crude fat content was higher for No. 1 green peas (1.08%) and No. 2 green peas (1.15%) than in 2022. The ash content was lower for No. 2 green peas (2.5%) than in 2022, but was similar to 2022 for No. 1 green peas (2.5%). In 2023, the trends in macroelement and microelement content in green peas were similar to those described above for yellow peas, with lower levels for the majority of the elements in No. 1 and No. 2 green peas compared to 2022.

The mean water holding capacity for No. 1 green peas and No. 2 green peas (0.91 and 0.93 grams of water per gram of sample) was higher than in 2022. The mean oil emulsifying capacity value of No. 1 green peas (286.5

millilitres of oil per gram of sample) was higher than that in 2022 but was lower for No. 2 green peas (276.9 millilitres of oil per gram of seeds).

The mean 100-seed weight of No 1 green peas (21.1 grams per 100 seeds) was lower compared to 2022 and higher for No. 2 green peas (22.6 grams per 100 seeds) compared to 2022. The water absorption value of No. 1 green peas (0.93 grams of water per gram of seeds) was similar to that in 2022 but was lower for No. 2 green peas (0.87 grams of water per gram of seeds). The cooking time of No. 1 green peas (17.2 min) was shorter compared to 2022 and longer for No. 2 green peas (23.8 min). The cooked texture of No. 1 green peas (22.4 newtons per gram of cooked seed) was similar to that in 2022 but was firmer for No.2 green peas (25.1 newtons per gram of cooked seeds).

Acknowledgements

The Grain Research Laboratory acknowledges the cooperation of western Canadian pulse processors, producers and grain companies in supplying the samples of newly harvested peas. We are also grateful to the following groups within the Canadian Grain Commission: Industry Services for assistance with grading the samples, the Pulse Research Program staff for technical assistance, the staff of the trace elements unit for mineral analysis, and Multimedia services for their assistance in the publication of this document.

Table 2 Protein content (% dry basis) for 2023 western Canadian yellow peas by grade ¹

Location	Grade	Number of samples	2023			2022
			Mean	Minimum	Maximum	Mean
Manitoba	Peas, No. 1 Canada	27	22.7	19.0	25.8	23.0
	Peas, No. 2 Canada	27	23.1	16.5	25.9	23.0
	Peas, No. 3 Canada	7	23.3	21.4	24.8	23.3
	All grades	61	22.9	16.5	25.9	23.0
Saskatchewan	Peas, No. 1 Canada	38	22.9	18.6	26.4	23.9
	Peas, No. 2 Canada	122	23.5	18.8	30.9	24.0
	Peas, No. 3 Canada	40	23.9	18.2	27.2	24.5
	All grades	200	23.4	18.2	30.9	24.1
Alberta	Peas, No. 1 Canada	34	23.4	18.5	28.7	23.8
	Peas, No. 2 Canada	74	23.4	19.9	27.8	23.9
	Peas, No. 3 Canada	17	24.8	21.6	27.7	24.1
	All grades	125	23.6	18.5	28.7	23.9
Western Canada	Peas, No. 1 Canada	99	23.0	18.5	28.7	23.8
	Peas, No. 2 Canada	223	23.4	16.5	30.9	23.8
	Peas, No. 3 Canada	64	24.0	18.2	27.7	24.3
	All grades	386	23.4	16.5	30.9	23.9

¹ Protein content (Nitrogen x 6.25) is determined by near-infrared measurement calibrated against the Combustion Nitrogen Analysis reference method.

Table 3 Protein content (% dry basis) for 2023 western Canadian green peas by grade ¹

Location	Grade	Number of samples	2023			2022
			Mean	Minimum	Maximum	Mean
Saskatchewan	Peas, No. 1 Canada	11	25.3	23.0	29.2	26.3
	Peas, No. 2 Canada	7	23.4	22.1	26.4	25.7
	Peas, No. 3 Canada	12	24.6	22.3	26.4	23.6
	All grades	30	24.6	22.1	29.2	24.8
Alberta	Peas, No. 1 Canada	no data	no data	no data	no data	23.8
	Peas, No. 2 Canada	6	24.5	22.5	26.0	24.4
	Peas, No. 3 Canada	6	22.1	19.9	23.1	25.0
	All grades	12	23.8	19.9	26.0	24.5
Western Canada	Peas, No. 1 Canada	11	25.3	23.0	29.2	25.5
	Peas, No. 2 Canada	13	23.9	22.1	26.4	25.4
	Peas, No. 3 Canada	18	23.7	19.9	26.4	23.8
	All grades	42	24.2	19.9	29.2	24.7

¹ Protein content (Nitrogen x 6.25) is determined by near-infrared measurement calibrated against the Combustion Nitrogen Analysis reference method.

Figure 5 Mean protein content (% dry basis) of western Canadian peas from 2013 to 2023

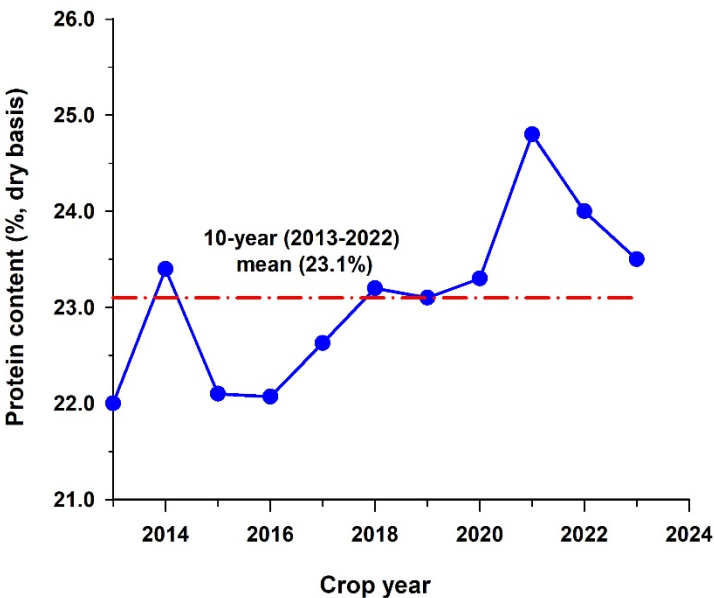


Figure 6 Crop regions in western Canada

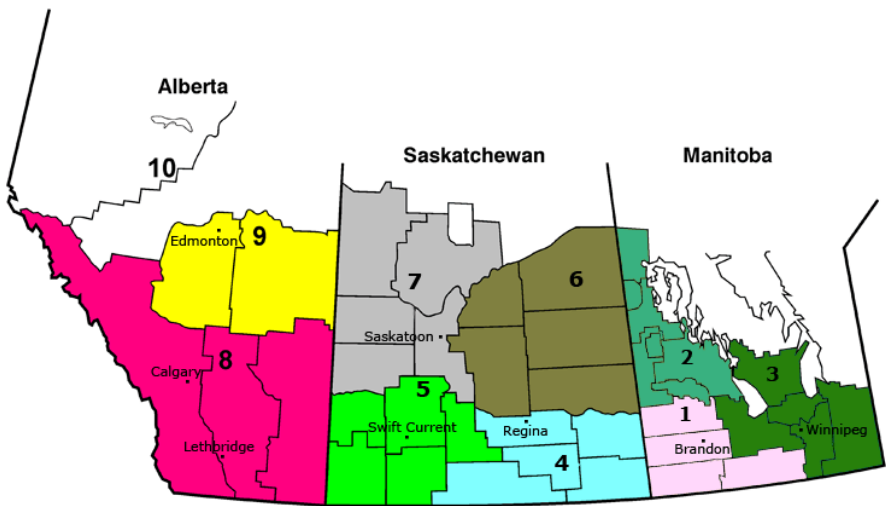


Table 4 Mean protein and mean starch content (% , dry basis) for 2023 western Canadian yellow peas by crop region

Crop region	Mean protein content		Mean starch content	
	2023	2022	2023	2022
1	22.8	23.6	47.9	45.3
2	18.7	21.3	50.7	47.1
4	22.7	23.1	48.6	46.0
5	24.8	27.3	47.0	44.7
6	22.6	22.8	48.2	46.0
7	23.2	23.7	48.5	46.5
8	24.3	25.0	47.7	44.7
9	22.6	22.9	48.3	46.7
10	21.4	23.0	48.3	47.3

Table 5 Mean protein and mean starch content (% , dry basis) for 2023 western Canadian green peas by crop region

Crop region	Mean protein content		Mean starch content	
	2023	2022	2023	2022
4	23.4	24.2	46.6	44.9
5	26.2	27.8	45.1	44.0
7	25.6	26.3	45.7	42.3

Table 6 Quality data for 2023 western Canadian yellow pea composites by grade

Category	Quality parameter	Peas, No. 1 Canada		Peas, No. 2 Canada	
		2023	2022	2023	2022
Chemical composition	Moisture, %	11.0	10.5	10.9	10.4
	Protein, %, dry basis	22.8	24.0	23.4	23.9
	Starch, %, dry basis	48.5	45.9	47.9	45.7
	Total dietary fiber, %, dry basis	15.8	17.5	16.3	16.5
	Crude fat, %, dry basis	1.35	0.97	1.30	1.03
	Ash, %, dry basis	2.5	2.6	2.5	2.7
Mineral content ¹⁾	Calcium, mg/100 g sample ²	87.4	95.4	86.1	91.8
	Copper, mg/100 g sample	0.70	0.69	0.68	0.68
	Iron, mg/100 g sample	5.0	5.3	5.3	5.6
	Potassium, mg/100 g sample	1038.8	1052.5	1031.2	1082.2
	Magnesium, mg/100 g sample	135.9	143.7	135.1	146.2
	Manganese, mg/100 g sample	1.3	1.4	1.1	1.4
	Phosphorus, mg/100 g sample	308.3	360.7	311.4	368.3
	Zinc, mg/100 g sample	3.5	3.4	3.4	3.5
Functional properties	Water holding capacity, g H ₂ O/g sample ³	0.91	0.89	0.92	0.89
	Emulsifying capacity, ml oil/g sample ⁴	272.8	277.2	270.6	274.0
Physical characteristics	100-seed weight, g/100 seeds ⁵	22.5	23.0	22.1	23.1
	Water absorption, g H ₂ O/g seeds ⁶	0.95	0.93	0.95	0.96
Cooking characteristics	Cooking time, min	25.4	25.3	29.8	19.8
	Firmness, N/g cooked seeds ⁷	26.6	23.7	26.4	22.8

¹ dry matter basis.

² mg/g 100 g sample = milligrams per 100 grams of sample.

³ g H₂O/g sample = grams of water per gram of sample.

⁴ ml oil/g sample = millilitres of oil per gram of sample.

⁵ g/100 seeds = grams per 100 seeds.

⁶ g H₂O/g seeds = grams of water per gram of seeds.

⁷ N/g cooked seeds = newtons per gram of cooked seeds (the maximum force required to shear cooked seeds).

Table 7 Quality data for 2023 western Canadian green pea composites by grade

Category	Quality parameter	Peas, No. 1 Canada		Peas, No. 2 Canada	
		2023	2022	2023	2022
Chemical composition	Moisture, %	11.9	10.2	11.3	10.5
	Protein, %, dry basis	25.4	25.1	23.5	26.1
	Starch, %, dry basis	45.5	44.7	45.9	44.0
	Total dietary fiber, %, dry basis	16.5	17.7	17.2	17.7
	Crude fat, %, dry basis	1.08	0.87	1.15	0.82
	Ash, %, dry basis	2.5	2.6	2.5	2.8
Mineral content ¹	Calcium, mg/100 g sample ²	78.6	86.7	77.9	84.9
	Copper, mg/100 g sample	0.72	0.67	0.64	0.77
	Iron, mg/100 g sample	5.1	5.0	4.7	5.4
	Potassium, mg/100 g sample	1001.8	1065.5	1046.5	1082.7
	Magnesium, mg/100 g sample	130.9	137.6	131.1	141.3
	Manganese, mg/100 g sample	1.0	1.2	1.1	1.2
	Phosphorus, mg/100 g sample	337.3	369.4	317.1	430.3
	Zinc, mg/100 g sample	3.3	3.4	3.4	3.5
Functional properties	Water holding capacity, g H ₂ O/g sample ³	0.91	0.88	0.93	0.89
	Emulsifying capacity, ml oil/g sample ⁴	286.5	277.7	276.9	284.3
Physical characteristics	100-seed weight, g/100 seeds ⁵	21.1	22.7	22.6	21.0
	Water absorption, g H ₂ O/g seeds ⁶	0.93	0.94	0.87	0.99
Cooking characteristics	Cooking time, min	17.2	20.3	23.8	9.2
	Firmness, N/g cooked seeds ⁷	22.4	22.3	25.1	20.7

¹ dry matter basis.

² mg/100 g sample = milligrams per 100 grams of sample.

³ g H₂O/g sample = grams of water per gram of sample.

⁴ ml oil/g sample = millilitres of oil per gram of sample.

⁵ g/100 seeds = grams per 100 seeds.

⁶ g H₂O/g seeds = grams of water per gram of seeds.

⁷ N/g cooked seeds = newtons per gram of cooked seeds (the maximum force required to shear cooked seeds).