Alberta 2007 Specialty Crop Report






Alberta

Acknowledgments

The Statistics and Data Development Unit of Alberta Agriculture and Food (AF) wishes to thank all of the producers who participated in the Alberta 2006 Specialty Crop Survey conducted in the winter of 2006/2007. Without their cooperation and assistance, this report would not have been possible.

Several AF staff members have made significant contributions to the successful completion of this report. Those staff include Charlie Pearson of Market and Consumer Analysis Unit, Nabi Chaudhary of Economics Unit, and Kwesi Ampong-Nyarko and Zhixiong Zhang of Agriculture Research Division.

Special thanks go to Melodie Mynzak of Statistics and Data Development Unit for conducting the survey, as well as other staff members, including Gail Atkinson, Guangzhi Liu, Marion Harry, Marian Elson, and Margaret McDonald, for their valuable assistance in the completion and dissemination of the report.

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This report is also available on the Internet at:

http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/sdd11803

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Alberta 2006 Specialty Crop Survey

Chuanliang Su

Purpose of Survey

To address some of the data and information needs of the specialty crop industry in Alberta, the Statistics and Data Development (SADD) Unit conducts an annual Specialty Crop Survey. Now into its twenty-fourth year, the survey captures data on area, yield and production for specialty crops grown in the province.

Data gathered from the survey are used primarily to generate related provincial and sub-provincial estimates. In turn, these estimates are used to validate some of the Alberta estimates generated by Statistics Canada, as well as to provide industry and other stakeholders with benchmark statistics for some of the "new" and emerging crops.

Methodology

The Alberta Specialty Crop Survey, which is provincial in scope, collects data through a non-probability sampling procedure. In January 2007, survey questionnaires were mailed out to 3,243 specialty crop producers across the province. The questionnaires specifically asked survey participants to provide information on the type of specialty crop grown, area (seeded and harvested acres), yield and production for 2006. Survey participants were informed that participation in the survey was voluntary. Moreover, all individual responses would be kept confidential under the provisions of the Federal Statistics Act, as well as under the Provincial Freedom of Information and Protection of Privacy (FOIP) Act. As of April 30, 2007, a total of 842 questionnaires were returned. Of this total 735 were usable and partly formed the basis in the generation of the Alberta 2006 specialty crop estimates.

Survey responses received were reviewed for data completeness, validated and entered into an electronic database. The data was then subjected to some computerized analyses, the results of which were rolled up into group summaries, to preserve data confidentiality of individual survey respondents. In turn, the group summaries, in conjunction with consultations with provincial specialists of Alberta Agriculture and Food (AF), industry, and information from published sources (e.g. Statistics Canada) were used to generate the provincial and sub-provincial (Census Division) estimates, where appropriate.

It cannot be over emphasized that extensive consultation is done with AF's provincial specialists and industry in the development of the provincial/sub-provincial estimates. Provincial specialists are acknowledged for their useful information and invaluable insights on crop conditions and yields, particularly when attempting to firm up some of the sub-provincial estimates generated from the survey. Similarly, administrative data on yield and crop area grown under private contracts also add value to the estimates.

It should be noted that the estimates are subject to error. Some of the possible sources of error include data coding, data entry and tabulation. Nonetheless, we believe that the statistics published in this report are reliable estimates for Alberta.

Survey Results

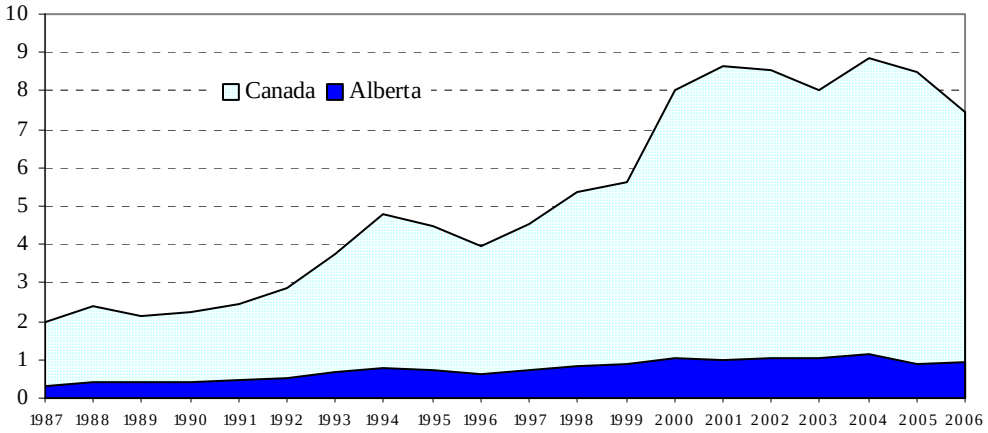
Area, Yield and Production in Alberta

In 2006, there were more acres seeded to specialty crops, compared to a year earlier. Total provincial seeded area, excluding potatoes and forage seeds, was estimated at 0.96 million acres (see Figure 1), up seven per cent, from 0.90 million acres in 2005. The increase in acreage was largely attributed to higher acres for dry peas and silage corn. Of the total seeded area in 2006, nearly 0.86 million acres or 89 per cent were harvested for grain. To offer some perspective, shown in Figure 3 on page 4 is the percentage distribution of specialty crop seeded acreage by crop type in 2006.

Regarding crop growing conditions in 2006, the hot, dry weather experienced in July caused significant deterioration in crop conditions and yield potentials. However, in southern Alberta, where moisture reserves were better compared to the rest of the province, average yields for most specialty crops grown on dryland were significantly higher than the 10-year averages. Some specialty crops grown under irrigation also benefited from the heat in July, producing record or near record yields.

In 2006, the provincial average yield for dry peas was 35.9 bushels per acre. This was about 16 per cent lower than in 2005, but one per cent above the 10-year average. With the majority of its acreage in southern Alberta, mustard seed had an average yield of 939 pounds per acre, or three per cent higher than in 2005, and 23 per cent above the 10-year average. For chickpeas, the average yield was estimated at 1,433 pounds per acre, slightly below the record yield of 1,442 pounds per acre in 2005. Setting a new record in 2006 was sugar beets, with a record yield of 26 tonnes per acre, or 31 per cent higher than a year earlier.

Figure 1 - Specialty Crop Seeded Area, Alberta and Canada
1987-2006 (million acres)



Source: Statistics Canada; and Alberta Agriculture and Food

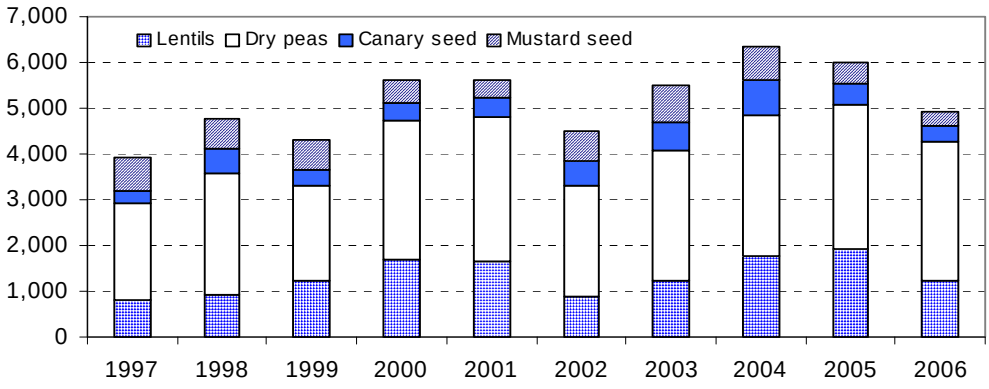
Specialty Crops in Western Canada

Based on the inter-censal revisions released by Statistics Canada in August 2007, and results of the Alberta 2006 Specialty Crop Survey, total seeded and harvested acres for specialty crops in Western Canada in 2006 declined from a year earlier. The inter-censal revisions reflected changes made to crop production estimates for the period of 2002 to 2006, using the 2006 census data as a benchmark. Due mainly to a substantial increase in fodder corn production, total 2006 production of specialty crops in Western Canada jumped significantly from a year earlier. Fodder corn production more than doubled from a year earlier, setting a record in 2006. As well, production for grain corn, soybeans, dry beans and sugar beets showed large increases over 2005 levels.

In 2006, a marked decline in the total seeded area of specialty crops in Saskatchewan more than negated increases in other provinces in Western Canada. As a result, the total seeded area of specialty crops in Western Canada dropped to 6.75 million acres, or eight per cent below the 7.36 million acres in 2005. On a provincial basis, Saskatchewan with its 4.66 million acres accounted for 69 per cent of the total specialty crop seeded area in Western Canada, while Manitoba and Alberta accounted for 16 per cent and 14 per cent, respectively. Specialty crop seeded area in British Columbia was extremely small. Similar to seeded area, the total harvested area in Western Canada in 2006 was down seven per cent from a year earlier, to 6.45 million acres.

The four large specialty crops grown in Western Canada in 2006 were dry peas, lentils, canary seed and mustard seed. Together, these crops accounted for 75 per cent of the total seeded area of specialty crops. Dry peas, with a total seeded area of 3.12 million acres, was the largest specialty crop, representing 46 per cent of the Western Canada total. Lentils was next, with seeded acres totaling 1.28 million or 19 per cent of the total, while mustard seed and canary seed accounted for five per cent each. Shown in Figure 2 is the harvested area of the top four specialty crops in Western Canada. Statistics on seeded area and production for selected specialty crops are presented in Table 5 on page 15.

Figure 2 - Harvested Area of Selected Specialty Crops
Western Canada ('000 acres)

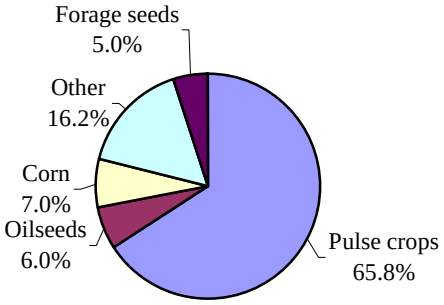


Source: Statistics Canada; and Alberta Agriculture and Food

Table 1 Alberta 2006 Specialty Crops

		Seeded Area (acres)	Harvested Area (acres)	Yield (per acre)	Production (tonnes)
Pulse crops	Dry peas, green	136,000	131,000	36.2 bu	129,215
	Dry peas, yellow	442,063	425,000	35.8 bu	414,567
	Dry peas, other	9,200	9,000	36.0 bu	8,818
	Total dry peas	**587,263**	**565,000**	**35.9 bu**	**552,600**
	Chickpeas, desi	3,100	3,000	1,420.3 lbs	1,933
	Chickpeas, kabuli	37,649	37,000	1,434.0 lbs	24,067
	Total chickpeas	**40,749**	**40,000**	**1,432.5 lbs**	**26,000**
	Dry beans	62,039	61,500	21.8 cwt	60,800
	Fababeans	4,000	4,000	26.3 cwt	4,800
	Lentils	10,825	10,600	1,400.0 lbs	6,731
Oilseeds	Mustard seed, brown	10,000	9,400	1,020.0 lbs	4,349
	Mustard seed, yellow	38,038	36,600	908.0 lbs	15,074
	Mustard seed, oriental	14,500	14,000	972.7 lbs	6,177
	Total mustard seed	**62,538**	**60,000**	**939.2 lbs**	**25,600**
	Sunflower seed	1,792	1,790	1,850.0 lbs	1,502
Corn	Grain corn	4,326	3,000	130.0 bu	9,900
	Silage corn	70,411	55,000	19.1 ton	952,500
Other	Potatoes (1)	54,759	53,200	342.0 cwt	825,280
	Triticale	76,299	15,000	39.3 bu	15,000
	Canary seed	3,317	3,300	-	-
	Sugar beets (2)	38,802	36,992	26.0 tonne	963,165
Forage seeds (3)	Alfalfa seed	14,458	14,458	585.0 lbs	3,836
	Clover seed	1,837	1,837	460.0 lbs	383
	Brome grass seed	7,135	7,135	405.0 lbs	1,311
	Fescue seed	13,494	13,494	390.0 lbs	2,387
	Timothy seed	10,388	10,388	275.0 lbs	1,296
	Other	6,499	6,499	-	-
All crops		1,070,931	963,193	-	3,453,092

Figure 3 - Percentage Distribution of Specialty Crop Seeded Acreage, Alberta, 2006 (Total area: 1,070,931 acres)



Source: Alberta 2006 Specialty Crop Survey, AF; and 2006 Census of Agriculture, Statistics Canada

Except for:

(1) Statistics Canada, Canadian Potato Production by Province, January 2007

(2) Alberta Sugar Beet Growers' Marketing Board

(3) Canadian Seed Growers' Association - Inspected Pedigreed Crop Acres; Yield estimates are generated from the Alberta 2006 Specialty Crop Survey, including pedigreed and common seeds.

cwt - hundredweight (hundred pounds)

ton = 2,000 lbs tonne = 1.1023 tons = 2,204.6 lbs

- Not available

Alberta Census Divisions
ID, MD and Counties

Alberta

Figure 4

Table 2 Alberta 2006 Specialty Crops by Census Division

C.D.	Dry Peas	Mustard	Lentils	Dry Beans	Chickpeas
	Harvested Area (acres)				
1	70,509	6,754	3,195	21,084	18,630
2	59,093	8,732	2,207	27,910	16,063
3	16,233	3,556	-	-	-
4	16,776	20,539	808	-	1,226
5	104,492	13,331	-	1,038	1,952
6	16,116	-	-	-	-
7	69,492	-	-	-	573
8	8,037	-	854	900	-
9	350	-	-	-	-
10	80,999	-	529	-	1,025
11	15,628	-	-	-	-
12	10,027	-	-	-	-
13	8,345	-	-	-	-
14	661	-	-	-	-
17	32,142	-	-	-	-
18	3,720	-	-	-	-
19	45,380	-	-	-	-
Alberta	**565,000**	**60,000**	**10,600**	**61,500**	**40,000**
	Yield Per Acre				
	(bushels)	**(pounds)**	**(pounds)**	**(cwt)**	**(pounds)**
1	30.8	1,035.5	-	22.5	906.5
2	39.7	994.4	1,772.8	22.0	1,847.3
3	30.6	899.5	-	-	-
4	31.7	668.5	-	-	1,260.0
5	36.3	986.0	-	-	-
6	28.8	-	-	-	-
7	34.0	-	-	-	-
8	36.5	-	-	-	-
9	-	-	-	-	-
10	34.4	-	-	-	-
11	36.8	-	-	-	-
12	41.6	-	-	-	-
13	53.0	-	-	-	-
14	-	-	-	-	-
17	39.3	-	-	-	-
18	-	-	-	-	-
19	33.5	-	-	-	-
Alberta	**35.9**	**939.2**	**1,400.0**	**21.8**	**1,432.5**
	Production (tonnes)				
1	59,052	3,172	-	21,518	7,660
2	63,805	3,939	1,775	27,824	13,460
3	13,501	1,451	-	-	-
4	14,488	6,228	-	-	701
5	103,303	5,962	-	-	-
6	12,636	-	-	-	-
7	64,304	-	-	-	-
8	7,978	-	-	-	-
9	-	-	-	-	-
10	75,833	-	-	-	-
11	15,668	-	-	-	-
12	11,365	-	-	-	-
13	12,032	-	-	-	-
14	-	-	-	-	-
17	34,339	-	-	-	-
18	-	-	-	-	-
19	41,325	-	-	-	-
Alberta	**552,600**	**25,600**	**6,731**	**60,800**	**26,000**

Note: Totals may not add up due to rounding or insufficient data for generating estimates for some census divisions.
cwt - hundredweight (hundred pounds) - Not available
Source: Statistics Canada; and Alberta Agriculture and Food

Table 3 Alberta 2005 Specialty Crops by Census Division

C.D.	Dry Peas	Mustard	Lentils	Dry Beans	Chickpeas
	Harvested Area (acres)				
1	57,743	5,950	5,101	35,839	18,079
2	56,697	28,900	6,593	18,216	10,445
3	17,145	3,898	-	-	-
4	24,002	18,403	7,145	-	1,476
5	106,357	16,344	1,160	944	-
6	11,857	1,505	-	-	-
7	77,422	-	-	-	-
8	9,062	-	-	-	-
9	-	-	-	-	-
10	80,183	-	-	-	-
11	11,689	-	-	-	-
12	12,882	-	-	-	-
13	10,322	-	-	-	-
17	22,413	-	-	-	-
18	5,329	-	-	-	-
19	26,897	-	-	-	-
Alberta	**530,000**	**75,000**	**20,000**	**55,000**	**30,000**
	Yield Per Acre				
	(bushels)	**(pounds)**	**(pounds)**	**(cwt)**	**(pounds)**
1	34.6	798.6	-	21.7	-
2	40.3	895.2	1,434.0	20.6	1,620.4
3	44.5	813.3	-	-	-
4	35.0	894.2	-	-	-
5	42.5	1,122.4	-	-	-
6	43.2	-	-	-	-
7	42.3	-	-	-	-
8	50.9	-	-	-	-
9	-	-	-	-	-
10	47.9	-	-	-	-
11	42.5	-	-	-	-
12	58.1	-	-	-	-
13	61.0	-	-	-	-
17	41.0	-	-	-	-
18	-	-	-	-	-
19	51.7	-	-	-	-
Alberta	**42.8**	**915.0**	**1,563.0**	**21.2**	**1,442.0**
	Production (tonnes)				
1	54,369	2,155	-	35,277	-
2	62,254	11,735	4,288	17,021	7,677
3	20,779	1,438	-	-	-
4	22,879	7,465	-	-	-
5	123,008	8,321	-	-	-
6	13,949	-	-	-	-
7	89,204	-	-	-	-
8	12,565	-	-	-	-
9	-	-	-	-	-
10	104,443	-	-	-	-
11	13,505	-	-	-	-
12	20,382	-	-	-	-
13	17,128	-	-	-	-
17	25,008	-	-	-	-
18	-	-	-	-	-
19	37,839	-	-	-	-
Alberta	**617,500**	**31,100**	**14,100**	**52,800**	**19,600**

Note: Totals may not add up due to rounding or insufficient data for generating estimates for some census divisions.
cwt - hundredweight (hundred pounds) - Not available
Source: Statistics Canada; and Alberta Agriculture and Food

Specialty Crops by Census Division in Alberta

This section presents estimates of area, yield and production at the Census Division level in Alberta for dry peas, mustard seed, lentils, dry beans and chickpeas. Just to note, Census Division estimates were generated from a small sample, and as such, caution should be exercised when interpreting and using the data. Also, for reference, the Alberta Census Division and municipality map is shown on page 5 – Figure 4.

Dry Peas

In 2006, Alberta producers seeded a total of 587,263 acres to dry peas, of which 565,000 acres were harvested (see Table 1). The provincial average yield of dry peas was estimated at 35.9 bushels per acre, or 16 per cent lower than the 42.8 bushels per acre in 2005. Largely responsible for the reduction in yield was the hot, dry weather in July. Despite this decline, the 2006 yield was still one per cent above the 10-year average. Total dry pea production was estimated at 552,600 tonnes, down 11 per cent from the 617,500 tonnes in 2005. The lower production stemmed from the reduced yield, which more than negated the impact of higher harvested acres.

Although dry peas are grown primarily on dryland across the province, more acreage is concentrated in central and northeastern Alberta, particularly in Census Divisions 5 (Drumheller area) and 10 (Vermilion area) - see Tables 2 and 3. These two Census Divisions (5 and 10) accounted for 33 per cent of the provincial total harvested area in 2006. Just to mention, dry pea yields varied across the province.

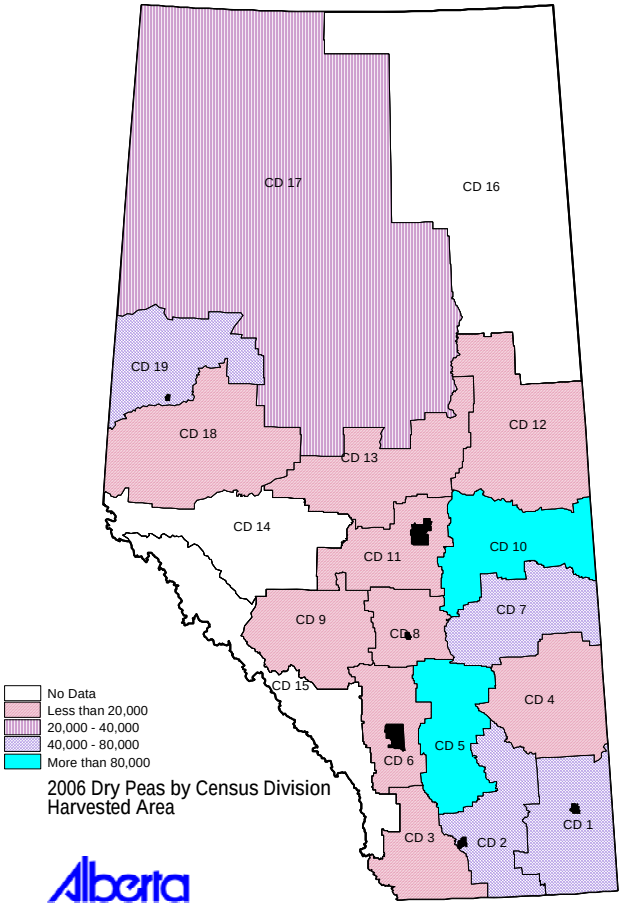


Figure 5

Mustard Seed

The total seeded area of mustard seed in Alberta in 2006 was estimated at 62,538 acres (see Table 1). Of this total, 60,000 acres were harvested, with an average yield of 939 pounds per acre. The 2006 yield was three per cent higher than the 915 pounds per acre in 2005, and 23 per cent above the 10-year average of 764 pounds per acre. Mustard seed is grown primarily on dryland in southern Alberta, where soil moisture reserves during the 2006 crop season were better, compared to other areas of the province.

The total provincial production of mustard seed was estimated at 25,600 tonnes, or about 18 per cent below the 2005 production of 31,100 tonnes, and 21 per cent lower than the 10-year average of 32,320 tonnes. The lower production in 2006 was attributed to a large reduction in harvested area, which more than negated the impact of a higher yield.

Of the three types of mustard seed produced in Alberta, yellow mustard seed continues to dominate, accounting for 59 per cent of the provincial total production in 2006, while oriental and brown mustard seed represented 24 per cent and 17 per cent, respectively.

In 2006, over 80 per cent of the provincial total harvested area was in Census Divisions 1, 2, 4 and 5 (see Table 2). Also, mustard yields varied significantly across the province. For example, Census Division 1 had the highest yield of 1,036 pounds per acre, while the lowest yield of 669 pounds per acre was reported in Census Division 4.

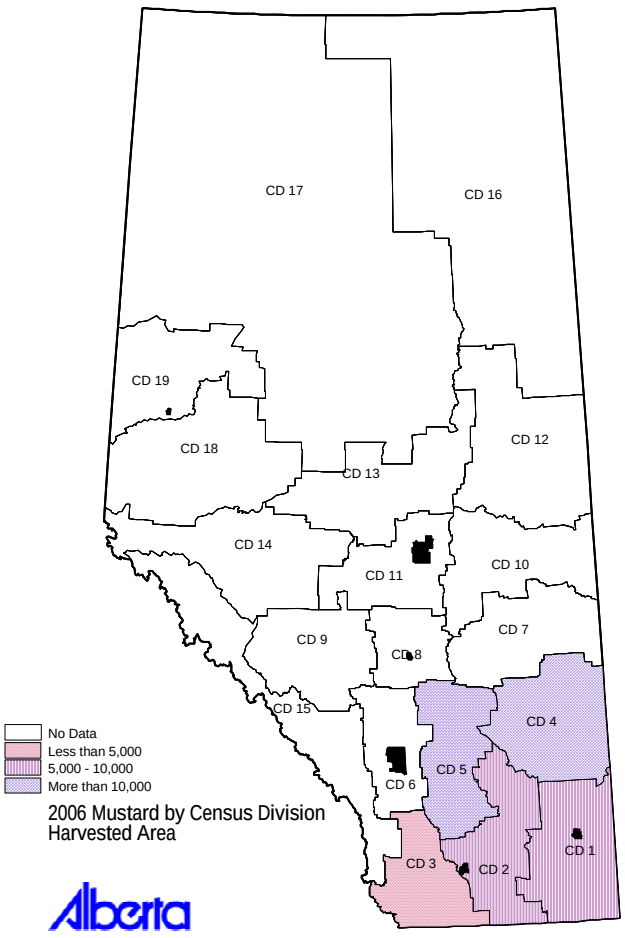


Figure 6

Lentils

In 2006, 10,825 acres were seeded to lentils in Alberta, of which 10,600 acres were harvested (see Table 1). The provincial average yield for lentils was estimated at 1,400 pounds per acre, 10 per cent below the record yield of 1,563 pounds per acre in 2005, but still 32 per cent higher than the 10-year average of 1,062 pounds per acre.

The total production of lentils in 2006 was estimated at 6,731 tonnes, down 52 per cent from 2005, and 20 per cent below the 10-year average. The lower production in 2006 was attributed to reductions in both average yield and harvested area.

Lentils are grown primarily on dryland in southern Alberta. In 2006, over 50 per cent of the provincial total harvested area was in Census Divisions 1 and 2 (see Table 2).

There is limited lentil acreage under irrigation in the province.

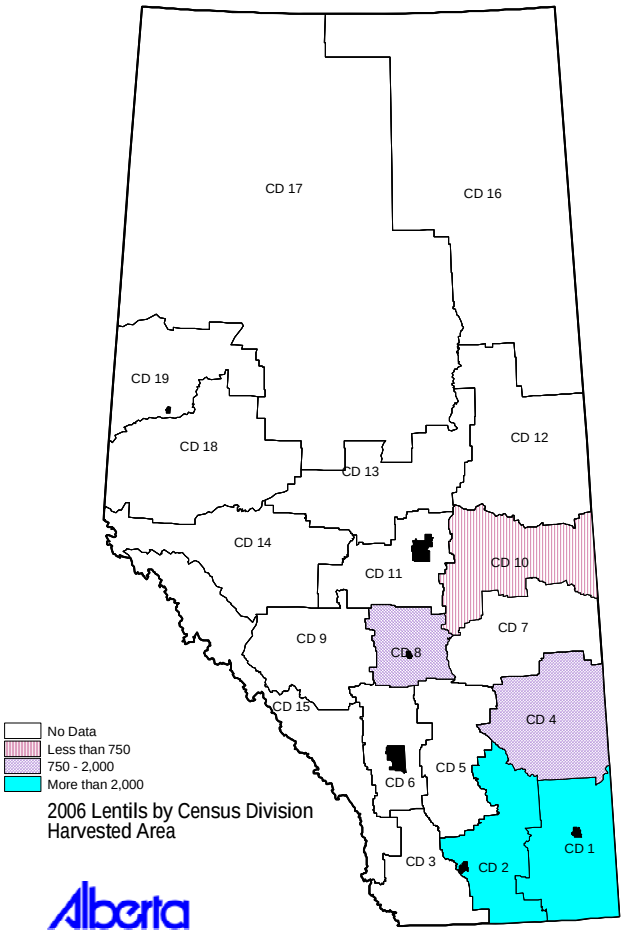


Figure 7

Dry Beans

In 2006, Alberta producers seeded a record high 62,039 acres to dry beans, of which 61,500 acres were harvested (see Table 1). The provincial average yield of dry beans was 2,180 pounds per acre, up three per cent from the 2005 yield of 2,120 pounds per acre, and marginally higher than the 10-year average of 2,170 pounds per acre.

The total production of dry beans in 2006 was a record 60,800 tonnes, or 15 per cent higher than in 2005, and 30 per cent above the 10-year average. Driving the record production was a substantial increase in harvested area.

Dry beans are grown mostly under irrigation in southern Alberta. In 2006, a total of 47,559 acres or 77 per cent of the provincial dry bean seeded area was irrigated, according to information from the Resource Sciences Branch of Alberta Agriculture and Food.

In 2006, Census Divisions 1 and 2 jointly accounted for 80 per cent of the provincial total harvested area (see Table 2). Dry beans are generally grown under contract in Alberta.

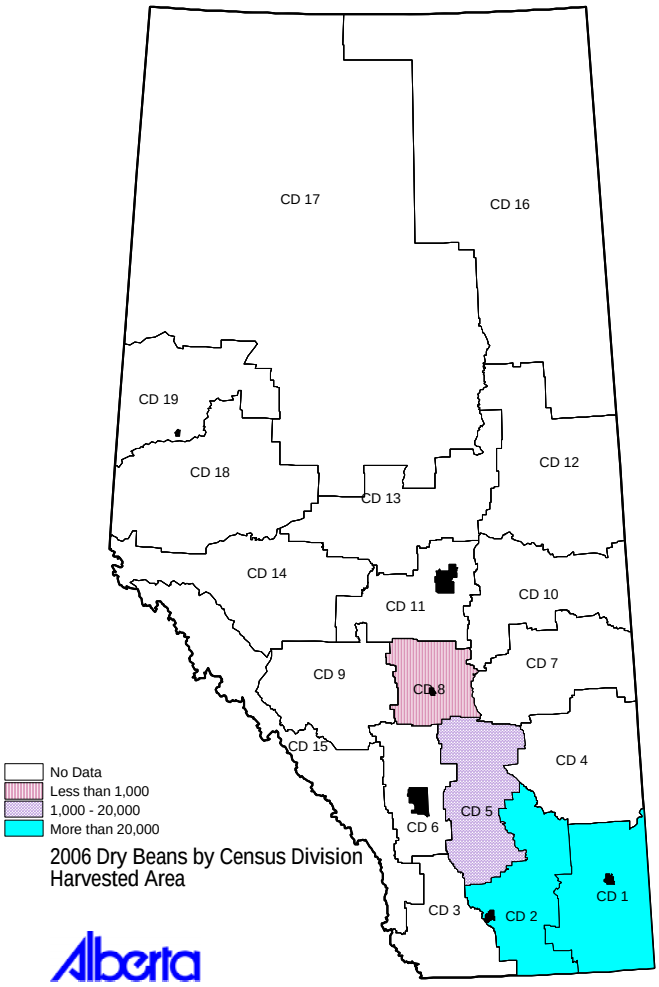


Figure 8

Chickpeas

The total seeded area of chickpeas in Alberta increased 36 per cent to 40,749 acres, from 30,000 acres in 2005. Of the total seeded area, 40,000 acres were harvested, with an average yield of 1,433 pounds per acre (see Table 1). The 2006 yield was marginally lower than the record yield of 1,442 pounds per acre in 2005, and 30 per cent higher than the 7-year average of 1,106 pounds per acre (chickpeas data is available for only 7 years). Chickpeas are primarily grown in southern Alberta. In 2006, moisture reserves in the region were better than other areas of the province, contributing to the relatively high yield for chickpeas.

The total provincial production of chickpeas was estimated at 26,000 tonnes, or 33 per cent higher than the 19,600 tonnes in 2005. The increase in production was due primarily to a higher harvested area.

Chickpeas are primarily grown on dryland, with only small amounts produced under irrigation. In 2006, about 87 per cent of the provincial total harvested area was in Census Divisions 1 and 2 (see Table 2).

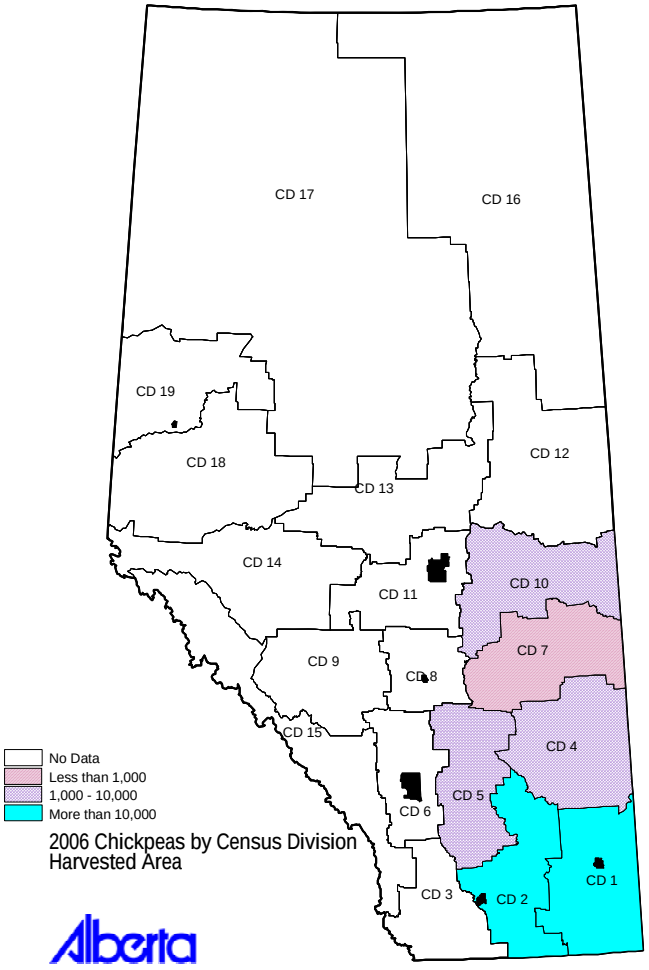


Figure 9

Table 4 Alberta Specialty Crops Historical Series

		1997	1998	1999	2000	2001	2002*	2003*	2004*	2005*	2006*
Alfalfa Seed (1)											
Inspected area	(acres)	10,376	12,069	16,461	17,117	15,381	12,709	11,292	10,345	10,050	14,458
Yield	(lbs/acre)	300.0	425.0	200.0	525.0	385.0	265.0	550.0	370.0	270.0	585.0
Production	(tonnes)	1,412	2,327	1,493	4,076	2,686	1,528	2,817	1,736	1,231	3,836
Buckwheat											
Harvested area	(acres)	400	400	400	-	-	-	-	-	-	-
Yield	(bu/acre)	-	-	-	-	-	-	-	-	-	-
Production	(tonnes)	-	-	-	-	-	-	-	-	-	-
Canary Seed											
Harvested area	(acres)	10,000	20,000	10,000	10,000	4,000	10,000	10,000	10,000	6,000	3,300
Yield	(lbs/acre)	810.0	950.0	1,400.0	1,100.0	775.0	520.0	900.0	1,040.0	1,200.0	-
Production	(tonnes)	3,700	8,600	6,400	5,000	1,400	2,400	4,100	4,700	3,266	-
Corn for Grain											
Harvested area	(acres)	4,000	5,000	10,000	10,000	3,000	10,000	5,000	5,000	5,000	3,000
Yield	(bu/acre)	100.0	90.0	80.0	110.0	86.7	80.0	60.0	65.0	104.0	130.0
Production	(tonnes)	10,200	11,400	20,300	27,900	6,600	20,300	7,600	8,300	13,200	9,900
Corn Silage											
Harvested area	(acres)	15,000	15,000	15,000	30,000	30,000	30,000	30,000	35,000	35,000	55,000
Yield	(tons/acre)	12.0	20.0	13.3	17.0	16.0	16.0	16.7	18.6	14.3	19.1
Production	(tonnes)	163,300	272,200	181,400	462,700	435,400	435,453	453,606	589,701	453,638	952,500
Fababeans											
Harvested area	(acres)	1,000	2,000	-	-	3,000	3,000	2,000	5,000	4,000	4,000
Yield	(cwt/acre)	20.0	25.0	-	-	17.0	5.0	20.0	26.0	27.5	26.3
Production	(tonnes)	900	2,300	-	-	2,300	700	1,800	5,900	5,000	4,800
Dry Beans											
Harvested area	(acres)	35,000	45,000	47,000	45,000	59,000	40,000	52,000	34,000	55,000	61,500
Yield	(cwt/acre)	22.9	22.2	20.0	21.3	22.3	17.5	25.6	22.2	21.2	21.8
Production	(tonnes)	36,300	45,400	42,700	43,500	59,700	31,700	60,300	34,200	52,800	60,800
Dry Peas											
Harvested area	(acres)	385,000	500,000	455,000	640,000	570,000	440,000	585,000	600,000	530,000	565,000
Yield	(bu/acre)	40.3	35.9	42.9	35.6	32.6	18.5	30.9	39.3	42.8	35.9
Production	(tonnes)	421,800	488,000	530,800	620,500	506,200	221,600	491,300	642,300	617,500	552,600
Lentils											
Harvested area	(acres)	25,000	15,000	22,000	32,000	15,000	6,000	15,000	18,000	20,000	10,600
Yield	(lbs/acre)	732.0	1,180.0	1,245.0	684.0	722.0	713.0	1,013.0	1,372.0	1,563.0	1,400.0
Production	(tonnes)	8,300	8,000	12,400	9,900	5,000	1,900	6,900	11,300	14,100	6,731
Mustard Seed											
Harvested area	(acres)	145,000	110,000	90,000	50,000	50,000	70,000	135,000	125,000	75,000	60,000
Yield	(lbs/acre)	769.0	795.0	1,100.0	606.0	373.0	603.0	634.0	902.0	915.0	939.2
Production	(tonnes)	50,600	39,700	44,800	13,800	8,500	19,100	38,800	51,200	31,100	25,600
Safflower											
Harvested area	(acres)	-	12,000	5,000	3,000	1,000	2,000	2,500	3,200	-	-
Yield	(lbs/acre)	-	1,020	900	625	750	320	1,215	-	-	-
Production	(tonnes)	-	1,400	2,000	900	300	300	1,378	-	-	-

Source: Statistics Canada; and Alberta Agriculture and Food (AF) - Not available

(1) Inspected pedigreed acres are from Canadian Seed Growers' Association; yield and production data are from the Alberta Specialty Crop Survey

* - Data are from the Alberta Specialty Crop Survey, AF.

Table 4 Alberta Specialty Crops Historical Series (Cont'd)

		1997	1998	1999	2000	2001	2002*	2003*	2004*	2005*	2006*
Sugar Beets (2)											
Harvested area	(acres)	33,124	41,132	44,522	42,017	28,457	27,754	27,389	34,954	33,667	36,992
Yield	(tonnes/acre)	19.6	23.3	18.9	21.9	18.4	15.2	22.9	21.2	19.9	26.0
Production	(tonnes)	650,423	959,310	839,773	920,252	523,110	422,389	628,081	740,508	668,141	963,165
Sunflowers											
Harvested area	(acres)	5,000	5,000	5,000	5,000	5,000	6,000	3,000	5,000	3,500	1,790
Yield	(lbs/acre)	1,400.0	1,900.0	1,600.0	2,240.0	1,250.0	1,500.0	1,500.0	800.0	-	1,850.0
Production	(tonnes)	3,200	4,300	3,600	5,100	2,800	4,100	2,000	1,800	-	1,502
Triticale											
Harvested area	(acres)	15,000	50,000	60,000	50,000	20,000	10,000	35,000	25,000	20,000	15,000
Yield	(bu/acre)	36.7	38.0	53.3	41.0	37.0	32.5	33.9	44.0	43.0	39.3
Production	(tonnes)	14,000	48,300	81,300	52,100	18,800	8,300	30,100	27,900	21,800	15,000
Potatoes											
Harvested area	(acres)	30,500	32,200	42,300	47,700	57,300	55,800	61,000	57,000	51,500	53,200
Yield	(cwt/acre)	290.0	295.0	290.0	310.0	315.0	280.0	330.0	350.0	344.0	342.0
Production	(tonnes)	401,200	430,900	556,400	670,700	818,700	708,700	913,097	904,932	803,598	825,280

Source: Statistics Canada; and Alberta Agriculture and Food (AF)

- Not available

(2) Alberta Sugar Beet Growers, Annual Report

* - Data are from the Alberta Specialty Crop Survey, AF.

Table 5 Western Canada Specialty Crops Area and Production

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Mustard Seed					**Seeded Area ('000 acres)**						
Alberta	90.0	145.0	110.0	100.0	50.0	60.0	85.0	140.0	130.0	80.0	62.5
Saskatchewan	490.0	560.0	580.0	585.0	465.0	330.0	600.0	675.0	600.0	400.0	268.2
Manitoba	11.0	17.0	10.0	7.0	10.0	20.0	30.0	25.0	8.0	-	-
Western Canada	591.0	722.0	700.0	692.0	525.0	410.0	715.0	840.0	738.0	480.0	330.7
					Production ('000 tonnes)						
Alberta	29.0	50.6	39.7	44.8	13.8	8.5	19.1	38.8	51.2	31.1	25.6
Saskatchewan	196.9	186.5	195.5	259.7	185.1	91.2	125.2	176.9	232.8	152.7	82.6
Manitoba	4.9	6.3	3.4	1.9	3.3	5.1	10.0	10.4	2.7	-	-
Western Canada	230.8	243.4	238.6	306.4	202.2	104.8	154.3	226.1	286.7	183.8	108.2
Sunflowers					**Seeded Area ('000 acres)**						
Alberta	2.0	5.0	5.0	5.0	5.0	5.0	6.0	3.0	5.0	3.5	1.8
Saskatchewan	25.0	35.0	40.0	65.0	25.0	20.0	30.0	45.0	30.0	30.0	15.9
Manitoba	63.0	85.0	125.0	140.0	155.0	155.0	210.0	220.0	165.0	185.0	190.2
Western Canada	90.0	125.0	170.0	210.0	185.0	180.0	246.0	268.0	200.0	218.5	207.9
					Production ('000 tonnes)						
Alberta	1.5	3.2	4.3	3.6	5.1	2.8	4.1	2.0	1.8	-	1.5
Saskatchewan	15.7	14.3	21.3	35.4	12.4	8.1	17.2	15.6	6.4	11.7	-
Manitoba	37.7	47.6	86.2	82.9	101.8	92.9	136.1	124.7	44.0	72.7	157.3
Western Canada	54.9	65.1	111.8	121.9	119.3	103.8	157.4	142.3	52.2	84.4	158.8
Lentils					**Seeded Area ('000 acres)**						
Alberta	20.0	25.0	20.0	25.0	32.0	20.0	15.0	15.0	18.0	24.0	10.8
Saskatchewan	690.0	780.0	900.0	1,210.0	1,660.0	1,720.0	1,320.0	1,250.0	1,800.0	1,960.0	1,275.8
Manitoba	40.0	8.0	15.0	16.0	35.0	10.0	0.0	4.0	7.0	-	-
Western Canada	750.0	813.0	935.0	1,251.0	1,727.0	1,750.0	1,335.0	1,269.0	1,825.0	1,984.0	1,286.6
					Production ('000 tonnes)						
Alberta	7.7	8.3	8.0	12.4	9.9	5.0	1.9	6.9	11.3	14.1	6.7
Saskatchewan	373.8	365.2	465.9	702.6	888.1	557.9	326.1	475.0	902.7	1,150.2	629.5
Manitoba	21.0	5.3	5.9	8.8	16.1	3.4	0.0	2.7	1.8	-	-
Western Canada	402.5	378.8	479.8	723.8	914.1	566.3	328.0	484.6	915.8	1,164.3	636.2
Dry Peas					**Seeded Area ('000 acres)**						
Alberta	290.0	385.0	510.0	470.0	660.0	610.0	650.0	600.0	640.0	555.0	587.3
Saskatchewan	900.0	1,500.0	1,900.0	1,520.0	2,240.0	2,550.0	2,135.0	2,145.0	2,375.0	2,550.0	2,430.5
Manitoba	145.0	205.0	260.0	105.0	155.0	150.0	200.0	135.0	150.0	110.0	91.4
Western Canada	1,345.0	2,097.0	2,680.0	2,104.0	3,065.0	3,320.0	2,990.0	2,890.0	3,170.0	3,220.0	3,115.5
					Production ('000 tonnes)						
Alberta	307.5	421.8	488.0	530.8	620.5	506.2	221.6	491.3	642.3	617.5	552.6
Saskatchewan	729.4	1,158.1	1,613.8	1,623.4	2,072.4	1,388.0	881.8	1,292.7	2,291.5	2,313.4	1,861.5
Manitoba	132.0	178.3	225.9	92.0	160.5	146.1	176.9	137.4	160.0	56.9	103.5
Western Canada	1,173.0	1,762.3	2,336.8	2,251.9	2,864.3	2,044.8	1,283.8	1,930.9	3,097.2	2,993.6	2,519.9
Canary Seed					**Seeded Area ('000 acres)**						
Alberta	25.0	10.0	20.0	15.0	10.0	5.0	10.0	10.0	10.0	6.0	3.3
Saskatchewan	520.0	250.0	450.0	340.0	360.0	360.0	580.0	550.0	820.0	435.0	326.2
Manitoba	70.0	20.0	50.0	15.0	40.0	55.0	100.0	60.0	30.0	20.0	9.0
Western Canada	615.0	280.0	520.0	370.0	410.0	420.0	690.0	620.0	860.0	461.0	338.5
					Production ('000 tonnes)						
Alberta	10.9	3.7	8.6	6.4	5.0	1.4	2.4	4.1	4.7	3.3	-
Saskatchewan	240.0	102.1	201.8	152.0	148.6	101.2	142.4	190.5	284.4	219.3	129.1
Manitoba	33.7	9.2	24.9	7.6	17.2	11.3	32.7	31.8	11.4	7.9	3.7
Western Canada	284.6	115.0	235.3	166.0	170.8	113.9	177.5	226.4	300.5	230.5	132.8

Source: Statistics Canada; Saskatchewan Agriculture and Food; and Alberta Agriculture and Food

- Not available

Markets for Selected Specialty Crops

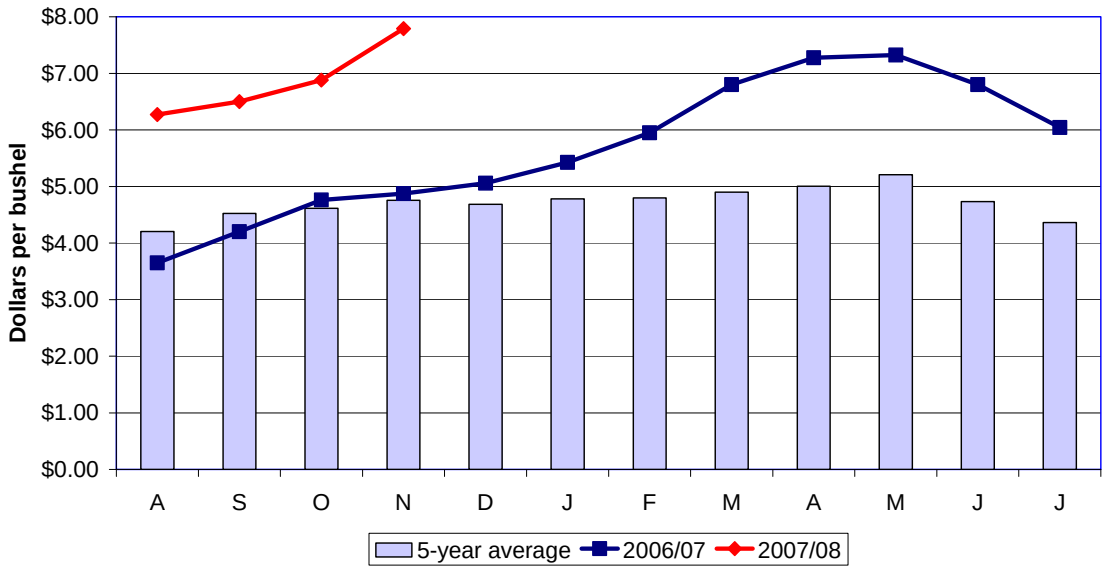
Charlie Pearson

Field Peas

International markets for field peas (both green and yellow) have rallied since the beginning of 2007. Current market prices for human consumption peas are near eight dollars per bushel, compared to about five dollars per bushel a year ago. As well, current prices are much above the 5-year averages. Factors contributing to the market rally included a large reduction in Australia production caused by dry conditions in 2006 and 2007, and a strong demand for human consumption peas from Southeast Asia.

The Canadian exports of field peas totaled 1.5 million tonnes in 2006/07, down 25 per cent from the 2.0 million tonnes the previous year. This was attributed mainly to lower exports of feed peas to Europe. However, exports to India jumped to 941,000 tonnes, from 672,000 tonnes in 2005/06.

Figure 10 - Yellow Edible Pea Prices (August to July)

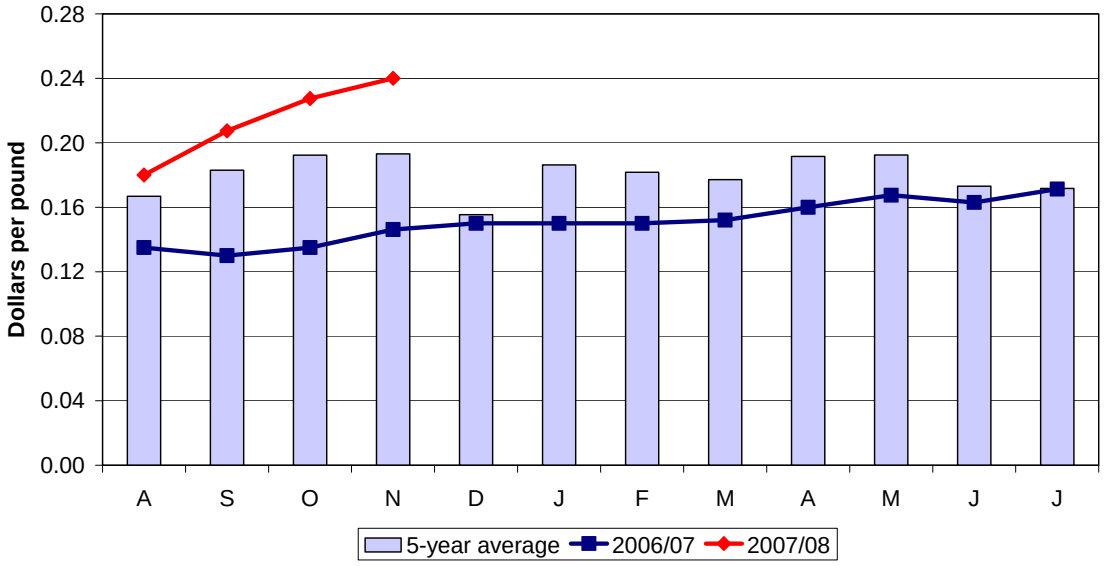


Lentils

A lower lentil production in Canada, in conjunction with a strong world demand, has pushed lentil prices higher during the recent months. Current market prices for top quality large lentils are in a range of 20 to 25 cents per pound, well above prices a year ago and the five-year averages.

Canada exported a total of 852,000 tonnes of lentils in 2006/07, up 27 per cent from the previous crop year. The five major importers of Canadian lentils were India (130,000 tonne), United Arab Emirates (82,000 tonnes), Algeria (70,000 tonnes), Pakistan (61,000 tonnes) and Colombia (54,000 tonnes).

Figure 11 - Large (Laird) Lentil Prices (August to July)

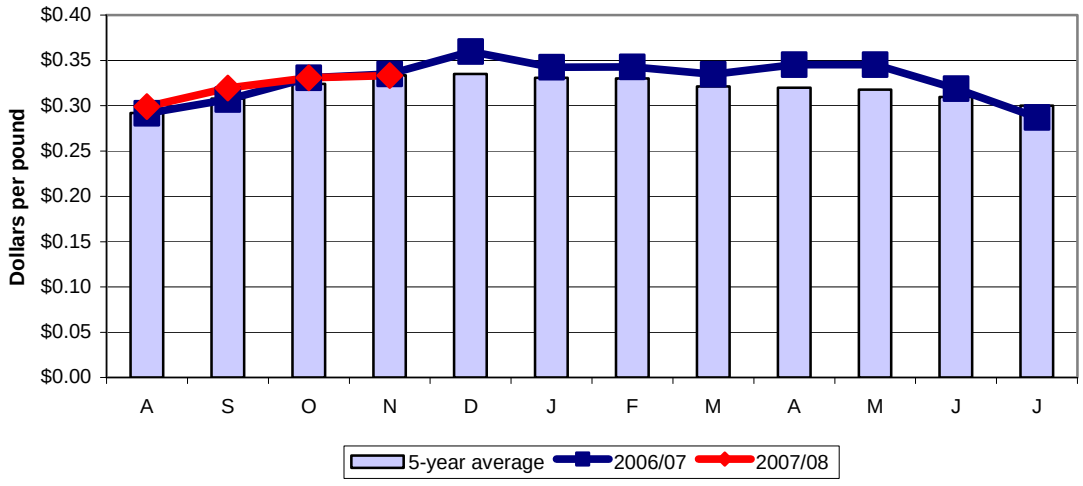


Chickpeas

Market prices for large high quality kakuli chickpeas maintained a moderate premium over the five-year averages during most parts of the 2006/07 crop year. Current prices range from 30 to 35 cents per pound for the 9 mm size.

In 2006/07, total Canadian exports of chickpeas were 115,000 tonnes, up about 80 per cent from 2005/06. The top three international buyers of Canadian chickpeas were Pakistan (17,000 tonnes), Jordan (15,000 tonnes) and India (13,000 tonnes).

Figure 12 - Kabuli Chickpea Prices - 9 mm (August to July)

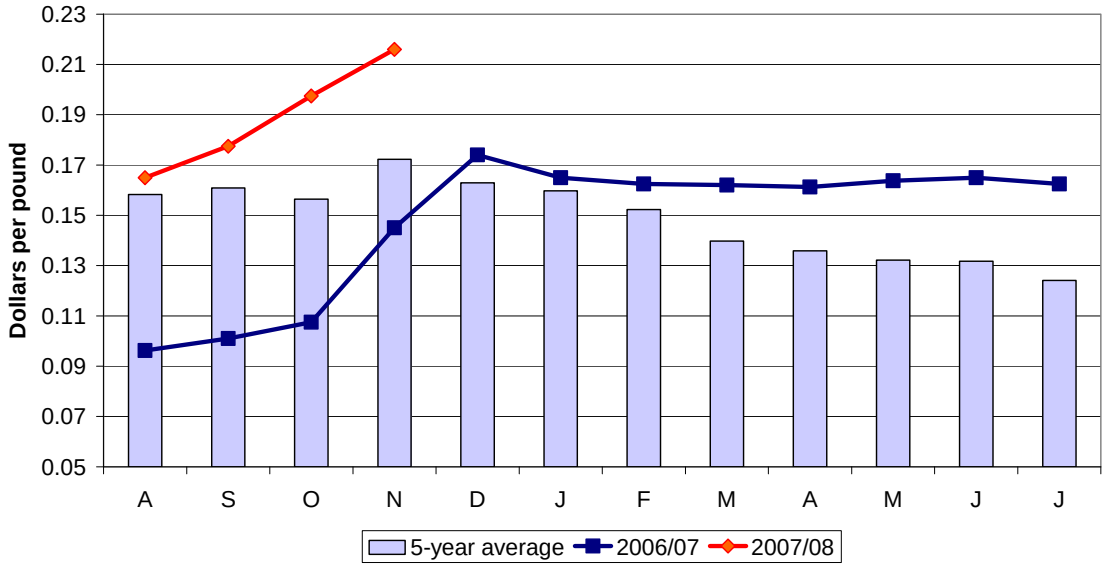


Canary Seed

Current market prices for canary seed are hovering around 20 cents per pound, well above prices a year ago and the five-year averages. The recent market rally was attributed to a reduced supply, mainly due to a lower production in Canada in 2007.

Canada exported about 178,000 tonnes of canary seed in 2006/07. The three top importers of Canadian canary seed were Mexico (43,000 tonnes), Belgium (30,000 tonnes) and Brazil (22,000 tonnes).

Figure 13 - Canary Seed Prices (August to July)



Mustard Seed

The recent market rally has pushed prices higher for all types of mustard seed. Current prices range from 45 to 50 cents per pound for yellow, 30 to 35 cents per pound for brown, and 22 to 25 cents per pound for oriental. These prices are well above prices a year ago and their five-year averages. Factors contributing to the market rally included a large reduction in Canadian production in 2007 and strong world demand.

In 2006/07, Canada exported a total of 153,000 tonnes of mustard seed, up 15 per cent from the previous crop year. The three top buyers of Canadian mustard seed were United States (71,000 tonnes), Belgium (26,000 tonnes) and Germany (16,000 tonnes).

Figure 14 - Yellow Mustard Seed Prices (August to July)

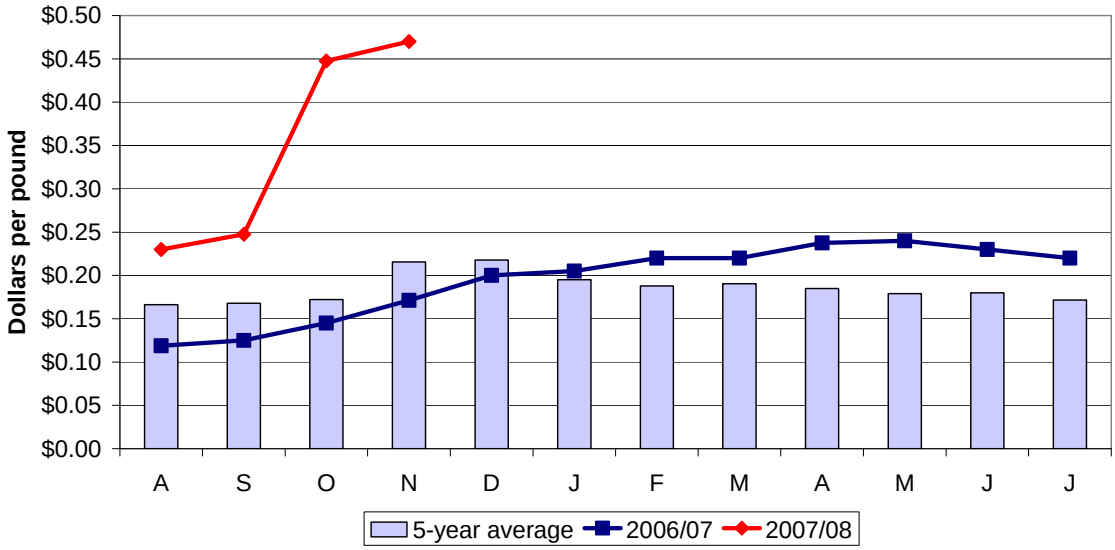


Figure 15 - Brown Mustard Seed Prices (August to July)

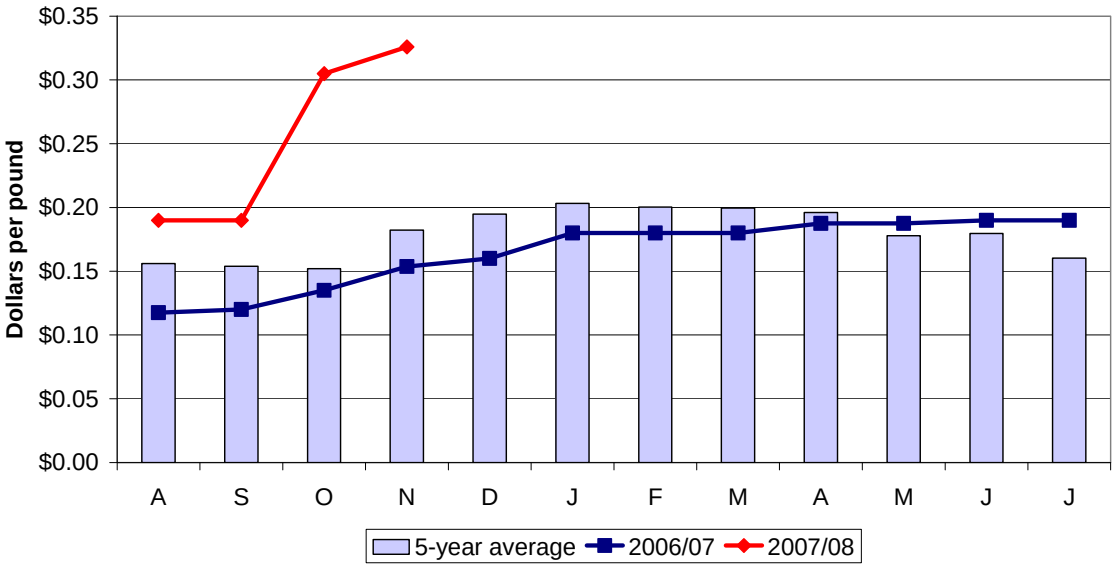
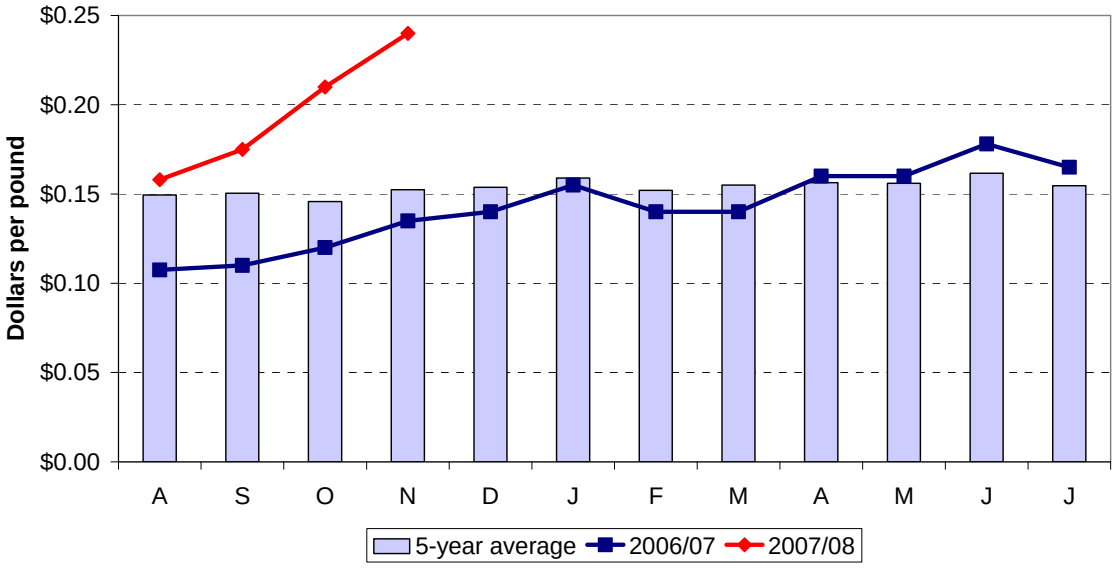


Figure 16 - Oriental Mustard Seed Prices (August to July)



Economics of Specialty Crop Production

Nabi Chaudhary

Costs and returns for crops, livestock, and several other enterprises have been monitored in the province in an extensive way since the 1960's. These studies have been viewed as an important tool for assisting producers in their cropping decisions and the federal and provincial governments in developing policies and programs for different farm enterprises. In addition, results from these studies have served to fill some data gaps for other provinces.

The Economics Unit (formerly known as Production Economics Branch), in the Economics and Competitiveness Division of Alberta Agriculture and Food, has been conducting economic studies on various farm enterprises for the last several decades. Since the early 1990's, much greater emphasis has been placed on developing costs and returns data on specialty crops for farm diversification purposes.

Continued volatile markets for traditional cereals and oilseeds have forced producers to diversify their operations into new and emerging specialty crops. As mentioned above, results from these studies have been very helpful to primary producers when making cropping decisions. Furthermore, individual producers have also used the results from these studies to compare costs and returns and profitability margins of their farms with the group averages from the respective areas in order to develop better management practices. Agri-businesses and other stakeholders have used the results of the economic studies for feasibility studies.

During the last ten years, area under special crops has increased significantly in Alberta. The total seeded area of dry peas was 385,000 acres in 1997, and jumped to 610,000 acres in 2001. In 2002, seeded area increased seven per cent, to 650,000 acres. However, seeded area declined to 600,000 acres in 2003. In 2004, seeded area was estimated at 640,000 acres, an increase of about seven per cent over 2003. The seeded area in 2005 decreased 13 per cent, to 555,000 acres. In 2006, seeded area for dry peas increased six per cent, to 587,263 acres. The total harvested area in 2006 was 565,000 acres, or 96 per cent of the seeded area. The provincial average yield for the 2006 dry peas crop was 35.9 bushels per acre.

Dry beans acreage in Alberta has fluctuated over the last decade. The total seeded area was 60,000 acres in 2001, and remained unchanged in 2002. It decreased about 13 per cent, to 52,000 acres in 2003. The acreage continued to decline, and totaled 35,000 acres in 2004. In 2005, the total seeded area was estimated at 57,000 acres, an increase of almost 63 per cent over 2004. The acreage in 2006 jumped to 62,039 acres, or nine per cent higher than in 2005. Of the total seeded area in 2006, 61,500 acres were harvested, with an average yield of 21,800 pounds per acre. Please note most of the dry beans are grown under contract on irrigated land in southern Alberta.

In the late 1990's, producers showed considerable interest in chickpeas (known as the new Cinderella crop on the Prairies). Chickpeas were a huge crop in Saskatchewan from 1999 to 2001, occupying almost one million acres. In Alberta, acreage under chickpeas was 100,000 acres in 2001, double the acreage in 2000. However, the area under chickpeas decreased drastically to 45,000 acre in 2002, primarily due to drought concerns and disease problems. In 2003, the acreage dropped to 25,000 acres. The decline in area continued in 2004, with a total of 15,000 acres, the lowest area on record. In 2005, the total seeded area doubled, to 30,000 acres. In 2006, it increased about 37 per cent to 40,749 acres. Of this total seeded, 40,000 acres were harvested, with an average yield of 1,433 pounds per acre. The changes in chickpea acreage over

the last decade could be attributed to drought concerns, crop diseases, and production of major importing countries.

Additionally, producer interest in other specialty crops, including caraway, buckwheat, coriander, borage, herbs and spices, continues to grow.

Shown in Tables 6 are estimates of 2006 production costs and returns for dry peas. Costs and returns data for dry beans and chickpeas (desi and kabuli) are presented in Tables 7 and 8, respectively.

Table 6 Production Costs and Returns for Dry Peas Dark Brown Soil Zone, 2006

	$ Per acre	$ Per bushel
Revenue per Acre		
Yield per Acre (bushels)	42	
Expected Market Price/Acre ($)	3.05	
(a) Gross Revenue per Acre	**138.60**	**3.05**
Costs per Acre ($)		
Seed and Seed Cleaning	26.96	0.64
Fertilizer Rates: 2N 16P 1K 3S	7.43	0.18
Chemicals	28.47	0.68
Hail/Crop Insurance Premiums	7.55	0.18
Trucking and Marketing	1.78	0.04
Fuel	10.27	0.24
Repairs - Machinery & Buildings	8.05	0.19
Utilities & Miscellaneous Expenses	12.23	0.29
Custom Work & Labour	7.35	0.18
Operating Interest Paid	2.85	0.07
Unpaid Labour	4.05	0.10
(b) Variable Costs	**116.99**	**2.79**
Taxes, License & Insurance	10.35	0.25
Equipment & Building - Depreciation	18.65	0.44
Paid Capital Interest	5.40	0.13
(c) Capital Costs	**34.40**	**0.82**
(d) Total Production Costs (b+c)	**151.39**	**3.60**
Gross Margin	**0.76**	**0.02**
Return to Investment (a-d+capital interest)	**-17.89**	**-0.43**
Return to Equity (a-d)	**-23.29**	**-0.55**

Note: Returns per acre would vary with yield and price.

Source: Alberta Agriculture and Food, Economics Unit

Table 7 Production Costs and Returns for Dry Beans Dark Brown Soil Zone, 2006

	$ Per acre	$ Per pound
Revenue per Acre		
Yield per Acre (lbs)	2,180	
Expected Market Price/Acre ($)	0.26	
(a) Gross Revenue per Acre	**566.80**	**0.26**
Costs per Acre ($)		
Seed and Seed Cleaning	28.34	0.01
Fertilizer Rates: 2N 16P 1K 3S	76.16	0.04
Chemicals	89.81	0.04
Hail/Crop Insurance Premiums	10.25	0.01
Trucking and Marketing	8.13	0.00
Fuel	43.70	0.02
Repairs - Machinery & Buildings	51.81	0.03
Utilities & Miscellaneous Expenses	13.93	0.01
Custom Work & Labour	10.80	0.01
Operating Interest Paid	2.96	0.00
Unpaid Labour	94.10	0.05
(b) Variable Costs	**429.95**	**0.21**
Cash/Crop Share Rent	0.00	0.00
Taxes, License & Insurance	30.85	0.02
Equipment & Building - Depreciation	66.80	0.03
Paid Capital Interest	9.85	0.00
(c) Capital Costs	**107.50**	**0.05**
(d) Total Production Costs (b+c)	**537.45**	**0.27**
Gross Margin	**106.00**	**0.05**
Return to Investment (a-d+capital interest)	**39.20**	**0.02**
Return to Equity (a-d)	**29.35**	**0.01**

Note: Returns per acre would vary with yield and price.

Source: Alberta Agriculture and Food, Economics Unit

Table 8 Production Costs and Returns
Desi and Kabuli Chickpeas, 2006

	Desi Chickpeas	Kabuli Chickpeas
Revenue Per Acre		
Estimated Yield per Acre (lbs)	1,420	1,434
Price per Pound ($)	0.15	0.26
(a) Gross Revenue per Acre ($)	**213.00**	**372.84**
Costs per Acre ($)		
Variable Costs per Acre		
Seed	22.30	51.56
Fertilizer	13.39	14.55
Chemicals	15.71	19.94
Machinery Expenses (Fuel & Repair)	23.35	23.35
Custom Work & Hired Labour	6.78	6.78
Utilities & Miscellaneous	9.20	9.88
Interest on Variable Expenses	2.17	2.92
(b) Total Variable Costs	**92.90**	**128.98**
Other Costs per Acre		
Building Repair	2.05	2.05
Property Expenses, Insurance & License	5.65	5.65
Machinery & Building Depreciation	18.09	18.09
Machinery & Building Investment	12.70	12.70
Labour & Management	16.15	16.15
(c) Total Other Costs	**54.64**	**54.64**
(d)TOTAL PRODUCTION COSTS (b+c)	**147.54**	**183.62**
RETURNS PER ACRE ($)		
Return Over Variable Expenses (a-b)	120.10	243.86
Return Over Total Production Costs (a-d)	65.46	189.22

Note: Returns per acre would vary with yield and price.

Source: Alberta Agriculture and Food, Economics Unit

New Crop Development
Crop Diversification Centre North

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Project 1: Development of basic agronomic recommendations for economically growing *Rhodiola rosea* in Alberta

To be competitive on world markets, technically advanced production systems will need to evolve. Quality of fresh and processed material is extremely important to the industry and there is increasing interest in product traceability and grower protocols. The main objective of the agronomic studies is to develop cost-effective crop management systems for *Rhodiola rosea*

a) Develop cost-effective crop management systems that fit into rotations and mechanization of the farm and gives maximum yield of roots and active ingredients within good agricultural practices
b) Develop mechanization alternatives for planting, harvesting and drying processes for *Rhodiola rosea* that maximize production of the active ingredients.

In 2005 the following activities related agronomy were undertaken.

1.0 Positively identify *Rhodiola rosea* for cultivation in Alberta

Rhodiola rosea is reported to be found in rocky alpine areas of the eastern slopes of the Rockies from Jasper National Park to the Alberta-Montana border. In August 2005 we collected specimens of *Rhodiola* from the Kananaskis area. Photographic and plant specimens were sent to Dr Alain Cuerrier of Jardin Botanique de Montreal for identification. Dr Cuerrier did 14 different runs of the Amplified Fragment Length Polymorphism (AFLP) technique of DNA fingerprinting using the DNA from the Kananaskis Rhodiola including DNA from Kananaskis.

The Kananaskis Rhodiola looks more like *Rhodiola integrifolia*. Dr Cuerrier will compare the Kananaskis Rhodiola with herbarium specimens of *R. integrifolia* to make confirm this identification. The results of the chemical analysis for rosavins on the Kananaskis Rhodiola carried out by Novokin were negative. Thus the Kananaskis specimens might all be *R. integrifolia*.

Select cultivars of *R. rosea* most suitable to Alberta
Seeds were obtained from Bertalan Galambosi of Finland. Transplants were field set into black plastic mulch in June 2005 in a replicated trial at CDC North, Edmonton. A randomized complete block design was used with four replications. Plot size was 6 rows 4.5 m long, spaced 30 cm apart. A non-replicated observation plot was established at Cremona.

Effect of plant density and spacing on yield and production of bioactives
The objective is to establish optimum plant density and spacing for growing *Rhodiola rosea* in Alberta. Field experiments were established in 2004 at CDC North, Edmonton (latitude 53^0 40'N, longitude 113^0 28'W, elevation 688 m). *Rhodiola rosea* seeds were purchased from Richters Herbs, Goodwood, Ontario. Plot size was 2 m long and 2.4 m wide with four replications. The plants were transplanted on May 31 2004. Fertilizer application rate is 112 kg/ha of nitrogen, 56 kg/ha of phosphorous (P_2O_5), 168-224 kg/ha of potassium and 34 kg/ha of sulphur applied over the 3-4 year crop duration. Fertilizer will be applied once a year, early in the spring. The plant material will be harvested in September 2007.

Weed management practices for *Rhodiola rosea*
The objective was to establish a non-chemical weed control options for economically growing *Rhodiola rosea*. Plot size was 2 m long and 2.4 m wide with four replications. The plant spacing was 60 x 20 cm. The plants were transplanted on 1 June 2004 at CDCN, Edmonton. Fertilizer application rate is 112 kg/ha of nitrogen, 56 kg/ha of phosphorous (P_2O_5), 168-224 kg/ha of potassium and 34 kg/ha of sulphur will be applied over the 3-year duration of the trial earl in the spring. The plant material will be harvested in September 2006.

R. rosea is not competitive with weeds while becoming established in the first year of growth. In the second and subsequent years, *R. rosea* emerges in early spring, (first week in April) before the weeds. This will be extremely important in determining the magnitude of crop yield losses and cost of weed control.

Effect of fertility on growth, yield and quality of *Rhodiola rosea*
The objective was to assess *R. rosea* response of to N, P, and K organic fertilizers to yield, salidroside, rosavin, rosarin and rosin content. The 12-treatment experiment is located at CDCN. The experiment was a randomized complete block design. The plot size was 2 m long and 2 m wide with four replications. The plant spacing was 60 x 20 cm. The plants were field set in June 2004 and will be harvested in the fall of 2007.

Establish time to economic root maturity of *Rhodiola rosea*
The objective was of this trial was to establish the length of time to economic root maturity of *R. rosea* in Alberta. Field experiments were conducted under field conditions in 2004 at three locations: CDC North Edmonton, Fairview and Cremona. As expected root yield in the year of establishment was very low, due to the plants going into dormancy after transplanting. The yields in the second year ranged between at 329 kg ha^{-1} (Edmonton) to 646 kg ha^{-1} (Cremona), a 4.6 to 13-fold increase. The plant density at the end of two years ranged between 63 to 80 per cent. The annual increase in yield and biaotives content will be used to determine the economic time to harvest.

Distribute foundation seedling stocks of *R. rosea* to build capacity and capability
This project is committed to distributing *Rhodiola rosea* seedlings to continuing and new growers in 2006. We distributed 400,000 of seedlings to 47 growers. Based on our 2005 experiences and grower feedback we have adopted several propagation methods that we hope will greatly improve seedling uniformity and vigour.

Concentrations of characteristic compounds in several parts of fresh *Rhodiola rosea*
The characteristic chemicals concentrations in extracts from *Rhodiola rosea* rhizomes differ depending on the age of the plant There was marked increase in rosrin and rosin levels in year two compared to the first year. Salidroside levels were reduced significantly in the second year. We will continue to monitor these levels in 2006.

Project 2: Develop crop management practices for industrial hemp

During the past five years, hemp products like magic soaps and hemp sprouted bread, hemp-blend clothing, hemp-blend paper for CD inserts have popped up all over the marketplace. In Canada, hemp farmers are increasing production to meet this rising demand; the Canadian Hemp Trade Alliance says Canadian farmers planted more than 24,000 acres of hemp 2005, nearly triple the 2004 total.

The objectives of this trial are:

1. Provide comparative information on varieties best adapted to our specific area of interest
2. Develop optimum agronomic practices to produce and harvest hemp
3. Determine optimal procedures for stand establishment
4. Determine optimum time of harvesting to optimize biomass yield and fibre quality
5. Establish cost of, hemp, at farm and at plant gate and economic comparison with other conventional crops and straw
6. Characterize and analyze risk of hemp production in Alberta

Field experiments were conducted under rain-fed conditions in 2005 at CDC, North, Edmonton and the Alpac Mill site near Boyle, Alberta. A randomized complete block design was used with four replications. The treatments consisted of factorial combination of 5 varieties (Fasamo, Uso14, Uso31, CRAG, Finola), two plant densities (150 and 250 plants m^{-2}) and two harvest times (flowering and seed maturity).

The seeds were planted with an air seeder equipped with a large seed opener, 12.7 cm giving 67% seed utilization. The plot length was 9 m with 8 rows width and inter- row spacing of 20 cm. The experiment was planted 12 May 2005 (CDC North) and 27 May at Alpac. The plants were harvested at flowering (August 11 2005 at CDC North and at Alpac on August 22 2005) and at seed maturity (September 21 2005 at Edmonton and September 19 2005 at Alpac). 80 kg/ha of nitrogen, 30 kg/ha of phosphorous, 60 kg/ha of potash and 20 kg/ha of sulphur were applied at planting. No herbicide was used. Data collected at each site included soil, precipitation, temperature, maximum and minimum temperature, stand emergence and final stand at harvest, flowering dates, stem diameter, plant height at flowering, THC content at 75-80 days post planting (following the protocol as outlined in Industrial Hemp Technical Manual, Health Canada), stem yield and grain yield.

Results

There were no significant differences between seeding rates of 150 and 250 plants per m^{-2} at either site. At CDC North the mean plant densities were 108 and 123 plants for 150 and 250 plants per m^{-2} respectively. The relative establishment of 41-52% for the 150 plants per m^{-2} density was higher than 34-42% for 250 plants per m^{-2}. On average, an increase in seeding rate of 66% only gave a corresponding 7-14% increase in plant stand. At both locations there were significant differences between in height at flowering between varieties. Plant height ranged from 157 cm (Finola) to 222 cm (USO 31) at Edmonton. At Alpac, the height of the hemp varieties ranged between 125 cm (Finola) and 160 cm for CRAG.

At CDC North the total biomass yield ranged between 13,177 kg ha^{-1} (Crag) and 8,171 kg ha^{-1} (Finola). The mean stem fraction of the total biomass was 63.9%. At Alpac the total biomass yield ranged between 3,486 kg ha^{-1} for Fasamo and 6,767 kg ha^{-1} for Crag. The mean stem fraction of the total biomass was 66%.

The seed yields at CDC North were 1,595 kg ha^{-1} for Finola, 1,819 kg ha^{-1} Crag, 1,494 kg ha^{-1} Fasamo, 1,547 kg ha^{-1} Uso 13 and 1,336 kg ha^{-1} for Uso 31. At Alpac seeds yields were 1028 kg ha^{-1} for Finola, 849 kg ha^{-1} Crag, 322 kg ha^{-1}Fasamo, 552 kg ha^{-1} Uso 13 and 522 kg ha^{-1} for Uso 31 and the differences were once again highly significant. Seed yield of Finola (an oilseed variety) was disappointingly low in 2004. However in 2005 Finola was one of the highest yielding at both sites. It is also early maturing indicated by the proportion of seeds that were harvested at the first harvest.

Project 3: Determine flower yield of red clover *Trifolium pratense* L and German chamomile *Matricaria recutita* L (Asteraceae)

Red Clover was grown under rain fed conditions at CDC North, Edmonton. Three cultivars of red clover were sown on May 31, 2005 and flowers were harvested September 16. The yield of air-dried flowers is given in Table 9. There were significant differences in flower yield between the cultivars with Bell being the highest producing 315 kg /ha. Alta Swede did not flower.

Table 9. Yield of Red Clover Flowers, CDC North, 2005

Cultivar	Flowers Fresh weight kg ha^{-1}	Flowers dry weight kg ha^{-1}	Number of flowers m^{-2}
Bell	1230	315	171.3
Alta Swede	0	0	0
Juliet	975	237	122.3
CV	34.2	44.6	33.5
SE Mean	130.8	41.1	16.4
P>F	0.001	0.004	0.001

German chamomile *Matricaria recutita* L. cv Bodegold was direct seeded on May 31 2005 at the CDC North, Edmonton. There were two harvesting protocols: treatment one, the flowers were harvested twice August 2 and Aug 25, 2005 and treatment two, flowers were harvested on August 25 2005. The harvest area was 90 m^2. The results are shown in Table 10. The flower yields were low with maximum yield of 332.7 kg $ha^{-1}$of air-dried flowers. Early harvesting appears to inhibit plant growth as indicated by low biomass and flower yield. Hand harvesting of flowers was extremely slow process and not cost effective.

Table 10. Yield of German Chamomile *F*lowers, CDC North, 2005

Harvesting frequency	Number of plants m^{-2}	Flowers air dry weight kg ha^{-1}	Yield aerial parts kg ha^{-1}
Twice	1633	67.9	386.0
Once	1316	332.7	732.4

Project 4: Preliminary Agronomic Evaluations of Special Crops

A crop adaptation study of 25 species of medicinal and culinary herbs and essential oil crops was established in 2003 at the CDC North, Edmonton, Alberta. The crops under observation included angelica, anise, arnica, bupleurum, burdock, curled mallow, comfrey, evening primrose, hyssop, milk thistle, stinging nettle, spearmint, St. John's Wort, valerian, vervian, yarrow, and zhi mu. Information on adaptation and yield in some cases is given below:

Angelica *Angelica archangelica* L. (Apiaceae)
Angelica was grown under rain fed conditions with supplementary irrigation at seedling establishment. Angelica was sown on April, 2003 and transplanted into the field on May 26, 2003 at spacing of 33,333 kg ha^{-1} in single row plot. Seedling stand was 3.3 plants per m in 2003. Aerial plant parts were harvested September 28, 2003 and September 29, 2004. Winterkill was high, only 30% of plants survived the 2003 winter. No flowers were observed.

Anise *Pimpinella anisum* L (Apiaceae)
Anise was grown as an annual under rain fed conditions with supplementary irrigation at seedling establishment. In 2003 anise was sown on April, 2 2003 and transplanted into the field on May 26 at spacing of 33,333 kg ha^{-1} in single row plot. Seeds were harvested on September 28, 2003 and September 29 2004 and September 30 in 2005.

Anise flowered on July 10 2003 and August, but flowered late in 2004, August 10. Yield of seed at CDC North was very low in 2003, and no seed yield in 2004 and 2005.

Table 11. Yield of Anise Seed and Aerial Parts, CDC North, 2003, 2004 and 2005

Year	Seed kg ha^{-1}	Aerial kg ha^{-1}
2003	495.5	1740
2004	0	1555
2005	0	0

Arnica *Arnica montana* L., Asteraceae (Compositae)
Arnica was grown as a perennial under rain fed conditions with supplementary irrigation at seedling establishment. Arnica was sown on April 2 2003 and transplanted into the field on May 26 at spacing of 33,333 kg ha^{-1} in single row plot. Aerial parts were harvested on September 28, 2003, September 29, 2004 and September 30, 2005.

Arnica flowered on August 1 in 2003. There was 100 per cent plant survival over three years. No ripe seeds were produced in 2003. The results are shown in Table 12.

Table 12. Yield of Aerial Parts of Arnica, CDC North, 2003, 2004 and 2005

Year	Flowers dry weight kg ha^{-1}	Aerial parts kg ha^{-1}
2003	230	1315
2004		3600
2005		6400

Bupleurum (Chai hu) *Bupleurum falcatum*
Bupleurum was grown under rain fed conditions with supplementary irrigation at seedling establishment. Bupleurum was sown on April 13 2003 and transplanted into the field on June 4 at spacing of 33,333 kg ha^{-1} in single row plot. Aerial parts were harvested on September 28, 2003, September 29, 2004 and September 30, 2005.

Bupleurum flowered on August 1, 2003. No ripe seeds were produced in 2003. There was 100 per cent plant survival over three years. The results are shown in Table 13

Table 13. Yield of Bupleurum Roots and Aerial Parts, CDC North, 2003, 2004 and 2005

Year	Roots kg ha^{-1}	Aerial parts kg ha^{-1}
2003	33.0	908
2004	395.0	460
2005		

Burdok *Arctium lappa* L., Asteraceae (Compositae)
Burdok was as an annual grown under rain fed conditions with supplementary irrigation at seedling establishment. Burdok was sown on April, 13 May 27 and April 11 in 2003, 2004 and 2005 respectively and transplanted into the field on May 26, July 23 and May 26 at spacing of 33,333 kg ha^{-1} in single row plot. Harvesting was done between September 28 and September 30 Burdok was easy to establish with 100 per cent establishment. The yield of roots and aerial parts are shown in Table 14. No ripe seeds were produced in 2003.

Table 14. Yield of Burdok Seed Roots and Leaves, CDC North, 2003, 2004 and 2005

Year	Roots kg ha^{-1}	Aerial kg ha^{-1}
2003	4553.8	4923.1
2004		7005
2005		6710

Curled mallow *Malva verticillata var. crispa* L. (Malvaceae)
Curled mallow was grown as an annual under rain fed conditions with supplementary irrigation at seedling establishment. Curled mallow was sown on April 13, 2003 May 27, 2004 and April 11, 2005 and transplanted into the field on May 26, July 15 and May 26 respectively, at a spacing of 33,333 kg ha^{-1} in single row plot. Harvesting was done between September 28 and September 30. Curled mallow had 100 per cent establishment. The yield of roots and aerial parts are shown in Table 15. No ripe seeds were produced in 2003.

Table 15. Yield of Curled Mallow Aerial Parts, CDC North, 2003, 2004 and 2005

Year	Aerial parts dry weight kg ha^{-1}
2003	15205
2004	1800
2005	11520

Comfrey *Symphytum officinale* L (Boraginaceae)
Comfrey was grown as a perennial under rain fed conditions with supplementary irrigation at seedling establishment. Comfrey transplanted into the field on June 17 at a density of 33,333 kg ha^{-1} in single row plot. Harvesting was done between September 28 and September 30. Comfrey had 100 per cent establishment. Winter survival was excellent, 100 per cent plant survival over three years. The yield of roots and aerial parts are shown in Table 16. No flowers were observed.

Table 16. Yield of Roots and Aerial Parts of Comfrey, CDC North, 2003, 2004 and 2005

Year	Roots dry weight kg ha^{-1}	Aerial parts kg ha^{-1}
2003	3215	2935
2004	1328	
2005	8247	

Evening Primrose *Oenothera biennis* L. (Onagraceae)
Evening Primrose was grown as an annual under rain fed conditions with supplementary irrigation at seedling establishment. Evening Primrose transplanted into the field on May 26 at a density of 33,333 kg ha^{-1} in single row plot. Harvesting was done on September 29. Evening primrose was easy to establish with 100 per cent establishment. The seeds did not ripen in 2003. The plants were still flowering on September 15

Hyssop *Hyssopus officinalis* L. (Lamiaceae)
Hyssop was grown as a perennial under rain fed conditions with supplementary irrigation at seedling establishment. Hyssop was transplanted into the field on May 26, 2003 at a density of 33,333 kg ha^{-1} in single row plot. Harvesting was done between September 28 and September 30. Hyssop was easy to establish with 100 per cent establishment and 100 per cent winter survival over the three years. No flowers were observed. Results are shown in table 17.

Table 17. Yield of Hyssop Aerial, CDC North, 2003, 2004 and 2005

Year	Aerial parts dry weight kg ha^{-1}
2003	6085
2004	7145
2005	10280

Milk thistle *Silybum marianum* L. (Asteraceae)
Milk thistle was grown as an annual under rain fed conditions with supplementary irrigation at seedling establishment. Milk thistle was transplanted into the field on May 26 in 2003 and 2004 at a density of 33,333 kg ha^{-1} in single row plot. Harvesting was done between September 28 and September 30.

Milk thistle was easy to establish with 100 per cent seedling establishment in 2003. The plants started flowering by August 6. The yield aerial parts are shown in Table 18.

Table 18. Yield of Milk Thistle Seed and Aerial Parts, CDC North, 2003 and 2004

Year	Seed kg ha^{-1}	Aerial parts kg ha^{-1}
2003	1645	18195
2004	350	15694
2005		

Stinging nettle *Urtica dioica* L. (Urticaceae)
Stinging nettle was grown as a perennial under rain fed conditions with supplementary irrigation at seedling establishment. Stinging nettle was transplanted into the field on May 26 in 2003 at a density of 33,333 kg ha^{-1} in single row plot. Harvesting was done between September 28 and September 30.

Stinging nettle was easy to establish with 100 per cent establishment. There was an excellent winter survival over the three years. The plants started flowering by August 6. The yield aerial parts are shown in Table 19.

Table 19. Yield of Stinging Nettle Aerial Parts, CDC North, 2003, 2004 and 2005

Year	Aerial parts dry weight kg ha^{-1}
2003	6490
2004	2115
2005	14440

Spearmint *Mentha spicata* L (Lamiaceae)

Spearmint was grown as a perennial under rain fed conditions with supplementary irrigation at seedling establishment. Spearmint was transplanted into the field on May 26, 2003 at a density of 33,333 kg ha^{-1} in single row plot. Harvesting was done between September 28 and September 30.

Spearmint was easy to establish with 100 per cent seedling establishment. There was an excellent winter survival over the three years. The plants started flowering by August 6. The yield aerial parts are shown in Table 20. Peppermint *Mentha x piperita* (Lamiaceae) suffered 100 per cent winterkill in the first year.

Table 20. Yield of Spearmint Aerial Parts, CDC North, 2003, 2004 and 2005

Year	Aerial parts dry weight kg ha^{-1}
2003	3340
2004	7070
2005	2000

St. John's Wort *Hypericum perforatum* L. (Clusiaceae)

St. John's Wort was grown as a perennial under rain fed conditions with supplementary irrigation at seedling establishment. St. John's Wort was transplanted into the field on May 26, 2003 at a density of 33,333 kg ha^{-1} in single row plot. Harvesting was done between September 28 and September 30.

St. John's Wort was easy to establish with 100 per cent seedling establishment. There was 100 per cent winter survival over the three years. The plants started flowering by August 6. The yield of aerial parts is shown in Table 21.

Table 21. Yield of St. John's Wort Aerial Parts, CDC North, 2003, 2004 and 2005

Year	Aerial parts dry weight kg ha^{-1}
2003	1970
2004	5280
2005	6920

Valerian *Valeriana officinalis* L. (Valerianaceae)

Valerian was grown as a perennial under rain fed conditions with supplementary irrigation at seedling establishment. Valerian was transplanted into the field on May 26, 2003 at a density of 33,333 kg ha^{-1} in single row plot. Harvesting was done between September 28 and September 30.

Valerian was easy to establish with 100 per cent seedling establishment. There was also 100 per cent winter survival over the three years. The plants started flowering by August 8. The yield of roots and rhizomes and aerial parts are shown in Table 22

Table 22. Yield of Valerian Roots and Aerial Parts, CDC North, 2003 and 2005

Year	Root/ rhizome kg ha^{-1}	Leaves kg ha^{-1}
2003	2175	2183
2004		
2005	5530	

Vervian *Verbena officinalis* L (Verbenaceae*)*
Vervian was grown as a perennial under rain fed conditions with supplementary irrigation at seedling establishment. Vervian was transplanted into the field on May 26, 2003 at a density of 33,333 kg ha^{-1} in single row plot. Harvesting was done between September 28 and September 30. Vervian was easy to establish with 100 per cent seedling establishment. There was also 100 per cent winter survival over the three years. The plants started flowering by July 25. The yield of roots and rhizomes and aerial parts are shown in Table 23.

Table 23. Yield of Vervian Seed, Roots Aerial Parts, CDC North, 2003, 2004 and 2005

Year	Seed kg ha^{-1}	Aerial parts kg ha^{-1}
2003	1377	668
2004		319
2005		271

Yarrow *Achillea millefolium* L. (Asteraceae)
Yarrow was grown as a perennial under rain fed conditions with supplementary irrigation at seedling establishment. Yarrow was transplanted into the field on May 26, 2003 at a density of 33,333 kg ha^{-1} in single row plot. Harvesting was done between September 28 and September 30. Yarrow was easy to establish with 100 per cent seedling establishment. There was also 100 per cent winter survival over the three years. The plants started flowering by August 1 and continued flowering into September. The yield of flowers and aerial parts are shown in Table 24

Table 24. Yield of Yarrow Seed Roots and Leaves, CDC North, 2003, 2004 and 2005

Year	Flowers dry kg ha^{-1}	Leaves dry kg ha^{-1}
2003	720	7165
2004	1830	11090
2005		12950

Zhi mu *Anemarrhena asphodeloides* Bunge (Asphodelaceae)
Zhi mu was grown as a perennial under rain fed conditions with supplementary irrigation at seedling establishment. Zhi mu was transplanted into the field on May 26, 2003 at a density of 33,333 kg ha-1 in single row plot. Harvesting was done between September 28 and September 30. Zhi mu was easy to establish with 100 per cent seedling establishment. There was also 100 per cent winter survival over the three years. The yield of flowers and aerial parts are shown in Table 25.

Table 25. Yield of Roots and Leaves of Zhi Mu, CDC North, 2003, 2004 and 2005

Year	Roots kg ha^{-1}	Leaves kg ha^{-1}
2003	83	50
2004	165	1635
2005		