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Quality of Canadian food-type soybeans 2014

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Introduction

This report presents the quality data for the 2014 harvest survey of Canadian food-type soybeans conducted by the Canadian Grain Commission. Soybean samples for food uses such as tofu, soymilk, miso and natto were submitted by soybean producers and processors from across Manitoba, Ontario and Quebec to the Canadian Grain Commission's Grain Research Laboratory for analysis.

Canadian food-type soybeans _____2014

Harvest survey samples

The Canadian Grain Commission received a total of 187 food-type soybean samples. The Canadian Grain Commission's Industry Services graded all of the samples. Composite samples were prepared based on end-use (generic or natto) and province (Manitoba, Ontario or Quebec). All samples were tested for protein and oil content. Composite samples were analyzed for 100-seed weight, water absorption capacity, nitrogen solubility index (NSI), and protein, oil, sugar and total isoflavones content. Due to insufficient natto-type samples, only results for generic food-type soybeans were included in this report. It is important to note that samples reported by grade do not necessarily represent the actual distribution of grade.

Quality of 2014 Canadian food-type soybeans

Protein and oil content

Protein content for 2014 Canadian food-type soybeans ranged from 36.3 g to 51.4 g per 100 g dry matter (Table 1). The mean protein content in 2014 was 40.6 g per 100 g dry matter, which was lower than the mean in 2013 (41.3 g per 100 g dry matter). The mean protein contents for Manitoba, Ontario and Quebec for 2014 were 37.2, 40.6 and 44.0 g per 100 g dry matter, respectively.

Oil content for 2014 Canadian food-type soybeans varied from 16.4 g to 23.1 g per 100 g dry matter (Table 2). The mean oil content in 2014 was 21.1 g per 100 g dry matter, which was the same as that for 2013. The mean oil content for Manitoba in 2014 was 21.9 g per 100 g dry matter, which was higher than the mean for 2013. The mean oil content for Ontario in 2014 was 21.1 g per 100 g dry matter, which was similar to that for 2013. The mean oil content for Quebec in 2014 was 19.9 g per 100 g dry matter, which was higher than the mean for 2013.

Canadian generic food-type soybeans

Table 3 shows the quality data for 2014 Canadian generic food-type soybeans used for tofu, soymilk or miso. Mean 100-seed weight for 2014 generic food-type soybean was 17.5 g, which was higher than the mean for 2013 (16.4 g). Water absorption capacity was 1.17 g H_2O per g seeds, which was higher than that for 2013. Seed size and water uptake capacity are important quality characteristics of food-type soybeans for the production of tofu, soymilk and miso.

The nitrogen solubility index, which indicates the percentage of water-soluble protein, was 82.8% for generic food-type soybeans in 2014 (Table 3), close to that for 2013 (83.1%). High nitrogen solubility index is preferred for soymilk and tofu production since soybeans with a high nitrogen solubility index tend to give a high protein recovery when processed into soymilk, which in turn leads to high recovery in the final tofu product.

The mean protein content for 2014 Canadian generic food-type soybean was 40.2 g per 100 g dry matter (Table 3), which was lower than the mean for 2013 (42.3 g per 100 g dry matter). The mean oil content for 2014 was 20.9 g per 100 g dry matter, which was slightly higher than the mean for 2013 (20.6 g per 100 g dry matter).

The mean sucrose content in 2014 generic food-type soybean was 65.7 g per kg dry matter, which was higher than the mean for 2013 (62.6 g per kg dry matter) (Table 3). The mean total oligosaccharides content for 2014 was 44.3 g per kg dry matter, which was slightly higher than the mean for 2013 (43.6 g per kg dry matter).

The mean total isoflavones content for 2014 Canadian generic food-type soybean was 3201 mg per kg dry matter, which was higher than the mean for 2013 (Table 3).

Table 1 – Mean protein content for 2014 Canadian food-type soybeans by grade and province[1]

	Protein content, g/100 g DM (dry matter)		
	2014		2013
Province	Mean	Range	Mean
Manitoba			
Soybean, No. 1 Canada	N/A[2]	N/A	N/A
Soybean, No. 2 Canada	37.2	36.5–38.0	41.2
All grades	**37.2**	36.5–38.0	**41.2**
Ontario			
Soybean, No. 1 Canada	40.6	37.7–43.3	41.4
Soybean, No. 2 Canada	40.2	36.6–46.0	41.2
All grades	**40.6**	36.6–46.0	**41.3**
Quebec			
Soybean, No. 1 Canada	N/A	N/A	N/A
Soybean, No. 2 Canada	44.0	40.8–51.4	44.8
All grades	**44.0**	40.8–51.4	**44.8**
Canada			
Soybean, No. 1 Canada	40.6	37.7–43.3	41.4
Soybean, No. 2 Canada	40.7	36.5–51.4	41.5
All grades	**40.6**	36.3–51.4	**41.4**

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

[2] N/A=not available due to insufficient samples.

Table 2 – Mean oil content for 2014 Canadian food-type soybeans by grade and province[1]

	Oil content, g/100 g DM (dry matter)		
	2014		2013
Province	Mean	Range	Mean
Manitoba			
Soybean, No. 1 Canada	N/A	N/A	N/A
Soybean, No. 2 Canada	21.9	21.1–23.1	20.8
All grades	**21.9**	21.1–23.1	**20.8**
Ontario			
Soybean, No. 1 Canada	21.4	19.2–23.0	22.5
Soybean, No. 2 Canada	21.0	18.1–23.0	21.1
All grades	**21.1**	18.1–23.0	**21.2**
Quebec			
Soybean, No. 1 Canada	N/A	N/A	N/A
Soybean, No. 2 Canada	19.9	16.4–21.8	19.0
All grades	**19.9**	16.4–21.8	**19.0**
Canada			
Soybean, No. 1 Canada	21.4	19.2–23.0	21.5
Soybean, No. 2 Canada	21.0	16.4–23.1	20.9
All grades	**21.1**	16.4–23.1	**21.1**

[1] Oil content is determined by near infrared measurement calibrated against the ISO 10565:1992(E) reference method.

[2] N/A=not available due to insufficient samples.

Table 3 – Quality data for 2014 Canadian generic food-type soybean composites[1]		
Quality parameter	2014	2013
Physical characteristic		
100-seed weight, g/100 seeds	17.5	16.4
Water absorption, g H_2O/g seeds	1.17	1.08
Nitrogen solubility index (NSI), %	82.8	83.1
Chemical composition (g/100 g DM)		
Protein content	40.2	42.3
Oil content	20.9	20.6
Sugar content (g/kg DM)		
Sucrose	65.7	62.6
Raffinose	7.1	8.1
Stachyose	36.4	35.1
Verbascose	0.84	0.40
Total oligosaccharides[2]	44.3	43.6
Isoflavones (mg/kg DM)		
Total isoflavones[3]	3201	2516

[1] Soybean, No.1 Canada and No. 2 Canada combined.

[2] Sum of raffinose, stachyose and verbascose.

[3] Sum of isoflavone aglycones (daidzein, genistein and glycitein), glucosides, malonyl glucosides and acetyl glucosides.