



# Quality of Canadian food-type soybeans

## 2015

### **Ning Wang**

Program Manager, Pulse Research

### **Contact: Ning Wang**

Program Manager, Pulse Research

Telephone: 204 983-2154

Email: [ning.wang@grainscanada.gc.ca](mailto:ning.wang@grainscanada.gc.ca)

Fax: 204-983-0724

Grain Research Laboratory

Canadian Grain Commission

1404-303 Main Street

Winnipeg MB R3C 3G8

[www.grainscanada.gc.ca](http://www.grainscanada.gc.ca)

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## Introduction

This report presents the quality data for the 2015 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, Saskatchewan, Ontario and Quebec to the Canadian Grain Commission's Grain Research Laboratory for analysis.

## Harvest survey samples

The Canadian Grain Commission received a total of 85 food-type soybean samples including 4 from Manitoba, 2 from Saskatchewan, 56 from Ontario, and 23 from Quebec. 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. Results from Manitoba and Saskatchewan were not included because of insufficient number of samples. All samples were tested for protein and oil content. Composite samples were analyzed for 100-seed weight, water absorption capacity, nitrogen solubility index (NSI), 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 2015 Canadian food-type soybeans

### Protein and oil content

Protein content for 2015 Canadian food-type soybeans ranged from 37.7 g to 51.6 g per 100 g dry matter (Table 1). The mean protein content in 2015 was 41.9 g per 100 g dry matter, which was higher than the mean in 2014 (40.6 g per 100 g dry matter). The mean protein contents for Ontario and Quebec for 2015 were 41.2 and 43.6 g per 100 g dry matter, respectively.

Oil content for 2015 Canadian food-type soybeans varied from 17.3 g to 24.1 g per 100 g dry matter (Table 2). The mean oil content in 2015 was 21.5 g per 100 g dry matter, which was slightly higher than that for 2014. The mean oil content for Ontario in 2015 was 21.7 g per 100 g dry matter, which was higher than that for 2014. The mean oil content for Quebec in 2015 was 21.1 g per 100 g dry matter, which was higher than the mean for 2014.

### Canadian generic food-type soybeans

Table 3 shows the quality data for 2015 Canadian generic food-type soybeans used for tofu, soymilk or miso. Mean 100-seed weight for 2015 generic food-type soybean was 19.6 g, which was higher than the mean for 2014 (17.5 g). Water absorption capacity was 1.22 g H<sub>2</sub>O per g seeds, which was higher than that for 2014. Seed size and water uptake capacity are important quality characteristics of food-type soybeans for the production of tofu, soymilk and miso.

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The nitrogen solubility index, which indicates the percentage of water-soluble protein, was 81.5% for generic food-type soybeans in 2015 (Table 3), slightly lower than that for 2014 (82.8%). 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 2015 Canadian generic food-type soybean was 43.1 g per 100 g dry matter (Table 3), which was higher than the mean for 2014 (40.2 g per 100 g dry matter). The mean oil content for 2015 was 19.6 g per 100 g dry matter, which was slightly lower than the mean for 2014 (20.9 g per 100 g dry matter).

The mean sucrose content in 2015 generic food-type soybean was 57.4 g per kg dry matter, which was lower than the mean for 2014 (65.7 g per kg dry matter) (Table 3). The mean total oligosaccharides content for 2015 was 49.1 g per kg dry matter, which was higher than the mean for 2014 (44.3 g per kg dry matter).

The mean total isoflavones content for 2015 Canadian generic food-type soybean was 2345 mg per kg dry matter, which was lower than the mean for 2014 (Table 3).

**Table 1 – Mean protein content for 2015 Canadian food-type soybeans by grade and province<sup>1</sup>**

Province	Protein content, g/100 g DM (dry matter)		
	2015		2014
	Mean	Range	Mean
<b>Ontario</b>			
Soybean, No. 1 Canada	40.8	38.1–43.6	40.6
Soybean, No. 2 Canada	41.4	37.7–45.5	40.2
<b>All grades</b>	<b>41.2</b>	<b>37.7–45.5</b>	<b>40.6</b>
<b>Quebec</b>			
Soybean, No. 1 Canada	NS <sup>2</sup>	NS	NS
Soybean, No. 2 Canada	43.6	39.8–51.6	44.0
<b>All grades</b>	<b>43.6</b>	<b>39.8–51.6</b>	<b>44.0</b>
<b>Canada</b>			
Soybean, No. 1 Canada	40.8	38.1–43.6	40.6
Soybean, No. 2 Canada	42.3	37.7–51.6	40.7
<b>All grades</b>	<b>41.9</b>	<b>37.7–51.6</b>	<b>40.6</b>

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

<sup>2</sup>NS=insufficient number of samples to generate a representative value.

**Table 2 – Mean oil content for 2015 Canadian food-type soybeans by grade and province<sup>1</sup>**

Province	Oil content, g/100 g DM (dry matter)		
	2015		2014
	Mean	Range	Mean
<b>Ontario</b>			
Soybean, No. 1 Canada	21.8	20.5–24.1	21.4
Soybean, No. 2 Canada	21.6	18.9–23.6	21.0
<b>All grades</b>	<b>21.7</b>	18.9–24.1	<b>21.1</b>
<b>Quebec</b>			
Soybean, No. 1 Canada	NS <sup>2</sup>	NS	NS
Soybean, No. 2 Canada	21.1	17.3–22.4	19.9
<b>All grades</b>	<b>21.1</b>	17.3–22.4	<b>19.9</b>
<b>Canada</b>			
Soybean, No. 1 Canada	21.8	20.5–24.1	21.4
Soybean, No. 2 Canada	21.4	17.3–23.6	21.0
<b>All grades</b>	<b>21.5</b>	17.3–24.1	<b>21.1</b>

<sup>1</sup>Oil content is determined by near infrared measurement calibrated against the ISO 10565:1992(E) reference method.

<sup>2</sup>NS=insufficient number of samples to generate a representative value.

**Table 3 – Quality data for 2015 Canadian generic food-type soybean composites<sup>1</sup>**

Quality parameter	2015	2014
<b>Physical characteristic</b>		
100-seed weight, g/100 seeds	19.6	17.5
Water absorption, g H <sub>2</sub> O/g seeds	1.22	1.17
Nitrogen solubility index (NSI), %	81.5	82.8
<b>Chemical composition (g/100 g DM)</b>		
Protein content	43.1	40.2
Oil content	19.6	20.9
<b>Sugar content (g/kg DM)</b>		
Sucrose	57.4	65.7
Raffinose	9.4	7.1
Stachyose	38.8	36.4
Verbascose	0.80	0.84
Total oligosaccharides <sup>2</sup>	49.1	44.3
<b>Isoflavones (mg/kg DM)</b>		
Total isoflavones <sup>3</sup>	2345	3201

<sup>1</sup>—Soybean, No.1 Canada and No. 2 Canada combined.

<sup>2</sup>—Sum of raffinose, stachyose and verbascose.

<sup>3</sup>—Sum of isoflavone aglycones (daidzein, genistein and glycitein), glucosides, malonyl glucosides and acetyl glucosides.