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# Quality of Ontario soybeans

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1999

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## Summary

The 1999 harvest survey shows Ontario soybeans are well above average in oil content but just above average in protein content. The average oil content is 0.9% higher and the protein content 0.1% higher than the 10-year means. Compared to 1998, the average oil content of 21.5% and the average protein content of 41.9% are similar to the previous year.

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**Table 1 • Quality data for Ontario soybeans  
No. 1 and No. 2 Canada grades combined<sup>1</sup>**

Quality parameter	1999	1998	1989–98
Oil content <sup>2</sup> , %	21.5	21.5	20.6
Protein content <sup>3</sup> , %	41.9	42.1	41.8

<sup>1</sup> Means for the combined grades

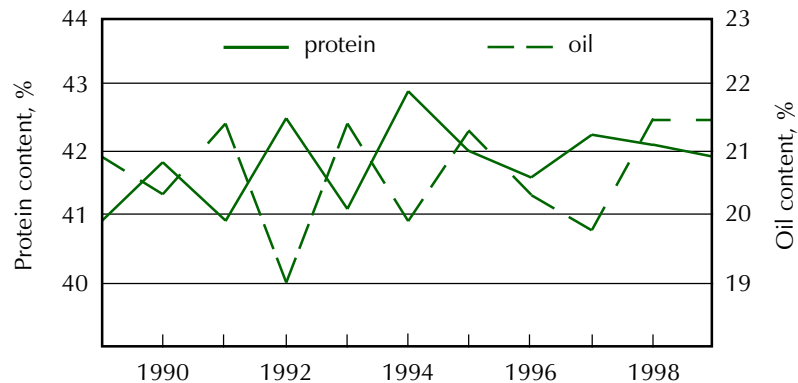
<sup>2</sup> Dry matter basis

<sup>3</sup> N x 6.25; dry matter basis

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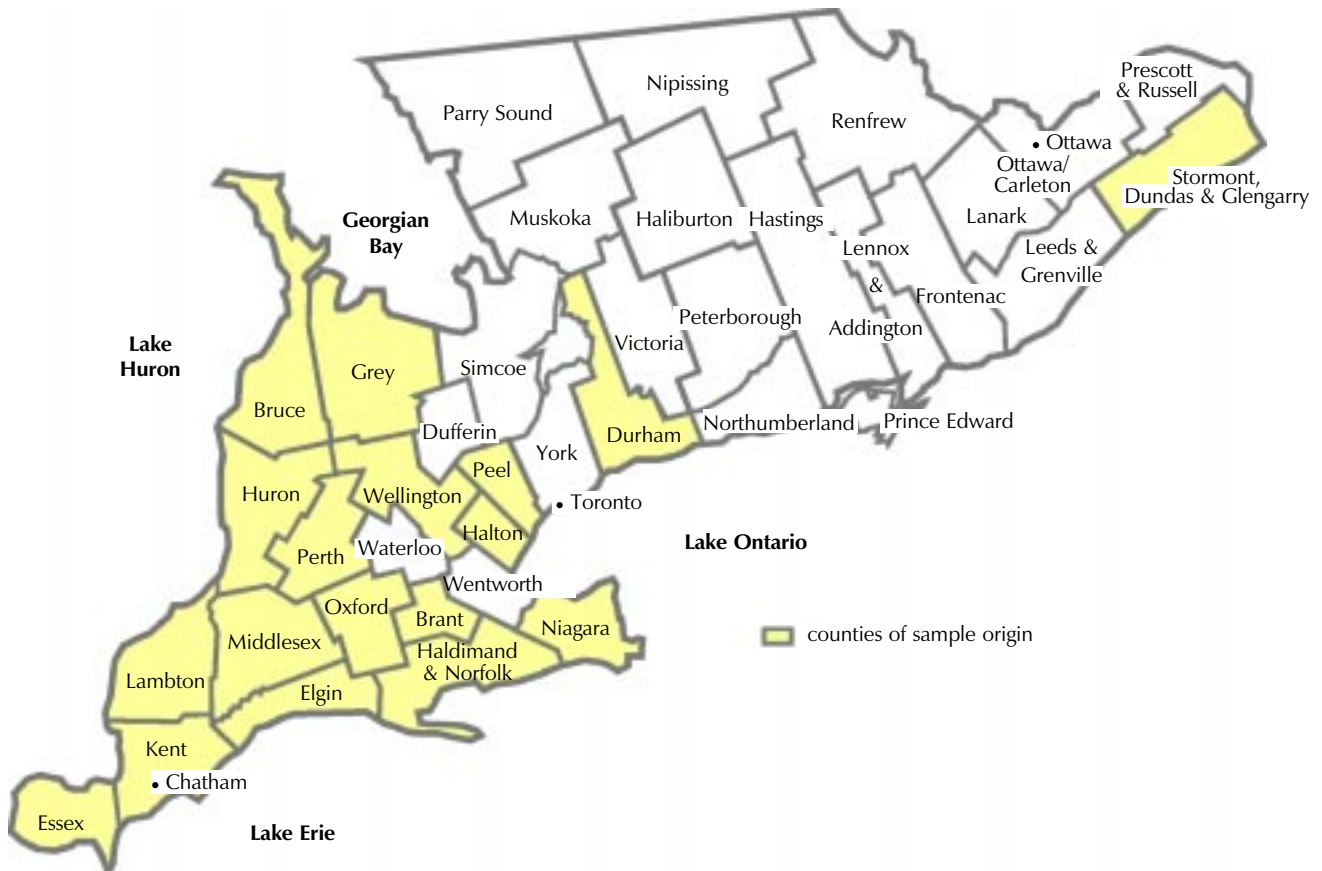
**Figure 1 • Average oil and protein contents of Ontario soybeans 1989 to 1999**



## Introduction

This report presents information on the quality of 1999 Ontario soybeans. Data on the oil, protein and fatty acid composition of harvest survey samples are included. Quality data were obtained from analyses of soybean samples submitted to the Canadian Grain Commission by the Ontario Soybean Growers' Marketing Board in Chatham. The map shows which counties contributed samples for the 1999 harvest survey.

**Figure 2 • Map of southern Ontario showing counties of origin for 1999 soybean survey samples**



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## Weather and production review

### Weather review

The weather and crop review for the 1999 Ontario soybean harvest survey is based on information found in the Ontario Ministry of Agriculture, Food and Rural Affairs 1999 Field Crop Reports and the Agriculture and Agri-Food Canada Crop Conditions Reports.

<http://www.gov.on.ca/OMAFRA/english/crops/field/reports/index.html>

[http://www.agr.ca/policy/crop/home\\_e.html](http://www.agr.ca/policy/crop/home_e.html)

### Seeding

A mild winter and a second consecutive dry spring created early planting conditions. The major proportion of the Ontario soybean crop was seeded into relatively dry soil and seeding was completed earlier than normal. By the end of May, 85% of the crop had been planted. Planting of the remainder of the crop was not completed until mid-June.

### Growing Conditions

Dry soil conditions caused emergence problems for early seeded soybeans. In addition, rainfall during April, May and well into June was below normal in many areas. Crops matured faster than usual under hot June temperatures. Hot, dry conditions continued over much of southern Ontario during the summer of 1999. Most of the crop received sufficient and timely rains in late June and early July. Dry conditions, however, during the rest of July and August increased stress on soybean plants, particularly in the drought stricken areas of Essex, Kent and Lambton.

### Harvest conditions

The harvest began two weeks early in some areas, but in general, got under way in mid-September. Good weather continued and by the third week of October, 85% of the soybean harvest was complete. Soybean yields were consistent with moisture patterns and overall were near average. Yields were below average in the drought-affected counties of Essex, Kent and Lambton.

### Production and grade information

Ontario accounted for about 85% of Canada's 1999 soybean production of 2.77 million tonnes. In Ontario, 860 000 hectares of soybean yielded an average of 2.70 tonnes/ha (40.5 bu/acre) for a total crop of 2.34 million tonnes. In some situations green stalks and pods affected quality for some specialty markets.

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**Table 2 • Production statistics for Canadian soybeans**

Year	Seeded area	Production	Yield
	hectares	tonnes	tonnes/ha
1989	539 500	1 219 000	2.26
1990	491 200	1 292 000	2.63
1991	575 500	1 459 900	2.44
1992	643 600	1 455 300	2.34
1993	728 700	1 851 300	2.57
1994	820 100	2 250 700	2.74
1995	826 000	2 293 000	2.78
1996	875 300	2 170 400	2.51
1997	1 058 900	2 737 700	2.59
1998	977 800	2 730 500	2.80
1999	999 000	2 765 900	2.80

Source—Statistics Canada, *Field Crop Reporting Series, No. 8, 1989–99*

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## Harvest survey samples

Samples for the 1999 Canadian Grain Commission (CGC) harvest survey were collected from producers by the Ontario Soybean Growers' Marketing Board in Chatham. The soybean samples came from producers in 19 different counties with the majority of samples coming from the counties of Lambton (61), Essex (35), Kent (30), Bruce (22) and Perth (19).

A total of 257 samples were forwarded to CGC Industry Services in Chatham for cleaning and grading. According to Chatham grain inspectors, 178 of the samples graded No. 1 Canada, 72 graded No. 2 Canada, four graded No. 3 Canada, one graded No. 4 Canada, one graded No. 5 Canada and one graded Sample Account Damage. Of the 257 total samples, 158 were dark hilum varieties and 99 were white hilum varieties.

All samples were analyzed for oil and protein content using a Tecator Infratec 1229 Grain Analyzer near-infrared (NIR) spectrometer calibrated and verified against the appropriate laboratory reference method. Only composite samples were analyzed for fatty acid composition. Grade composites were prepared from 178 No. 1 Canada and 72 No. 2 Canada samples. Variety composites were prepared by combining No.1 and No. 2 Canada grades of the varieties identified and represented by at least five samples, a total of 79 samples representing 12 different varieties.

## Acknowledgments

The Grain Research Laboratory (GRL) acknowledges the contributions of the Ontario Soybean Growers' Marketing Board and its producers for supplying samples of soybean harvested in 1999, the assistance of Industry Services grain inspectors in Chatham for grading the samples, Industry Services staff in Winnipeg for the Tecator 1229 NIR analyses, the Ontario Ministry of Agriculture, Food and Rural Affairs and Agriculture and Agri-Food Canada for the weather reviews, and the GRL staff, in particular Ken Howard, Michelle Kisolowsky, Barry Misener and Bert Siemens, for their technical assistance and for conducting the fatty acid composition and reference analyses.

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## Soybean quality

There are two major types of soybeans grown in Canada, commonly referred to as oil beans and food beans. A listing of Canadian soybean varieties is provided in *"List of Varieties which are Registered in Canada"*, Variety Registration Office, Variety Section, Plant Health and Production Division, Canadian Food Inspection Agency.

[http://www.cfia-acia.agr.ca/english/plant/variety/list\\_e.html](http://www.cfia-acia.agr.ca/english/plant/variety/list_e.html)

Oil beans are soybeans designed primarily for producing oil used in salad oil, shortening and margarine products, and in defatted meal, which is used as a protein supplement in livestock rations. Key quality factors for oil beans include oil content, protein content and fatty acid composition. Oil and protein content give quantitative estimates of the seed as a source of oil and of the resulting meal as a source of protein for animal feed. The fatty acid composition provides information about the nutritional, physical and chemical characteristics of the oil extracted from the seed.

Food beans are those varieties of soybeans that have been bred for specific attributes required in the production of traditional soyfoods. These beans possess quality features such as a clear or white hilum, large seed size and a high protein content. White hilum soybeans that do not meet quality standards for food processing can be used as oil beans.

Soyfoods are divided roughly into nonfermented and fermented classes. Nonfermented soyfoods include soymilk, soybean curd or tofu, toasted soy powder and bean sprouts. Fermented products include soy sauce, miso, tempeh and natto.

## Quality of 1999 Ontario soybeans

### Oil and protein content

The 1999 average oil content of 21.5% is the same as 1998 and 0.9% higher than the ten-year mean of 20.6%. The 1999 average protein content of 41.9% is 0.2% lower than last year which is slightly above the ten-year mean of 41.8%. While the No. 1 and No. 2 Canada soybeans have similar protein contents, the No. 1 grade has higher oil contents. On average, the white hilum soybean samples contain more protein and less oil than the dark hilum samples. The oil and protein data are summarized by grade and county in Tables 4 and 5. Quality data of the major varieties in the survey as identified by producers are provided in Table 6.

### Fatty acid composition

Compared to 1998, both No. 1 and No. 2 Canada grade composites have fatty acid profiles similar to the previous year. Oleic acid is lower by 1% and 2% in No. 1 and No. 2 Canada composites, respectively. Both grade composites show increases in stearic, linoleic and linolenic acid content. The fatty acid profiles of the major varieties and the No. 1 and No. 2 grade composites are shown in Table 7.

**Table 3 • Quality data for 1999 Ontario soybeans  
by grade and hilum type**

Type	Oil content <sup>1</sup> , %			Grade	Protein content <sup>2</sup> , %			No. of samples
	mean	min.	max.		mean	min.	max.	
<b>No. 1 Canada</b>								
Dark hilum	21.6	19.3	25.5		41.8	33.8	46.5	111
White hilum	21.3	16.5	23.9		42.1	35.3	52.6	67
<b>All types</b>	<b>21.5</b>	<b>16.5</b>	<b>25.5</b>		<b>41.9</b>	<b>33.8</b>	<b>52.6</b>	<b>178</b>
<b>No. 2 Canada</b>								
Dark hilum	21.5	19.2	23.4		41.6	37.1	44.6	44
White hilum	21.1	18.9	22.9		42.3	39.1	48.0	28
<b>All types</b>	<b>21.4</b>	<b>18.9</b>	<b>23.4</b>		<b>41.9</b>	<b>37.1</b>	<b>48.0</b>	<b>72</b>
<b>No. 3 Canada</b>								
Dark hilum	22.6	22.3	22.9		40.2	39.5	40.8	2
White hilum	21.8	21.3	22.2		41.4	41.2	41.6	2
<b>All types</b>	<b>22.2</b>	<b>21.3</b>	<b>22.9</b>		<b>40.8</b>	<b>39.5</b>	<b>41.6</b>	<b>4</b>
<b>No. 4 Canada</b>								
White hilum	22.7	22.7	22.7		40.3	40.3	40.3	1
<b>All types</b>	<b>22.7</b>	<b>22.7</b>	<b>22.7</b>		<b>40.3</b>	<b>40.3</b>	<b>40.3</b>	<b>1</b>
<b>No. 5 Canada</b>								
White hilum	22.0	22.0	22.0		41.4	41.4	41.4	1
<b>All types</b>	<b>22.0</b>	<b>22.0</b>	<b>22.0</b>		<b>41.4</b>	<b>41.4</b>	<b>41.4</b>	<b>1</b>
<b>Sample</b>								
Dark hilum	21.2	21.2	21.2		43.7	43.7	43.7	1
<b>All types</b>	<b>21.2</b>	<b>21.2</b>	<b>21.2</b>		<b>43.7</b>	<b>43.7</b>	<b>43.7</b>	<b>1</b>
<b>All</b>								
Dark hilum	21.6	19.2	25.5		41.8	33.8	46.5	158
White hilum	21.3	16.5	23.9		42.1	35.3	52.6	99
<b>All types</b>	<b>21.5</b>	<b>16.5</b>	<b>25.5</b>		<b>41.9</b>	<b>33.8</b>	<b>52.6</b>	<b>257</b>

<sup>1</sup> Dry matter basis

<sup>2</sup> N x 6.25; dry matter basis



**Table 4 • Oil and protein content of 1999 Ontario soybeans by county and grade**

County	Oil content <sup>1</sup> , %			Protein content <sup>2</sup> , %			No. of samples
	mean	min.	max.	mean	min.	max	
<b>No. 1 Canada</b>							
Brant	22.2	21.6	22.7	39.2	37.9	41.6	5
Bruce	20.8	19.9	22.6	42.5	35.9	45.0	20
Durham-West	21.0	20.9	21.0	42.4	41.8	42.9	2
Elgin	20.9	17.6	22.5	43.6	40.0	47.1	12
Essex	22.4	20.2	23.9	40.9	37.3	46.3	25
Glengarry	21.0	21.0	21.0	42.0	42.0	42.0	1
Grey	21.0	20.1	21.9	41.2	38.3	44.1	2
Haldimand	21.5	16.5	25.5	42.2	33.8	52.6	10
Halton	20.5	20.4	20.6	43.1	42.1	43.8	3
Huron	21.5	20.2	22.5	41.2	39.7	43.9	6
Kent	21.9	19.3	23.6	41.5	36.9	47.8	23
Lambton	21.3	18.1	23.3	42.5	37.8	50.0	41
Middlesex	21.5	21.0	22.1	41.7	40.0	43.1	9
Niagara	21.5	21.5	21.5	42.2	42.2	42.2	1
Oxford	21.3	20.8	21.8	42.7	42.0	43.4	2
Peel	22.1	20.8	23.9	40.1	35.3	42.0	4
Perth	21.7	20.5	22.9	41.3	38.0	43.7	8
Stormont	20.1	20.1	20.1	43.1	43.1	43.1	1
Wellington	20.7	19.3	21.8	42.6	41.9	43.7	3
<b>All counties</b>	<b>21.5</b>	<b>16.5</b>	<b>25.5</b>	<b>41.9</b>	<b>33.8</b>	<b>52.6</b>	<b>178</b>
<b>No. 2 Canada</b>							
Brant	20.4	20.4	20.4	43.2	43.2	43.2	1
Bruce	21.0	20.0	22.0	42.3	41.1	43.5	2
Elgin	20.5	18.9	21.6	43.7	40.9	48.0	3
Essex	22.4	21.7	23.4	40.0	37.1	42.3	6
Glengarry	21.8	20.9	22.7	41.5	40.4	43.3	3
Grey	21.8	21.6	22.0	41.2	39.5	42.9	2
Haldimand	21.6	21.6	21.6	42.2	42.2	42.2	1
Halton	21.8	21.3	22.2	41.1	40.1	42.1	2
Huron	21.0	21.0	21.0	41.4	41.4	41.4	1
Kent	21.3	20.4	22.9	42.5	39.7	45.3	7
Lambton	21.3	20.3	22.3	42.3	40.1	44.6	19
Middlesex	21.3	20.7	22.6	40.9	39.1	42.5	4
Oxford	21.8	21.3	22.3	41.3	40.7	42.1	5
Peel	21.3	21.3	21.3	42.3	42.3	42.3	1
Perth	21.3	18.9	22.4	41.7	38.7	45.5	11
Wellington	20.2	19.2	21.0	42.5	41.7	43.4	4
<b>All counties</b>	<b>21.4</b>	<b>18.9</b>	<b>23.4</b>	<b>41.9</b>	<b>37.1</b>	<b>48.0</b>	<b>72</b>

<sup>1</sup> Dry matter basis

<sup>2</sup> N x 6.25; dry matter basis

**Table 5 • Oil and protein content of 1999 Ontario soybeans by county  
No. 1 and No. 2 Canada grades combined**

County	Oil content <sup>1</sup> , %			Protein content <sup>2</sup> , %			No. of samples
	mean	min.	max.	mean	min.	max.	
Brant	21.9	20.4	22.7	39.9	37.9	43.2	6
Bruce	20.8	19.9	22.6	42.5	35.9	45.0	22
Durham-West	21.0	20.9	21.0	42.4	41.8	42.9	2
Elgin	20.8	17.6	22.5	43.6	40.0	48.0	15
Essex	22.4	20.2	23.9	40.7	37.1	46.3	31
Glengarry	21.6	20.9	22.7	41.6	40.4	43.3	4
Grey	21.4	20.1	22.0	41.2	38.3	44.1	4
Haldimand	21.5	16.5	25.5	42.2	33.8	52.6	11
Halton	21.0	20.4	22.2	42.3	40.1	43.8	5
Huron	21.4	20.2	22.5	41.2	39.7	43.9	7
Kent	21.7	19.3	23.6	41.8	36.9	47.8	30
Lambton	21.3	18.1	23.3	42.4	37.8	50.0	60
Middlesex	21.4	20.7	22.6	41.4	39.1	43.1	13
Niagara	21.5	21.5	21.5	42.2	42.2	42.2	1
Oxford	21.6	20.8	22.3	41.7	40.7	43.4	7
Peel	21.9	20.8	23.9	40.5	35.3	42.3	5
Perth	21.5	18.9	22.9	41.5	38.0	45.5	19
Stormont	20.1	20.1	20.1	43.1	43.1	43.1	1
Wellington	20.4	19.2	21.8	42.5	41.7	43.7	7
<b>All counties</b>	<b>21.5</b>	<b>16.5</b>	<b>25.5</b>	<b>41.9</b>	<b>33.8</b>	<b>52.6</b>	<b>250</b>

<sup>1</sup> Dry matter basis

<sup>2</sup> N x 6.25; dry matter basis

**Table 6 • Oil and protein content of 1999 Ontario soybeans by variety  
No. 1 and No. 2 Canada grades combined**

Variety <sup>1</sup>	Oil content <sup>2</sup> , %			Protein content <sup>3</sup> , %			No. of samples
	mean	min.	max.	mean	min.	max.	
S 08-80	21.3	20.2	22.5	42.0	39.7	43.9	8
S 19-90	21.2	20.3	22.3	42.7	40.4	44.6	8
9305	22.3	21.0	22.9	40.6	39.4	42.9	7
2601R	21.9	21.0	22.7	41.6	40.7	42.9	7
OAC Bayfield	21.5	20.6	22.3	41.9	40.7	44.1	7
Westag 97	21.7	20.6	23.1	41.6	39.1	43.7	7
S 24-12	21.3	20.3	22.9	42.5	39.4	44.2	6
92B61	21.6	20.8	21.9	42.5	41.5	44.2	6
Achiever	21.2	20.5	21.8	42.1	41.7	42.7	6
Harovinton	19.3	18.1	20.8	47.7	44.4	50.0	6
Starburst	21.3	20.7	22.2	40.7	39.1	42.2	6
9063	21.4	20.6	22.0	40.3	38.6	42.2	6
PS 50	20.7	20.0	21.6	42.2	41.4	43.2	5

<sup>1</sup> As identified on sample envelope

<sup>2</sup> Dry matter basis

<sup>3</sup> N x 6.25; dry matter basis

**Table 7 • Fatty acid composition of 1999 Ontario soybeans by variety and by No. 1 and No. 2 grade composites**

Variety <sup>2</sup>	Fatty acid composition <sup>1</sup> , %					Iodine value <sup>3</sup>	No. of samples
	C16:0	C18:0	C18:1	C18:2	C18:3		
S-08-80	8.9	5.0	23.9	52.7	8.2	133.4	8
S-19-90	9.3	4.9	24.3	52.3	7.9	132.2	8
9305	9.3	4.5	25.8	52.0	7.1	130.9	7
2601R	9.7	3.8	22.7	54.9	7.7	134.7	7
OAC Bayfield	9.4	4.4	23.1	54.2	7.7	133.9	7
Westag 97	11.1	5.0	23.0	51.2	8.4	130.4	7
S 24-12	9.2	4.0	26.3	52.5	6.6	130.9	6
92B61	9.7	4.4	22.6	54.8	7.3	133.5	6
Achiever	10.3	5.0	23.6	51.5	8.2	131.0	6
Harovinton	9.3	4.3	27.4	49.9	8.0	130.9	6
Starburst	9.9	4.6	22.7	52.6	8.0	134.3	6
PS 50	8.9	4.3	26.1	51.0	8.3	132.6	5
No. 1 Canada	9.8	4.6	23.8	52.4	8.1	132.4	178
No. 2 Canada	9.9	4.8	23.7	52.2	8.1	132.1	72

<sup>1</sup> Percentage of total fatty acids including palmitic (C16:0), stearic (C18:0), oleic (C18:1), linoleic (C18:2), and linolenic (C18:3)

<sup>2</sup> As identified on the sample envelope

<sup>3</sup> Calculated from the fatty acid composition