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Quality of western Canadian lentils

2011

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Introduction

This report presents the quality data for the 2011 harvest survey for western Canadian lentils. Samples submitted by western Canadian producers to the Canadian Grain Commission's (CGC) Grain Research Laboratory (GRL) were collected for data analysis.

Growing and harvesting conditions

The prairie provinces experienced excessive rainfall early in the growing season, followed by drier conditions over the summer months. Favorable weather in fall resulted in improved pulse quality and yield.

Saturated soils from heavy rains in 2010 followed by heavier than normal snowfall in eastern and northern areas, and cool weather during April and May delayed planting in 2011. Dry weather in central and northern Alberta and northern Saskatchewan during May allowed fields to be seeded. However, flooding and excessive moisture in the southern prairies, especially in southeastern Saskatchewan and southwestern Manitoba, combined with cooler temperatures, minimized planting opportunities in May and June. Overall, planting progress stopped in mid June with approximately 86 per cent of the crops sown.

Weather during July and August turned hot and dry in the southern regions, and wet in the northern regions. Temperatures in Manitoba and Saskatchewan were above normal, which helped boost crop development. However, temperatures in Alberta were below normal, which slowed crop development.

Warm and dry conditions from late August through September allowed harvest to move ahead in all prairie regions. A severe frost in parts of the prairie provinces in mid September had minimal effect on the crops, as most were mature. Warm, dry conditions at the end of September and into October allowed a rapid completion of the harvest.

Production review

Lentil production in 2011 was estimated to be 1.5 million tonnes, which was down 21% from 2010, but still significantly higher (72%) than the 10-year average of 0.9 million tonnes (Table 1). Both the overall harvested area and yield decreased in 2011 from 2010. Saskatchewan continues to dominate lentil production in Western Canada, accounting for 95% of production, while Alberta accounts for 5% of production.

Table 1 – Production statistics for western Canadian lentils¹

	Harvested area		Production		Yield		Mean production ²
Province	2011	2010	2011	2010	2011	2010	2001-2010
	thousand hectares		thousand tonnes		kg/ha		thousand tonnes
Lentils							
Manitoba	-	-	-	-	-	-	1
Saskatchewan	955	1281	1455	1840	1500	1400	872
Alberta ³	43	55	77	107	1800	2000	17
Western Canada	998	1336	1532	1947	1500	1700	890

¹ Statistics Canada, *Field Crop Reporting Series*, Vol. 90, No. 8.

² Statistics Canada, *Field Crop Reporting Series*, 2001-2010.

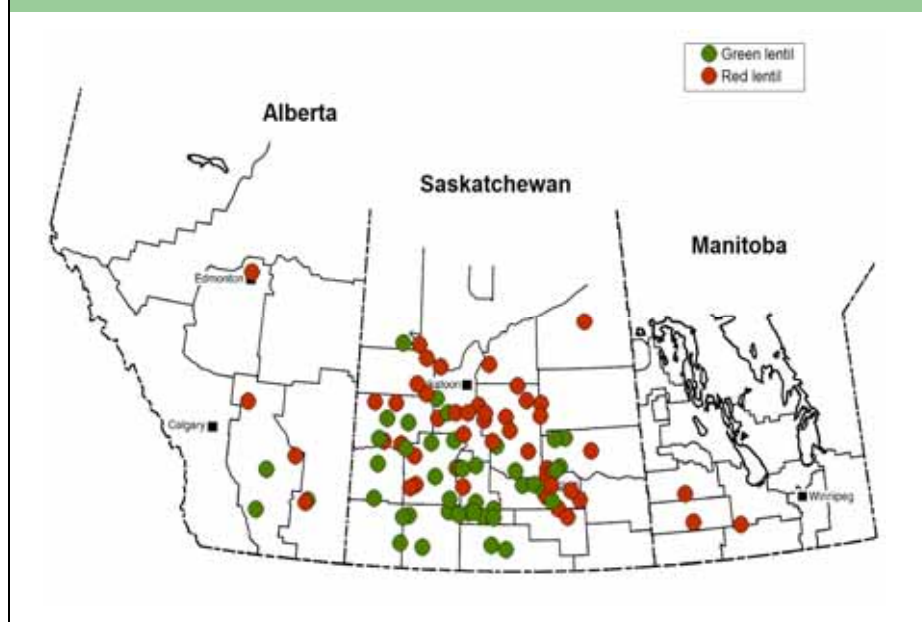
³ Includes the Peace River area of British Columbia.

Western Canadian lentils _____ 2011

Harvest survey samples

Samples for the CGC's 2011 harvest survey were collected from producers across western Canada (Fig. 1). A total of 332 lentil samples including 211 green lentils and 121 red lentils were received at the CGC for analysis. All samples were graded and tested for protein content and seed size distribution. Size distribution was determined using the Image Analysis technique developed at the CGC. Composites for green lentils were prepared based on size (small, medium and large), crop region and grade (No. 1 and No. 2). The composites were tested for protein content, starch content, ash content, 100-seed weight and water absorption. Composites for red lentils were prepared based on crop region and variety (No. 1 and No. 2 Canada red combined). In addition to the quality evaluations done on green lentils, 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 2011 harvest survey lentil samples



Quality of 2011 western Canadian lentils

Protein content ranged from 23.5% to 31.3% for 2011 western Canada lentils, including green and red lentils (Table 2). The mean protein content for 2011 was 26.8%, which was lower than 2010 (28.0%) and the five-year average of 27.6% (Fig. 2). Grade level and province did not show much variation of protein content.

Small size green lentils (CDC Invincible, CDC Milestone, and CDC Viceroy) and medium size green lentils (CDC Impress, CDC Meteor, and CDC Richlea) had mean protein contents of 27.2% and 25.2%, respectively, which were higher than their respective type of lentil in 2010 (Table 3). Large size green lentils (CDC Glamis, CDC Grandora, CDC Greenland, CDC Impower, CDC Improve, CDC Plato, CDC Sedley, CDC Sovereign, and Laird) had average protein content of 26.2%, which was similar to 2010. Small size lentils had similar mean starch content in 2011 and 2010 (45.9% and 45.6%, respectively), while medium size lentils had lower starch content (47.6% and 48.2%, respectively) and large size lentils had higher starch content (47.6% and 45.6%, respectively). Ash content was similar for all sizes of green lentils in 2011.

Small size green lentils in 2011 had a mean 100-seed weight of 2.9 g (Table 3), which was similar to 2010 (3.0 g), but their mean water absorption for 2011 was lower than for 2010 (0.89 and 0.94 g H₂O/g seeds, respectively). Medium and large size green lentils in 2011 had mean 100-seed weights of 5.3 g and 6.8 g, respectively, which were higher than in 2010 (5.1 g and 6.4 g, respectively). Mean water absorption values for medium and large lentils were lower in 2011 (0.92 g H₂O/g seeds and 0.98 g H₂O/g seeds, respectively) than 2010 (0.98 g H₂O/g seeds and 1.01 g H₂O/g seeds, respectively).

The seed size distribution for green lentils (Table 4) was determined by the image analysis technique developed at the Canadian Grain Commission. The reported results may differ from those obtained by conventional sieving techniques. For small size green lentils in 2011, 70.2% of the seeds fell within 4.0 to 5.0 mm, which was similar to 2010 (70.0%). Most medium size green lentils fell within 5.0-6.0 mm for both 2011 (77.9%) and 2010 (57.5%). In 2011, large size green lentils were similar in size to 2010, as shown by the majority of seeds for both years (68.3% and 63.9%, respectively) falling in 6.0-7.0 mm.

Red lentils, including the varieties CDC Impact, CDC Impala, CDC Imperial, CDC King Red 1, CDC Maxim, CDC Red Rider, CDC Redberry, and CDC Rouleau, had a mean protein content of 26.6% in 2011 (Table 5), which was similar to 2010 (26.8%). Red lentils displayed similar mean starch contents for 2011 (45.8%) and 2010 (45.1%). Ash content ranged from 2.3% to 3.1% in 2011. The mean 100-seed weight and mean water absorption was similar in 2011 (3.7 g and 0.88 g H₂O/g seeds, respectively) and 2010 (3.7 g and 0.86 g H₂O/g seeds, respectively).

In both 2011 and 2010, 69% of the red lentils fell within the 4.0-5.0 mm range (Table 6). This indicates that the 2011 seeds have a similar size to the 2010 seeds.

Table 7 shows the dehulling quality for 2011 western Canadian red lentils. The mean dehulling efficiency for 2011 red lentils was 76.0%, as compared to 76.7% in 2010. The dehulling efficiency was slightly lower in 2011 than in 2010 due to a higher amount of broken seeds (1.7% and 0.6%, respectively). Powder content and unhulled whole seed amounts were similar for 2011 (2.4 % and 8.9%, respectively) and 2010 (2.7% and 9.0%, respectively). 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*), similar redness (a*) and more yellowness (b*) as compared to dehulled whole seeds (Table 7). Dehulled whole and split red lentils from 2011 had similar respective colour values to 2010.

Table 2 – Protein content for 2011 western Canadian lentils by grade¹

Grade	Protein content, %			
	mean	2011 min.	max.	2010 mean
Manitoba				
Lentils, No. 1 Canada	-	-	-	-
Lentils, No. 2 Canada	-	-	-	29.2
Lentils, No. 3 Canada	28.5	28.2	28.8	-
All grades	28.6	28.2	28.9	29.2
Saskatchewan				
Lentils, No. 1 Canada	26.7	23.5	31.3	27.5
Lentils, No. 2 Canada	26.8	24.0	30.1	27.4
Lentils, No. 3 Canada	27.3	25.5	29.0	28.3
All grades	26.8	23.5	31.3	28.0
Alberta				
Lentils, No. 1 Canada	25.7	25.3	26.4	27.0
Lentils, No. 2 Canada	27.4	26.4	28.7	28.3
Lentils, No. 3 Canada	28.6	28.6	28.6	28.1
All grades	27.1	25.3	28.7	27.9
Western Canada				
Lentils, No. 1 Canada	26.7	23.5	31.3	27.4
Lentils, No. 2 Canada	26.8	24.0	30.1	27.4
Lentils, No. 3 Canada	27.6	25.5	29.0	28.3
All grades	26.8	23.5	31.3	28.0

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

Figure 2 – Mean protein content of western Canadian lentils

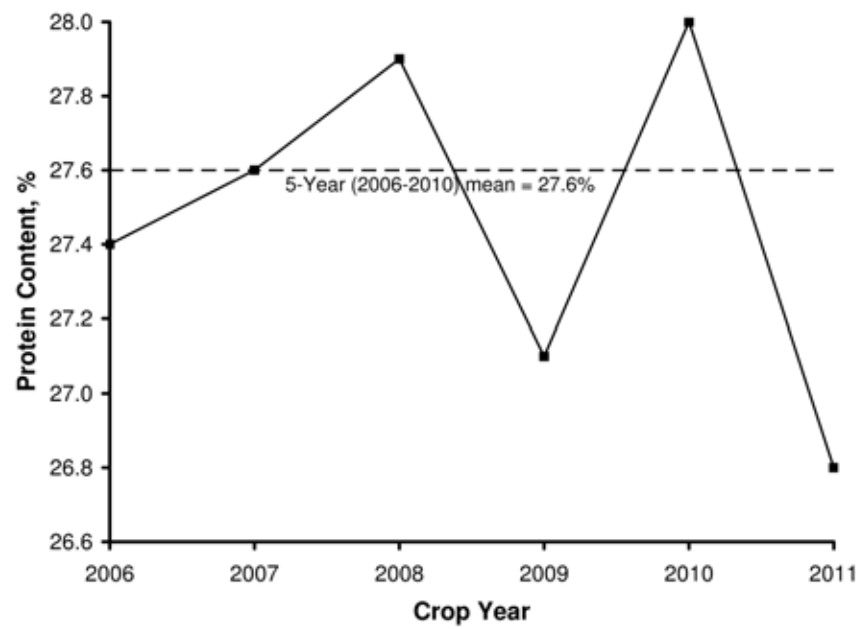


Table 3 – Quality data for 2011 western Canadian green lentils by size¹

Quality parameter	2011			2010		
	SL ²	ML ³	LL ⁴	SL ²	ML ³	LL ⁴
Protein, % dry basis						
Number of samples	6	7	31	4	3	16
Mean	27.0	25.2	26.2	26.3	24.5	26.1
Standard deviation	1.4	1.0	0.6	2.4	1.9	0.6
Minimum	25.6	23.8	24.9	24.0	22.5	24.7
Maximum	29.2	26.6	27.3	28.6	26.2	26.8
Starch, % dry basis						
Number of samples	6	7	31	4	3	16
Mean	45.9	47.6	47.6	45.6	48.2	45.6
Standard deviation	1.4	1.2	1.0	2.0	1.8	1.2
Minimum	44.4	45.1	44.3	43.4	46.4	43.8
Maximum	48.0	48.6	49.4	47.5	50.1	48.5
Ash, % dry basis						
Number of samples	6	7	31	– ⁵	– ⁵	– ⁵
Mean	2.6	2.6	2.7	–	–	–
Standard deviation	0.1	0.1	0.2	–	–	–
Minimum	2.4	2.4	2.2	–	–	–
Maximum	2.7	2.8	3.2	–	–	–
100-seed weight, g/100 seeds						
Number of samples	6	7	31	4	3	16
Mean	2.9	5.3	6.8	3.0	5.1	6.4
Standard deviation	0.2	0.4	0.3	0.3	0.3	0.3
Minimum	2.5	4.6	6.2	2.7	4.8	5.9
Maximum	3.1	6.0	7.4	3.3	5.3	6.8
Water absorption, g H₂O/g seeds						
Number of samples	6	7	31	4	3	16
Mean	0.89	0.92	0.98	0.94	0.98	1.01
Standard deviation	0.05	0.04	0.03	0.10	0.03	0.04
Minimum	0.81	0.87	0.92	0.83	0.95	0.95
Maximum	0.93	0.98	1.05	1.07	1.00	1.10

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

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

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

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

⁵ Not available.

Table 4 – Seed size distribution for 2011 western Canadian green lentils¹

Seed size distribution	2011			2010		
	SL ²	ML ³	LL ⁴	SL ²	ML ³	LL ⁴
	Number of samples			Number of samples		
	14	8	190	19	12	220
<3.5 mm, %	4.9	0.2	0.1	4.6	0.5	0.2
3.5–4.0 mm, %	22.6	0.4	0.3	20.6	1.1	0.4
4.0–4.5 mm, %	43.8	1.9	0.7	42.1	2.9	1.0
4.5–5.0 mm, %	26.4	11.6	2.6	27.9	12.0	3.3
5.0–5.5 mm, %	2.2	38.8	7.3	4.5	26.3	8.5
5.5–6.0 mm, %	0.1	39.1	18.9	0.3	31.2	19.5
6.0–6.5 mm, %	-	8.0	41.5	-	18.3	37.4
6.5–7.0 mm, %	-	0.1	26.8	-	6.8	26.5
7.0–7.5 mm, %	-	-	1.7	-	0.9	3.1
>7.5 mm, %	-	-	-	-	0.1	0.1

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

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

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

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

Table 5 – Quality data for 2011 western Canadian red lentils^{1,2}

Quality parameter	2011	2010
Protein, % dry basis		
Number of samples	22	16
Mean	26.6	26.8
Standard deviation	1.1	1.4
Minimum	24.7	23.7
Maximum	29.1	28.7
Starch, % dry basis		
Number of samples	22	16
Mean	45.8	45.1
Standard deviation	1.2	1.0
Minimum	43.3	43.8
Maximum	47.9	47.6
Ash, % dry basis		
Number of samples	22	– ³
Mean	2.7	–
Standard deviation	0.2	–
Minimum	2.3	–
Maximum	3.1	–
100-seed weight, g/100 seeds		
Number of samples	22	16
Mean	3.7	3.6
Standard deviation	0.7	0.8
Minimum	2.6	2.7
Maximum	5.7	5.4
Water absorption, g H₂O/g seeds		
Number of samples	22	16
Mean	0.88	0.86
Standard deviation	0.06	0.06
Minimum	0.74	0.77
Maximum	1.00	0.98

¹ Red lentils (CDC Impact, CDC Impala, CDC Imperial, CDC King Red 1, CDC Maxim, CDC Red Rider, CDC Redberry and CDC Rouleau.

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

³ Not available.

Table 6 – Seed size distribution for 2011 western Canadian red lentils¹

Seed size distribution ²	2011	2010
	Number of samples	
	121	236
<3.5 mm, %	2.1	2.2
3.5–4.0 mm, %	10.8	11.0
4.0–4.5 mm, %	30.1	29.8
4.5–5.0 mm, %	38.9	39.0
5.0–5.5 mm, %	14.7	15.7
5.5–6.0 mm, %	3.1	2.0
6.0–6.5 mm, %	0.3	0.2
6.50–7.0 mm, %	-	-
>7.0 mm, %	-	-

¹ Red lentils (CDC Blaze, CDC Impact, CDC Impala, CDC Imperial, CDC KR-1, CDC Maxim, CDC Red Rider, CDC Redberry, CDC Rouleau and Crimson).

² Seed size including all grades determined by the Image Analysis technique.

Table 7 – Quality data on dehulling quality for 2011 western Canadian red lentils¹

Quality parameter	2011	2010		
Dehulling efficiency, %				
Number of samples	19	14		
Mean	76.0	76.7		
Standard deviation	9.0	4.3		
Minimum	48.4	70.7		
Maximum	85.6	84.6		
Powder, %				
Number of samples	19	14		
Mean	2.4	2.6		
Standard deviation	0.3	0.4		
Minimum	1.7	2.0		
Maximum	2.9	3.4		
Broken seeds, %				
Number of samples	19	14		
Mean	1.7	0.6		
Standard deviation	2.1	0.4		
Minimum	0.2	0.2		
Maximum	1.5	1.8		
Undehulled whole seeds, %				
Number of samples	19	14		
Mean	8.9	9.0		
Standard deviation	6.9	3.7		
Minimum	3.0	2.9		
Maximum	29.7	14.1		
Colour ²	Whole	Splits	Whole	Splits
Brightness, L*				
Number of samples	19	19	14	14
Mean	60.7	62.3	60.4	62.5
Standard deviation	0.7	1.0	0.8	0.8
Minimum	58.9	59.7	58.7	60.8
Maximum	61.8	63.5	61.3	63.2
Redness, a*				
Number of samples	19	19	14	14
Mean	30.2	30.3	30.2	30.6
Standard deviation	1.1	1.2	1.2	1.5
Minimum	28.3	27.4	27.9	27.8
Maximum	32.6	32.3	31.6	33.4
Yellowness, b*				
Number of samples	19	19	14	14
Mean	37.5	39.6	37.3	39.2
Standard deviation	0.9	0.8	1.1	1.0
Minimum	35.7	38.3	35.0	38.1
Maximum	38.9	40.8	39.1	41.3

¹ Red lentils (CDC Blaze, CDC Impact, CDC Impala, CDC Imperial, CDC King Red 1, CDC Maxim, CDC Red Rider, CDC Redberry and CDC Rouleau). Lentils, No. 1 Canada and Lentils, No. 2 Canada are combined.

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