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Quality of western Canadian canola 2001

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Canada 

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Quality of western Canadian canola 2001

Introduction

This report presents quality data and information based on the Canadian Grain Commission (CGC) 2001 harvest survey of western Canadian canola. Quality parameters included are the contents of oil, protein, chlorophyll, glucosinolates and free fatty acids, and the fatty acid composition of harvest samples. Quality data are from analyses of canola samples submitted to the CGC throughout the harvest period by producers, grain companies and oilseed crushing companies. The map shows the traditional growing areas for canola in western Canada.

Figure 1 • Map of western Canada showing traditional growing area for canola



Source: Canola Council of Canada

Summary

Western Canadian canola tested in the 2001 harvest survey is average in oil content but well above average in protein content. While oil content is equal to the 10-year mean, protein content is 1.7% higher.

Compared to 2000, oil content, 42.8%, is 0.5% lower while protein content, 22.3%, is 1.3% higher. Chlorophyll content for No. 1 Canada canola is 17 mg/kg, significantly higher than the 14 mg/kg in 2000.

The 2001 survey shows higher oleic acid content, 61.9%, and lower linolenic acid content, 9.4%. Total saturated fatty acids content, 7.2%, is 0.1% higher than in 2000. The iodine value of 112 units, calculated from the fatty acid composition, is lower than the 2000 survey.

The erucic acid, 0.1%, and the total seed glucosinolates, 11 µmoles/gram, are both similar to those in 2000.

**Table 1 • No. 1 Canada canola
Quality data for 2001 harvest survey**

Quality parameter	2001	2000	1991–2000 Mean
Oil content ¹ , %	42.8	43.2	42.8
Protein content ² , %	22.3	21.0	20.6
Oil-free protein content ² %	41.8	39.8	38.7
Chlorophyll content, mg/kg in seed	17	14	13
Total glucosinolates ¹ , µmol/g	11	10	13
Free fatty acids, %	0.4	0.2	0.3
Erucic acid, % in oil	0.1	0.2	0.4
Linolenic acid, % in oil	9.4	9.9	10.3
Oleic acid, % in oil	61.9	61.5	60.1
Total saturated fatty acids ³ , % in oil	7.2	7.1	6.8
Iodine value	112	114	115

¹ 8.5% moisture basis

² N x 6.25; 8.5% moisture basis

³ Total saturated fatty acids are the sum of palmitic (C16:0), stearic (C18:0), arachidic (C20:0), behenic (C22:0), and lignoceric (C24:0).

Weather and production review

Weather review

The Weather and Crop Surveillance department of the Canadian Wheat Board provided the weather review for the 2001 harvest survey.

Seeding

Overall, 2001 seeding progress was ahead of normal for the prairie crop, although not as rapid as what was experienced in 2000.

Dry conditions in Alberta and a large portion of Saskatchewan during the fall and winter of 2000 resulted in very poor soil moisture levels going into the 2001 planting season. Exceptions to this were Manitoba and southeastern Saskatchewan where above normal precipitation during the fall of 2000 provided ample soil moisture reserves for spring planting. Overall, dry, warm conditions during late April and May resulted in early seeding of most crops in the western Prairies.

However, planting of smaller seeded crops such as canola was delayed in some areas due to the lack of soil moisture. In the driest areas, plant populations were reduced markedly by the extreme conditions as germination was quite uneven. Planting in the western Prairies was over 50 percent complete by the middle of May and was wrapped up by the end of the month. The excess soil moisture and persistent precipitation in eastern areas also slowed planting until late May and into June in parts of southeastern Saskatchewan and Manitoba.

Growing conditions

Cooler temperatures through most of the month of June kept crop stress to a minimum, despite the very dry conditions. Rains during the month of June were isolated to the eastern Prairies with only scattered rainfall reported in western areas. June precipitation ranged from significantly above normal in the eastern Prairies to well below normal in southern Alberta. Central and northern Alberta, including the Peace River region, received moderate amounts of precipitation during the last half of the month which provided much needed moisture for crops.

The rainfall caused some problems as ungerminated seeds started to grow and many fields had two to three different growth stages for the remainder of the season. Other than the southeast, Saskatchewan remained extremely dry and crop conditions began to deteriorate rapidly by the end of the month.

Above normal temperatures during the first two weeks of July caused severe stress to all crops and yield potentials declined in the western areas of the Prairies. Most locations in Saskatchewan and southern Alberta received less than 50 percent of normal precipitation for the month. Northern Alberta received frequent moderate amounts of precipitation during the month, which helped improve the condition of the crop in that region. Moderate to heavy rainfall events covered parts of Manitoba and eastern Saskatchewan during July that resulted in increased disease pressure and caused some losses due to flooding.

Harvest conditions

The harvest began in many regions during the first two weeks in August, although activity was not general until the third week in August. Harvest weather was ideal with most locations in the prairie region receiving minimal amounts of precipitation (less than half of normal) and warmer than normal temperatures. The harvest was over one-third complete by the end of August and essentially finished by the third week of September. The uneven growth in central and northern Alberta slowed harvest activity in those regions, with harvesting essentially complete by the first week of October.

Production review

Table 2 shows western Canadian farmers planted 3.94 million hectares of canola in 2001, which is a 19 percent decrease from last year's area. The final 2001 yield estimate of 1300 kg/ha is about five percent below the 10-year mean of 1367 kg/ha and well below the 1500 kg/ha reported in 2000.

With less planted area and a drop in yield, total canola production in western Canada is down 29 percent to 5.02 million tonnes according to estimates by Statistics Canada reported in *Field Crop Reporting Series No. 8*, December 5, 2001. The largest proportion of 2001 production, 42 percent, was grown in Saskatchewan. Alberta and British Columbia accounted for 35 percent and Manitoba for 23 percent.

Harvest survey samples

Samples for the Canadian Grain Commission canola harvest survey are collected from producers, crushing plants and grain handling offices across western Canada. The samples are cleaned to remove dockage prior to testing. Harvest survey samples are analyzed for oil, protein, chlorophyll and total glucosinolates using a NIRS 6500 scanning near-infrared spectrometer. Grain Research Laboratory staff assign grade level based on chlorophyll content. Industry Services grain inspectors grade samples if they show significant levels of visible damage.

Grades and chlorophyll content relationships are based on long term data.

No. 1 Canada 25 mg/kg or less

No. 2 Canada 26 to 45 mg/kg

No. 3 Canada 46 to 100 mg/kg

Composite samples are used for free fatty acids and fatty acid composition analyses. Composites are prepared by combining No. 1 Canada samples by provincial crop district and No. 2 and No. 3 grade samples by province.

This year's harvest survey included 1334 samples from across western Canada. Saskatchewan contributed 667 samples, Manitoba 359 samples, and Alberta and British Columbia 308 samples during the survey period, August 15 to November 30, 2001. Weighting factors used to calculate provincial and western Canadian means are derived from the previous five years average production for each crop district and the 2001 provincial production estimates in Statistics Canada's *Field Crop Reporting Series No. 8*, December 5, 2001. Factors used to calculate grade distributions are taken from crop reports published by the line elevator companies.

Table 2 • Seeded area and production for western Canadian canola

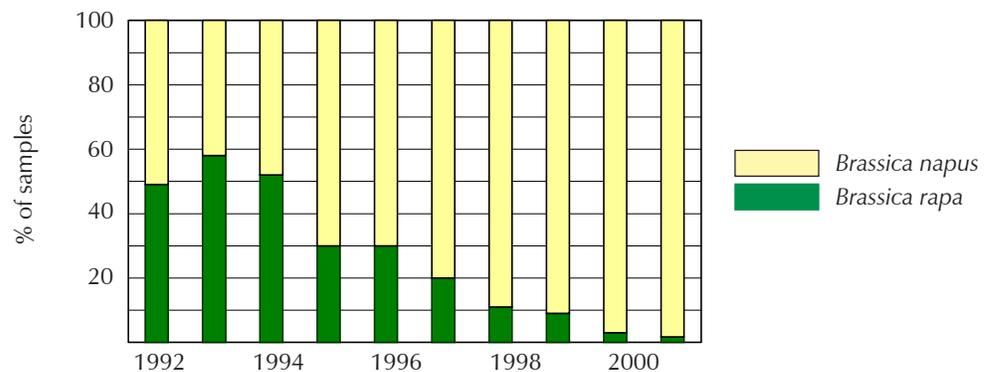
	Seeded area ¹ thousand hectares		Production ¹ thousand tonnes		Average production ² thousand tonnes
	2001	2000	2001	2000	1991–2000
Manitoba	789	951	1145	1488	1287
Saskatchewan	1943	2367	2109	3379	2684
Alberta ³	1206	1554	1766	2210	2177
Western Canada	3938	4872	5021	7077	6148

¹ Source—*Field Crop Reporting Series, No. 8*, December 5, 2001, Statistics Canada

² Source—*Field Crop Reporting Series*, revised final estimates for 1991–2000

³ Includes the part of the Peace River area that is in British Columbia

Figure 2 • 2001 harvest survey
Proportion of samples identified as *Brassica rapa* and *Brassica napus*



Quality of 2001 canola

Tables 3, 4 and 5 show detailed information on the quality of western Canadian canola harvested in 2001. Table 6 compares the quality of recent canola exports. The numbers of samples in each grade or province may not be representative of the total production or grade distribution. However, there were sufficient samples to provide good quality information for each province. Provincial means were calculated from results for each crop district, weighted by a combination of five-year average production by crop district, and an estimate of grade distribution from line elevator companies. To calculate western Canadian averages for each grade, provincial averages are weighted by the Statistics Canada production estimate and the estimate of grade distribution.

**Table 3 • 2001 harvest survey
Canola quality data by grade and province**

	Number of samples	Oil content ¹			Protein content ²			Chlorophyll content		
		%			%			mg/kg		
		Mean	Min.	Max.	Mean	Min.	Max.	Mean	Min.	Max.
No. 1 Canada										
Manitoba	235	42.6	36.1	47.6	22.1	17.5	26.4	18	4	25
Saskatchewan	466	42.9	36.7	50.5	22.4	16.9	28.2	17	1	25
Alberta ³	238	42.6	35.8	49.5	22.2	15.7	29.1	16	0	25
Western Canada⁴	939	42.8	35.8	50.5	22.3	15.7	29.1	17	0	25
No. 2 Canada										
Manitoba	107	42.2	37.1	45.8	22.8	19.5	27.1	32	21	45
Saskatchewan	180	41.8	36.6	46.5	23.3	17.7	27.6	32	20	45
Alberta ³	59	41.9	36.3	46.2	22.9	18.9	28.6	33	22	44
Western Canada⁴	346	41.9	36.3	46.5	23.0	17.7	28.6	32	20	45
No. 3 Canada										
Manitoba	17	41.3	36.8	44.8	23.4	20.4	29.4	48	15	72
Saskatchewan	21	41.5	36.5	46.1	23.1	18.5	27.5	58	34	87
Alberta ³	11	41.0	36.4	44.3	23.6	20.3	28.6	56	46	69
Western Canada⁴	49	41.2	36.4	46.1	23.4	18.5	29.4	54	15	87

¹ 8.5% moisture basis

² N x 6.25; 8.5% moisture basis

³ Includes part of the Peace River area that is in British Columbia

⁴ Values are weighted averages based on production by province as estimated by (Statistics Canada).

**Table 4 • 2001 harvest survey
Canola quality data by grade and province**

	Number of samples ¹	Glucosinolates ²			Free fatty acids
		µmol/g			%
		Mean	Min.	Max.	
No. 1 Canada					
Manitoba	235	10	5	16	0.56
Saskatchewan	466	11	5	21	0.25
Alberta ²	238	11	6	25	0.36
Western Canada³	939	11	5	25	0.35
No. 2 Canada					
Manitoba	107	12	7	17	0.65
Saskatchewan	180	13	6	30	0.39
Alberta ²	59	12	7	26	0.48
Western Canada³	346	12	6	30	0.49
No. 3 Canada					
Manitoba	17	14	9	21	1.01
Saskatchewan	21	13	7	23	0.57
Alberta ²	11	13	9	19	0.99
Western Canada³	49	13	7	23	0.90

¹ 8.5% moisture basis; total glucosinolates

² Includes part of the Peace River area that is in British Columbia

³ Values are weighted averages based on production by province as estimated by (Statistics Canada).

**Table 5 • 2001 harvest survey
Fatty acid composition by grade and province**

	Fatty acid composition, % ¹								
	C16:0	C16:1	C18:0	C18:1	C18:2	C18:3	C20:0	C20:1	C20:2
No. 1 Canada									
Manitoba	4.1	0.3	2.1	61.9	19.4	9.0	0.7	1.3	0.1
Saskatchewan	3.9	0.3	2.0	62.4	19.0	9.2	0.7	1.3	0.1
Alberta ⁴	3.9	0.3	2.0	61.4	19.2	9.8	0.7	1.4	0.1
Western Canada⁵	4.0	0.3	2.0	61.9	19.1	9.3	0.7	1.3	0.1
No. 2 Canada									
Manitoba	4.0	0.3	2.0	61.2	19.5	9.6	0.7	1.3	0.1
Saskatchewan	3.9	0.3	2.1	61.7	19.3	9.3	0.7	1.3	0.1
Alberta ⁴	4.0	0.3	2.1	60.9	19.2	9.7	0.7	1.4	0.1
Western Canada⁵	4.0	0.3	2.1	61.3	19.3	9.5	0.7	1.4	0.1
No. 3 Canada									
Manitoba	3.9	0.3	2.0	60.3	20.4	9.4	0.7	1.4	0.1
Saskatchewan	4.1	0.3	2.1	60.7	19.8	9.6	0.7	1.3	0.1
Alberta ⁴	4.1	0.3	2.1	61.5	18.5	9.6	0.7	1.4	0.1
Western Canada⁵	4.0	0.3	2.1	61.0	19.4	9.5	0.7	1.4	0.1
	C22:0	C22:1	C24:0	C24:1	Total saturates ²	Iodine value ³			
No. 1 Canada									
Manitoba	0.3	0.0	0.2	0.2	7.5	112			
Saskatchewan	0.3	0.1	0.2	0.1	7.2	112			
Alberta ⁴	0.3	0.2	0.2	0.2	7.1	113			
Western Canada⁵	0.3	0.1	0.2	0.2	7.2	112			
No. 2 Canada									
Manitoba	0.3	0.1	0.2	0.2	7.3	113			
Saskatchewan	0.3	0.2	0.2	0.2	7.2	112			
Alberta ⁴	0.4	0.2	0.2	0.2	7.4	113			
Western Canada⁵	0.3	0.1	0.2	0.2	7.3	113			
No. 3 Canada									
Manitoba	0.4	0.1	0.2	0.2	7.2	113			
Saskatchewan	0.4	0.1	0.2	0.2	7.5	113			
Alberta ⁴	0.4	0.1	0.2	0.2	7.6	112			
Western Canada⁵	0.4	0.1	0.2	0.2	7.5	113			

¹ Percentage of total fatty acids including: palmitic (C16:0), palmitoleic (C16:1), stearic (C18:0), oleic (C18:1), linoleic (C18:2), linolenic (C18:3), arachidic (C20:0), gadoleic (C20:1), eicosadienoic (C20:2), behenic (C22:0), erucic (C22:1), lignoceric (C24:0), nervonic (C24:1)

² Total saturated fatty acids are the sum of palmitic (C16:0), stearic (C18:0), arachidic (C20:0), behenic (C22:0), and lignoceric (C24:0)

³ Calculated from fatty acid composition

⁴ Includes part of the Peace River area that is in British Columbia

⁵ Values are weighted averages based on production by province as estimated by (Statistics Canada).

**Table 6 • No. 1 Canada canola
Comparison of 2001 harvest survey quality data with recent export shipments**

Quality parameter	2001 survey	October 2001 exports		2000–01 exports	
		Thunder Bay ¹	Vancouver	Thunder Bay	Vancouver
Oil content ² , %	42.8	41.2	42.0	41.1	42.5
Protein content ³ , %	22.3	22.2	21.7	22.6	21.1
Oil-free protein content ³ , %	41.8	40.4	40.1	40.9	39.4
Chlorophyll, mg/kg in seed	17	21	25	21	26
Total glucosinolates, mmol/g	11	12	12	16	11
Free fatty acids, %	0.4	0.7	0.7	0.4	0.5
Erucic acid, % in oil	0.1	0.1	0.2	0.1	0.2
Linolenic acid, % in oil	9.4	9.3	9.8	9.2	10.2
Oleic acid, % in oil	61.9	61.7	61.2	61.5	60.8
Total saturated fatty acids ⁴ , % in oil	7.2	7.4	7.2	7.4	7.1
Iodine value	112	112	113	112	114

¹ No. 1 Canada canola shipped from Thunder Bay during October, 2001 was not commercially clean.

² 8.5% moisture basis

³ N x 6.25; 8.5% moisture basis

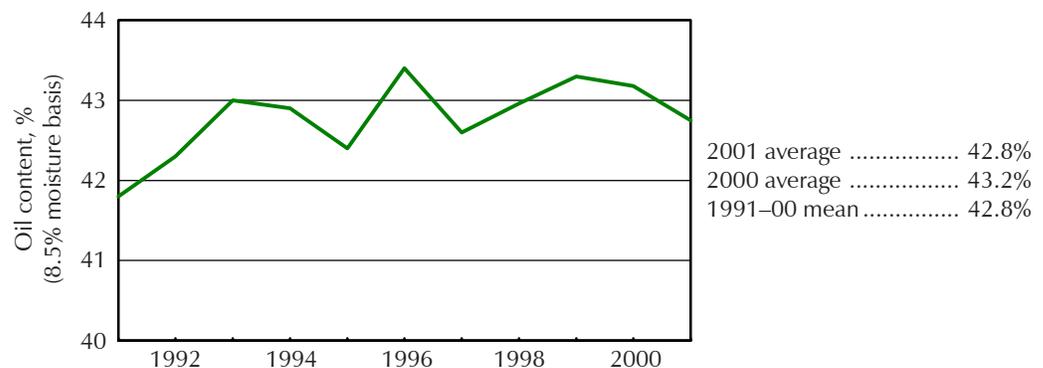
⁴ Total saturated fatty acids are the sum of palmitic (C16:0), stearic (C18:0), arachidic (C20:0), behenic (C22:0), and lignoceric (C24:0).

Oil content

The oil content of 42.8% for No. 1 Canada canola from the 2001 harvest survey is lower than the 43.2% in 2000 but similar to the 10-year mean of 42.8% (Table 1). The Saskatchewan oil content of 42.9% is slightly higher than the 42.6% values for Manitoba and Alberta. Compared to 2000, mean oil contents have decreased by 0.8% and 0.6% for Alberta and Saskatchewan respectively, while it has increased by 0.6% for Manitoba. The oil content of No. 1 Canada canola from producers across western Canada varies from 35.8% to 50.5%. The mean oil contents decrease with lower grades of canola.

As Table 6 shows, the oil content of canola exports from Vancouver was 42.0% in October 2001, about 0.5% lower than the 2000-01 mean of 42.5%. These shipments comprised seed primarily from the western Prairies. The oil content of the remaining Vancouver exports in the 2001-02 shipping season should remain around 42.0% on an 8.5% moisture basis. The oil content of Thunder Bay exports may in fact increase slightly from the 2000-01 mean value of 41.1%.

**Figure 3 • No. 1 Canada canola
Oil content of harvest survey samples, 1991–2001**

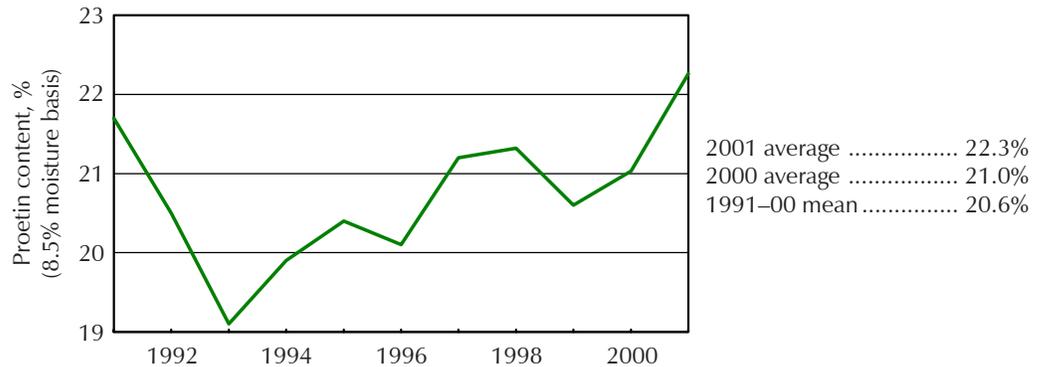


Protein content

The seed protein content of 22.3% for No. 1 Canada canola from the 2001 harvest survey is significantly higher than both the 21.0% in 2000 and the 10-year mean of 20.6% (Table 1). The 2001 protein content calculated on an oil-free, 8.5% moisture basis is 41.8% compared to 39.8% in 2000. The Saskatchewan protein content of 22.4% is slightly higher than the 22.1% in Manitoba and the 22.2% in Alberta. Compared to 2000, mean protein contents have increased by 2.0% and 1.0% respectively, in Saskatchewan and Alberta and decreased by 0.1% in Manitoba. Protein content of No. 1 Canada canola samples from producers across western Canada varies from 15.7% to 29.1%. The mean protein contents increase with lower grades of canola.

As Table 6 shows, the protein content of canola exports from Vancouver averaged 21.7% in October 2001 compared to 21.1% during the 2000-01 shipping season. The protein content in Vancouver exports could increase further in the remainder of the 2001-02 shipping season. Protein content of Thunder Bay canola shipments may decrease slightly from the 2000-01 mean of 22.6%.

**Figure 4 • No. 1 Canada canola
Protein content of harvest survey samples, 1991–2001**



Chlorophyll content

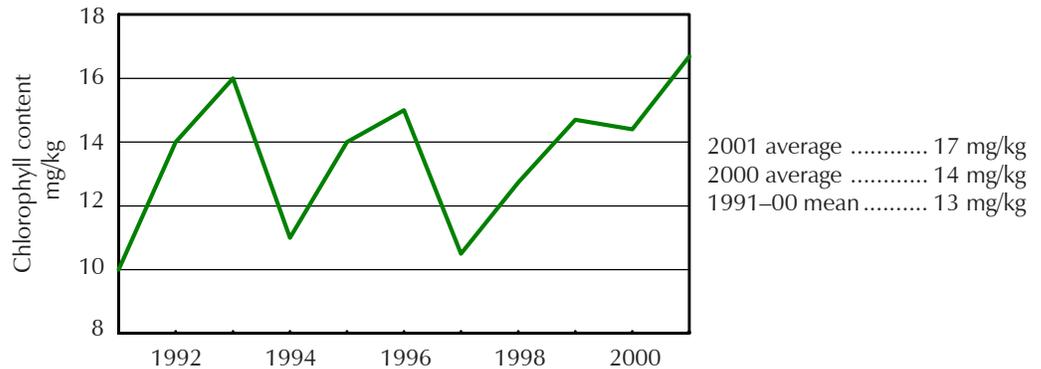
Harvest survey samples of No. 1 Canada canola average 17 mg/kg chlorophyll in the 2001 survey, higher than the 14 mg/kg in the 2000 harvest (Table 1). The chlorophyll level of 16 mg/kg for Alberta, was slightly lower than the 18 mg/kg for Manitoba and the 17 mg/kg for Saskatchewan.

Chlorophyll levels for No. 2 Canada canola are averaging 32 mg/kg, higher than the 30 mg/kg for No. 2 Canada canola seed in 2000. Some of the No. 2 and No. 3 Canada samples were assigned those grades due to grading factors such as sprout damaged rather than just immaturity (distinctly green seed). For this reason, the Manitoba No. 3 Canada canola is lower in mean chlorophyll content than the Alberta and Saskatchewan canola of the same grade.

Discussions with producers and processors suggest high distinctly green seed levels are the major degrading factor in many canola-growing areas. The overall higher chlorophyll levels in the 2001 survey samples are a reflection of these higher green seed counts. The green seed problem in 2001 was largely due to the canola being cut during intense heat. As canola plants mature and die, chlorophyll naturally disappears through the action of enzymes. However, the enzyme responsible for clearing the chlorophyll requires a seed moisture content in excess of 20 percent. Typically, the existing moisture in a swath or rain on the swath would allow the canola crop to “cure” after swathing. But this harvest, many green canola crops were cut under hot and dry conditions, which caused the crops to quickly drop below 20 percent moisture. Without the moisture, the swathed canola crops did not mature properly.

The October 2001 shipments of canola leaving Vancouver and Thunder Bay had average chlorophyll levels of 25 and 21 mg/kg respectively. Both of the October values were similar to the average chlorophyll levels in the 2000-01 exports. The levels of chlorophyll in Vancouver and Thunder Bay export shipments are expected to remain similar to 2000-01 values (Table 6).

**Figure 5 • No. 1 Canada canola
Chlorophyll content of harvest survey samples, 1991–2001**

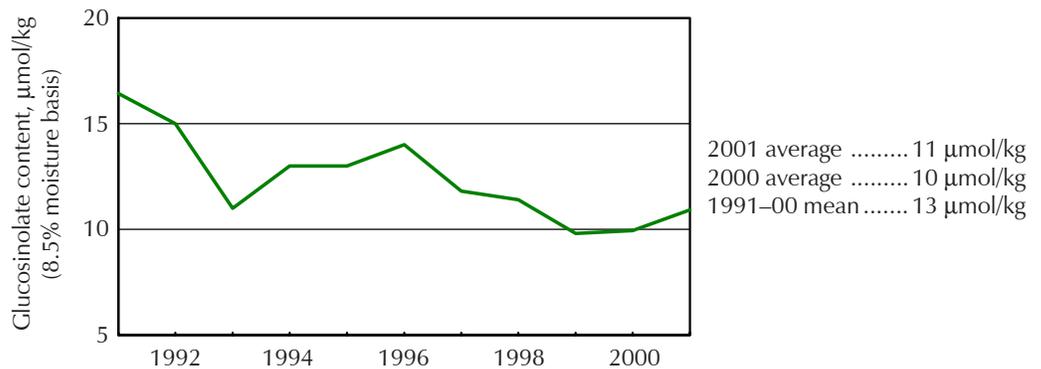


Glucosinolate content

For the 2001 survey, the total seed glucosinolates content of No. 1 Canada canola averages 11 $\mu\text{mol/g}$, similar to the 2000 value of 10 $\mu\text{mol/g}$. Some of the drought-affected areas have glucosinolates levels several mmol/g higher than the provincial averages. Overall, the continuing low level of glucosinolates is due largely to increased use of *Brassica napus* varieties, which are lower in glucosinolates.

The average level of total seed glucosinolates, 12 $\mu\text{mol/g}$, in the October 2001 Vancouver and Thunder Bay canola exports indicates glucosinolate levels in exports should remain similar to those in the 2000-01 shipping season.

**Figure 6 • No. 1 Canada canola
Total seed glucosinolate content of harvest survey samples, 1991-2001**



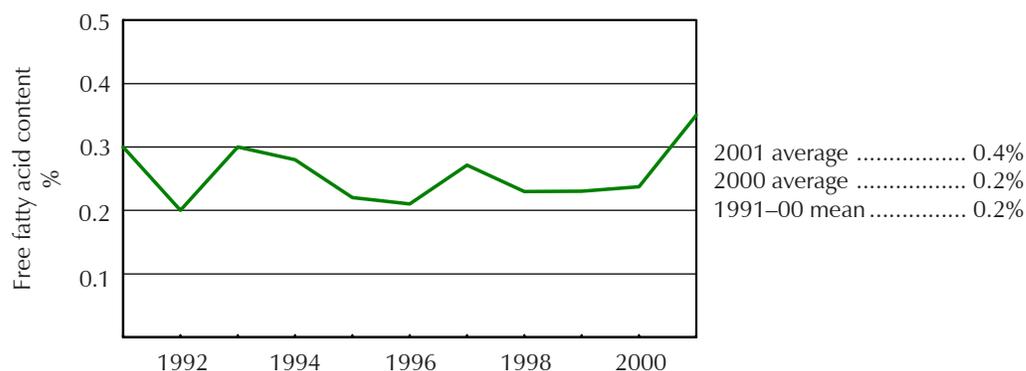
Free fatty acid content

No. 1 Canada canola for 2001 has a mean free fatty acids content of 0.35%. This level is slightly higher than both the 2000 value of 0.24% and long-term mean of 0.25%. The free fatty acids content of 0.56% for Manitoba seed is noticeably higher than the 0.25% in Saskatchewan samples and the 0.36% in Alberta samples. Survey samples from some areas are notably higher in free fatty acids, 0.8% to 1.0%, than the reported western Canadian mean of 0.4%. For 2001-02 exports, free fatty acids levels are expected to be around 0.7% as shown in Table 6.

In some Manitoba areas, swathed canola was exposed to significant rainfall followed by warm temperatures resulting in varying degrees of sprouting. Also, in some of the drought areas of Alberta free fatty acids content is much higher than the provincial mean. As a result, there are noticeably higher free fatty acids levels in the lower grade samples from these regions.

The GRL initiated a study in 2000 to examine the relationship between various quality parameters and the incidence of sprouted seed. Samples from the 2001 survey with sprout damage and high free fatty acids will be added to the study.

**Figure 7 • No. 1 Canada canola
Free fatty acid content of harvest survey samples, 1991–2001**



Fatty acid composition

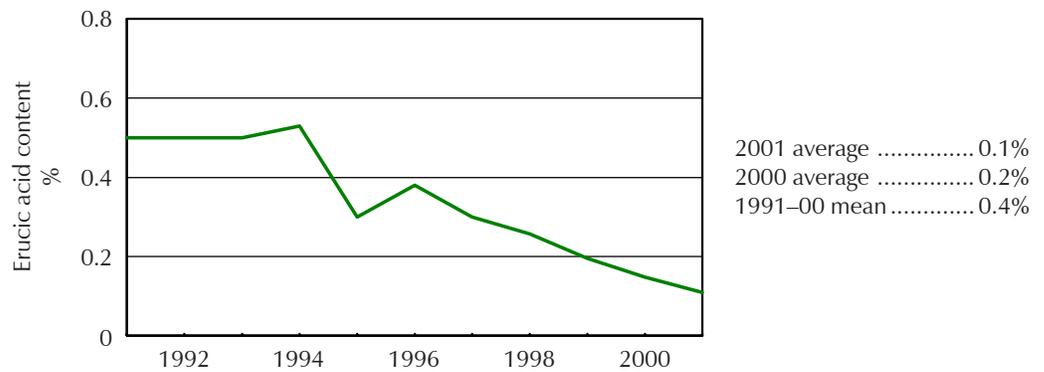
The mean iodine value of the canola oil from 2001 harvest survey is calculated as 112 units compared to 114 units in 2000 (Table 2). The linolenic acid is 9.4% in 2001, which is lower than both the 9.9% in 2000 and the 10-year mean of 10.3% (Table 3). At 9.8%, the linolenic acid in Alberta is higher than in Saskatchewan, 9.2%, and Manitoba, 9.0%. The oleic acid content of the 2001 crop has increased to 61.9% from 61.5% in 2000. Harvest survey samples indicate the 2001 crop was comprised of 98% *Brassica napus* types compared to 97% in 2000.

The average level of erucic acid in the 2001 crop is 0.1%, slightly lower than the 0.2% in 2000 and well below the 10-year mean of 0.4%. The mean level of saturated fatty acids is 7.2% in 2001, slightly higher than the 2000 value of 7.1% but significantly lower than the record high of 7.4% in 1998. The levels of saturated fatty acids are notably higher in Manitoba, 7.5%, than in Saskatchewan, 7.2%, and Alberta, 7.1%.

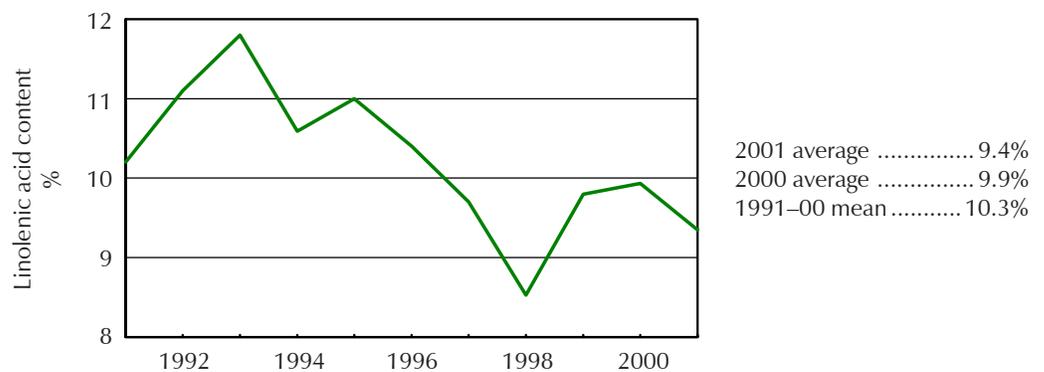
Based on the October 2001 data in Table 6, the linolenic acid content for Vancouver No. 1 Canada canola exports decreased by 0.4% from the 2000-01 level of 10.2%. October Thunder Bay exports remained similar with a 9.3% linolenic acid content.

At 113 units, the iodine value for Vancouver canola exports decreased by one unit from the 2000-01 levels. The iodine value for October Thunder Bay canola exports remained at the 2000-01 level of 112 units.

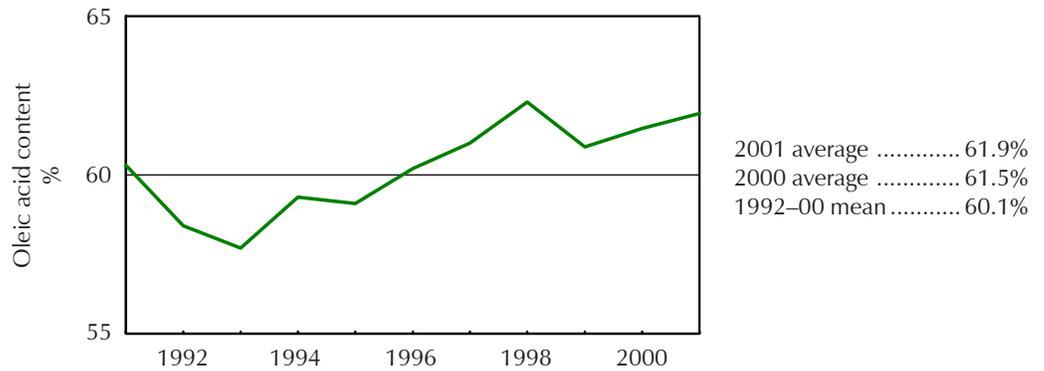
**Figure 8 • No. 1 Canada canola
Erucic acid content of harvest survey samples, 1991–2001**



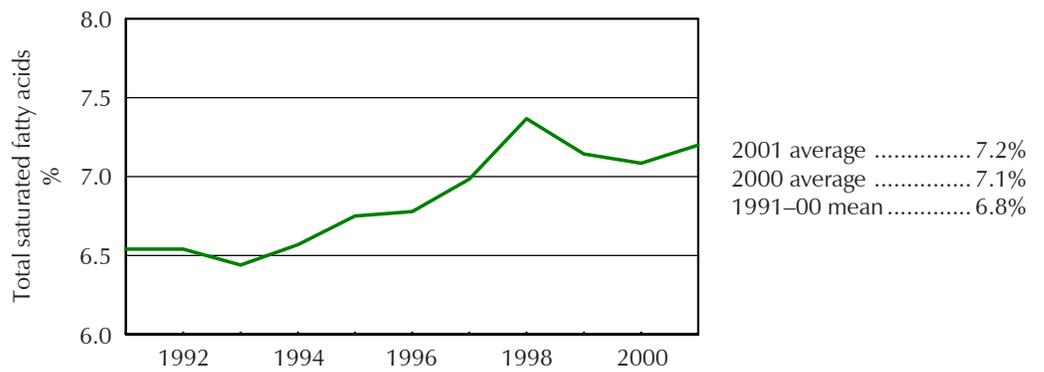
**Figure 9 • No. 1 Canada canola
Linolenic acid content of harvest survey samples, 1991–2001**



**Figure 10 • No. 1 Canada canola
Oleic acid content of harvest survey samples, 1991-2001**



**Figure 11 • No. 1 Canada canola
Total saturated fatty acids of harvest survey samples, 1991-2001**



**Figure 12 • No. 1 Canada canola
Iodine value of harvest survey samples, 1991-2001**

