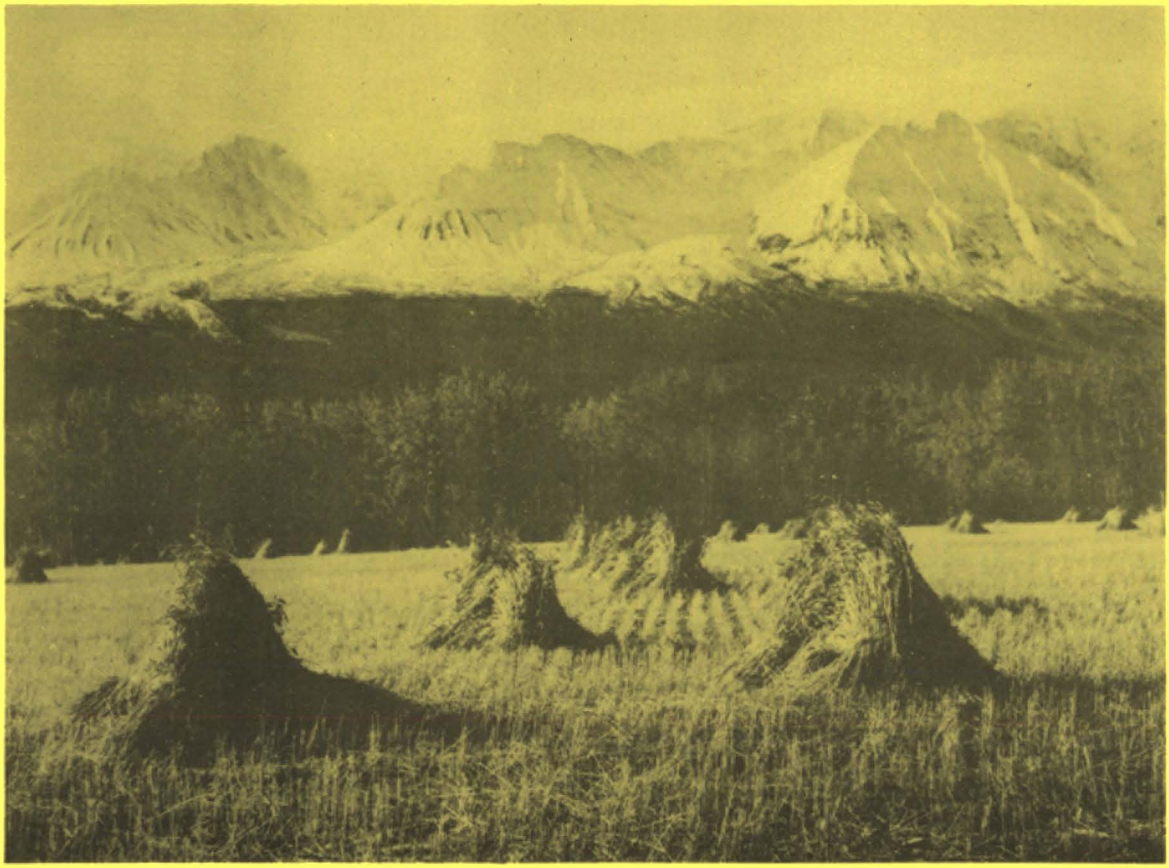

VIEW OF MOUNT ARCHIBALD FROM CEREAL FIELD

RESEARCH HI-LITES 1955-56

WHITEHORSE EXPERIMENTAL FARM

MILE 1019, ALASKA HIGHWAY, YUKON TERRITORY

INTRODUCTION

The Whitehorse Experimental Farm is a young research station, being only 12 years removed from the virgin woodlands of the southern Yukon. The Farm has an area of some 838 acres, of which about 130 acres are at present cleared and tillable.

The purpose of the research conducted at this station is to study the problems of agricultural production in the Yukon. The chief problems are caused by such things as soil infertility, unseasonal frosts and lack of rainfall.

It has been known since the time of the Klondike gold rush in '98 that many of the hardier agricultural crops would grow well at this northern latitude. The work of the Whitehorse Farm is dedicated to a study of these crops in terms of the modifications to the southern agricultural practices that are necessary to achieve maximum crop production in the north, as well as to the introduction, breeding and testing of new crops which might become adapted to northern conditions.

While local agricultural production is not as yet a very profitable endeavour because of such things as high transportation and labour costs and a small local market, it is believed that in the years to come, when Canada's population pressure becomes great enough to push the boundaries of the settled areas northward the Yukon can be as self-sufficient agriculturally as most areas of Canada.

It is visualized that the main stay of Yukon agriculture might well be in the form of beef cattle production. However before detailed studies of this phase of production can be undertaken, it is necessary to put the emphasis of work on the study of field crop production. Because of high transportation costs the importation of livestock feeds and their components must be kept to a minimum if northern agriculture is to be financially sound.

At present the research work at the Whitehorse Farm is in this latter stage of development.

WEATHER

In a consideration of northern agriculture the extraordinary fact that first comes to mind is the weather. The meteorological details that most interest the farmer are such things as minimum temperatures, maximum temperatures, rainfall, total precipitation and frost free periods.

The 1956 weather summary is presented on page 3 along with the twelve year summary averages.

A study of this table will show that the limiting factors to good farm production are, a) low rainfall and low total precipitation, b) a short killing frost free period, and c) a still shorter frost free period.

As a comparison of growing conditions between the Whitehorse Farm and the Experimental Farm at Beaverlodge, Alberta, the following is presented.

	Whitehorse	Beaverlodge
Summer rainfal - total	5.09 inches	9.57 inches
Mean summer temperature	47.7°F.	54.7°F.
Hours of summer sunshine	1122	1282
No. of frost free days	26	97
No. of killing frost free days (temperatures of 28°F. and lower are considered killing)	49	130

This comparison shows the specific meteorological factors which limit agricultural production in the north.

CONTENTS

TECHNICAL STAFF

W. H. Hough, B.S.A. M.S.	Superintendent.
J. Y. Tsukamoto, B.Sc.	Agronomist.

Meteorological data recorded at the Experimental Farm, Mile 1019, Alaska Highway, Whitehorse, Y.T.
Lat. N. 60° - 45' Long. W. 137° - 35'. 1956

	1956 Max Temp. in °F.	1956 Min Temp. in °F.	1956 Mean Max Temp. in °F.	1956 Mean Min Temp. in °F	1956 Mean Temp. in °F.	Ave. 12 yrs. Mean Temp. in °F.	Rain 1956 in inch	Ave. 12 yrs. rain inch	Snow 1956 in inch	Ave. 12 yrs. snow in inch	1956 Total Precipitation in inch	Total Precipitation of ave. 12 yrs. in inch	Bright Sunshine hours 1956	Sunshine hours Ave. 11 yrs.	Free Surface Evaporation in inch
January	36.5	-46.0	.4	-23.0	-22.6	-6.73	0	0.01	0.57	0.67	0.57	0.68	17.1	19.39	
February	40.5	-47.0	10.2	-13.3	- 1.5	-.82	0	0.002	0.16	0.40	0.16	0.41	70.4	77.44	
March	46.0	-41.0	26.2	-3.9	10.7	14.05	0	0.02	0.08	0.27	0.08	0.29	149.8	158.90	
April	62.5	3.5	44.3	18.6	31.5	27.53	0	0.22	0.27	0.23	0.27	0.45	247.2	187.76	
May	68.0	18.0	55.9	27.9	41.9	40.69	0	0.39	0.14	0.10	0.14	0.49	320.5	267.47	4.34
June	74.0	22.5	60.8	33.5	47.0	48.67	3.05	1.22	0	0.02	3.05	1.23	239.1	249.27	6.65
July	80.5	32.0	67.1	40.7	53.9	52.71	1.86	1.54	0	0	1.86	1.54	304.5	244.55	3.86
August	80.0	27.0	63.4	38.2	50.8	48.97	0.56	0.90	0	0	0.58	0.90	200.5	213.68	2.28
September	72.5	4.5	53.3	28.3	40.8	40.59	0.50	1.04	0.09	0.23	0.59	1.27	132.7	146.33	.48
October	48.0	-16.5	34.0	15.3	24.6	28.05	0.10	0.82"	0.12	0.82"	0.22	1.65"	64.9	88.58	
November	56.5	-16.0	30.8	12.4	21.6	9.67	3.69	0.49"	3.60	0.99"	7.29	1.48"	3.2	21.01""	
December	42.5	-46.0	-0.2	-19.9	-10.1	5.10	0	0.41"	1.63	0.93"	1.63	1.34"	0.2	0.34""	
Total							9.78	7.082	6.66	4.66	16.44	11.73	1750.1	1674.72	

Date of last spring frost - July 11th. 32°F.
Date of first fall frost - July 23rd. 32°F.
Date of last spring killing frost - June 24th. 27.5°F
Date of first fall killing frost - Aug. 6th. 27.0°F.

" Average of 13 yrs.
"" Average of 12 yrs.

Frost Free Period - 11 days.

Killing Frost Free Period - 41 days.

HORTICULTURE

The main object of the horticultural experiments conducted at the Whitehorse Farm is to determine the adaptation to northern growing conditions of all horticultural crops inclusive of vegetables, small fruit, ornamental trees and shrubs and annual and perennial flowers. In addition to these adaptability trials certain relative studies on dates of seeding vegetable crops, irrigation of vegetable crops and the use of irrigation to prevent frost damage to tender garden crops have also been conducted.

Dates of Seeding Vegetables.

This study was undertaken to determine the most suitable date for seeding various vegetables. Ten different vegetable crops were seeded on May 18, and 25, June 9, 16 and 23. Radishes were sown until August 25.

Golden Acre cabbage, Little Marvel pea and Laurentian swedes yielded satisfactorily for the sowings of May 18 and 25. A fifty per cent reduction in yield was obtained in seedings after May 25.

Detroit Dark Red beets sown on May 18 bolted 100 per cent by August 1, however sowings made on May 25 and June 9 produced a high yield of good quality roots. When sown after June 9 a 50 per cent reduction in yield was obtained.

Red Cored Chantenay carrots and Keswick potatoes produced good yields of quality vegetables when sown up to June 9. Seedings at later dates resulted in a 50 per cent reduction in yield.

King of Denmark spinach produced good quality greens in ample quantity from all sowings. There were no marked differences among dates of seeding in yield data or in days to bolting.

Cherry Belle radish produced good quality roots for all sowings made until August 12. The sowings of August 16 and 25 were severely frost damaged on September 3.

Early Snowball cauliflower gave unsatisfactory results at all seeding dates tested. These results indicate that

cauliflower must be started indoors and transplanted to the garden during the first week of June.

Great Lakes head lettuce was also included in this trial, but because of poor germination inconclusive information was obtained.

THE RESPONSE OF POTATOES TO IRRIGATION

The application of 3.5 inches of water to potatoes at planting increased the yield of marketable tubers by 341 per cent in 1956.

The variety Early Gem was used as the measuring crop and was planted on June 1st. Immediately after planting 3.5 inches of water was applied by sprinkler irrigation. The yield of marketable potatoes was 1343 pounds per acre from the irrigated lot and 317 pounds per acre from the check or non-irrigated lot.

Spring rainfall at Mile 1019 is very limited. The 12 year average precipitation for April and May is 0.45 inches and 0.49 inches respectively. Crops that require a long time to germinate respond very well when the limited natural water supply is supplemented with irrigation.

Vegetable Section.

Adaptation Trials.

Tomatoes.

The growing of tomatoes at this location is limited to greenhouse culture because of the hazards of summer frosts and the short growing season.

The following varieties are recommended for the Yukon home garden; Quebec #152 - 11 pounds per plant, Early Chatham - 8.5 pounds, and Early Lethbridge - 8.3 pounds.

Cucumbers.

The following four varieties were tested under glass cultivation; Niagara, Marketer, Straight Eight and Surecrop Hybrid.

Surecrop Hybrid with a plant yield of 11.2 pounds and Marketer with a yield of 10.2 pounds are the locally recommended varieties.

Peppers.

The varieties Tendersweet and Vinedale have yielded satisfactorily here when grown under greenhouse cultivation.

Beans.

This vegetable is not a recommended garden crop for this area because of its extreme susceptibility to frost damage.

Peas.

Early maturing varieties of peas produce satisfactorily at the Farm. The suitable varieties for local gardens are; Progress #9, Alton, Alaska Dark Green, Onward Early, and Little Marvel.

Summer Turnips.

Turnips grow well at the Farm, however root maggots can be a troublesome problem if they are not controlled by chlordane emulsion. The recommended varieties are; Early White Milan and Purple Top Milan.

Radish.

Good quality radishes can be grown. Cherry Belle is the recommended variety. As with turnips an application of chlordane emulsion is necessary to control root maggots.

Rutabaga.

This root crop must be sown as early as as possible in the spring to ensure a good crop. Frequently here to, chlordane emulsion treatment is necessary for root maggot control. Laurentian is a successful variety.

Table Beets.

The early sowing of beets frequently results in the plants going to seed (bolting). For a satisfactory crop this vegetable should be sown usually from May 25 to June 7. Flat Egyptian is the recommended early maturing variety while Detroit Dark Red is preferred for its good storing qualities.

Parsnip.

The results to date show that parsnips do not grow satisfactorily at this location. Plans for further study on culture methods for this crop are under way.

Onions - from seed.

This crop is generally unsatisfactory here. The chief reason for its failure is believed to be the long hours of daylight and the cool temperature. These factors appear to delay bulb formation. Chlordane emulsion treatment is necessary for root maggot control.

Carrots.

Like rutabagas, carrots must be sown as early as possible to ensure good plant and root growth. The varieties recommended are; Red Cored Chantenay, Golden Hart and Amsterdam.

Celery.

Utah #15 and Golden Plume varieties have both been tested at the Farm with satisfactory results. Celery must be sown in flats in mid-February in order to obtain a good crop.

Cauliflower.

This crop will produce satisfactorily if the young plants are started indoors in mid-April and transplanted to the garden in early June. The best varieties are, Atle with an average head weight of 4.4 pounds, Codania, 4 pounds, and Snowball E 3.6 pounds.

Cabbage.

Early maturing cabbage when seeded directly in the garden in early spring will produce mature heads. Plants of medium maturing varieties must be started indoors in order to produce mature heads. Late maturing varieties are not recommedned. The recommended early varieties are, Golden Acre, Viking, Small Early, Bergkabis, and First Crop, while the medium maturing varieties are Badger Market, and Glory of Enkhuizan.

Spinach.

This is a hardy leafy vegetable which can tolerate late spring and early fall frost. In 1956 good quality spinach was produced throughout the growing season. Bloomsdale, America and King of Denmark are all promising varieties at this location.

Swiss Chard.

This leafy crop does not have as much frost tolerance as spinach. However it produced good quality greens during the summer season.

The varieties Lucullus and Fordhook Giant grew well here in 1955 and 1956.

Lettuce.

Both head and leaf lettuce grow well at this location. Severe bolting is observed in some seasons. The promising varieties are; Grand Rapids and Salad Bowl leaf lettuce and Great Lakes and Imperial head lettuce.

Perennial vegetables.

Rhubarb.

This vegetable has proved to be the most hardy and satisfactory perennial vegetable grown at Mile 1019. Canada Red and Macdonald are both suitable varieties.

Chives.

Chives and perennial onions are also hardy at this location.

Small Fruits.

Strawberry.

All varieties tested to date have been unsatisfactory in production. The hybridization of hardy native strawberries and domestic varieties to obtain a hardier strawberry of the domestic type is under way at the Farm.

Raspberry.

The production of this berry in 1955 and 1956 was unsatisfactory because of a severe infestation of mites.

Currants.

In 1956 severe winter injury was suffered by all varieties of black, red and white currants.

Further study is necessary to ascertain their adaptation here.

Gooseberry.

The production of domestic gooseberries has been unsatisfactory here. Native gooseberries frequently yield well.

Saskatoon berry.

This is the hardiest bush fruit tested; it consistently yields well and is highly recommended.

Annual Flowers.

The kinds of annual flowers that will bloom well here are quite limited in number because of the frost hazards. In 1956 annual flowers seeded directly in the garden were not satisfactory. However annuals started indoors and set out in early June bloomed rather well. Alyssum, early flowering aster, kochia and dwarf morning glory produced abundant flowers while snapdragons, cosmos and salpiglossis produced a few blooms. Marigolds, zinnias, sweet peas and dahlias started indoors and set out in early June were a failure in 1956.

Perennial Flowers.

A few species of perennial flowers were tested in 1955 and 1956.

Delphinium is the hardies perennial with the variety Pacific Hybrid highly recommended.

Peonies were also quite hardy and bloomed

profusely in 1955 and 1956. The varieties Festiva Maxima and Sarah Barnhardt were the most satisfactory.

Bleeding Heart and Pink (dianthus species) also showed promise but they were considered to be only semi-hardy at this location.

Ornamental Trees and Shrubs.

Because of the difficulty in making sufficient plant growth in the first year of planting, ornamental trees are not winter hardy here.

Ornamental Shrubs are generally quite promising however. A small white single flowered Scotch rose is very hardy as is hawthorn. Media spirea is quite hardy also. This is a dwarf spirea that produces very attractive clusters of white flowers. Golden clematis is the only hardy climbing vine that survives here. It produces an abundance of yellow flowers and silver coloured seeds after flowering.

CEREAL CROPS

In general good quality oats and barley can be grown satisfactorily in the Yukon. Spring wheat occasionally matures but frequently it freezes before maturity, resulting in the harvesting of green grain of feed grade quality, which is difficult to store. Winter wheat reaches a more advanced stage of maturity than spring wheat before it is subjected to fall frosts but it seldom is ripe and dry enough to be stored in the bin when newly threshed. Winter rye usually is a reliable crop and is comparable to barley in stage of maturity at harvest.

The drying of partially matured grains at harvest time, without the use of expensive mechanical dryers is one of the major obstacles to cereal crop production in the north.

Oats.

In a study of the adaptability of oat varieties to northern growing condition, the following varieties have been tested and are listed here according to the quality of the grain produced. The main factor used in judging quality was maturity of the grain.

	Varieties	Yield bus./acre	Average of-years results
1	Larain	43	5
2	Garry	58	1
3	Scotian	51	1
4	Simcoe	56	3
5	Shefford	52	3
6	Abegweit	75	4
7	Ajax	68	2
8	Beaver	56	4
9	Rodney	72	2
10	4218-8	56	1
11	4083-6	58	1
12	Exeter	79	3
13	Vicland	44	5
14	Gold Rain	67	5
15	Victory	68	5

These results show that Larain gives the best quality grain while Exeter yields the largest quantity. In the selection of a satisfactory variety of oats to grow in the Yukon for feed purposes, the first choice is Abegweit because of its relatively

good quality and its high yield.

Barley.

In a barley adaptability study similar to the oat study above the yield results are as follows;

Note: The barley varieties are not ranked according to the quality of the grain produced. However since the main factor used here in judging quality is maturity the early maturing varieties generally have the best quality.

Varieties.	Yield bus./acre	Average of years results	Maturity rating (Yukon)
S-48-2	47	2	early
S-48-5	46	2	early
Olli	44	5	early
Sask. 5210	42	2	early
Asa	54	1	medium
Wolfe	50	2	medium
Vantage	46	3	medium
Gateway	47	5	medium
Edda 1	47	5	medium
Edda 11	45	3	medium
Br. 3902	43	3	medium
Vantmore	45	2	late
Parkland	44	1	late
Pirrka	41	1	late

In 1955 the ranking of the varieties according to quality generally paralleled their maturity rating. In 1956 the varieties Olli, S-48-5, Edda 1 and Edda 11 were the highest in quality of the varieties tested while Vantage and Vantmore showed the poorest quality because of the presence of many discolored and immature seeds.

On the basis of its early maturity, high quality and consistently good yield the recommended barley variety for the Yukon is Olli.

Spring Wheat.

In general spring wheat is not considered a reliable grain crop for the Yukon. Its late maturity often results in the production of green immature grain which is difficult to store. The only fully ripened wheat crop produced at the

Whitehorse Farm was grown in 1953.

However, wheat of an acceptable feed grade is usually produced and can be profitably used as an ingredient in home grown mixed feeds for livestock.

The results of the spring wheat variety tests are as follows:

Varieties	Yield bus./acre	Average of - years results
Saunders	32	5
Thatcher	31	5
Khogot	29	5
Diamond X Khogot S 29	33	2
Yagui 50	29	2
Gasser	25	2
40-31-22	34	1

The variety Saunders gave the best quality grain and appeared to be the most frost resistant, while Thatcher produced the lowest quality wheat and was very susceptable to frost damage. Because of its consistently high yield and resistance to frost damage the recommended spring wheat variety for the Yukon is Saunders.

Winter Wheat.

In a study of the adaptability of winter wheat to Yukon conditions the following varieties were tested and results obtained. The varieties are listed according to the quality of the grain produced.

	Variety	Yield bus./acre	Average of - years results
1	Minter	22	3
2	Marmin	19	4
3	Minturki	22	2
4	Yogo	25	4
5	Comanche	21	3
6	Kharkov M C 22	26	4
7	Minhardi	27	3

While the yields of winter wheat do not exceed those of spring wheat, for any given year winter wheat usually produces grain of superior quality to spring wheat.

In selecting the best variety for use in the north primary consideration must be given to the winter hardiness of the seedlings. On the basis of its winter hardiness and its high yield the variety Kharkov MC 22 is recommended for the Yukon.

Winter Rye.

A small adaptability trial on winter rye has been conducted for the past four years.

The results are as follows:

Variety	Average Yield
Dakold	38.8 bus./ acre
Sitnikoff	35.4 " "

Because of its superior winter hardiness Sitnikoff winter rye is the recommended variety for the Yukon.

FORAGE CROPS

The main object of the forage crop investigations at the Whitehorse Farm is to select the species and varieties of grasses and legumes that are most adaptable to hay and pasture uses in the Yukon.

A summary of the data collected to date is given in the following table.

Species	Winter hardiness	Drought resistance	Herbage quality
Brome grass	1	3	3
Wheatgrass			
Crested wheatgrass	1	2	3
Slender wheatgrass	1	2	3
Intermediate wheatgrass	1	2	3
Timothy	2	4	3
Wild ryegrass			
Russian wild ryegrass	2	3	3
Siberian wild ryegrass	1	3	2
Canada wild ryegrass	2	2	4
Fescue			
Creeping red fescue	2	3	3
Tall fescue	1	3	3
Reed canary grass	2	3	3
Big bluegrass	1	3	3

Winter hardiness 1 - excellent
5 - very weak

Drought resistance 1 - excellent
5 - very poor

Herbage quality 1 - excellent
2 - very poor

A perusal of the data summary given above shows that brome grass, wheatgrass, timothy, wild ryegrass and Reed canary grass are the most promising of the forage grasses studied.

Brome grass:

This is the hardiest grass tested at Mile 1019. It is easy to establish, and withstands considerable drought and maintains its stand well. It is recommended for up-land hay and pasture crops, and in a pasture mixture it may be used as the main species.

Wheatgrass.

Crested wheatgrass - Plant growth of this species starts early in the spring making it a very suitable grass for

use in an early pasture mixture.

Slender and Intermediate wheatgrass - These species are very winterhardy. They are suited best for use on poor sandy soil where they will provide some light grazing and will prevent soil erosion.

Timothy.

This species is best suited as a low land hay crop. When used as such it will produce hay of good quantity and quality.

Wild ryegrass.

Siberian wild ryegrass - This species produces early spring herbage of good quality. It is quite winter hardy and seed can be produced locally without difficulty. A disadvantage of this species is its loss in palatability after heading.

Russian wild ryegrass - This species produces an abundance of basal leaves and provides good spring pasture. However the herbage becomes quite coarse in texture during midsummer.

Canada wild ryegrass - This species is very slow in producing spring growth. However it does make rapid lush growth during the summer months when many other forage species are in a period of partial dormancy.

Fescue.

Creeping red fescue - This species gives good plant growth on low land. It should only be used as a minor component of a pasture mixture.

Tall fescue - This grass is very winter hardy and does well in a pasture mix.

Reed canary grass.

This species can be satisfactorily grown with timothy on low land where prolonged spring moisture conditions are expected.

Big blue grass.

This grass is equal in winter hardiness to tall fescue and can be used as a minor part of the pasture mixture.

Legume species.

At present the adaptation of domestic legume crops at this location is extremely limited because of 'Brown Root Rot' a disease which is prevalent under the cool climatic conditions of this territory. 'Brown Root Rot' is caused by a parasitic fungus which lives in cool soil. It attacks the tap roots of legume plants 4" to 5" below the ground level and infected plants are soon weakened and killed. This organism was first noted at the Farm in 1952. Since that time it has been found elsewhere in the Yukon and it is now believed to be quite common to the whole territory.

In 1956 old stands of common alfalfa in the introductory nursery have been infected by 'Brown Root Rot' with a 99 per cent loss. No apparent damage has been noted on companion plots of yellow blossom alfalfa. Observations show that sweet clover is the most susceptible legume to this organism. Red clover and alsike clover are quite susceptible also while common alfalfa is just moderately susceptible.

Yellow blossom alfalfa is the only common legume that can be safely recommended for this area.

FIELD HUSBANDRY

The main object of the field husbandry studies at the Whitehorse Farm is to improve the productivity of grain crops by cultural methods.

At the Farm the soil type ranges from sandy silt to heavy clay. The soil is deficient in organic matter and available phosphorus. The prevailing cool dry weather of April and May prolongs the spring season and retards the plant growth of grain crops. Early fall frosts is also one of the chief limitations to grain production at this location.

Crop Rotation.

The chief aim of this study is to improve the productivity of the grain crops grown and maintain soil fertility. Ajax oats were used as the test grain crop while a mixture of approximately 40 per cent legumes and 60 per cent grasses was sown as the hay part of the rotation. The rotations tested were as follows:

1. a two year rotation of grain and fallow.
11. a three year rotation of grain, grain and fallow.
111. a six year rotation of grain, grain, hay, seeded without a nurse crop, hay, hay and hay.
1V. continuous grain crop (used as an experimental check).

Average of Eight Years Yields of Crop Rotations

Rotation	1949	1950	1951	1952	1953	1954	1955	1956	Ave.
2 years rotation	18.2	33.9	30.2	24.6	29.7	36.2	15.5	36.5	28.1
3 years rotation	25.0	27.4	19.1	26.3	34.5	31.4	14.9	31.0	26.2
continuous grain	35.6	19.1	22.5	22.8	21.6	21.2	4.5	25.7	21.6
6 years rotation	36.1	43.7	43.5	47.6	50.2	58.3	22.4	34.7	42.0
(grain yield is in bushels per acre)									
1st. year hay			1.2	0.6	0.4	0.8	1.3	0.7	0.8
2nd. year hay			0.6	0.5	0.6	0.4	1.0	0.9	0.7
3rd. year hay			0.7	0.5	0.7	0.5	0.7	0.7	0.6
(hay yield is in tons per acre)									

The annual yields of grain were averaged with the fallow treatment when summer fallow was used. This provided a much more

accurate measure of the productivity of the rotation.

The average yield figures presented above shows that a six year rotation of grain with hay proved to be the most satisfactory at this location. In most seasons the yields of the first hay crop were higher than subsequent crops. This is due to the thick stands of legumes in the first seasons crop; legumes diminish in stands sharply after the first year.

The Response of Barley to Commercial Fertilizers.

The object of this study was to attempt to hasten the maturity of the grain crop and increase the grain yield.

Commercial fertilizers were applied to the fallow land in the form of

I.	ammonium nitrate	-	48 pounds per acre.
II.	triple superphosphate	-	100 pounds per acre.
III.	muriate of potash	-	32 pounds per acre.
IV.	ammonium phosphate	-	100 pounds per acre.
V.	9-27-9 (complete)	-	180 pounds per acre.
VI.	no treatment	-	check.

Olli barley, the test grain, was sown at the rate of two bushels per acre.

Response of Barley to Commercial Fertilizer.

Treatment	Average Yield bushels/acre	Average days to ripen	Difference from check plot
Ammonium nitrate	39.9	128.2	2.25 days delayed
Triple super-phosphate	63.2	107.2	18.7 days advanced
Muriate of potash	40.5	133.0	7 days delayed
Ammonium phosphate	69.2	108.5	17.5 days advanced
Complete 9-27-9	87.4	112.5	13.5 days advanced
Check No treatment	43.1	126.0	-

In 1956 the young barley plants were severely injured by 9 degrees of frost in May. The plots which received the phosphorus fertilizers recovered rapidly while those not phosphorus treated made a very slow recovery. This caused the wide range in the number of 'days to ripen'.

An acceleration in maturity was very evident in all plots receiving phosphorus fertilizers. The hastening of maturity is a very important factor in the production of mature grain at this location because of the short growing season which prevails.

In addition to its maturity hastening effect, phosphorus fertilizer also increased the yield of barley. This effect may be due to the rapid recovery made by the young plants from frost damage, thus giving the plants an opportunity to tiller-out more. These stronger plants with the advantage of hastened maturity produce a larger number of heavy mature heads and so increase the grain yield.

It appears that the application of muriate of potash and ammonium nitrate to the barley crop tended to depress the yield and delay the maturity of the grain. However further study is necessary before this conclusion can be considered definite.

OFF-STATION TEST PLOTS

The purpose of off-station plot testing of cereal and forage crops is to determine the local adaptability of these crops to the various growing conditions found in the different area of the Yukon. From 1949 to 1956 tests were conducted at thirteen different sites ranging from the southern to the central part of the territory.

MAYO DISTRICT

Red clover and ladino clover produced good plant growth here the first year but severe winter killing sharply reduced production in subsequent years. At least part of the legume loss that is attributed to winter killing actually is due to 'brown root rot'. Alsike clover appeared to have some resistance to winter killing but growth after the first season was only fair. Yellow blossom alfalfa maintained a good stand each year and consistently produced a good growth.

Fairway crested wheatgrass, Chewing's fescue, and Western ryegrass produced good growth the first two years but thereafter the forage production was inferior. Creeping red fescue and Climax timothy produced vigorous plant growth for the first three seasons but thereafter lost vigor. The limitations to continued forage production of these grass species at this location are believed to be a deficiency of soil moisture and fertility.

Beaver and Ajax oats and Olli barley performed satisfactorily here but the short growing season made wheat a marginal or hazardous cereal crop.

DAWSON DISTRICT

Ajax oats and Olli barley gave good yields here but wheat is an unreliable crop because of the short season. Oats and barley usually matured by the third week of August.

It has been found that forage grasses grow well the first year in this area but sufficient data is not available as yet to substantiate any comment on winter hardiness.

FORT SELKIRK - PELLY DISTRICT

As in most Yukon areas here too oats and barley are dependable crops while wheat is marginal. Production figures show yields of 36.1 bushels per acre for Beaver oats, 32.3 for Newal barley and 32.0 for Reward wheat - the wheat was immature.

Grimm and Rhizoma alfalfa had good over-wintering habits in this district as did crested wheatgrass, creeping red fescue and western ryegrass. Timothy and red clover were less adapted here than the above listed forages.

CARMACKS DISTRICT

In the six seasons from 1951 to 1956 two varieties of wheat, one of barley and six varieties of oats were tested here. The yield results are as follows;

Garnet wheat	-	22.3 bus./acre	1*
Saunders wheat	-	13.2 " "	2
Olli barley	-	18.8 " "	3
Ajax oats	-	33.8 " "	3
Beaver oats	-	31.0 " "	8
Larain oats	-	27.7 " "	1
Shefford oats	-	30.4 " "	1
Rodney oats	-	33.0 " "	1
Victory oats	-	37.0 " "	1

*number of years in the average results.

The quality of the oats and barley was good but the wheat was green and immature at harvest.

During the same six seasons twenty forage grasses and

legumes were tested here. Yellow blossom alfalfa appeared to be the hardiest and most reliable legume tested with Common and Grimm alfalfa next. Sweet clover and alsike clover were found to be less hardy than the alfalfas. Russian wild ryegrass, slender wheatgrass and green stipa grass all appeared to be adapted to this district while timothy, reed canary grass and red top were not.

Yellow blossom sweet clover, alsike clover and red clover were frequently infected with brown root rot at this location.

TAHKINI DISTRICT

The productivity of cereal crops was not satisfactory here since the test plots were situated in a frost pocket, that is in a sheltered area with poor air drainage.

Of the twenty varieties of forage crops tested, timothy, reed canary grass and alsike clover were the most suited crops.

TAGISH DISTRICT

Cereal crops have been tested satisfactorily in this area and good feed grades of oats, barley and wheat have been produced.

Thirteen forage crop species were tested here for two years but because of the effects of 'brown root rot' and apparent soil infertility winter hardiness data was not available. However fair to good plant growth was noted the first year of planting in all species.

MENDENHALL DISTRICT

At this location Kharkov winter wheat and Sitnikoff fall rye produced good plant growth and overwintered in good condition in the two seasons they were tested. Because of severe rodent damage yield figures were not available.

Spring wheat, oats and barley were all tested here but oats was the only cereal to mature and give satisfactory yields. Red Wing flax was tested one year but early fall frosts prevented its maturity.

Of the seventeen forage crop species tested, yellow blossom alfalfa was the only legume adapted here. The limiting factor to adaptation was believed to be the infection of 'brown root rot' suffered each year. Reed canary grass was the only grass which survived at this site and it appeared to be adapted to the area. A limiting factor to good plant growth here is believed to be soil infertility.

ANIMAL HUSBANDRY

A small herd of about 20 head of purebred Shorthorn cattle has been maintained at Mile 1019 for the purpose of observing the cold tolerance and adaptability of beef cattle to Yukon farming conditions. These cattle have access to two small sheltered pens for protection from the weather. They are fed outside and are watered at a creek some 400 yards away. Green oat bundles supplemented with five pounds of oat and barley chop per head per day constitutes the winter ration for the cows. The hay crop is fed primarily to the young stock. In summer the cattle graze on native and improved pastures along and adjoining Pine Creek.

Under the rigorous conditions of the Yukon winter these animals apparently thrive with the limited shelter provided. In 1955 a heifer calf was born in August and contrary to expectations she tolerated the severe cold of winter quite well.

The health status of the herd is very good. In September 1956 all animals were negative to the tuberculosis and brucellosis tests conducted at that time. The calving rate was 100% for the years 1955 and 1956.

POULTRY

A small flock of laying hens has been maintained, on a yearly basis, at the Farm for the purpose of observing the adaptability of poultry to northern conditions when no supplementary heat is used in the laying house.

A double walled, insulated hen house was constructed and in 1955 the egg production of Barred Plymouth Rock hens in this house reached a peak of 75 per cent when the birds were 26 to 31 weeks of age. As the hens matured production dropped to 72 per cent.

In 1956, White Leghorn hens were raised. The egg production for this breed seldom exceeded 50 per cent. The reason for this lower production is believed to be partly due to an undiagnosed pathological condition suffered by the chicks at brooding.

Because of the fact that much of the poultry feed must be imported from British Columbia at a high freight cost, egg production is not a financially sound venture at present.

Future research is planned to study the practicability of importing only the necessary mineral and protein parts of the ration for mixing with locally grown grains. This would result in a substantial decrease in the costs of poultry feeds in the north.