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Quality of western Canadian peas 2021

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Introduction

This report presents data on the quality of peas grown in western Canada in 2021. Samples were submitted to the Harvest Sample Program by pea producers and analysed by the Canadian Grain Commission's 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 2021 growing season (June and July). Figure 3 displays the total precipitation in the prairie region from April 1 to October 31, 2021.

Figure 1 Mean temperature difference from normal in the prairie region during the 2021 growing season (June)

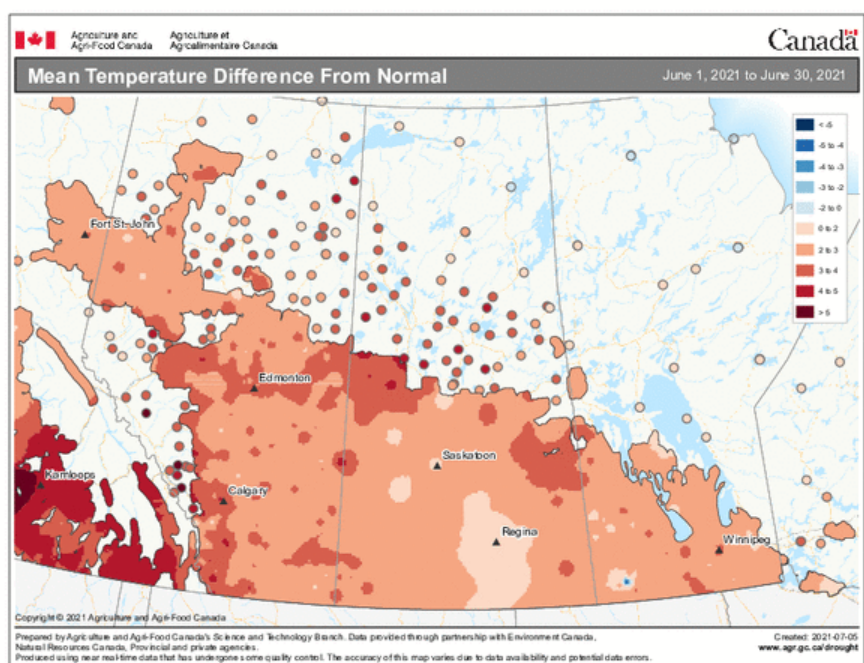


Figure 2 Mean temperature difference from normal in the prairie region during the 2021 growing season (July)

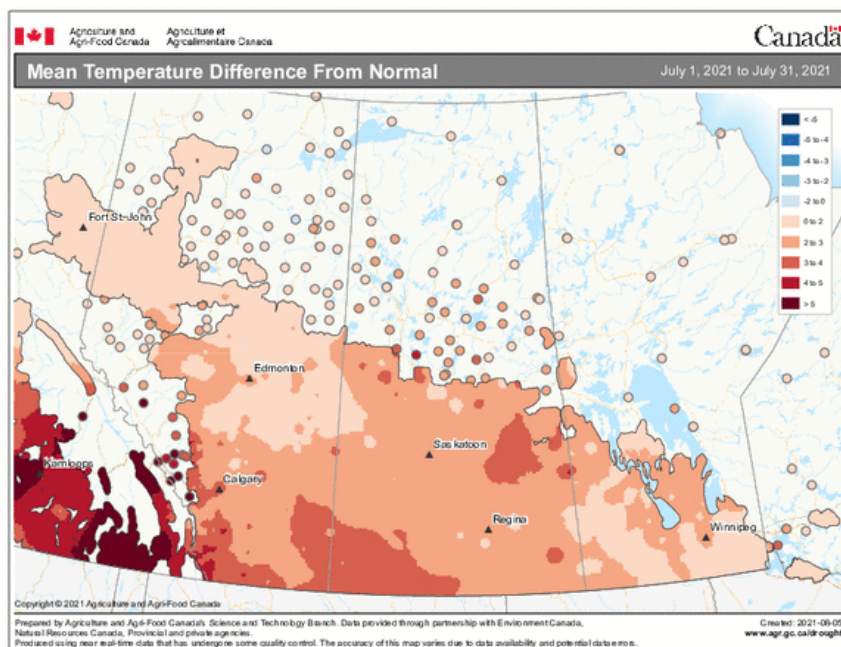
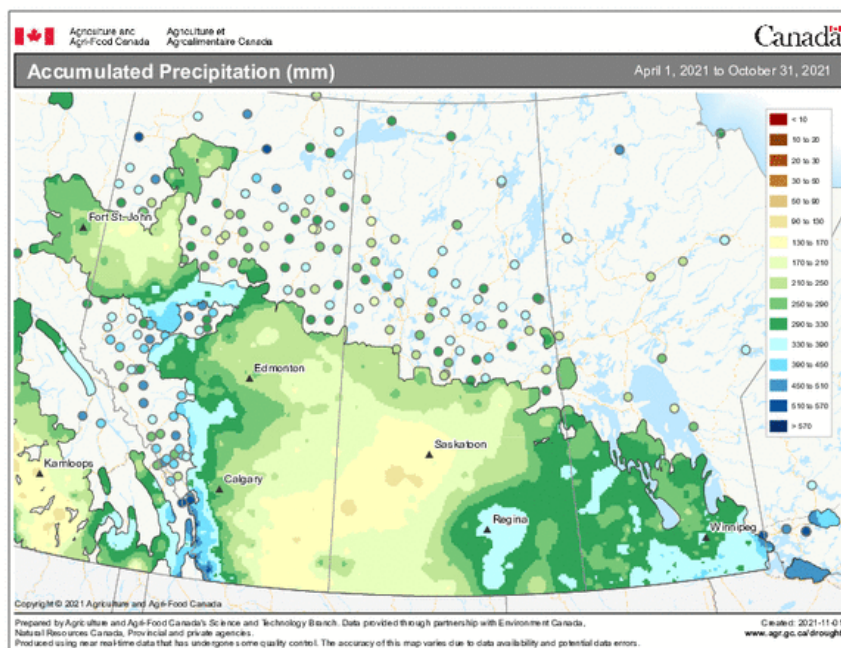


Figure 3 Total precipitation in the prairie region from April 1 to October 31, 2021



Extremely dry and hot conditions characterized the 2021 growing season in the Canadian prairies. A lack of snowmelt and dry soils allowed seeding to begin in early May in Alberta and Saskatchewan, and late April in Manitoba. Frost occurred in late May in Manitoba, causing injury to crops. Extreme heat in late June and July (Figures 1 and 2), as well as minimal rainfalls, affected crop development in the prairies. Crops were short, thin with dry lower leaves, and matured at a rapid pace. Rain and cooler temperatures in August (Figure 3) helped replenish soil moisture across the prairies and benefited the growth of late season crops. Harvest started early across the prairies due to early seeding and the adverse effects of drought on plants. Yield varied, depending on the moisture received. Overall, pulse crops had a lower than average yield.

Production

Pea production in 2021 was estimated to be 2.2 million tonnes, which is approximately 50.8% lower than in 2020, and 41.2% lower than the 10-year average of 3.8 million tonnes (Table 1). The reduced production was due to an 11% decrease in harvested area and a 44.7% decrease in yield compared to 2020. Saskatchewan accounted for 49.3% of Canadian pea production, while Alberta accounted for 41.3% and Manitoba accounted for 9.4%.

Table 1 Production statistics for 2021 western Canadian peas ¹

Province	Harvested area (thousand hectares)		Production (thousand tonnes)		Yield (kg/ha) ²		Mean production (thousand tonnes)
	2021	2020	2021	2020	2021	2020	2011–2020
Manitoba	90	70	211	246	2346	3532	105
Saskatchewan	814	933	1106	2478	1359	2655	2124
Alberta ³	581	666	925	1830	1591	2749	1581
Western Canada	1485	1669	2242	4554	1510	2729	3810

¹ Source: Statistics Canada

² kg/ha = kilograms per hectare

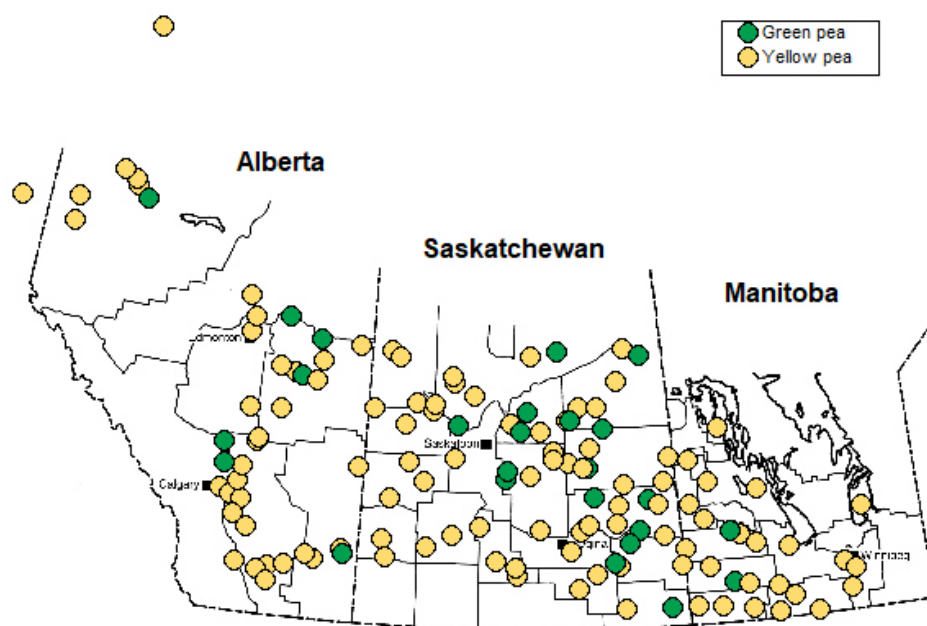
³ Includes the Peace River area of British Columbia

Western Canadian peas in 2021

Pea samples

Samples were submitted to the Canadian Grain Commission's Harvest Sample Program by pea producers across western Canada (Figure 4). The program received 540 pea samples, consisting of 437 yellow pea samples and 103 green pea samples. All samples were graded and tested for protein content. Composite samples were prepared based on class (yellow and green), crop region and grade (No. 1 and No. 2). All composites were tested for chemical composition (moisture, protein, starch, 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). It should be noted that the samples reported by grade do not necessarily represent the actual distribution of the grade across western Canada.

Figure 4 Origin of 2021 pea samples submitted to the Canadian Grain Commission's Harvest Sample Program



Quality of 2021 western Canadian peas

The protein content of yellow peas in 2021 ranged from 19.9% to 30.8% (Table 2) and ranged from 20.9% to 30.7% for green peas (Table 3). The mean protein content was 24.5% and 24.9% for yellow and green peas, respectively, which are higher than the 2020 mean (yellow and green combined) and the 10-year mean of 22.8% (Figure 5). Tables 4 and 5 show the mean protein and starch content for yellow and green peas according to crop region (Figure 6).

Canada Yellow peas

Table 6 contains the quality data for 2021 yellow pea composites by grade. Mean protein values of No. 1 and No. 2 Canada Yellow peas were both 24.6%, higher than in 2020. Total starch content of Canada Yellow peas in 2021 was similar to 2020 for No. 1 grade (47.1%) but higher than No. 2 grade (46.8%). Total dietary fiber of No. 1 (15.5%) and No. 2 (16.5%) Canada Yellow peas was higher in 2021 than in 2020. The 2021 ash content was similar to that for 2020.

Potassium (K) was the most abundant macroelement present in yellow peas, followed by phosphorus (P), magnesium (Mg) and calcium (Ca) (Table 6). Among the microelements, iron (Fe) was the highest, followed by zinc (Zn), manganese (Mn) and copper (Cu). Element contents for No. 1 and No. 2 Canada Yellow peas were similar to 2020 except for No. 2 which had a higher Fe level.

Mean water holding capacity for No. 1 (0.87 grams of water per gram of sample) and No. 2 (0.88 grams of water per gram of sample) Canada Yellow peas was lower than in 2020 (Table 6). Mean oil emulsifying capacity of No. 1 (268.5 millilitres of oil per gram of sample) and No. 2 (268.4 millilitres of oil per gram of sample) Canada Yellow peas was also lower than in 2020.

Mean 100-seed weight for No. 1 (21.5 g) and No. 2 (21.6 g) Canada Yellow peas in 2021 was slightly lower than in 2020. Yellow peas had a higher water absorption value in 2021 than 2020, with 0.97 grams of water per gram of sample for both No. 1 grade and No. 2 grade.

Cooking time for yellow peas in 2021 was longer for No. 1 grade (24.3 min) while less for No. 2 grade (15.9 min) in 2020 (Table 6). Firmness of cooked yellow peas was slightly reduced for No. 1 Grade (22.5 newton per gram of cooked seeds) but increased for No. 2 Grade (23.7 newton per gram of cooked seeds) in 2021.

Canada Green peas

Table 7 contains the 2021 quality data for No. 1 and No. 2 Canada Green pea composites by grade. The No. 1 and No. 2 Canada Green peas in 2021 had higher protein (24.9%, 25.1%) and total starch (46.3%, 46.2%) than in 2020. Total dietary fiber of No.1 Green peas (16.2%) was also higher in 2021 than in 2020, but was similar in 2021 and 2020 for No. 2 Green peas (15.2%). Ash content of No. 1 Canada Green peas (2.7%) was the same as in 2020 but was lower for No. 2 green peas (2.5%) in 2021. Similar trends in yellow peas for macro- and micro-elements were noted in green peas (Table 7). Element quantity did not show much difference between 2021 and 2020 for No. 1 and No. 2 Canada Green peas except for No. 2 which had a higher Zn value.

Compared to 2020, mean water holding capacity for Canada Green peas was slightly higher for No. 1 (0.89 grams of water per gram of sample) and lower for No. 2 (0.87 grams of water per gram of sample) in 2021 (Table 7). Mean oil emulsifying capacity value for No. 1 (274.6 millilitres of oil per gram of sample) and No. 2 (258.0 millilitres of oil per gram of sample) Canada Green peas was lower in 2021 than in 2020.

Mean 100-seed weight and water absorption for No. 1 (21.7 grams per 100 seeds, 0.95 grams of water per gram of seeds) and No. 2 (22.9 grams per 100 seeds, 0.94 grams of water per gram of seeds) Canada Green peas in 2021 were higher than in 2020 (Table 7). Both No. 1 (15.9 min) and No. 2 (20.5 min) Canada Green peas showed longer cooking times in 2021 compared to 2020. Cooked texture of Canada Green peas No. 1 (21.6 newton per gram of cooked seeds) was less firm in 2021 but No.2 (26.2 newton per gram of cooked seeds) was firmer than in 2020 (Table 7).

Acknowledgements

The Grain Research Laboratory acknowledges the cooperation of western Canadian pulse processors, producers and grain handling facilities in supplying the samples of newly harvested peas. We are also grateful to the Industry Services Division of the Canadian Grain Commission for assistance with grading the samples. Furthermore, we would like to extend our thanks to the Pulse Research Program staff for technical assistance, to the trace elements unit for mineral analysis and to Multimedia services for their assistance in the publication of this document.

Table 2 Protein content (% , dry basis) for 2021 western Canadian yellow peas by grade ¹

Province	Grade	Number of samples	2021			2020
			Mean	Minimum	Maximum	Mean
Manitoba	Peas, No. 1 Canada	16	22.9	20.9	26.0	22.5
	Peas, No. 2 Canada	31	24.4	21.0	28.0	22.6
	Peas, No. 3 Canada	13	25.5	22.8	28.8	22.6
	All grades	60	24.3	20.9	28.8	22.6
Saskatchewan	Peas, No. 1 Canada	65	25.0	21.7	28.6	23.1
	Peas, No. 2 Canada	108	25.2	21.6	29.3	23.0
	Peas, No. 3 Canada	47	24.8	21.2	27.6	23.3
	All grades	220	25.1	21.2	29.3	23.1
Alberta	Peas, No. 1 Canada	33	23.0	20.7	30.8	23.2
	Peas, No. 2 Canada	87	23.9	19.9	29.7	23.0
	Peas, No. 3 Canada	27	23.4	20.5	26.8	23.5
	All grades	147	23.8	19.9	30.8	23.2
Western Canada	Peas, No. 1 Canada	114	24.4	20.7	30.8	23.1
	Peas, No. 2 Canada	226	24.6	19.9	29.7	23.0
	Peas, No. 3 Canada	87	24.5	20.5	28.8	23.3
	All grades	427	24.5	19.9	30.8	23.1

¹ Protein content (N x 6.25) is determined by near infrared measurement calibrated against the combustion nitrogen analysis reference method

Table 3 Protein content (% dry basis) for 2021 western Canadian green peas by grade ¹

Province	Grade	Number of samples	2021			2020
			Mean	Minimum	Maximum	Mean
Saskatchewan	Peas, No. 1 Canada	10	24.2	20.9	25.6	24.5
	Peas, No. 2 Canada	8	25.8	23.2	30.1	23.6
	Peas, No. 3 Canada	10	24.9	22.2	30.7	24.2
	All grades	28	24.9	20.9	30.7	24.1
Alberta	Peas, No. 1 Canada	5	26.4	25.1	27.3	23.4
	Peas, No. 2 Canada	3	24.2	23.5	24.7	24.2
	Peas, No. 3 Canada	6	24.4	23.0	25.3	23.3
	All grades	14	25.0	23.0	27.3	23.6
Western Canada	Peas, No. 1 Canada	15	24.9	20.9	27.3	24.3
	Peas, No. 2 Canada	11	25.4	23.2	30.1	23.8
	Peas, No. 3 Canada	16	24.7	22.2	30.7	23.7
	All grades	42	24.9	20.9	30.7	23.9

¹ Protein content (N x 6.25) is determined by near infrared measurement calibrated against the combustion nitrogen analysis reference method

Figure 5 Mean protein content of western Canadian peas (yellow and green combined) from 2011 to 2021.

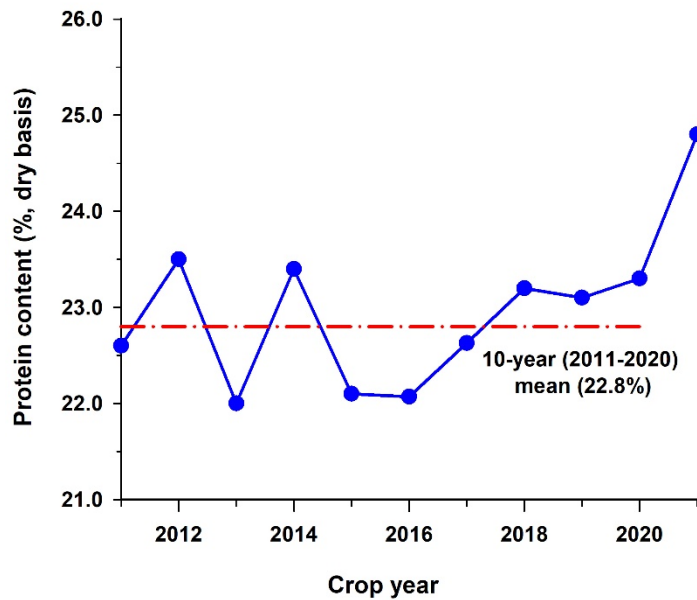


Figure 6 Crop regions in western Canada

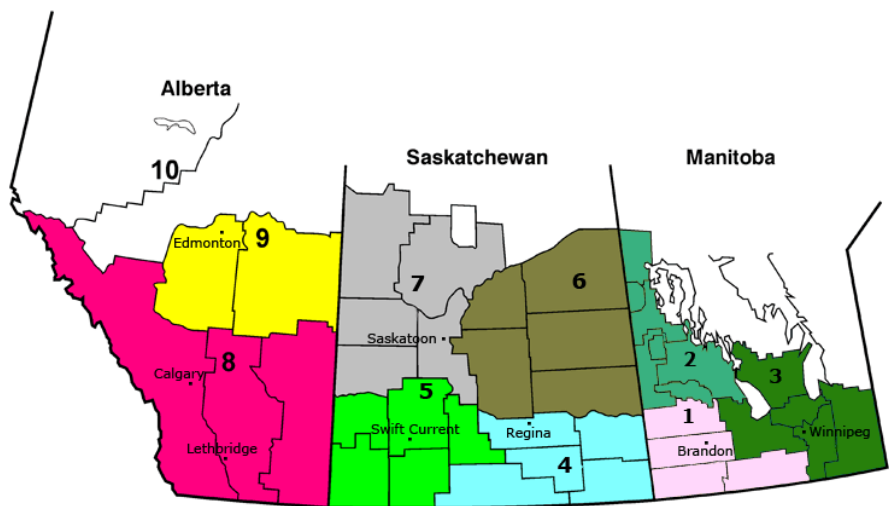


Table 4 Mean protein and starch content (% , dry basis) for 2021 western Canadian yellow peas by crop region

Crop region	Mean protein content		Mean starch content	
	2021	2020	2021	2020
1	24.0	23.0	47.5	47.0
2	24.0	NS ¹	47.8	NS
3	24.3	NS	46.7	NS
4	24.8	23.2	47.1	46.7
5	25.9	23.9	47.1	47.0
6	25.1	23.6	46.6	46.6
7	24.4	24.2	47.2	46.0
8	24.7	24.6	46.8	45.8
9	23.3	22.4	46.2	47.4
10	23.0	22.7	46.4	45.6

¹ NS = Non-sufficient number of samples to generate a representative value

Table 5 Mean protein and starch content (% , dry basis) for 2021 western Canadian green peas by crop region

Crop region	Mean protein content		Mean starch content	
	2021	2020	2021	2020
4	24.6	23.6	46.9	44.6
5	27.1	24.7	45.3	46.6
6	22.9	23.4	48.4	46.3
7	25.5	26.7	45.8	44.0
8	26.3	25.9	44.6	44.9
9	24.5	23.9	46.5	45.5

Table 6 Quality data for 2021 western Canadian yellow pea composites by grade

Quality category	Quality parameter	Peas, No. 1 Canada Yellow		Peas, No. 2 Canada Yellow	
		2021	2020	2021	2020
Chemical composition	Moisture content, %	11.1	10.3	11.0	10.3
	Protein content, % (dry basis)	24.6	23.7	24.6	23.7
	Starch content, % (dry basis)	47.1	47.0	46.8	46.1
	Total dietary fiber, % (dry basis)	15.5	14.6	16.5	14.2
	Ash content, % (dry basis)	2.6	2.7	2.6	2.7
Mineral (mg/100 g sample ¹ , dry basis)	Calcium (Ca)	94.5	79.6	99.6	81.9
	Copper (Cu)	0.80	0.77	0.81	0.76
	Iron (Fe)	5.6	5.4	7.0	5.6
	Potassium (K)	1050.7	1076.2	1050.6	1060.2
	Magnesium (Mg)	141.5	137.0	144.2	138.3
	Manganese (Mn)	1.2	1.2	1.2	1.3
	Phosphorus (P)	345.7	348.1	356.1	358.7
	Zinc (Zn)	3.7	3.2	3.8	3.3
Functional property	Water holding capacity, g H ₂ O/g sample ²	0.87	0.89	0.88	0.90
	Emulsifying capacity, mL oil/g sample ³	268.5	270.2	268.4	275.8
Physical characteristic	100-seed weight, g/100 seeds ⁴	21.5	21.7	21.6	21.7
	Water absorption, g H ₂ O/g seeds ²	0.97	0.92	0.97	0.94
Cooking characteristic	Cooking time, min	24.3	19.2	15.9	18.5
	Firmness, N/g ⁵ cooked seeds	22.5	22.8	23.7	22.3

¹ mg/100g = milligrams per 100 grams

² g H₂O/g sample or seeds = grams of water per gram of sample or seeds

³ mL oil/g sample = millilitres of oil per gram of sample

⁴ g/100 seeds = grams per 100 seeds

⁵ N/g = newton per gram (the firmness of cooked peas, which is the maximum force required to shear the cooked seeds)

Table 7 Quality data for 2021 western Canadian green pea composites by grade

Quality category	Quality parameter	Peas, No. 1 Canada Green		Peas, No. 2 Canada Green	
		2021	2020	2021	2020
Chemical composition	Moisture content, %	11.3	10.3	11.1	10.2
	Protein content, % (dry basis)	24.9	24.5	25.1	24.0
	Starch content, % (dry basis)	46.3	45.1	46.2	45.6
	Total dietary fiber, % (dry basis)	16.2	14.4	15.2	15.1
	Ash content, % (dry basis)	2.7	2.7	2.5	2.8
Mineral (mg/100 g sample ¹ , dry basis)	Calcium (Ca)	82.1	74.2	92.6	81.0
	Copper (Cu)	0.74	0.75	0.74	0.73
	Iron (Fe)	5.1	5.2	5.3	5.3
	Potassium (K)	1106.7	1072.7	1026.6	1087.9
	Magnesium (Mg)	139.7	132.2	132.5	135.1
	Manganese (Mn)	1.1	1.1	1.2	1.2
	Phosphorus (P)	369.3	365.6	355.6	374.4
	Zinc (Zn)	3.4	3.3	3.7	3.2
Functional property	Water holding capacity, g H ₂ O/g sample ²	0.89	0.88	0.87	0.89
	Emulsifying capacity, mL oil/g sample ³	274.6	277.9	258.0	263.8
Physical characteristic	100-seed weight, g/100 seeds ⁴	21.7	21.3	22.9	22.2
	Water absorption, g H ₂ O/g seeds ¹²	0.95	0.90	0.94	0.86
Cooking characteristic	Cooking time, min	15.9	14.2	20.6	14.9
	Firmness, N/g ⁵ cooked seeds	21.6	22.4	26.2	22.8

¹ mg/100 g = milligrams per 100 grams

² g H₂O/g sample or seeds = grams of water per gram of sample or seeds

³ mL oil/g sample = millilitres of oil per gram of sample

⁴ g/100 seeds = grams per 100 seeds

⁵ N/g = newton per gram (the firmness of cooked peas, which is the maximum force required to shear the cooked seeds)