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Quality of western Canadian lentils

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Canada 

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Introduction

This report presents the quality data for 2014 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.

Production

Lentil production in 2014 was estimated to be 1.8 million tonnes, which was 15% lower than in 2013, but 38% higher than the 10-year average of 1.3 million tonnes (Table 1). Decrease in production was due to a 25% reduction in yield in 2014 from 2013. Saskatchewan continues to dominate lentil production in western Canada, accounting for about 95% of production, while Alberta accounts for about 5%.

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

	Harvested area		Production		Yield		Mean production
Province	2014	2013	2014	2013	2014	2013	2004–2013
	thousand hectares		thousand tonnes		kg/ha		thousand tonnes
Lentils							
Manitoba	-	-	-	-	-	-	-
Saskatchewan	1139	1016	1753	2068	1540	2040	1275
Alberta ²	44	36	84	104	1930	2870	59
Western Canada	1183	1052	1837	2173	1550	2070	1316

¹Statistics Canada.

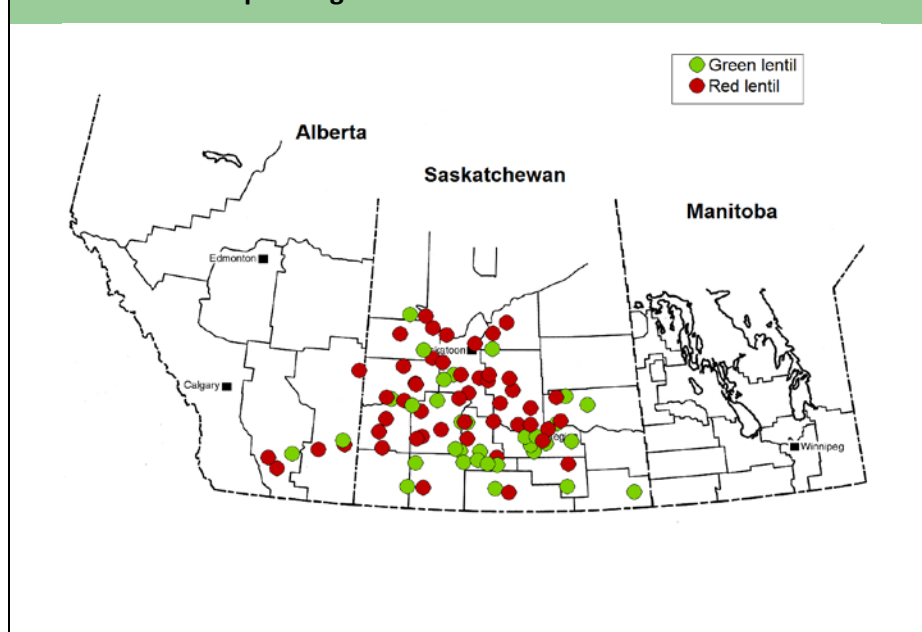
²Includes the Peace River area of British Columbia.

Western Canadian lentils 2014

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 425 lentil samples including 205 green and 220 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, 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 2014 lentil samples from Harvest Sample Program



Quality of 2014 western Canadian lentils

Protein content for green and red lentils in 2014 ranged from 22.8% to 31.7% (Table 2). The mean protein content was 27.0%, which was higher than the mean for 2013 (26.5%), but similar to the 5-year mean of 27.1% (Figure 2). 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 Invincible, CDC Milestone, CDC Viceroy, and Eston) was 28.6%, which was higher than the mean for 2013. Mean protein content for medium-size green lentils (CDC Imigreen, CDC Impress, and CDC Richlea) was 26.1%, which was lower than the mean for 2013. Protein content for large-size green lentils (CDC Glamis, CDC Grandora, CDC Greenland, CDC Impower, CDC Improve, CDC Plato, CDC Sedley, CDC Sovereign, and Laird) was 27.2%, similar to that for 2013. Mean starch content for medium-size green lentils was higher than the mean for 2013, while the means for small-size and large-size green lentils were similar to the means for 2013. Mean ash content for all 3 green lentil sizes was similar to levels in 2013. 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 2.8 g, 4.6 g and 6.2 g, respectively (Table 4). Mean 100-seed weights for all 3 sizes of lentils were higher than the means for 2013. Mean water absorption values were 0.87 g H₂O per g seeds for small-size lentils, 1.0 g H₂O per g seeds for medium-size lentils and 0.97 g H₂O per g seeds for large-size lentils, which were higher than the means for 2013.

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 78% of the seeds fell within 4.0 to 5.0 mm. For medium-size green lentils, 78% fell within 5.0 to 6.0 mm. For large-size green lentils, 69.5% fell within 6.0 to 7.0 mm.

Table 6 shows 2014 quality data for red lentil composites. Mean protein content for red lentils, including the varieties CDC Impact, CDC Impala, CDC Imperial, CDC Maxim, CDC Redberry, CDC Rouleau and Crimson, was 27.1%, which was higher than the mean (26.6%) for 2013. Mean starch content (46.3%) was similar to the mean for 2013. Mean ash content was 2.8%, which was similar to the mean for 2013. 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 3.3 g per 100 seeds and the mean water absorption was 0.82 g H₂O per g seeds, which were higher than the means for 2013.

The mean dehulling efficiency for red lentils was 78.8%, which was slightly lower than the mean for 2013 (Table 6). Colour of dehulled lentils was measured using a Hunterlab LabScan XE spectrophotometer with the CIE L*, a* and b* colour scale. Dehulled splits exhibited more brightness (L*), more redness (a*) and more yellowness (b*) as compared to dehulled whole seeds (Table 6). Approximately 74% of red lentils fell within the 4.0 to 5.0 mm range, which was similar to that for 2013 (Table 7).

Table 2 – Protein content for 2014 western Canadian lentils (green and red combined) by grade¹

Grade	Protein content, % dry basis			
	2014			2013
	Mean	Min.	Max.	Mean
Saskatchewan				
Lentils, No. 1 Canada	26.8	23.7	29.1	26.5
Lentils, No. 2 Canada	27.0	24.0	29.3	26.6
Lentils, Extra No. 3 Canada	27.1	24.2	30.2	N/A ²
Lentils, No. 3 Canada	27.1	25.5	29.7	27.6
All grades	27.0	22.8	31.7	26.5
Alberta				
Lentils, No. 1 Canada	26.1	25.9	26.3	26.1
Lentils, No. 2 Canada	26.4	24.5	29.1	25.2
Lentils, Extra No. 3 Canada	26.9	25.9	27.7	N/A
Lentils, No. 3 Canada	N/A	N/A	N/A	N/A
All grades	26.5	24.5	29.1	25.6
Western Canada				
Lentils, No. 1 Canada	26.8	23.7	29.1	26.5
Lentils, No. 2 Canada	27.0	24.0	29.3	26.4
Lentils, Extra No. 3 Canada	27.1	24.2	30.2	N/A
Lentils, No. 3 Canada	27.1	25.5	29.7	28.0
All grades	27.0	22.8	31.7	26.5

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

²N/A=Not available due to insufficient samples.

Figure 2 – Mean protein content of western Canadian lentils

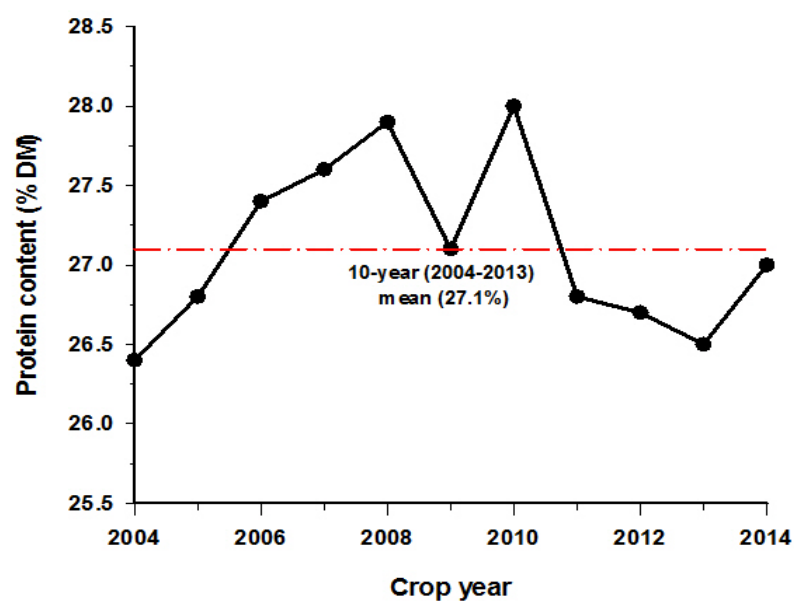


Figure 3 – Crop regions in western Canada

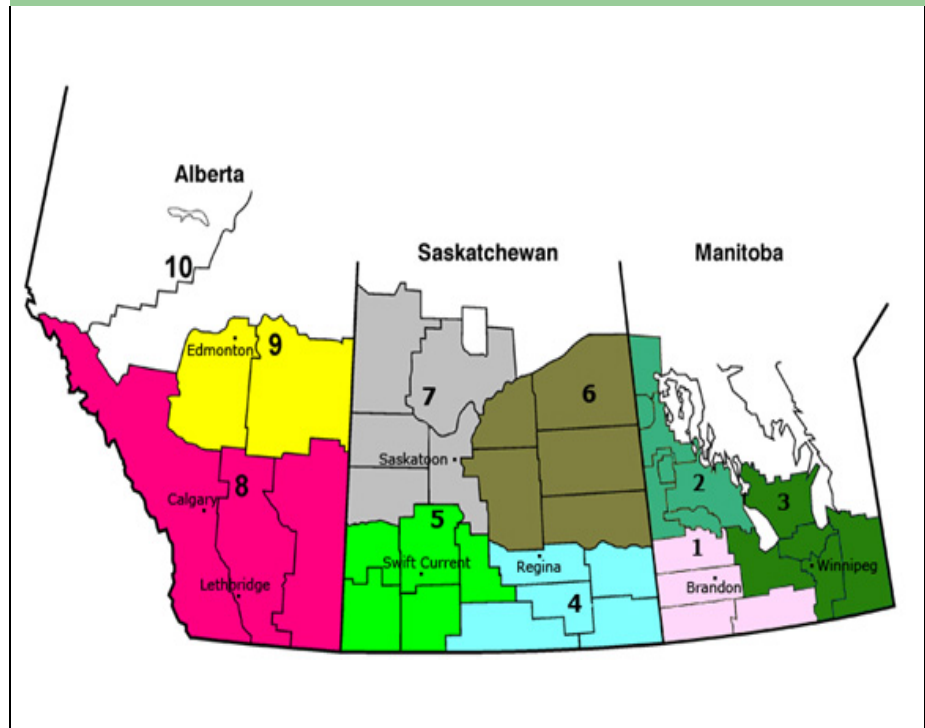


Table 3 – Mean protein and starch content for 2014 western Canadian lentils (green and red combined) by crop region

Crop region ¹	Protein content, % drybasis		Starch content, % dry basis	
	2014	2013	2014	2013
4	27.3	26.3	46.6	N/A ²
5	27.1	26.4	46.3	N/A
6	27.2	27.6	45.4	N/A
7	28.0	26.3	45.9	N/A
8	26.4	25.8	47.4	N/A

¹Saskatchewan 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).

²N/A=Not available (analysis was not done in 2013).

Table 4 – Quality data for 2014 western Canadian green lentil composite by seed size¹

Quality parameter	2014			2013		
	SL ²	ML ³	LL ⁴	SL ²	ML ³	LL ⁴
Chemical composition						
Moisture content, %	9.8	10.4	10.2	9.7	9.6	10.1
Protein content, % dry basis	28.6	26.1	27.2	27.6	27.3	27.2
Starch content, % dry basis	45.8	48.7	46.4	45.8	46.9	46.4
Ash content, % dry basis	2.8	2.6	3.0	2.5	2.7	2.7
Mineral (mg/100 g dry basis)						
Calcium (Ca)	61.1	74.9	72.3	N/A ⁵	N/A	N/A
Copper (Cu)	1.2	1.0	1.0	N/A	N/A	N/A
Iron (Fe)	8.9	7.2	7.3	N/A	N/A	N/A
Potassium (K)	1047	934.9	984.9	N/A	N/A	N/A
Magnesium (Mg)	107.9	108.7	117.6	N/A	N/A	N/A
Manganese (Mn)	1.7	1.5	1.7	N/A	N/A	N/A
Phosphorus (P)	413.8	333.4	380.8	N/A	N/A	N/A
Zinc (Zn)	3.9	3.5	4.0	N/A	N/A	N/A
Physical characteristic						
100-seed weight, g/100 seeds	2.8	4.6	6.2	2.4	4.4	5.7
Water absorption, g H ₂ O/g seeds	0.87	1.0	0.97	0.74	0.85	0.88

¹Lentils, No. 1 Canada and Lentils, No. 2 Canada combined.

²SL=small lentils including CDC Invincible, CDC Milestone, CDC Viceroy and Eston.

³ML=medium lentils including CDC Imigreen, CDC Impress, and CDC Richlea.

⁴LL=large lentils including CDC Glamis, CDC Grandora, CDC Greenland, CDC Impower, CDC Improve, CDC Plato, CDC Sedley, CDC Sovereign, and Laird.

⁵N/A=Not available (analysis was not done in 2013).

Table 5 – Seed size distribution for 2014 western Canadian green lentils¹

Seed size distribution	2014			2013		
	SL ²	ML ³	LL ⁴	SL ²	ML ³	LL ⁴
<3.5 mm, %	2.9	0.1	0.1	5.0	0.4	0.1
3.5–4.0 mm, %	14.8	0.4	0.3	23.7	3.3	0.3
4.0–4.5 mm, %	43.3	1.7	0.7	47.2	10.2	0.7
4.5–5.0 mm, %	34.8	8.2	2.2	22.7	27.5	3.0
5.0–5.5 mm, %	4.2	33.5	6.5	1.2	34.6	8.8
5.5–6.0 mm, %	0.1	44.8	18.1	0.0	20.9	24.1
6.0–6.5 mm, %	0.0	11.1	40.1	0.0	3.0	46.0
6.5–7.0 mm, %	0.0	0.4	29.4	0.0	0.1	16.6
7.0–7.5 mm, %	0.0	0.0	2.6	0.0	0.0	0.4
>7.5 mm, %	0.0	0.0	0.0	0.0	0.0	0.0

¹Seed size including all grades determined by the image analysis technique.

²SL=small lentils including CDC Invincible, CDC Milestone, CDC Viceroy, and Eston.

³ML=medium lentils including CDC Imigreen, CDC Impress, and CDC Richlea.

⁴LL=large lentils including CDC Glamis, CDC Grandora, CDC Greenland, CDC Impower, CDC Improve, CDC Plato, CDC Sedley, CDC Sovereign, and Laird.

Table 6 – Quality data for 2014 western Canadian red lentil composite¹

Quality parameter	2014	2013		
Chemical composition				
Moisture content, %	10.2	9.8		
Protein content, % dry basis	27.1	26.6		
Starch content, % dry basis	46.3	46.5		
Ash content, % dry basis	2.8	2.6		
Mineral (mg/100 g dry basis)				
Calcium (Ca)	84.3	N/A ³		
Copper (Cu)	0.68	N/A		
Iron (Fe)	5.1	N/A		
Potassium (K)	971.9	N/A		
Magnesium (Mg)	130.4	N/A		
Manganese (Mn)	1.2	N/A		
Phosphorus (P)	335.4	N/A		
Zinc (Zn)	3.8	N/A		
Physical characteristic				
100-seed weight, g/100 seeds	3.3	3.1		
Water absorption, g H ₂ O/g seeds	0.82	0.76		
Dehulling quality				
Dehulling efficiency, %	78.8	81.9		
Powder, %	2.2	2.1		
Broken seeds, %	1.6	0.8		
Undehulled whole seeds, %	5.6	4.7		
Colour of dehulled seeds	Whole	Splits	Whole	Splits
Brightness, L*	61.0	63.0	61.2	62.9
Redness, a*	29.5	30.2	30.3	31.0
Yellowness, b*	37.1	39.5	36.5	39.0

¹Lentils, No. 1 Canada and Lentils, No. 2 Canada combined. Red lentils including CDC Impact, CDC Impala, CDC Imperial, CDC Maxim, CDC Redberry, CDC Rouleau and Crimson

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

³N/A=Not available (analysis was not done in 2013).

Table 7 – Seed size distribution for 2014 western Canadian red lentils¹

Seed size distribution ²	2014	2013
<3.5 mm, %	1.6	2.2
3.5–4.0 mm, %	8.9	12.1
4.0–4.5 mm, %	30.7	34.7
4.5–5.0 mm, %	43.6	40.7
5.0–5.5 mm, %	14.4	9.9
5.5–6.0 mm, %	0.9	0.5
6.0–6.5 mm, %	0.0	0.0
6.50–7.0 mm, %	0.0	0.0
>7.0 mm, %	0.0	0.0

¹Red lentils including CDC Impact, CDC Impala, CDC Imperial, CDC Maxim, CDC Redberry, CDC Rouleau and Crimson.

²Seed size determined by the image analysis technique.