

Quality of eastern Canadian canola 2011
Preliminary report – December 15th, 2011

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This quality report for the 2011 harvest survey is based on 12, 72 and 74 samples from New Brunswick, Ontario and Québec, respectively.

This report is based on the analysis of individual samples provided by producer as well as individual producer samples collected by processors. All samples were analyzed using a NIRSystems 6500 scanning near-infrared spectrometer. This instrument was calibrated to allow prediction results for oil, protein, chlorophyll, total glucosinolates, oleic acid, α -linolenic acid, total saturated fatty acid contents and iodine value. Individual samples were assigned a grade by Industry Services grain inspectors according to the Official Grain Grading Guide for Canola and Rapeseed (Chapter 10, <http://grainscanada.gc.ca/oggg-gocg/10/oggg-gocg-10-eng.htm>).

This report presents the provincial averages (Table 1), and data of the various canola grades in the various eastern provinces (Tables 2, tables 3a and 3b). The tables are also provided at the end of this report; which show the quality results for Canola No. 1 Canada from various growing areas in Ontario and Québec (Tables 4a and 4b).

Provincial means were obtained by using individual samples, without weighting with the region/district production since Statistics Canada provided only provincial production data. All oil and protein content values discussed in this report are calculated based on the Canadian Grain Commission's historical 8.5% moisture basis in order to permit annual and regional comparisons.

Harvest survey samples and grade distribution

After grading, 100.0% (New Brunswick), 94.4% (Ontario) and 89.2% (Québec) of the canola samples obtained in the eastern harvest survey were graded as Canola No. 1 Canada. This however might not be representative of the real grade distribution in eastern Canada,

especially in New Brunswick. All the samples from New Brunswick were obtained thanks to an oil processor and the New Brunswick Grain Commission; it is likely that only Canola No. 1 Canada loads were contracted and received at that time of the year. It is probable that the percent of Canola No. 1 Canada observed in Québec and Ontario were more representative of the grade distribution in these provinces since the samples were mainly obtained from producers.

As in the western provinces, the main degrading factor was green seeds count (2 to 3 samples were downgraded to Canola No. 2 Canada in Ontario and Québec due to DGR higher than 2.0%), but other downgrading factors were also observed. Two samples from Ontario were down graded to sample grade - one showed a high content of conspicuous admixture (higher than 2%) whereas the other one without showing any visual damage had a odour associated with damaged oxidized seeds (Table 2). In Québec, four samples were downgraded to Canola No. 3 Canada; one because of high DGR, one for high heated seed counts and the other two to high total damages. One sample from Québec was downgraded to sample grade due to high sclerotinia counts.

Quality of eastern Canadian canola—2011

Oil content

For Canola No.1 Canada, the 2011 mean oil contents were 45.2, 43.0 and 43.5% for samples from New Brunswick, Ontario and Québec (Table 1). When comparing to the 2010 harvest results for Ontario, there was a decrease for the oil content - 43.0% in 2011 versus 43.6% in 2010. The overall oil content average for all samples of Canola No. 1 Canada from the eastern provinces is 43.6% in 2011, much lower than the record high obtained this year in the western provinces (45.4%). Canola grown in Manitoba is often affected by warmer growing conditions when compared to canola grown in Saskatchewan and Alberta; in 2011, Canola No. 1 Canada grown in Manitoba had an oil content average of 44.2%, still higher than what was observed in the eastern provinces.

It was interesting to note that Abitibi-Temiscamingue in Québec and Timiskaming in Ontario very close canola growing areas showed different oil content averages (Table 4a) – 43.3% for samples from Ontario versus 44.0% for samples from Québec – however, a statistical analysis

showed that these results could not be considered statistically different due to the oil ranges 39.0 to 47.3% and 39.3 to 47.5% observed in Ontario and Québec, respectively.

Oil content is influenced by both genetics and environment. For any known canola variety cool growing conditions will give higher oil content when compared to hot growing conditions. It is likely that the high temperatures observed during the summer months (Figures 3a to 3f) associated with low precipitations (Figures 4a to 4f) in most areas affected the oil content of the canola grown in the eastern Provinces.

Other agronomic factors, such as fertilizer - sulphur and nitrogen levels – also affect canola quality; the higher nitrogen levels and the higher protein and glucosinolate contents of canola. Because of the inverse relationship between protein and oil contents - the higher the protein and the lower the oil content – oil content will decrease with high sulphur and nitrogen fertilizer levels. It is likely that warm temperatures, high moisture followed by lack of precipitation, root development, fertilizer leaching or not into the soil affected greatly the canola oil content not only in Ontario and Québec but also in the Western provinces.

In Québec, with the exception of the samples from the area Centre du Québec, the more northern the sample growing region is, the higher the oil content; it is likely that the northern location would have lower temperature averages when compared to a location such as Montérégie (Table 4a). Drought watch maps issued by Agriculture and Agri-Food Canada showed that in Québec, Centre du Québec and Montérégie received significant amount of precipitation in August (Figures 4a to 4f) whereas the other growing locations showed low amount of precipitation if any. This could explain why the oil content averages of the samples grown in the region centre du Québec was higher than the average of Abitibi-Témiscamingue, Saguenay-Lac St Jean or Bas St Laurent. Agriculture and Agri-Food Canada provides detailed maps of the temperature and precipitation for Canada at:

<http://www4.agr.gc.ca/DW-GS/historical-historiques.jsp?lang=eng>

In Ontario, the great lakes are likely to play an important role in tempering the effects of the high temperatures on canola quality as a result geographic growing areas showed a moderate effect on canola oil content (Table 4a).

Protein content

The 2011 crude protein contents mean were 20.7, 22.1 and 20.8% in New Brunswick, Ontario and Québec (Table 1), respectively, much higher than the 19.7% observed for Canola No. 1 Canada samples grown in the prairies but similar to what was observed in Manitoba (20.7%). The 2011 protein content calculated to an oil-free meal at 8.5% moisture basis were 40.9, 42.3 and 40.1% from New Brunswick, Ontario and Québec, respectively. This is higher than what was obtained in average in the prairies (39.1%).

Higher protein contents were expected for the samples grown in the eastern provinces compared to the prairies since lower oil contents were observed in the eastern provinces compared to the western provinces.

Again, it is likely that environmental factors were responsible of the variations observed for oil and protein contents when comparing canola grown in New Brunswick, Ontario, Québec, Manitoba, Saskatchewan and Alberta.

Chlorophyll content

Chlorophyll contents averages of producer samples graded Canola No. 1 Canada were 5.5, 4.6 and 8.3 mg/kg in New Brunswick, Ontario and Québec, respectively (Table 1). The overall average for Canola No. 1 Canada in the eastern province was 6.4 mg/kg well below the average obtained in the western provinces (14.4 mg/kg). The highest chlorophyll content for individual producer samples of Canola No.1 Canada from the eastern province was 27.3 mg/kg versus 66.3 mg/kg in the western province.

Chlorophyll levels (Table 3a) for Canola, No. 2 Canada samples from the eastern provinces averaged 13.4 mg/kg with Ontario and Québec averages being 5.8 and 17.2 mg/kg, respectively.

Glucosinolate content

The 2011 total glucosinolate content averaged 9.2, 8.5 and 9.3 μ moles/gram for New Brunswick, Ontario and Québec, very similar to what was observed in 2010 in Ontario (9.4 μ moles/gram) (Table 1).

Constant low total glucosinolate contents have been observed in canola grown in Canada for the last couples of years. The various Canadian breeding programs and the low amount of *Brassica rapa* grown in Canada are the reason of these low levels.

Free fatty acids content

Free fatty acid content analyses were not done on the harvest survey samples for this report. Sprouting and heat stress are known to lead to higher than normal free fatty acid in canola. No sprouting was observed this year in the seeds harvested in New Brunswick, Ontario and Québec, but some heat-stressed seeds were observed in the samples. Free fatty acid analyses will be performed on the composite of Canola No. 1 Canada from each province growing areas and on provincial Canola No. 2 Canada and Canola No. 2 Canada samples.

Fatty acid composition

In 2011, α -linolenic acid (C18:3) means were 8.6, 9.2 and 8.9 in New Brunswick, Ontario and Québec, the range was from 6.8 to 13.0% depending of the location and grade. Oleic acid (C18:1) content of the 2011 crop was predicted to be 63.6%, 63.5 and 62.8 in New Brunswick, Ontario and Québec. The NIR predicted mean content of saturated fatty acids was in the 7.0% range in 2011 for Canola No. 1 Canada (Tables 1 and 4b).

Canola fatty acid composition is affected by the genetics and the environment. Hot temperatures lead to higher total saturated fatty acid contents compared to cool temperatures. Northern growing locations have in general higher contents of α -linolenic acid and lower contents of total saturates than southern growing areas.

Acknowledgement

Thanks to all producers for providing samples for the harvest survey. Thanks to Ms. Carrie James (Ontario Canola Producers), Ms. Daphné Touzin (MAPAQ), Mr. Denis Ruel (MAPAQ), Mr. Etienne Tardif (TRT-ETGO), Mr. Gilles Tremblay (CEROM), Ms Heather Russell (New Brunswick Grain Commission) and Mr. Terry Phillips (Cooperative Regional de Nipissing) and for helping to collect the samples. Thanks to Ann Puvirajah, Barry Misener, Brad Speiss, Bert Siemens, Marnie MacLean and Robyn Makowski for technical assistance in the sample analyses.



Figure 1: Map of Ontario, includes the various counties, the main canola growing locations are highlighted in yellow. Counties are 7: Timiskaming, 22: Bruce, 23: Grey, 24: Simcoe and 30: Dufferin.

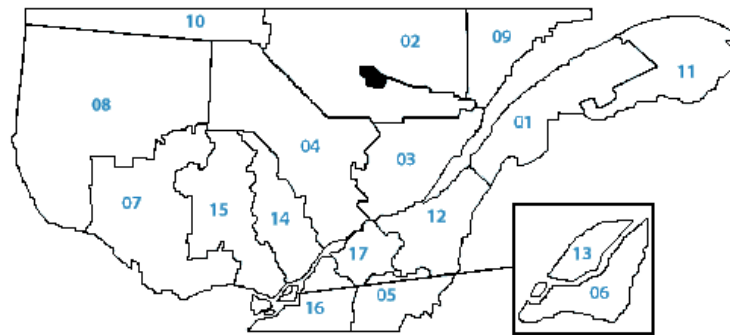


Figure 2: Map of Québec includes the various agricultural regions. The regions are: 001 Bas-Saint-Laurent, 02 Saguenay-Lac-Saint-Jean, 3 Capitale-Nationale, 04 Mauricie, 05 Estrie, 06 Gaspésie-Îles-de-la-Madeleine, 12 Chaudière-Appalaches, 13 Laval, 14 Lanaudière, 15 Laurentides, 16 Montérégie and 17 Centre-du-Québec

Table 1: Canola No. 1 Canada: Quality data for 2011 harvest survey

Quality parameter	2011 Harvest					2010 Harvest
	New Brunswick	Ontario	Québec	Manitoba	Western Canada**	Ontario
Harvest	2011	2011	2011	2011	2011	2010
Number of received samples	12	72	74	427	1749	67
Number of Canola, No. 1 Canada samples	12	68	66	375	1487	58
Oil content ¹ (%)	45.2	43.0	43.5	44.2	45.4	43.6
Protein content ² (%)	20.7	22.1	20.8	20.7	19.7	21.2
Oil-free protein ² (%)	40.9	42.3	40.1	40.0	39.1	40.5
Chlorophyll content (mg/kg in seed)	5.5	4.6	8.3	11.8	14.4	4.5
Total glucosinolates ¹ (µmol/g)	9.2	8.5	9.3	10.7	10.2	9.4
Oleic acid (% in oil)	63.6	63.5	62.8	62.2	61.9	61.7
α-Linolenic acid (% in oil)	8.6	9.2	8.9	9.3	9.6	8.9
Total saturated fatty acids ³ (% in oil)	6.8	7.0	7.0	7.0	7.0	7.0
Iodine value (units)	112.2	111.8	112.4	112.5	113	112.7

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).

2011 data were obtained by NIR

**Results obtained using western Canadian averages for each grade; provincial averages were weighted using Statistics Canada production estimate and of the grade distribution for each crop district.

1 Table 2: Grading factor results for 2011 harvest survey per province and grade

			Distinctly Green Seeds (DGR, %)			Heated seeds (%)			Total Damages (TDMG, %)		
Province	Grade	N Obs	Mean	Min.	Max.	Mean	Min.	Max.	Mean	Min.	Max.
New Brunswick	1	12	0.30	0.00	0.80	0.00			0.30	0.00	0.8
Ontario	1	68	0.36	0.00	3.00	0.00			0.36	0.00	3
	2	2	3.20	2.40	4.00	0.00			3.20	2.40	4
	3	1	0.00			1.00			1.00		
	4	2	0.10	0.00	0.20	0.00			0.10	0.00	0.20
Québec	1	66	0.60	0.00	2.00	0.00			0.69	0.00	3.7
	2	4	2.15	0.40	4.00	0.05	0.00	0.20	4.38	0.60	10.5
	3	3	5.47	3.20	6.80	0.20	0.00	0.60	14.57	7.00	22.2
	4	1	0.60			0.00			0.60		

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			Sclerotinia (SCL, %)			Conspicuous admixture (CADMX, %)		
Province	Grade	N Obs	Mean	Min.	Max.	Mean	Min.	Max.
New Brunswick	1	12	0.00			0.00		
Ontario	1	68	0.00			0.01	0.00	0.86
	2	2	0.00			0.00		
	3	1	0.00			0.00		
	4	2	0.00			5.80	0.00	11.60
Québec	1	66	0.00			0.00		
	2	4	0.00			0.00		
	3	3	0.00			0.00		
	4	1	0.26			0.00		

3 Total damages = sum of DGR, heated seeds and other damages (not reported)

4 Table 3a: 2011 Harvest survey - Canola quality data by grade and province – Oil, protein, chlorophyll and glucosinolate contents.

Province	Grade Name	N Obs	Oil (% ¹ , 8.5 m.b.)			Protein (% ² , 8.5% m.b.)			Chlorophyll (mg/kg)			Glucosinolate (µmol/g, 8.5m.b.)		
			Mean	Min.	Max.	Mean	Min.	Max.	Mean	Min.	Max.	Mean	Min.	Max.
Eastern Canada	1 Canada	146	43.6			21.4			6.4			8.9		
New Brunswick	1 Canada	12	45.2	43.5	47.0	20.7	19.4	22.2	5.5	0.8	17.5	9.2	6.3	11.3
Ontario	1 Canada	68	43.0	39.0	47.3	22.1	18.4	25.4	4.6	0.1	20.6	8.5	6.5	10.3
	2 Canada	2	43.3	41.9	44.6	23.0	22.5	23.5	5.8	5.2	6.4	8.5	7.9	9.1
	3 Canada	1	38.3			26.0			6.2			10.2		
	Sample	2	39.5	37.7	41.2	22.9	22.2	23.5	11.0	2.6	19.5	10.5	10.	11.0
Québec	1 Canada	66	43.5	37.8	47.5	20.8	17.5	25.9	8.3	0.0	27.3	9.3	5.0	13.9
	2 Canada	4	43.5	42.6	45.0	20.8	20.2	21.5	17.2	12.7	26.4	9.7	7.4	13.7
	3 Canada	3	42.5	41.7	43.5	20.6	18.9	22.2	18.5	8.7	28.1	11.5	10.0	14.3
	Sample	1	40.4			22.6			13.7			9.8		

5 ¹ 8.5% moisture basis ² N x 6.25, 8.5% moisture basis 2011 data were obtained by NIR

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7 Table 3b: 2011 Harvest survey - Canola quality data by grade and province – Oleic, α-linolenic acid, total saturated fatty acid contents
8 and iodine value of the oil.

Province	Grade Name	N Obs	In the oil (%)									In the oil (units)		
			Oleic Acid			Linolenic Acid			Saturates			Iodine Value		
			Mean	Min.	Max.	Mean	Min.	Max.	Mean	Min.	Max.	Mean	Min.	Max.
Eastern Canada	1 Canada	146	63.1			9.1			7.0			112.2		
New Brunswick	1 Canada	12	65.6	61.6	65.6	9.6	7.5	9.8	6.8	6.5	7.0	112.2	110.0	114.60
Ontario	1 Canada	68	63.5	60.6	67.7	9.2	6.0	13.0	7.0	6.7	7.6	111.8	106.6	115.5
	2 Canada	2	62.9	62.4	63.3	8.3	7.5	9.0	7.3	7.2	7.3	112.0	110.8	113.2
	3 Canada	1	62.9			12.3			6.9			114.4		
	Sample	2	64.6	63.1	66.0	14.8	11.7	17.9	7.4	6.8	8.0	113.1	111.8	114.3
Québec	1 Canada	66	62.8	58.4	74.3	8.9	2.5	11.4	7.01	6.60	7.70	112.36	96.40	117.60
	2 Canada	4	66.3	62.4	74.4	6.8	1.2	9.2	7.20	7.10	7.30	107.05	95.30	112.90
	3 Canada	3	62.9	60.9	64.0	9.0	7.7	10.1	7.50	7.30	7.60	111.97	109.80	114.50
	Sample	1	60.1			10.6			7.20			114.60		

9 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).

10 2011 data were obtained by NIR

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11 Table 4a: 2011 Harvest survey - Canola quality data by grade and regions of Ontario and Québec – Oil, protein, chlorophyll and
 12 glucosinolate contents (unknown location: some samples were received without location identified on the envelope)

Province	Region	N Obs	Oil (%, 8.5% m.b.)			Protein (%, 8.5% m.b.)			Chlorophyll (mg/kg, as this)			Glucosinolate (μ mol/g, 8.5% m.b.)		
			Mean	Min.	Max.	Mean	Min.	Max.	Mean	Min.	Max.	Mean	Min.	Max.
Ontario	Bruce	6	42.3	40.3	44.6	22.9	20.5	25.3	3.8	0.4	6.5	8.1	6.5	9.0
	Carleton	4	39.9	39.6	40.4	25.1	24.7	25.4	3.0	2.4	3.6	8.0	7.6	8.4
	Dufferin	8	43.6	41.7	46.2	21.1	18.4	22.2	2.7	0.1	8.6	7.9	7.0	8.9
	Grey	12	43.5	41.7	45.2	22.0	20.5	23.7	2.4	0.3	5.0	8.9	7.9	10.0
	Hasting	4	43.8	42.7	44.7	20.3	19.8	20.6	3.4	2.2	4.7	7.9	7.4	8.5
	Huron	1	42.9			24.1			9.0			7.5		
	Manitoulin	1	42.9			21.3			1.5			9.1		
	Perth	6	42.8	41.6	45.1	22.8	20.9	24.5	7.1	2.4	18.3	8.3	7.0	9.3
	Timiskaming	13	43.3	39.0	47.3	21.7	19.6	25.3	8.4	0.3	20.6	9.4	7.8	10.3
	Wellington	11	43.2	40.4	45.1	21.9	20.7	24.0	3.9	1.0	9.9	8.2	6.6	8.9
Unknown location	2	41.9	41.3	42.4	22.4	22.1	22.6	4.5	4.4	4.5	8.1	7.7	8.4	
Québec	Abitibi-Temiscamingue	25	44.0	39.3	47.5	20.8	17.7	23.0	8.0	0.0	22.1	9.1	5.3	13.8
	Bas St laurent	6	43.4	41.3	44.7	21.1	18.8	23.1	11.4	6.9	18.0	9.9	8.9	10.7
	Capitale Nationale	1	43.7			21.1			10.3			9.7		
	Centre du Québec	10	45.0	43.0	46.7	19.5	17.5	21.9	5.2	0.6	11.3	8.7	5.9	11.7
	Chaudiere Applache	3	41.9	40.0	43.3	21.3	20.5	22.6	9.9	7.7	14.1	11.9	10.4	13.8
	Lac St Jean	7	44.3	42.6	46.3	20.9	20.2	21.7	10.8	4.1	19.0	8.6	7.0	10.4
	Lanaudiere	1	37.8			25.9			27.3			11.6		
	Monteregie	1	41.8			22.9			6.3			10.1		
Unknown location	12	44.4	42.7	45.9	21.1	19.2	22.5	7.0	0.7	13.3	9.3	5.0	13.9	

13 ¹ 8.5% moisture basis ² N x 6.25, 8.5% moisture basis 2011 data were obtained by NIR

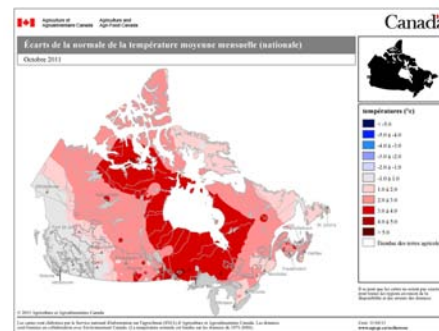
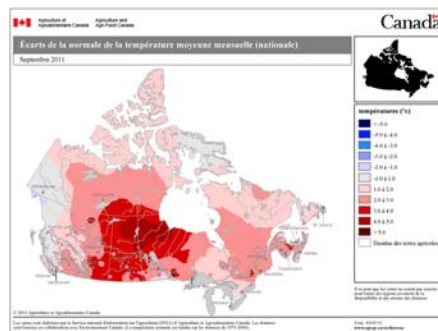
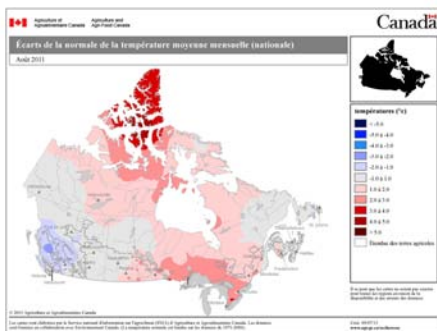
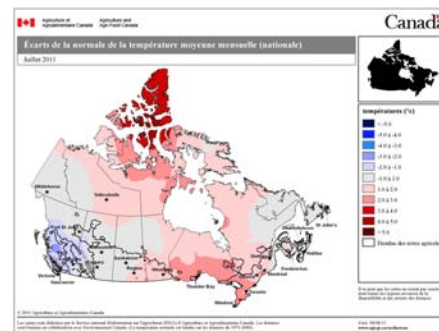
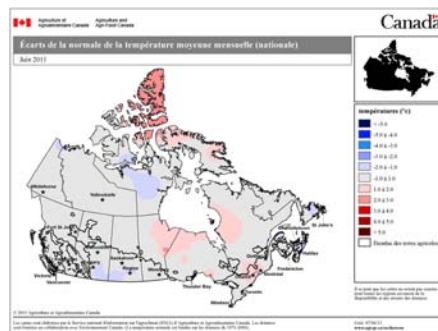
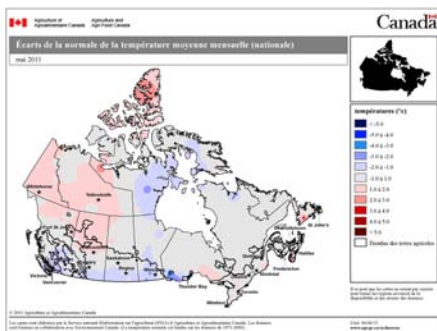
15 Table 4b: 2011 Harvest survey - Canola quality data by grade and regions of Ontario and Québec – Oleic, α -linolenic acid, total
 16 saturated fatty acid contents and iodine value of the oil (unknown location: some samples were received without location identified on
 17 the envelope)

Province	Region	N Obs	Oleic Acid			Linolenic Acid			Saturates			Iodine Value		
			Mean	Min.	Max.	Mean	Min.	Max.	Mean	Min.	Max.	Mean	Min.	Max.
Ontario	Bruce	6	64.15	62.30	67.70	9.62	8.30	11.20	7.07	6.70	7.30	110.87	106.60	112.50
	Carleton	4	64.42	64.20	64.70	10.02	9.60	10.40	7.25	7.20	7.30	110.35	110.10	110.50
	Dufferin	8	64.01	62.80	66.50	9.09	7.50	11.40	7.06	6.70	7.60	110.79	108.60	112.10
	Grey	12	63.46	61.90	65.10	9.00	6.60	11.30	6.93	6.70	7.30	112.14	110.70	114.10
	Hasting	4	63.27	61.90	63.90	9.50	8.60	10.60	7.02	6.80	7.40	111.23	110.30	113.40
	Huron	1	64.60				9.10				7.20			109.10
	Manitoulin	1	62.10				9.40			7.00				113.80
	Perth	6	63.33	61.60	65.20	9.25	7.90	10.90	6.92	6.70	7.10	112.22	109.30	115.40
	Timiskaming	13	62.57	60.60	64.90	9.07	6.30	13.00	7.01	6.70	7.60	113.11	110.10	115.50
	Wellington	11	63.66	61.80	64.60	9.14	6.00	11.00	7.05	6.70	7.30	111.54	109.50	114.20
	Unknown location	2	63.70	62.70	64.70	9.60	8.20	11.00	7.20	7.00	7.40	110.75	109.50	112.00
	Québec	Abitibi-Temiscamingue	25	62.12	59.10	64.90	9.36	7.70	11.40	7.07	6.70	7.70	113.23	109.50
Bas St laurent		6	61.47	60.30	62.60	9.55	8.80	10.60	6.92	6.70	7.10	114.27	113.50	115.80
Capitale Nationale		1	62.00				9.20			7.10				113.20
Centre du Québec		10	63.58	60.30	67.00	8.31	7.10	9.80	7.03	6.70	7.40	111.16	107.60	115.40
Chaudiere Applache		3	62.10	60.60	63.70	8.80	8.30	9.50	7.03	6.80	7.30	112.97	111.10	114.50
Lac St Jean		7	62.23	58.40	64.20	9.20	8.00	10.10	6.90	6.60	7.40	113.17	112.20	114.80
Lanaudiere		1	59.80				10.60			6.80				116.80
Monteregie		1	60.80				9.40			7.00				115.00
Unknown location		12	64.08	60.10	67.00	8.33	6.80	10.60	6.96	6.70	7.20	110.68	106.80	115.70

18 2011 data were obtained by NIR`

19 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).

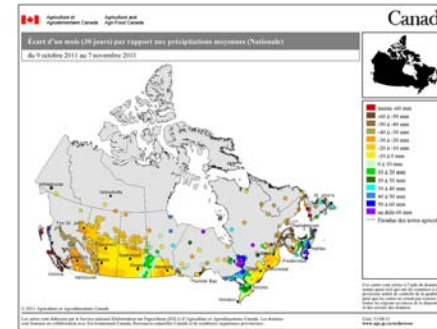
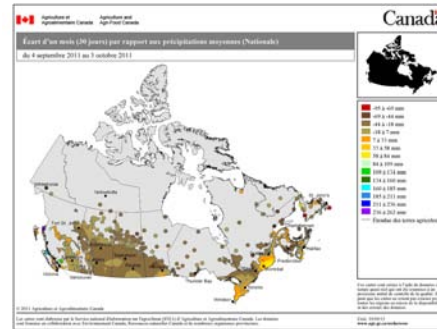
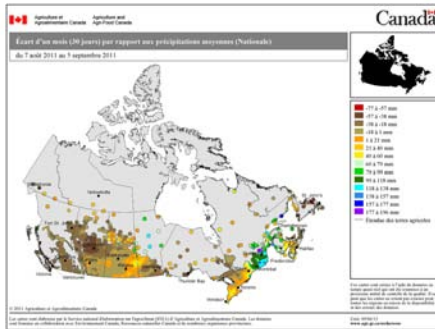
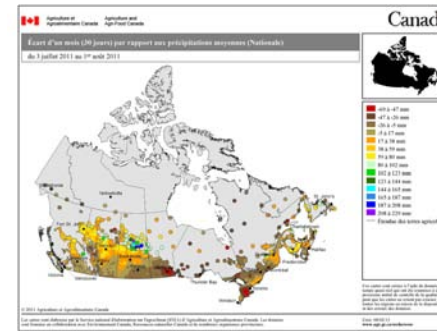
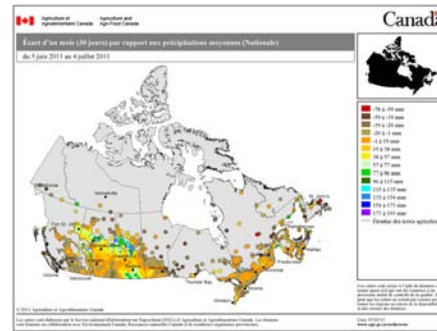
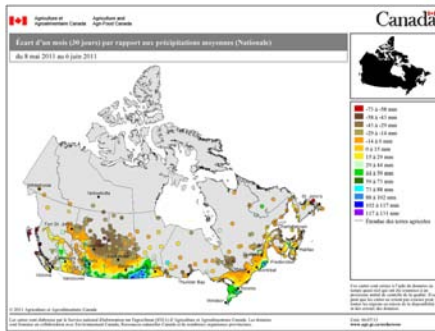
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Figures 3a to 3f: Monthly mean temperature in Canada, 30 days departure from normal

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Figures 4a to 4f: Precipitation in Canada, 30 days departure from average