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Quality of western Canadian lentils

2017

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Canada

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Introduction

This report presents the quality data for 2017 western Canadian lentils from Canadian Grain Commission's Harvest Sample Program. Samples were submitted by western Canadian producers to the Canadian Grain Commission's Grain Research Laboratory for analysis.

Growing and harvesting conditions

Cool temperatures in Saskatchewan and Alberta in early spring resulted in delayed planting until May, especially in the central and northern areas of both provinces. Slightly above normal temperatures coupled with a lack of rainfall in May allowed growers in most areas to complete spring planting by the first week of June. However, in some areas of the northern Prairies, planting was delayed due to rainfall during the last week of May.

Above normal temperatures and mostly dry growing conditions prevailed during June and July over most of Western Canada. The primary lentil growing areas in Western Canada experienced stress which reduced yield expectations. However, quality of lentils was high for this year. The dry growing season resulted in minimal disease pressure in most pulse growing areas.

Excellent weather conditions in late August and September advanced crop maturity and allowed harvest to progress rapidly. Dry conditions occurred in the Peace River region, central Alberta and Saskatchewan. Wet conditions in northern regions caused delays in harvest. However, most lentil crops were in the bin by mid-October.

Production

Lentil production in 2017 was estimated to be 2.6 million tonnes, which was 21% lower than in 2016, but 42% higher than the 10-year average of 1.8 million tonnes (Table 1). Decrease in production was due to a 24% decrease in harvested area from 2016. Saskatchewan continues to dominate lentil production in western Canada, accounting for about 90% of production, while Alberta accounts for about 10%.

Table 1 – Production statistics for western Canadian lentils (green and red combined)[1]

	Harvested area		Production		Yield		Mean production
Province	2017	2016	2017	2016	2017	2016	2007–2016
	thousand hectares		thousand tonnes		kg/ha		thousand tonnes
Lentils							
Manitoba	-	-	-	-	-	-	-
Saskatchewan	1578	2096	2294	2742	1450	1310	1685
Alberta[2]	196	227	264	506	1350	2230	144
Western Canada	**1774**	**2323**	**2559**	**3248**	**1440**	**1400**	**1800**

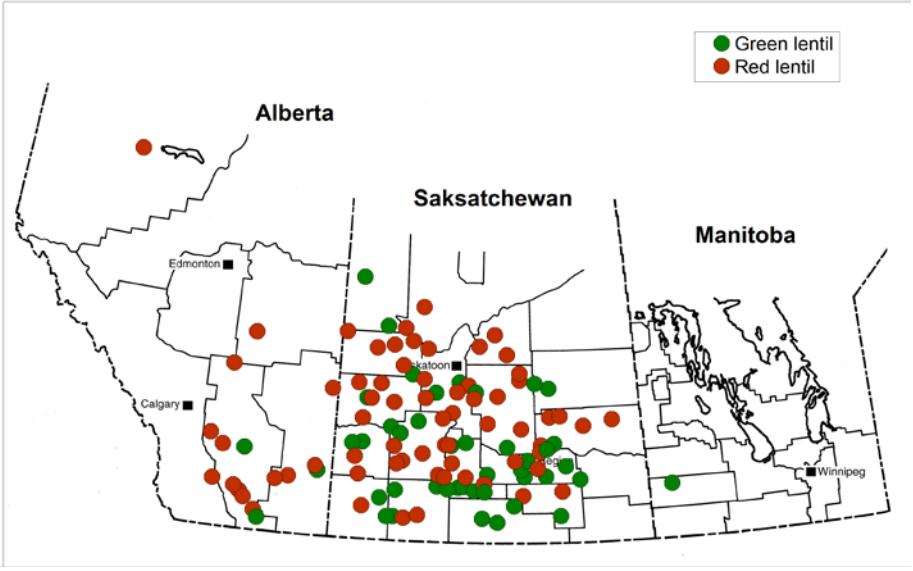
[1]Statistics Canada.
[2]Includes the Peace River area of British Columbia.

Western Canadian lentils _____ 2017

Lentil samples

Samples for the Canadian Grain Commission's Harvest Sample Program were collected from producers across western Canada (Figure 1). The Canadian Grain Commission received a total of 644 lentil samples including 291 green and 353 red lentils for analysis. All samples were graded and tested for protein content and seed size distribution. Size distribution was determined using the image analysis technique. Composites for green lentils (No. 1 and No. 2 Canada combined) were prepared based on seed size (small, medium and large) and crop region, while composites for red lentils were prepared based on crop region and variety (No. 1 and No. 2 Canada combined). The composite samples were tested for moisture content, protein content, starch content, total dietary fiber, ash content, mineral content, 100-seed weight and water absorption. In addition, red lentils were also evaluated for their dehulling quality. It is important to note that the samples reported by grade do not necessarily represent the actual distribution of grade.

Figure 1 – Map of western Canada showing origin of 2017 lentil samples from CGC's Harvest Sample Program



Quality of 2017 western Canadian lentils

Protein content for green and red lentils in 2017 ranged from 22.3% to 29.4% (Table 2). The mean protein content was 25.6%, which was lower than the mean for 2016 (27.1%), and lower than the 10-year mean of 27.1% (Figure 2). Lower protein content in 2017 may be due to the dry growing conditions. Table 3 represents the mean protein content for green and red lentils by crop region (Figure 3).

Table 4 shows quality characteristics for green lentil composites by seed size. Mean protein content for small-size green lentils (CDC Imvincible, CDC Viceroy, and Eston) was 26.8%, which was lower than the mean for 2016. Mean protein content for medium-size green lentils (CDC Imigreen, CDC Impress, and CDC Richlea) was 25.5%, identical to the mean for 2016. Protein content for large-size green lentils (CDC Glamis, CDC Grandora, CDC Greenland, CDC Greenstar, CDC Impower, CDC Improve, CDC Plato, CDC Sovereign, and Laird) was 26.2%, slightly lower than the mean for 2016. Mean starch contents for medium-size and large-size green lentils were lower than the means for 2016, while the mean for small-size green lentils was higher than the mean for 2016. Mean total dietary fiber contents for small-size, medium-size and large-size green lentils were lower than the means for all 3 sizes of lentils in 2016. Mean ash content for all 3 green lentil sizes was lower than the levels in 2016. Potassium (K) was the most abundant macroelement present in green lentils, followed by phosphorus (P), magnesium (Mg) and calcium (Ca) (Table 4). Among microelements, iron (Fe) was the highest, followed by zinc (Zn), manganese (Mn), and copper (Cu).

Mean 100-seed weights for small, medium and large-size green lentils were 2.9 g, 5.4 g and 6.7 g, respectively (Table 4). Mean 100-seed weights for all 3 sizes of lentils were higher than the means for 2016. Mean water absorption values were 0.95 g H_2O per g seeds for small-size lentils, 0.93 g H_2O per g seeds for medium-size lentils and 0.98 g H_2O per g seeds for large-size lentils, which were slightly lower than the means for 2016.

Seed size distribution for green lentils was determined by the image analysis technique (Table 5). The reported results may differ from those obtained by conventional sieving techniques. For small-size green lentils, approximately 82% of the seeds fell within 4.0 to 5.0 mm. For medium-size green lentils, 71% fell within 5.0 to 6.0 mm. For large-size green lentils, 92% fell within 5.5 to 7.0 mm.

Table 6 shows 2017 quality data for red lentil composites. Mean protein content for red lentils, including the varieties CDC Dazil, CDC Imax, CDC Impact, CDC Impala, CDC Imperial, CDC King Red, CDC Maxim, CDC Redberry and CDC Rouleau, was 25.9%, which was lower than the mean (26.5%) for 2016. Mean starch content (46.4%) was similar to the mean for 2016. Mean total dietary fiber content was 13.2%, lower than the mean for 2016. Mean ash content was 2.6%, lower than the mean (2.9%)

for 2016. Results for both macroelements and microelements observed in red lentils had similar trends to those observed in green lentils (Table 6).

Mean 100-seed weight was 3.5 g per 100 seeds, which was higher than the mean (3.1 g per 100 seeds) for 2016 and the mean water absorption was 0.90 g H_2O per g seeds, similar to the mean for 2016.

The mean dehulling efficiency for red lentils was 84.8%, which was higher than the mean for 2016 (Table 6). Colour of dehulled lentils was measured using a Hunterlab LabScan XE spectrocolorimeter with the CIE L*, a* and b* colour scale. Dehulled splits exhibited more brightness (L*) and more yellowness (b*) as compared to dehulled whole seeds (Table 6). Approximately 71% of red lentils fell within the 4.0 to 5.0 mm range, which was lower than that (75%) for 2016 (Table 7).

Table 2 – Protein content for 2017 western Canadian lentils (green and red combined) by grade[1]

Grade	Protein content, % dry basis			
	2017			2016
	Mean	Min.	Max.	Mean
Saskatchewan				
Lentils, No. 1 Canada	25.4	22.3	28.2	26.7
Lentils, No. 2 Canada	25.6	22.6	28.2	26.9
Lentils, Extra No. 3 Canada	26.0	23.9	28.5	27.4
Lentils, No. 3 Canada	26.5	25.0	27.4	27.3
All grades	**25.5**	**22.3**	**28.5**	**27.1**
Alberta				
Lentils, No. 1 Canada	26.1	22.6	29.4	26.3
Lentils, No. 2 Canada	26.7	25.0	29.1	27.0
Lentils, Extra No. 3 Canada	26.4	24.2	27.6	26.8
Lentils, No. 3 Canada	NS[2]	NS	NS	NS
All grades	**26.3**	**22.6**	**29.4**	**26.7**
Western Canada				
Lentils, No. 1 Canada	25.5	22.3	29.4	26.6
Lentils, No. 2 Canada	25.7	22.6	29.1	27.0
Lentils, Extra No. 3 Canada	26.1	23.9	28.5	27.4
Lentils, No. 3 Canada	26.6	25.0	27.5	27.3
All grades	**25.6**	**22.3**	**29.4**	**27.1**

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

[2]NS=insufficient number of samples to generate a representative value.

Figure 2 – Mean protein content of western Canadian lentils

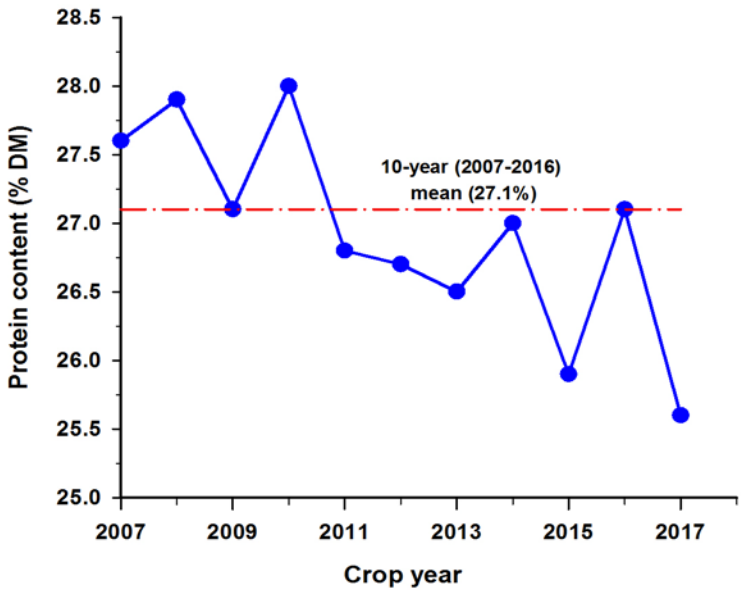


Figure 3 – Crop regions in western Canada

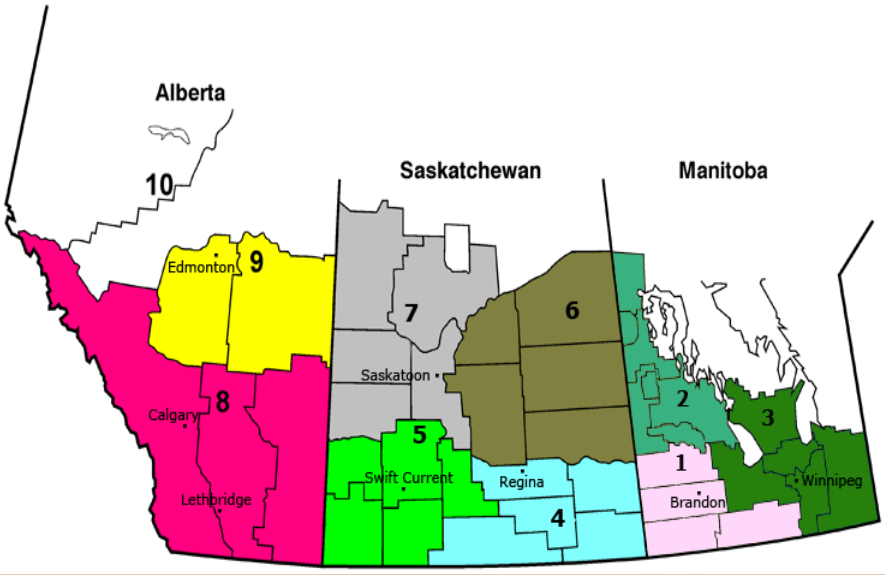


Table 3 – Mean protein and starch content for 2017 western Canadian lentils (green and red combined) by crop region

	Protein content, % dry basis		Starch content, % dry basis	
Crop region[1]	2017	2016	2017	2016
4	25.9	26.7	46.9	46.9
5	26.0	26.5	46.4	46.7
6	26.1	27.0	46.1	45.5
7	26.4	26.8	45.5	45.6
8	26.8	26.2	45.9	47.6

[1]Saskatchewan crop regions (Figure 3): 4 (South East Saskatchewan), 5 (South West Saskatchewan), 6 (North East Saskatchewan), and 7 (North West Saskatchewan); Alberta crop regions: 8 (Southern Alberta).

Table 4 – Quality data for 2017 western Canadian green lentil composite by seed size[1]

	2017			2016		
Quality parameter	SL[2]	ML[3]	LL[4]	SL[2]	ML[3]	LL[4]
Chemical composition						
Moisture content, %	10.3	10.2	10.2	10.0	9.8	10.5
Protein content, % dry basis (DM)	26.8	25.5	26.2	27.8	25.5	26.5
Starch content, % DM	46.6	47.2	46.3	44.7	48.9	47.2
Total dietary fiber content, % DM	13.2	11.7	12.4	15.6	15.2	14.1
Ash content, % DM	2.5	2.7	2.6	2.8	3.0	2.9
Mineral (mg/100 g dry basis)						
Calcium (Ca)	69.0	74.6	67.7	67.9	79.6	83.4
Copper (Cu)	1.1	1.0	1.0	1.3	0.97	1.0
Iron (Fe)	7.7	6.8	6.7	9.0	6.9	8.1
Potassium (K)	932.6	968.2	988.3	1092.2	1019.3	1079.2
Magnesium (Mg)	101.5	108.2	112.1	116.3	115.4	123.7
Manganese (Mn)	1.4	1.5	1.3	1.7	1.9	1.8
Phosphorus (P)	344.7	355.1	319.2	445.8	369.2	437.9
Zinc (Zn)	3.9	4.1	3.9	3.8	4.4	4.5
Physical characteristic						
100-seed weight, g/100 seeds	2.9	5.4	6.7	2.5	4.7	6.1
Water absorption, g H_2O/g seeds	0.95	0.93	0.98	0.97	1.01	1.01

[1]Lentils, No. 1 Canada and Lentils, No. 2 Canada combined.
[2]SL=small lentils including CDC Imvincible, CDC Viceroy and Eston.
[3]ML=medium lentils including CDC Imigreen, CDC Impress, and CDC Richlea.
[4]LL=large lentils including CDC Glamis, CDC Grandora, CDC Greenland, CDC Greenstar, CDC Impower, CDC Improve, CDC Plato, CDC Sovereign, and Laird.

Table 5 – Seed size distribution for 2017 western Canadian green lentils[1]

Seed size distribution	2017			2016		
	SL[2]	ML[3]	LL[4]	SL[2]	ML[3]	LL[4]
<3.5 mm, %	1.3	0.2	0.0	4.8	0.6	0.0
3.5–4.0 mm, %	9.6	0.7	0.0	24.3	1.4	0.4
4.0–4.5 mm, %	36.3	2.5	0.1	50.9	4.2	1.1
4.5–5.0 mm, %	46.6	9.5	0.9	19.2	13.3	4.3
5.0–5.5 mm, %	6.1	30.3	3.8	0.7	31.5	11.1
5.5–6.0 mm, %	0.1	41.2	14.7	0.0	40.9	24.9
6.0–6.5 mm, %	0.0	15.4	41.4	0.0	7.8	40.5
6.5–7.0 mm, %	0.0	0.3	35.7	0.0	0.4	16.8
7.0–7.5 mm, %	0.0	0.0	3.3	0.0	0.0	0.8
>7.5 mm, %	0.0	0.0	0.0	0.0	0.0	0.0

[1]Seed size including all grades determined by the image analysis technique.
[2]SL=small lentils including CDC Imvincible, CDC Viceroy, and Eston.
[3]ML=medium lentils including CDC Imigreen, CDC Impress, and CDC Richlea.
[4]LL=large lentils including CDC Glamis, CDC Grandora, CDC Greenland, CDC Impower, CDC Improve, CDC Plato, CDC Sovereign, and Laird.

Table 6 – Quality data for 2017 western Canadian red lentil composite[1]				
Quality parameter		2017	2016	
Chemical composition				
Moisture content, %		9.8	10.6	
Protein content, % dry basis (DM)		25.9	26.5	
Starch content, % DM		46.4	46.6	
Total dietary fiber content, % DM		13.2	15.6	
Ash content, % DM		2.6	2.9	
Mineral (mg/100 g dry basis)				
Calcium (Ca)		73.3	74.6	
Copper (Cu)		1.1	1.1	
Iron (Fe)		7.3	8.9	
Potassium (K)		921.7	1043.3	
Magnesium (Mg)		108.9	133.3	
Manganese (Mn)		1.4	1.8	
Phosphorus (P)		339.2	432.2	
Zinc (Zn)		4.0	4.2	
Physical characteristic				
100-seed weight, g/100 seeds		3.5	3.1	
Water absorption, g H_2O/g seeds		0.90	0.96	
Dehulling quality				
Dehulling efficiency, %		84.8	80.3	
Powder, %		2.4	2.1	
Broken seeds, %		0.38	1.3	
Undehulled whole seeds, %		2.6	5.4	
Colour of dehulled seeds	**Whole**	**Splits**	**Whole**	**Splits**
Brightness, L*	60.6	62.5	60.4	62.2
Redness, a*	30.5	29.7	28.8	28.8
Yellowness, b*	38.7	40.1	38.3	39.9

[1]Lentils, No. 1 Canada and Lentils, No. 2 Canada combined. Red lentils including CDC Dazil, CDC Imax, CDC Impact, CDC Impala, CDC Imperial, CDC King Red, CDC Maxim, CDC Redberry and CDC Rouleau.

[2]L*=darkness (0) to brightness (+); a*=greenness (-) to redness (+); b*=blueness (-) to yellowness (+).

Table 7 – Seed size distribution for 2017 western Canadian red lentils[1]

Seed size distribution[2]	2017	2016
<3.5 mm, %	0.7	3.0
3.5–4.0 mm, %	5.9	15.3
4.0–4.5 mm, %	25.2	40.6
4.5–5.0 mm, %	45.4	33.9
5.0–5.5 mm, %	19.3	6.3
5.5–6.0 mm, %	2.9	0.8
6.0–6.5 mm, %	0.5	0.1
6.5–7.0 mm, %	0.0	0.0
>7.0 mm, %	0.0	0.0

[1]Red lentils including CDC Dazil, CDC Imax, CDC Impact, CDC Impala, CDC Imperial, CDC King Red, CDC Maxim, CDC Redberry and CDC Rouleau.
[2]Seed size determined by the image analysis technique.