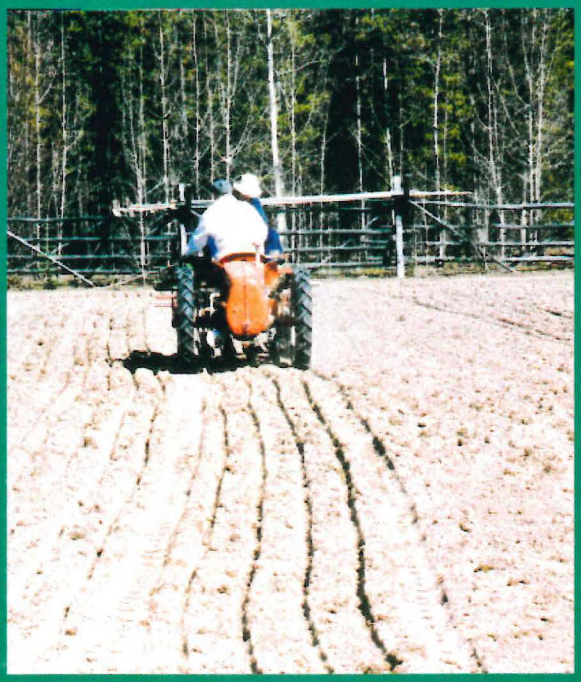
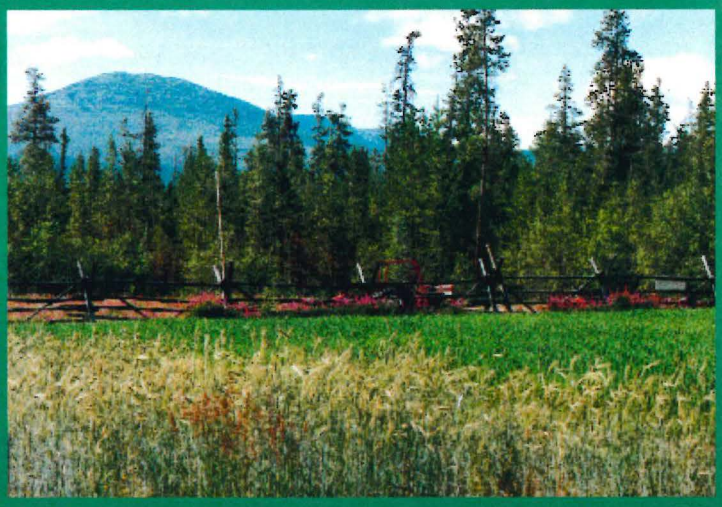
Yukon Agriculture Research and Demonstration Report

1999 Field Season





GROWN IN THE YUKON

Yukon
Renewable Resources
Agriculture Branch

PR-00-01

Yukon Agriculture Research and Demonstration Report

Tony Hill, Agrologist, Agriculture Branch
Brenda Sproule, Agriculture Technician, Agriculture Branch

Progress Report No. 1
1999 Field Season

Summary

Forestry Farm Demonstration Plot

The 1999 growing season was the first year in a four year grain maturity trial undertaken at the Takhini Forestry Farm. The purpose of this trial is to measure the economics of production and management inputs required to mature grain in southern Yukon. Cash crops, including potatoes and carrots, were also grown at the Forestry Farm to test different varieties and determine profitability.

The agroclimatic rating for the 1999 growing season at the Forestry Farm was Class 4. Although temperatures were below normal in May, the valley received over three times the average amount of precipitation which provided good soil moisture for seed germination and crop growth. Temperatures in June, July and August were all above normal, contributing to the longest frost free period in over five years. The hottest and driest weather came at the beginning of August, providing excellent haying conditions in southern Yukon.

Horticulture crops consisted of "Norland" potatoes and "Vita Treat" carrots. The longer period between killing frosts and an early potato variety provided the most mature crop of potatoes grown at this site in five years. The 1999 net return for potatoes was $8,397.71/ha. One of the two sets of five rows of carrots was covered with "Remay" row covering to see if germination and/or yield would be improved compared to the row without "Remay". When the row cover was removed, the carrot tops and weeds under the "Remay" were larger than those in the rows without a covering. However, at harvest there was no difference in quality or quantity between the two treatments. The 1999 net return for carrots was $1,901.23/ha. The high cost of manual weed control accounted for low economic returns on carrots at this site.

The barley crop was grown for 135 days, and at time of sampling the grain was dry enough to store directly. The barley plot produced a marketable harvest of 6.08 tonne/ha (5,424 lb/ac). At a selling price of $285.00/tonne, this produced a net return of $1,138.02/ha ($460.55/ac).

The wheat plot produced a marketable harvest of 3.29 tonne/ha (2,931 lb/ac). At a selling price of $300.00/tonne, the net return was $347.00/ha. The wheat grain harvested would have been fine for feed, but it was poor seed quality, and would have required drying to be stored.

The oat plot was sampled when 90% of the grain was mature. This plot produced a marketable harvest of 4.67 tonne/ha (4,160 lb/ac). At a selling price of $260.00/tonne, the net return was $587.34/ha.

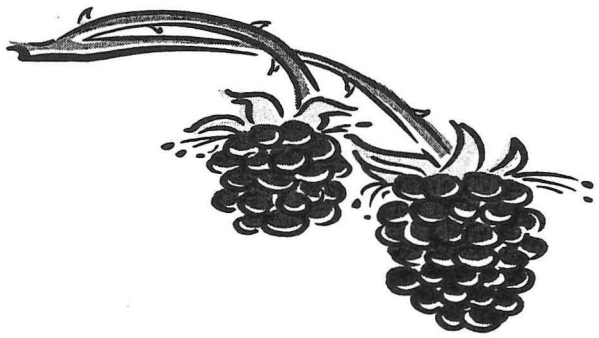
Raspberry Variety Trial

The summer of 1999 was the second growing season in a multi-year raspberry variety trial undertaken at a farm located on the north side of the Takhini River. The purpose of the trial is to test the commercial viability of six raspberry varieties using various soil amendment techniques. Soil reaction to the various amendments is being recorded together with the economic input, which will measure the commercial viability of the amendments.

The soil at the trial site is mainly silt/loam, pH is above neutral and salinity levels range from slightly to moderately saline. In an attempt to lower the alkalinity level of the soil, the trial plot was divided in half and sulfur was applied to the top section.

In 1998, six varieties of raspberries were planted in 30.5 m (100 ft) rows. Varieties included Kiska, Boyne, Souris, Red River, Double Delight and Honey Queen. Three rows of each variety were planted. Before planting, a commercial farm fertilizer was applied to the first row, an organic fertilizer was applied to the second row, and the same organic fertilizer and shredded peat moss was added to the third row of each variety. A drip irrigation system is being used to water the raspberry plants.

At the end of July 1998, the plants were assessed to determine transplant success and health as they entered their first winter. Overall, Boyne and Honey Queen were the healthiest, and Red River had the most unhealthy or dead plants. On June 11 1999, the plants were assessed to determine how well they overwintered. Overall, Boyne had the greatest number of healthy plants, and Red River had the least. On June 12th, the dead raspberry plants were replaced with new stock. However, the new planting stock was not of very good quality and most of the replacement plants did not take. At the end of the 1999 growing season, Boyne had the strongest growth and fruit set. Double Delight was second in vigour, and Honey Queen was third. Both Souris and Red River displayed poor to moderate growth in the second year.



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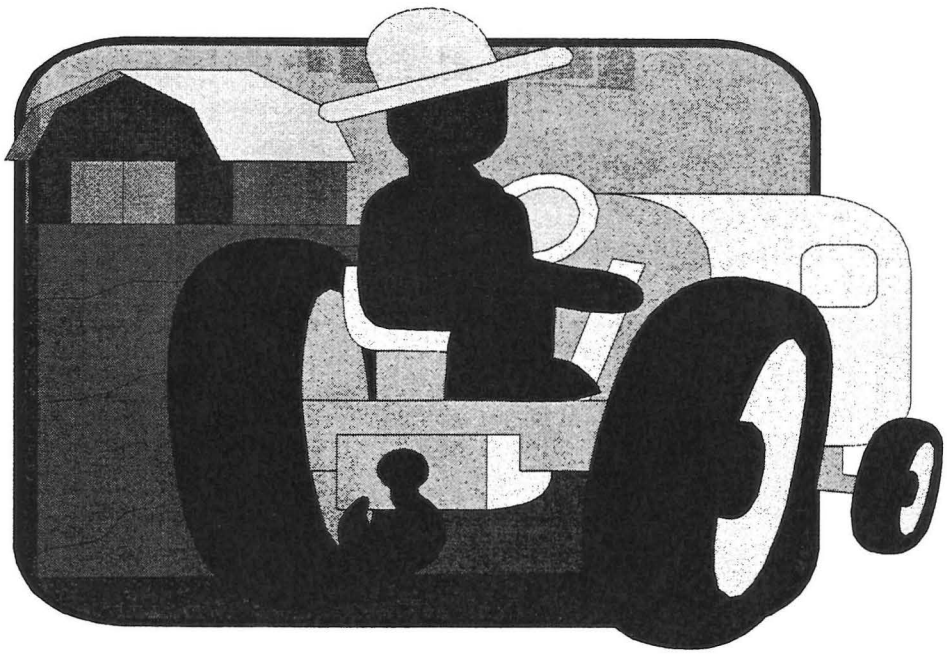


Part 1: FORESTY FARM DEMONSTRATION PLOT

Introduction

The 1999 growing season marked the first year in a four year grain maturity trial undertaken at the Takhini Forestry Farm. Following the success of growing wheat, barley and oats to maturity under irrigated conditions over the past four years in central Yukon, the Agriculture Branch decided to see how well these crops would grow in southern Yukon. The purpose of this trial is to measure the economics of production and management inputs required to mature grain in this part of the territory. Cash crops, including potatoes and carrots, were also grown at the Forestry Farm to test different varieties and determine profitability. This section of the report describes the 1999 field season and the overall findings of the grain maturity and cash crop trials.

Photo 1: Takhini Forestry Farm Research Plots

Site Description

Agrometeorology

Climate is the major limiting factor to agriculture in the Yukon because of the short frost free period and lack of heat units during the growing season. Agroclimatic capability ratings are a measure of the degree of limitation imposed by climate on agricultural production. These ratings are derived from 30 year normal data collected by Atmospheric

Environment Services of Environment Canada. They represent a measure of the amount of heat available to crops during the growing season. The agroclimatic rating is modified to account for local climate patterns, such as frost occurrences, which affect the length of the growing season. Agroclimatic classes range from Class 1 (no restrictions) to Class 7 (unable to be used for any agricultural purpose; Table 1).

Table 1
Definitions and Operational Constraints of Land Capability Classes for Cultivated Agriculture in Yukon Territory (Tarnocai et al. 1988, Table 6)

Class 1	These lands have no significant limitations that restrict the production of the full range of common Canadian agricultural crops (none in Yukon). (1400-1600 GDD)
Class 2	These lands have slight limitations that restrict the range of some crops but still allow the production of grain and warm season vegetables (none in Yukon, based on a 30 year average). (1200-1400 GDD)
Class 3	These lands have moderate limitations that restrict the range of crops to small grain cereals and vegetables (in a few localized areas in Yukon). (1050-1200 GDD)
Class 4	These lands have severe limitations that restrict the range of crops to forage production, marginal grain production and cold-hardy vegetables (valleys of central Yukon). (900-1050 GDD)
Class 5	These lands have very severe limitations that restrict the range of crops to forages, improved pastures and cold-hardy vegetables (the most common class of agricultural land in Yukon). (700-900 GDD)
Class 6	These lands have such severe limitations for cultivated agriculture that cropping is not feasible. These lands may be suitable for native grazing. (<700 GDD)
Class 7	These lands have no capability for cultivated agriculture or range for domestic animals.

The 1999 growing season was about as good as it gets in the Takhini Valley. Although temperatures were below normal in May, the valley received over three times the average amount of precipitation which provided good soil moisture for seed germination and crop growth. Temperatures in June, July and August were all above normal, contributing to the longest frost free period in over five years. The hottest and driest weather came at the beginning of August providing excellent haying conditions in southern Yukon.

The number of growing degree days (GDD) are calculated beginning the fifth consecutive day with mean temperatures above 5°C, and terminated the day following the first killing frost which occurs after mid-July. During the 1999 growing season, the weather station at the Takhini test plot recorded 811.1 GDD. When corrected for latitude, this becomes 957.1 effective growing degree days (EGDD; Table 2). The first killing frost occurred on August 23rd (Table 2). The agroclimatic rating for 1999 was Class 4 (900-1050), which is suitable for the maturation of oats, barley and rye (Table 2). This rating is similar to the last two years. However, the normal rating for this area is Class 5 (700-900 EGDD).

Table 2
Agroclimatic Data for the 1999 Growing Season at the Takhini Test Plots

Climate Factor	May	June	July	August	Total	Adjusted for day length*
Max Temp (°C)	18.8	29.1	30.0	33.2		
Min Temp (°C)	-9.5	-2.1	-0.9	-2.9		
Daily Mean (°C)	5.4	13.5	14.8	13.2		
30 Year Normal	6.7	12.0	14.1	12.5		
Total Precipitation (mm)	42.3	27.7	40.9	33.7	144.6	
30 Year Normal	12.9	30.7	33.6	37.9	115.1	
Growing Degree Days (>5°C)	25.0	256.3	303.1	226.7	811.1	957.1
Frost Free Period (0°C)		8	28		50 days**	
Killing Frost Free Period (-2.2°C)	30			23	85 days	

* The temperature factor is adjusted upward by 18% to account for the boost plants receive from the long hours of daylight north of 60° latitude.
** Whitehorse Airport records a 30 year mean frost free period of 87 days. This is longer than the 1999 frost free period and most others recorded at the Forestry Farm. The airport site regularly receives winds which tend to keep the temperature above freezing, while the forest sheltered nature of the Takhini Valley site reduces air movement, and therefore frosts are more common.

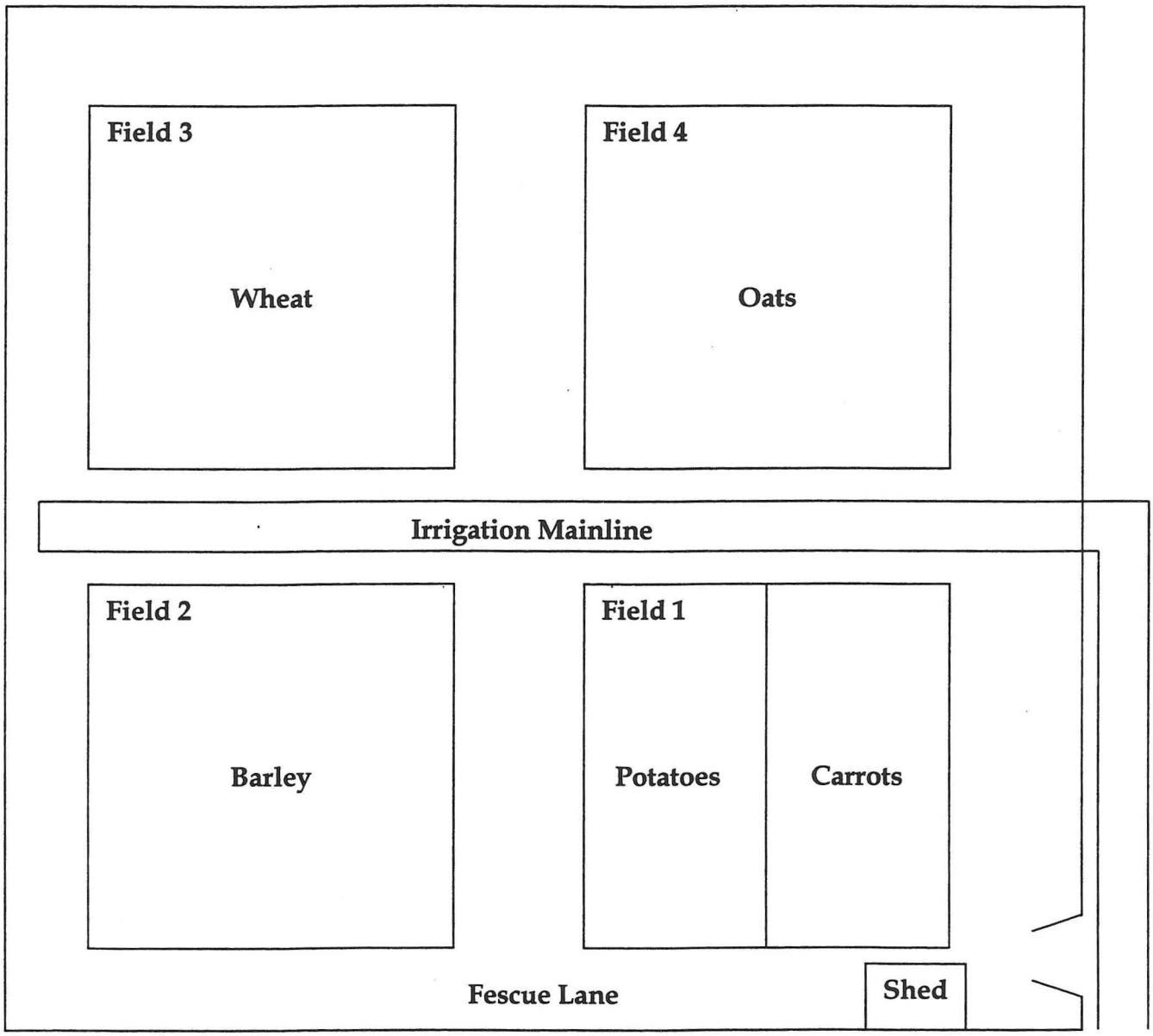
Soils

The fine textured soils at the demonstration plot vary from silt loam to sandy loam, and their potential for agricultural production is rated as fair to good. These soils belong to the Lewes soil association and are characterized as loam, with an average particle size breakdown of 42% sand, 47% silt and 11% clay throughout the four fields. The average soil pH of the three plots this year was 6.8, and the average soil organic matter was 1.8%.

Site Preparation and Plot Design

The agriculture test plots are located at the Federal Forestry Nursery situated south of the junction of the Klondike Highway and the Takhini Hotsprings Road. The demonstration plots are located on a level, sheltered 0.98 hectare field which is divided into four 40 m x 35 m test plots (Figure 1). All crops are grown under irrigated conditions. The soil, landscape and climatic properties of the site are typical of those encountered at many farms in the southwest region of the Yukon.

Figure 1
Forestry Farm Plot Layout 1999



The seedbed was prepared using a 1.83 m (six foot) rototiller and chain harrows. Grains were drilled into the seedbed using a small plot precision seeder, and fertilizers were broadcast according to soil test recommendations. Potatoes were planted by hand and carrots were seeded using a one row push seeder.

Weed control in the horticultural trial consisted of mechanical cultivating between rows and hand roguing. Weeds in the crop rows were also removed by hand roguing.

Trial Description and Results

Horticulture Trial

Field 1: Potatoes and Carrots

In 1999, the horticulture trial consisted of growing an early potato variety and a high beta-carotene variety of carrot. The purpose of the trial was to measure the performance of these particular varieties and the economics of production on a per acre basis.

On May 20th, the first two 30.5 m (100 ft) long rows of "Norland" potatoes were planted with 30.5 cm (12 inch) spacing between plants (Table 3). The remaining four rows were planted on June 1st. The weather was very cool in late May and early June, and no difference in maturity or yield was detected from the different planting dates.

Table 3
Horticulture Crops – Potatoes and Carrots

Plot Design	35 x 40 m
Seedbed Preparation	Spring Plowdown, Spring Rototilling
Fertilizer Application	137-118-141kg/ha (122-105-126 lb/ac)
Seed Varieties – Potatoes	Norland
- Carrots	Vita Treat, Peletted Seed
Seeding Date	May 20 and June 1, 1999
Planting Methods	Hand, One Row Push Seeder
Harvest Date – Potatoes	September 8 & 9, 1999
- Carrots	September 9, 1999

Peletted, "Vita Treat" carrots were seeded on June 1st using a one row push seeder. Two sets of five, 30.5 m (100 ft) rows were seeded, with 15.3 cm (6 inch) between rows (Table 3). One set was covered with "Remay" row covering to see if germination and/or yield would be improved compared to the row without "Remay".

Both carrots and potatoes were fertilized according to soil test recommendations. Irrigation of the horticulture plots occurred nine times between June 3rd and August 12th.

The row cover on the one set of carrot rows remained intact from the time of seeding until June 28th (28 days). When the row cover was removed, the carrot tops and weeds under the "Remay" were larger than those in the rows without a row covering. However, at harvest, there was no difference in quality or quantity between the two treatments. Due to the high cost of manual weed control required at this site, carrots are not considered economically feasible (Table 4).

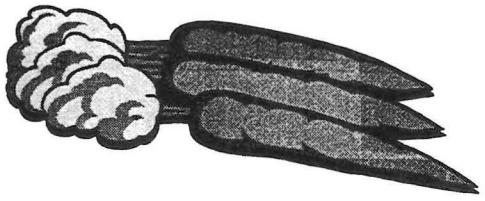


Table 4
1999 Horticulture Harvest Results
Cost and Return Summary

Cost:	**Carrots**	**Potatoes**
Certified Seed	$158.08/ha	$3,408.60/ha
Fertilizer	$338.39/ha	$338.39/ha
Irrigation	$259.35/ha	$259.35/ha
Fuel and Equipment	$358.15/ha	$358.15/ha
Labour	$7,014.80/ha	$1,580.80/ha
Total Cost	$8,128.77/ha	$5,945.29/ha
Return:		
Total Harvest	18,997 kg/ha	18,110 kg/ha
Cull and Undersize	40%	10%
Marketable Harvest	11,398 kg/ha	16,299 kg/ha
Selling Price	$0.88/kg	$0.88/kg
Gross Return	$10,030.24/ha	$14,343.12/ha
Net Return	$1,901.23/ha	$8,397.71/ha

The longer period between killing frosts and the choice of an earlier potato variety than in some other years provided the most mature crop of potatoes grown at this site in five years. Horticulture harvest results and economics are presented in Table 4.

Cereal Maturity Trials

The purpose of this trial is to compare the growth and yield of wheat, barley and oats grown in southern Yukon, to the growth and yield of the same crops grown in central Yukon using the same crop inputs. The central Yukon trial, conducted from 1995 to 1998, demonstrated the need for irrigation to produce grain on a consistent basis (Hill and Sproule 1999). The trial initiated in 1999 in southern Yukon was also conducted under irrigated conditions. Early maturing varieties of grain were used and seeding was done as early as weather permitted to determine how consistently grain could be matured in the cooler southern climate.

For the third year in a row, the Takhini Demonstration Site experienced a Class 4 agroclimatic rating. This is one class above the 30 year normal and, as mentioned in the previous section, 1999 was warmer and wetter than normal. Given the right management and crop inputs, these conditions should allow for the best crop results possible in this area.

Field 2: Barley

The barley plot was seeded on May 11th and irrigated the next day (Table 5). Since the month of May was cooler and wetter than normal, the plot was not irrigated again until June 7th, then twice more throughout that month.

Table 5
Grain Trial – Barley

Plot Design	35 x 40 m
Seedbed Preparation	Spring Plowdown, Spring Harrowing
Fertilizer Application	118-50-47 kg/ha (105-45-42 lb/ac)
Seeding Rate	112 kg/ha (100 lb/ac)
Seeding Method	Precision Plot Seeder
Seeding Date	May 11, 1999
Seed Variety	AC Albright
Soil Test Date	September 15, 1999
PH	6.6
Organic Matter	1.7

The barley seeded was a six row general purpose variety called "AC Albright". This variety was noted for its early maturity and was recommended for our area by both Alberta Agriculture and the University of Alaska, Fairbanks. The seeding rate was 112 kg/ha and fertilizer was applied according to soil test results. Soil samples were taken from each plot the previous fall.

The barley crop was grown for 135 days from time of seeding to time of sampling which occurred on September 15th. Crop conditions were approximately one week later than optimum for harvest. The crop was randomly sampled twice using a 0.5 m^2 frame. The barley grain was dry enough to store directly and when weighed, produced 6,075 kg/ha or 113 bushels of grain per acre (Table 6).

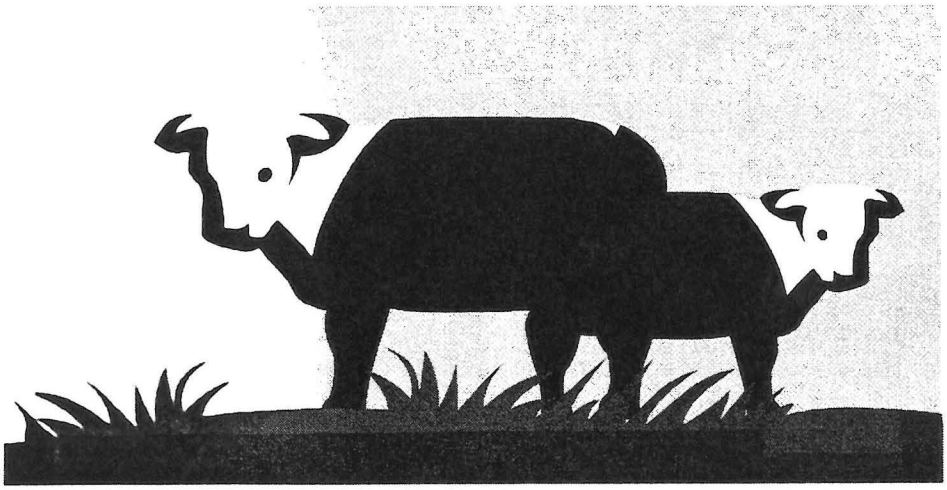


Table 6
1999 Barley Harvest Results – Cost and Return Summary

Cost:	
Seed Cost	$51.15/ha
Fertilizer	$135.91/ha
Operating Costs (labour, depreciation, irrigation)	$407.72/ha
Herbicide	None used
Total Cost	$594.78/ha
Return:	
Marketable Harvest	6.08 tonne/ha
Selling Price	$285.00/tonne
Gross Return	$1,732.80/ha
Net Return	$1,138.02/ha

Field 3: Wheat

The wheat plot was seeded on May 11th and irrigated two days later (Table 7). Approximately 160 mm of irrigation water was applied in four sets one week apart throughout June. On June 16th, 2-4D herbicide was applied to the plot with ground spraying equipment in an attempt to control an infestation of narrow leaf hawksbeard (*Hieracium scabriusculum*) and other broad leaf weeds. Spraying occurred under optimum weather conditions and was effective on all the broadleaf weeds with the exception of the hawksbeard, which was stunted but not killed. The wheat was stunted for a few days as well, but recovered fully within 10 days.

Table 7
Grain Trial – Wheat

Plot Design	35 x 40 m
Seedbed Preparation	Spring Plowdown, Spring Harrowing
Fertilizer Application	118-50-47 kg/ha (105-45-42 lb/ac)
Seeding Rate	112 kg/ha (100 lb/ac)
Seeding Method	Precision Plot Seeder
Seeding Date	May 11, 1999
Seed Variety	AC Minto
Soil Test Date	September 15, 1999
pH	6.9
Organic Matter	1.7

The variety of wheat seeded was a hard red spring type named "AC Minto". Characteristics of growth are intermediate height, with fair shattering resistance and maturity similar to Neepawa. Seeding rate was 112 kg/ha, and fertilizer was applied according to soil test results.

Photo 2: Wheat Plot – Takhini Forestry Farm Research Plots

The wheat grain was noted to be in the soft dough stage by August 24th. Sampling occurred on September 24th when frost had stopped any further ripening. The grain harvested would have been fine for feed, but it was poor for seed quality. It would have also required drying if it was to be stored and not kept in a frozen state. Yields were very good at 3,282 kg/ha or 49 bushels per acre (Table 8).

Table 8
1999 Wheat Harvest Results – Cost and Return Summary

Cost:	
Seed Cost	$59.30/ha
Fertilizer	$135.91/ha
Operating Costs (labour, depreciation, irrigation)	$407.72/ha
Herbicide	$37.07/ha
Total Cost	$640.00/ha
Return:	
Marketable Harvest	3.29 tonne/ha
Selling Price	$300.00/tonne
Gross Return	$987.00/ha
Net Return	$347.00/ha

Field 4: Oats

The oat plot was seeded on the same day as the other cereals, May 11th (Table 9). Irrigation began on this plot on May 20th and ended on July 6th with four sets of water being applied at approximately 40 mm per set. The herbicide 2-4D was applied at the same time and same rate as in the wheat field, with the same results.

Table 9
Grain Trial – Oats

Plot Design	35 x 40 m
Seedbed Preparation	Spring Plowdown, Spring Harrowing
Fertilizer Application	104-50-47 kg/ha (105-45-42 lb/ac)
Seeding Rate	112 kg/ha (100 lb/ac)
Seeding Method	Precision Plot Seeder
Seeding Date	May 11, 1999
Seed Variety	AC Mustang
Soil Test Date	September 15, 1999
pH	6.9
Organic Matter	1.9

The variety of oats planted was "AC Mustang". This is the third year of trials with this variety in different areas of the Yukon. Yields in both forage and grain production trials in Alberta were as much as 117% of the "Cascade" variety, which had been the best producing oat in previous Yukon Crop Trials. Our results have been mixed. Although Mustang produced a taller crop, producers reported the greenfeed to be less palatable to horses. So far, grain production appears to be inconclusive, with quality and yield being widely variable.

On August 24th, the oat grain was in the milk to soft dough stage of maturity. Sampling occurred on September 24th when 90% of the grain was mature and no further ripening was likely to occur. Yields were higher than average for the Whitehorse area with 4,660 kg/ha or 122 bushels or grain per acre (Table 10).

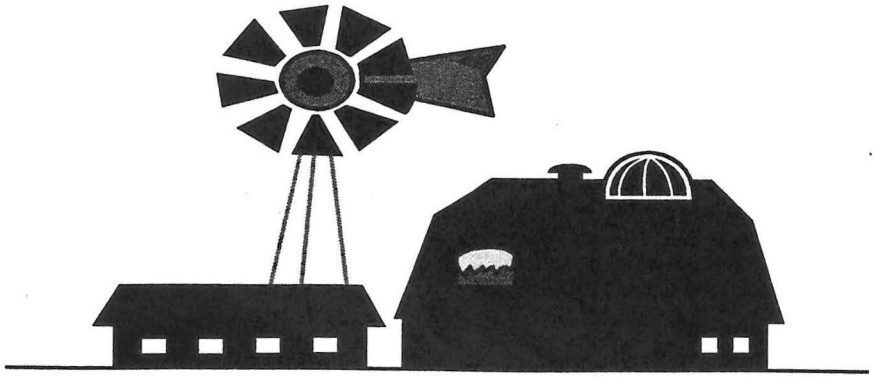


Table 10
1999 Oat Harvest Results – Cost and Return Summary

Cost:	
Seed Cost	$46.21/ha
Fertilizer	$135.91/ha
Operating Costs (labour, depreciation, Irrigation)	$407.72/ha
Herbicide	$37.07/ha
Total Cost	$626.91/ha
Return:	
Marketable Harvest	4.67 tonne/ha
Selling Price	$260.00/tonne
Gross Return	$1,214.25/ha
Net Return	$587.34/ha

Photo 3: Ground Spraying Equipment

Part 2: RASPBERRY VARIETY TRIAL

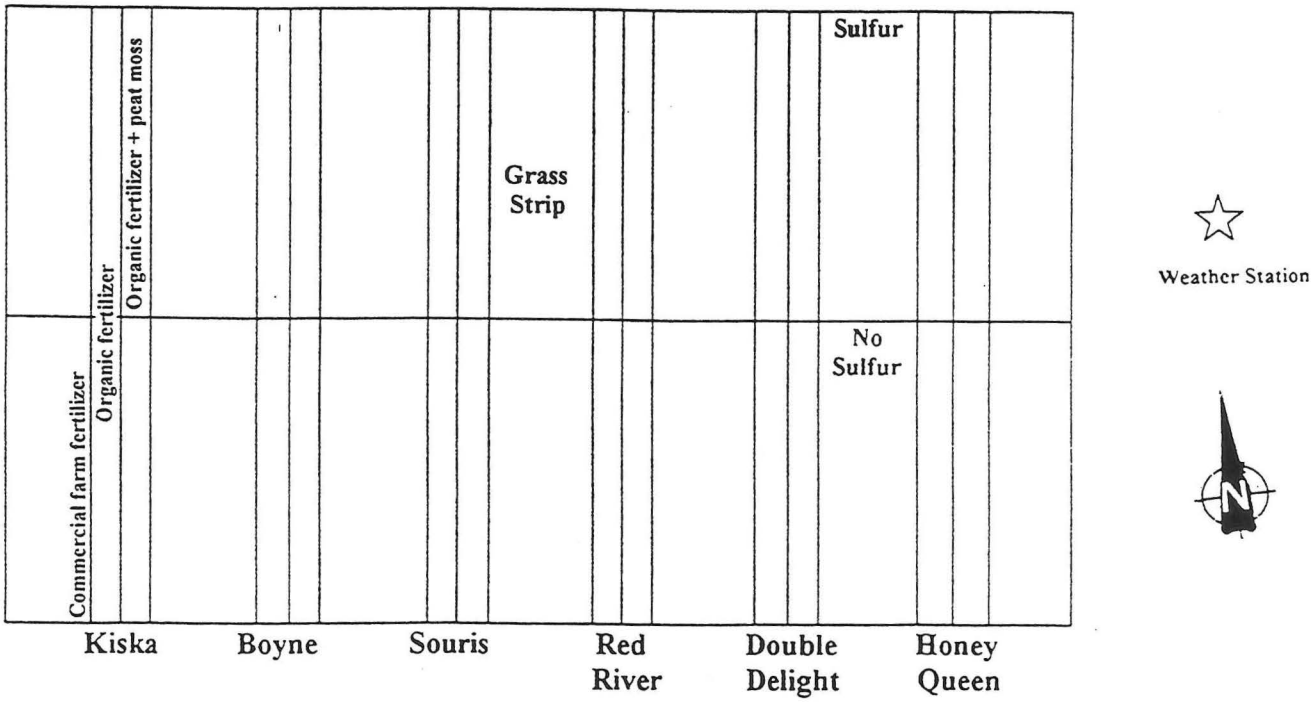
Introduction

The summer of 1999 was the second growing season of a five year raspberry variety trial undertaken at a farm located on a lower bench on the north side of the Takhini River. The purpose of this trial is to test the commercial viability of six raspberry varieties using various soil amendment techniques. Monitoring of soil reaction to the various amendments is being recorded together with the economic input, which will measure the commercial viability of the amendments. In the long term, practical data on the commercial production of raspberries in southern Yukon's main agricultural belt will benefit the industry.

Site Description

The area chosen for the trial plot is approximately 0.405 ha (one acre) in size, and is located in the least saline area of the farm. Soils at the trial site are mainly silt/loam, pH is above neutral and salinity levels range from slightly saline (electrical conductivity (EC) 1.5 ds/m) to moderately saline (EC 4-8 ds/m). Since the soil at the chosen site is highly alkaline, the trial plot was divided in half in 1998, and sulfur was applied to the top half at a rate of 890 kg/ha (795 lb/ac) in an attempt to lower the alkalinity level (Figure 2). The bottom half of the plot was left untreated.

Figure 2
Raspberry Trial Plot Layout



An automated weather station was installed on the east side of the trial plot, but not enough data was collected during the 1998 growing season to determine growing degree day values. During the 1999 growing season, the temperature sensors only recorded until the end of July. Once again not enough data was collected to determine growing degree day values.

A drip irrigation system is being used to water the raspberries at the site. A five centimetre (two inch) gasoline powered water pump is located on the river side at the nearest point to the test plot. This pump brings water to the test plot through approximately 220 m of five centimetre (two inch) poly pipe. Two overhead sprinklers were used to germinate the grass mowing strips.

Raspberry Trials

On May 29-31st 1998, six different varieties of raspberries were planted in 30.5 m (100 ft) rows. Varieties included Boyne and Souris, two Agriculture Canada varieties widely grown in the west; Red River and Double Delight, two primocane varieties released recently by Agriculture Canada; Kiska, a native cross developed in Alaska; and Honey Queen, a yellow raspberry from Rocky Mountain House in Alberta (Figure 2; Appendix A). Plant spacing was 0.91 m (three feet) between plants and 0.91 m (three feet) between rows, with three metre (10 ft) grassed mowing strips between the varieties. Three rows of each raspberry variety were planted for a total of 18 rows. Before planting, a commercial farm fertilizer was applied according to soil test recommendations to the first row of each variety. An organic fertilizer was applied to the second row, and the same organic fertilizer and shredded peat moss was added to the third row of each variety (Table 11).

Table 11
Raspberry Variety Trial - Row Treatments

	TREATMENTS	
ROW	**1998**	**1999**
1	2.27 kg 34-17-0 0.45 kg 0-0-60	0.68 kg 35-15-0 0.23 kg 0-0-60
2	2.27 kg 12-0-0 Blood Meal 2.27 kg 2-14-0 Bone Meal 0.45 kg 0-0-50-18 Potassium Sulfate	1.82 kg 7-7-0 Blood + Bone Meal 0.23 kg 0-0-50-18 Potassium Sulfate
3	2.27 kg 12-0-0 Blood Meal 2.27 kg 2-14-0 Bone Meal 0.45 kg 0-0-50-18 Potassium Sulfate 0.12 m^3 Shredded Peat Moss	1.82 kg 7-7-0 Blood + Bone Meal 0.23 kg 0-0-50-18 Potassium Sulfate

At the end of July 1998, a first year assessment of the plants was undertaken to determine transplant success and the state of the plants as they entered their first winter (Table 12). Overall, the Boyne and Honey Queen varieties had the greatest number of healthy plants.

Some were even producing first year fruit. The Red River variety did not take very well and had the greatest number of dead or unhealthy plants. Since the effects of soil amendments are long term, observations on their effect was not possible in the first year of the trial.

Soil tests taken on site during the 1999 season revealed no effect on soil pH from the sulphur granules that were applied to the north half of the plot in 1998. The lack of soil acidification at this site can be explained by the presence of free lime (calcium carbonate) which counteracts the acidification caused by the sulphur granules. Also, temperatures below 20°C greatly reduces the amount of acid produced (S.Smith, pers. com.). Consequently, soil pH at the site was not reduced as hoped, and some of the plants displayed nutrient deficient symptoms (interveinal chlorosis of younger leaves) consistent with calcareous soil conditions.

Table 12
Raspberry Variety Trial - Assessment

PLANT VARIETY	July 1998		June 1999		August 1999	
	Alive	Dead	Alive	Dead	Alive	Dead
Kiska						
Row 1	27	7	26	8	23	11
Row 2	27	7	27	7	25	9
Row 3	24	10	23	11	23	11
Boyne						
Row 1	32	2	33**	1	32	2
Row 2	33	1	32	2	33	1
Row 3	33	1	32	2	32	2
Souris						
Row 1	28	6	23	11	24***	10
Row 2	28	6	23	11	25***	9
Row 3	27	7	21	13	19	15
Red River						
Row 1	28	6	26	8	22	12
Row 2	11	23	10	24	10	24
Row 3	16	18	10	24	13***	21
Double Delight						
Row 1	21	13	17	17	19	15
Row 2	26	8	23	11	24***	10
Row 3	20	14	21	13	26	8
Honey Queen						
Row 1	31	3	23	11	23	11
Row 2	34	0	29	5	31***	3
Row 3	29	5	23	11	25***	9

* each row has 34 plants
** new plants had sprouted from the roots
*** plants had been replaced

On June 11 of this year, the plants were assessed again to determine how well they overwintered (Table 12). Overall, Boyne had the greatest number of healthy plants, and Red River had the least.

On June 12, the raspberry plants that died the previous year were replaced with new stock. The new planting stock was not of very good quality, and most of the replacement plants did not take. On June 14th, each plant was fertilized individually with approximately one handful of fertilizer. Much less fertilizer was used than when the whole row was fertilized. The herbicide "Round-Up" was applied to the grass in the rows between the raspberry plants to decrease the competition for water and nutrients.

On August 24, the second year assessment comparing variety performance in terms of fruiting and plant vigour was performed. Boyne continues to receive the highest rating, having both the best fruit set and plant vigour. The primocane variety, Double Delight, was a surprising second in vigour with strong re-growth. As of the August 24th, this variety had finished flowering and had a good fruit set. However, it was unlikely to mature as killing fall frosts had already occurred in the valley. Honey Queen, reported to be the hardiest of the yellow raspberries, was third in vigour during the second year. Similar to Double Delight, it had a strong fruit set but was not mature at the time of assessment. Honey Queen was also displaying symptoms of iron deficiency in all row treatments due to high soil pH. The Kiska variety from Alaska was the earliest to flower and produce fruit. On August 24th, Kiska was at the end of its fruiting period and its leaves were beginning to show fall colour, indicating it was adapted to a northern photoperiod. This variety, although less vigourous than the first three mentioned, was suckering in the rows and appeared to be well adapted to the Takhini Valley. Both Souris and Red River displayed poor to moderate growth in the second year.

Photo 4: "Honey Queen" Raspberry Showing Interveinal Chlorosis on Younger Leaves

References

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Tarnocai, C., Smith, C.A.S., and Beckman, D. 1988. Agriculture potential and climate change in Yukon. *In* Proceedings of the Third Meeting on Northern Climate, September 7-8, 1988, Whitehorse, Yukon. Atmospheric Environment Service, Environment Canada, Downsview, Ontario, pp. 181-196.

Appendix A

Raspberry Variety Descriptions

Kiska - Developed by Dr. Arvo Kallio at the Agricultural and Forestry Experiment Station, Fairbanks Alaska. Kiska raspberries have thin, willowy canes. Under optimum fertility and moisture, canes may easily reach 6-8 feet in height. These canes tend to bend outward and downward making harvesting difficult.

Boyne (Chief x Indian Summer) – Developed at the Agriculture Canada Research Station at Morden, Manitoba and introduced in 1960. It is the hardiest and most consistently productive cultivar for the Prairies and the main cultivar for commercial production in all colder regions of Canada and the United States. Canes are medium in height, thick, erect and stocky, with many lateral branches. Fruit is medium sized, dark red, firm, juicy, aromatic and tart. It has very good dessert quality, good frozen quality and is excellent for processing and canning.

Red River {[Fall Red x native primocane fruiting type (Cheyenne x Wyoming)] x (Fall Red x Boyne)} – Selected in 1978 at the Agriculture Canada Research Station, Morden Manitoba, Red River fruits earlier than other selections tested. It has medium red berries which are sweet, tart and good. Canes are relatively short and stout with sparse short spines, and grow to a height of 3.5 feet.

Double Delight {[Fall Red x native primocane fruiting type (Cheyenne x Wyoming)] x (Fall Red x Boyne)} – Developed by Agriculture Canada Research Station, Morden Manitoba. Double Delight canes are stout with sparse, short spines and grow to a height of 5 feet. The medium red berries are sweet, tart and excellent.

Souris – Developed by Agriculture Canada Research Station, Morden Manitoba. An improved selection of Boyne because it is better tasting, a heavier producer of fruit and it has 15% better spider mite resistance.

Honey Queen – Introduced by Robert Erskine from Alberta's Rocky Mountain House in the mid-sixties. It is the hardiest of the yellow raspberries. It has good-sized, aromatic berries that have a mild but entirely different flavour than the red berries. The berries are considered soft, and poorly suited to freezing and processing, but are excellent fresh.