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U. S. DEPARTMENT OF AGRICULTURE.

OFFICE OF EXPERIMENT STATIONS—BULLETIN NO. 169.

A. C. TRUE, Director.

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REPORT

ON

AGRICULTURAL INVESTIGATIONS IN ALASKA,  
1905.

BY

C. C. GEORGESON, M. S.,  
*Special Agent in Charge of Alaska Experiment Stations.*



WASHINGTON:  
GOVERNMENT PRINTING OFFICE.  
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## LETTER OF TRANSMITTAL

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U. S. DEPARTMENT OF AGRICULTURE,  
OFFICE OF EXPERIMENT STATIONS,  
*Washington, D. C., April 30, 1906.*

SIR: I have the honor to transmit herewith and to recommend for publication as Bulletin No. 169 of this Office a Report on Agricultural Investigations in Alaska for 1905, by C. C. Georgeson, M. S., special agent in charge of the Alaska agricultural experiment stations.

Respectfully,

A. C. TRUE,  
*Director.*

HON. JAMES WILSON,  
*Secretary of Agriculture.*



# CONTENTS.

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	Page.
Weather conditions .....	7
Summary of the season's work .....	7
Sitka Station .....	7
Burning lime .....	9
Cooperation with settlers .....	10
Meteorological work .....	11
Copper Center Station .....	11
Irrigation may be necessary .....	12
Fertilizers improve the yield .....	13
Fall plowing essential .....	13
Early seeding necessary .....	13
Rampart Station .....	13
Kenai Station .....	14
Reservation at Fairbanks .....	15
The Tanana Valley .....	18
Hot Springs, Tanana Valley .....	18
Work with live stock .....	20
Situation at Kenai .....	21
Homesteads .....	22
Grass investigations .....	22
Imports of farm products .....	23
Forests in the interior .....	23
Analyses of soil from Sitka Station .....	25
Angora goats at Copper Center .....	26
Notes on garden and nursery, Sitka Station, 1905 .....	27
Apples .....	27
Cherries .....	31
Plums .....	31
Bush fruits .....	32
Ornamentals .....	34
Vegetables .....	34
Work at the Copper Center Station .....	39
Outline of operations .....	39
Weather conditions .....	40
Culture work and field notes .....	40
Vegetables .....	51
Nursery .....	54
Flower garden .....	54
Fall seeding .....	54
Live stock .....	54
Work at the Rampart Station .....	55
Weather conditions for the year .....	55
Progress of station work .....	55
Field crops .....	56
Vegetables .....	58
Flowers .....	60
Distribution of seed .....	60

	Page.
Work at the Kenai Station .....	60
Weather conditions .....	60
Work accomplished .....	60
Additional equipment .....	61
Grain .....	61
Legumes .....	61
Grasses .....	62
Vegetables .....	63
Flowers .....	65
Fruits .....	65
Live stock .....	65
Reports from seed distribution .....	66
Reports for 1904 .....	80
Soil temperatures .....	91
Meteorological reports .....	94

---

## ILLUSTRATIONS.

---

### PLATES.

	Page.
PLATE I. Fig. 1.—View of Tanana Valley from Hot Springs farm. Fig. 2.— Nenana, Indian village on the Tanana .....	16
II. Fig. 1.—Vegetables, Hot Springs farm on the Tanana. Fig. 2.— Vegetables, Hot Springs farm on the Tanana .....	20
III. Fig. 1.—View on Alaska Central Railway. Fig. 2.—Town of Seward, Resurrection Bay, terminus of Alaska Central Rail- way .....	22
IV. Views at the Copper Center Station .....	40
V. Views at the Copper Center Station .....	48
VI. Fig. 1.—Station herd, Kenai Station. Fig. 2.—Cutting grain at Kenai Station .....	60
VII. Fig. 1.—Vegetables and meat at Sitka. Fig. 2.—Vegetable gar- den on La Touche Island—a typical prospector's garden .....	66
VIII. Vegetables grown at Council City by Mrs. C. B. Phillips .....	78

### TEXT FIGURE.

FIG. 1. Map of proposed United States reservation for experiment station purposes between Fairbanks and Chena, Alaska .....	16
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# REPORT ON AGRICULTURAL INVESTIGATIONS IN ALASKA, 1905.

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## WEATHER CONDITIONS.

In Alaska the weather is the controlling factor which determines the degree of success attainable in agriculture. During the season of 1905 the weather was favorable to agricultural operations in the coast region. The months of July and August were bright and warm, and the gardens throughout that region were quite successful. In the interior, on the other hand, conditions were somewhat less favorable. The spring was late, raw, and overcast. Seeding was therefore late and early growth was slow. In July and early August the weather was favorable, but during the middle and latter part of August the weather was rainy and overcast, which retarded the ripening of the crops. Conditions were not uniform throughout the interior. In the Yukon and Tanana valleys the settlers complained of too much rain and not enough sunshine. In the Copper River Valley there was not enough rain, and killing frosts began in the latter region as early as August 14. Light frosts occurred in the Yukon Valley on several days the latter part of August, but no killing frosts destructive to hardy plants occurred until September. Hence the grain crops matured at the Rampart Station, although they were late, while only a small percentage matured in the Copper River Valley because of an early killing frost.

## SUMMARY OF THE SEASON'S WORK.

### SITKA STATION.

It was explained in last year's report that the work of the Sitka Station would in the future be devoted chiefly to horticulture. In conformity to this plan two lines of work were undertaken which it seemed most important to prosecute: (1) The introduction, propagation, and testing of fruit trees and fruit bushes, with a view to ascertaining what sorts, if any, can be successfully cultivated in Alaska; and (2) the testing of varieties of vegetables best suited to the climate and the soil in various parts of the Territory.

As to the introduction and propagation of nursery stock work begun last year was continued. Among fruit trees attention has been chiefly directed to the apple as the one most likely to succeed in far northern latitudes. Only summer varieties have been selected, and these again of only the hardiest sorts. It is almost certain that the season in any part of Alaska is too short to mature fall and winter varieties, but summer apples which, in more southern latitudes, mature in July or early in August may possibly have time to develop before the cold weather sets in. As stocks, seedling apples of hardy varieties have been chosen. Several thousand of these seedlings have been grafted at the station, and some have been purchased already grafted. A few trees of each of the promising varieties have been planted at the station with a view to noting their behavior, but the majority have been or will be sent out to all parts of the Territory to be tested. It will take some years before results can be secured from which it is safe to draw conclusions. Success in fruit growing is problematic at best. At Wrangel are two trees known to the writer which have matured apples. There is a native crab apple in south-eastern Alaska (*Pyrus rivularis*), but it is little more than a bush, though specimens have been found with trunks 5 or 6 inches in diameter. It is of slow growth, and on that account it is doubtful if it would have any value as a stock on which to graft. The apples are about the size of sour cherries, but they are much valued for jelly. When the weather is cold and rainy during the flowering period, the last of May, these native crab apples fail to set fruit. This would point to failure also of better varieties under similar conditions. Among the varieties considered for introduction, we have selected several of the crab apples and their hybrids as being on the whole the most promising sorts.

The nursery stock at the station has not grown as vigorously as it would in a better soil and warmer climate. This is in part due to the soil, which has not as yet been brought into satisfactory condition. Our efforts to improve it will be briefly mentioned later. A year ago there were slight signs of fungus diseases appearing on the nursery stock. The past season this evil increased so that we found it necessary to spray with Bordeaux mixture several times. These sprayings kept the attacks in check, but they nevertheless had a retarding effect on the growth. This nursery work will be continued and extended.

While there may be some doubt of the success of fruit trees, there is no doubt whatever concerning the success of fruit bushes in almost all parts of Alaska south of the Arctic Circle. Raspberries and currants grow wild, and cultivated varieties of these bush fruits are grown with marked success everywhere they have so far been tried. In the coast region raspberries, currants, and gooseberries grow better

and yield more fruit than they do in regions east of the Rocky Mountains. It is planned to test as many varieties of these as can be obtained at slight cost, in order to determine what sorts do best.

Strawberries have been only a partial success at the Sitka Station. The cultivated varieties so far introduced have been winterkilled, not, indeed, as the result of cold weather, but by repeated freezings and thawings, which caused the plants to be heaved out of the soil, even when protected by a covering of spruce boughs. In some places strawberry culture is quite successful, as, for instance, at points on Prince of Wales Island, at Killisnoo, and in some gardens at Skagway. The native Alaskan strawberry has been brought under cultivation, and though it grows well it is found to produce very little fruit. Efforts will be made to produce hybrids between this native berry and some of the cultivated varieties. In this connection I will mention that we succeeded last year in cross-fertilizing the cultivated raspberry with the salmon berry (*Rubus spectabilis*), which grows wild throughout the coast region. The two plants do not bloom at the same time, the salmon berry being out of bloom before the raspberry begins. To overcome this we planted raspberry bushes in boxes and kept them in the greenhouse, and the periods of blooming of the two were thus adjusted to correspond to each other.

In the line of vegetable growing efforts were directed chiefly to potatoes, cabbage, and cauliflower, though small beds of all the hardy vegetables were grown. The work will be continued. The soil on which these tests were made is new and raw, the best soil having been given over to the nursery work. A piece of new ground in front of the cottage has been grubbed and drained. This has, however, only proceeded when time could be spared from the cultivated ground. It is not completed and will be continued as time and means may permit.

#### BURNING LIME.

For the purpose of procuring lime to apply to the land at less cost than it can be purchased in the local markets, we have tried the experiment of quarrying limestone from a ledge of that material located some 14 miles from Sitka. The launch and scow belonging to the station were used for hauling the rock home, where it was burned. It was impracticable to burn it at the quarry because the frequent rains would slack the burned lime, and it was out of the question to build a rain-proof shelter. The experiment was a success so far as it went. Good, active quicklime was made, and the fuel used consisted mostly of roots and stumps from the clearings. The labor involved is considerable, however, and in the absence of a lime-kiln, which it would not pay to build, only a little over half of the rock was burned sufficiently each time. Two methods of piling the

fuel and rock were tried. In one case a foundation of logs 12 feet long was laid on the ground; on this another layer of logs was laid crosswise, and on top of this 2 or 3 feet of roots and stumps. A layer of lime rock, broken in sizes of 6 or 7 inches in diameter, was piled on top 1 foot thick. Then the pile was built up with alternate layers of fuel and lime rock until it was 12 feet high. Slabs (the outer cuts from logs), obtained from a local sawmill, were nailed outside the whole pile and the chinks between these closed with sod to exclude the inrush of cold air so far as possible. The top of the pile was also covered with sod, and to secure a good draft a flue was built in the center by placing old barrels, with the bottoms knocked out, on top of each other as the pile was built up. When all was ready a can of lowest grade kerosene obtainable was poured over the whole and the fire started. The result was a success, as stated, to the extent of burning rather more than 50 per cent of the limestone.

In the other case a pit 12 feet in diameter was dug 6 feet deep, and the fuel and rock were piled in alternate layers as before. Here the slabs were not needed. The earth excluded the air more effectively than the slabs did. The results were practically the same. Settlers who have convenient access to a ledge of limestone can burn lime in this way. More would be burned at the station but for two circumstances. One is that the launch is disabled, so that the limestone can not be hauled, and the other is a fall in the price of lime on Puget Sound, by which it can be laid down at the station at \$1.67 per barrel of 200 pounds, all charges paid. At this rate there will be little if anything saved by burning the lime, when all the items of quarrying, hauling, and cutting and transporting the fuel, etc., are counted.

#### COOPERATION WITH SETTLERS.

As in former years, the station has enlisted the cooperation of the settlers throughout the Territory in the testing of varieties of vegetables, by the distribution of seeds for their use. Seeds are sent to those who desire them with the understanding that at the end of the season they are to write a detailed report of the results obtained. Very many of them neglect this duty; others, however, do write interesting and valuable reports, some of which are published under the head of "Reports from the seed distribution." The object is two-fold—first, to ascertain as far as possible what varieties of vegetables are best suited to certain regions, and, second, to ameliorate the conditions of life among the settlers and prospectors by helping them to raise gardens.

In this connection we desire to give grateful acknowledgment to the chief of the Bureau of Plant Industry, Dr. B. T. Galloway, and to Mr. A. J. Pieters, in charge of seed and plant introduction and distribution, who have furnished the seed for this purpose.



As noted, we have extended this cooperation by the distribution of selected fruit trees and fruit bushes. Only a limited number of trees were available last year, so only a few were sent to each person, and we were unable to fill all the applications received; but it is planned to continue and extend this work. It is of vital importance to ascertain which varieties, if any, of the tree fruits can be successfully grown in Alaska, and it is likewise important to stock the Territory with fruit trees, if any are found which will mature fruit. The apple is at once the most important and the most likely fruit to mature. This is therefore given chief attention. The varieties under experiment are enumerated in the notes (page 27).

#### METEOROLOGICAL WORK.

The cooperation with the United States Weather Bureau in collecting meteorological data has been continued during the past year. The Weather Bureau supplies the instruments required for voluntary observer's stations. They consist of a maximum and a minimum thermometer and a rain gauge. The special agent establishes the stations wherever it is thought desirable one should be located, provided a reliable permanent resident can be found to undertake the work, which is wholly without compensation. Monthly reports from all these stations are sent to the special agent at Sitka, who conducts the correspondence and issues supplies as needed. It is a most important work and should be continued for a long period of years, but it involves considerable office work.

#### COPPER CENTER STATION.

The work of this station is devoted chiefly to grain growing. About 40 acres in all have been cleared, and the past season this area was divided into about 200 plats and cropped mainly to grain, but also to grasses and vegetables. Only a small percentage of the grain matured this year. Early frost is the bugbear of this station. This is the third year since work was begun here. In 1903 the first frost occurred August 27. At that date nearly all the grain had matured, so the outlook was quite encouraging. In 1904 the first killing frost occurred August 17. At that time only the earliest varieties had matured. But this year a severe killing frost occurred August 14, before any but the very earliest sowings of the earliest varieties had matured. Owing to the fact that we have but one team and only one man employed the period of seeding necessarily extends over some three weeks, the past year from May 9 until the close of the month. Now, it is found that the varieties sown before May 15 have matured, at least in part, whereas those sown later than that date were totally killed by frost and had to be cut for hay. In no case did a variety

mature as completely as could be desired. The following varieties matured in part: Kharkov winter wheat and Ladoga spring wheat; Excelsior winter rye; Champion, Lapland, and Manshury barleys, and, to a less extent, Chevalier, Odessa, Black Hulless, Hanna, and Primus barleys. The following varieties of oats matured in part: Finnish Black, Banner, Russian No. 2800, Tartar King, Sixty-Day, the Improved Ligowo, and Burt Extra Early.

Attempts are being made to develop varieties which will mature by the middle of August, and there is scarcely any doubt but that we shall succeed in this. The earliest maturing heads will be selected and saved for seed, and this selection will be continued year by year until the result sought is obtained.

It is a rather remarkable fact that killing frost did not occur at the Rampart Station in the Yukon Valley,  $3\frac{1}{2}$  degrees farther north than the Copper Center Station, until September. While there were six light frosts at Rampart in the latter part of August none of these injured the grain seriously, and the crops therefore matured. For some reason, as yet unexplained, the Copper River Valley appears to have killing frosts earlier than the Yukon Valley.

Rapid-growing vegetables did fairly well. Peas were especially successful, and the varieties known as "Alaska" and "Prolific Early Market" matured seed before the killing frost of August 14. Turnips and ruta-bagas succeeded nearly everywhere. The Broad Windsor bean, it is worthy of notice, produced edible pods, but it failed to mature seed before the frost. All the clovers were winter-killed. There is therefore but little hope that the perennial clovers can be grown as ingredients of the pastures.

In the interior grain hay will always be an important crop. In this connection attention is called to the fact that rye gave a better yield than oats or other grain.

#### IRRIGATION MAY BE NECESSARY.

One point which has developed since work began in the Copper River Valley is that the rainfall there is very light, and it is feared it will be insufficient for the normal development of grain crops, at least in some seasons. The rainfall from October 1, 1904, to September 13, 1905, at the Copper Center Experiment Station, was but 9.8 inches. Of this only 3.05 inches fell during the months of May, June, July, and August. The remainder represents mostly snow, which fell during the winter. This looks as though irrigation would be necessary to insure normal development of crops. Owing to the drought in the early part of the summer, much of the grain was too short to cut.

## FERTILIZERS IMPROVE THE YIELD.

It is further to be noted that the soil is not naturally rich. Where fertilizers were applied there was an increase in the yield of straw, which, in some cases, amounted to double the weight obtained on unfertilized plats. Alaska soils are, as a rule, not fertile, except on alluvial deposits near the mouths of the rivers or elsewhere where silt has accumulated. There is but a small amount of vegetable mold in the soil. In the coast region, where the rainfall is abundant, vegetation is luxuriant nearly everywhere, but in the interior, where the rainfall is scant, the native vegetation is not abundant. Consequently, but little humus is accumulated. Owing in part, also, to the same cause, disintegration of the rocky material is not so complete as it is in more southern latitudes; that is, the soil, as a rule, contains a large percentage of gravel. These conditions combine to make the addition of fertilizers very desirable. The fertilizer used the past season was fish guano, an Alaskan product manufactured at Killisnoo.

## FALL PLOWING ESSENTIAL.

An important point to note in regard to grain growing in the interior is that the land should be fall plowed. This will save labor in the spring, when it will be only necessary to go over the field with a disc harrow in order to put it in condition for seeding. All who attempt to farm in the interior should, therefore, make an effort to plow the land thoroughly immediately after the crops are gathered in the latter part of August or the beginning of September.

## EARLY SEEDING NECESSARY.

Another important point is to get the seed in the ground as early as possible. Begin seeding in early May whenever it is possible to work the ground, and let nothing interfere with the work until all the seed is planted. Early seedings may be caught by frost, but late seedings are sure to be.

## RAMPART STATION.

While the Rampart Station was reserved in 1900 and a small clearing of about half an acre made, no one was regularly employed at this station until July, 1904, when Mr. Fred. E. Rader, formerly assistant at Sitka, was made superintendent of the station. He went to work at once and cleared about  $2\frac{1}{2}$  acres of land in that year, 2 acres of which were seeded for the first time in the present season. During the summer of 1905 the clearing was continued, and he has now about  $5\frac{1}{2}$  acres ready for the plow. The cleared portion was seeded to grain and planted to vegetables. It has already been noted that most

of the grain matured, although the seeding was late, the first grain being sown May 18. The summer was not altogether favorable. It was colder than usual, with more cloudy and rainy weather than is normal in that region, and the early growth was slow. Mr. Rader's report (see p. 55) shows that nearly everything matured. Winter rye ripened satisfactorily, but winter wheat, on the other hand, did not fully ripen. These fall-sown grains were partly winter-killed from the fact that the snowfall was very light, and as the snow was the only protection the grain was killed where the snow was thinnest. The writer visited this station in the middle of July and again on August 10. On these dates the prospects were not favorable for the harvest; but seasonable weather continued throughout the month of August, and as the frosts which occurred in the latter part of that month were not severe enough to injure the grain the crops ripened.

Ten thousand feet of lumber were purchased to be used in the building of a house at this station, which is planned to be put up during the summer of 1906. The logs for this lumber were purchased from the contractor who had supplied Fort Gibbon with logs for buildings, and they were sawed and transported through the courtesy of officers of the War Department.

Rabbits are so numerous about Rampart as to be a veritable pest. Both grain and garden crops have to be fenced rabbit proof. In the absence of such protection, everything is eaten to the ground. Part of the cleared ground has been fenced by driving barrel staves in the ground and part will be fenced with wire netting.

#### KENAI STATION.

The writer visited Kenai Station in early September. There are 25 acres under cultivation at this place, all of which was seeded to grain. Only once since the first crop was harvested, in 1899, has grain matured at this station. The summers are too cool and cloudy and, though the rainfall is not excessive, there is a lack of the sunshine which is so necessary for the grain. Last season's crop was intended only for feed and consisted chiefly of oats, though some barley was also grown. These grains made a good growth, and by the beginning of September the grain was in the milk, and thus afforded most excellent feed. The fall was so dry that all the grain was cured for hay.

Pursuant to the plan announced in last year's report, this station will in the future be devoted chiefly to dairying. A small herd of native cattle has been reared at the station, the cows being purchased in the village three and four years ago. There were four cows in milk last summer, which, with the heifers, calves, and yoke of oxen, made a total of thirteen head. From this number the superintendent

sold a cow and a calf, leaving eleven to be wintered. Part of the milk has been sold and part made into butter, which found a ready sale at from 35 to 40 cents a pound. A dairy equipment suited for about twelve cows has been purchased and sent to this station, and the manufacture of butter and cheese will hereafter be the main feature of the work there, aside from the growing of feed and experiments with forage plants.

### RESERVATION AT FAIRBANKS.

The people of Fairbanks petitioned the Secretary of Agriculture last winter for the establishment of an agricultural experiment station at some suitable point in the Tanana River Valley. As a result, the special agent in charge was instructed to examine the Tanana Valley and, if a suitable location was found, to make a reservation for possible future use as an experiment station. Pursuant to these instructions the writer left Sitka on July 9 and went down the Yukon by way of Skagway and Whitehorse, arriving at the Rampart Experiment Station on the evening of July 17. Two days were spent at this station. Superintendent Rader, with one hired man, was hard at work clearing land. The crops on the cultivated ground looked well, but they appeared to be rather late. This was due to cold, wet weather in the spring and early summer. Plans were perfected for the building of a small house for the use of the station, and Mr. Rader and the writer left Rampart July 19 and arrived at Baker, 80 miles from Tanana, July 23. After examining the region about the Baker Creek Hot Springs (concerning which a statement will be made elsewhere in this report), they returned to the river and arrived at Fairbanks July 28. Three days were spent in exploring the country in various directions from Fairbanks, with a view to finding a suitable location for the purpose of an experiment station. The best situation was found to be a tract of land which lies nearly midway between Fairbanks and Chena, and which adjoins the Tanana Mines Railway, now completed between these two towns, with a main line running to the mines. Accordingly, a survey was made of this tract, field notes and map of which are submitted herewith. On the return trip the station at Rampart was again visited while the boat remained in port, and it was noted that the crops had made good progress during the preceding three weeks.

Referring to the map submitted herewith (fig. 1) it will be seen the tract selected lies in the angle formed by the Fairbanks branch of the Tanana Mines Railway and the main line of this road, which forms a junction with the line from Chena to Fairbanks, nearly midway between the two towns, and runs out to the gold diggings

some 20 miles distant. The tract comprises 1,393.97 acres. It is in many respects ideal. A low ridge of hills runs almost parallel to the railway, beginning near the southeast corner of the reservation and extending in a westerly direction three-fourths of the distance across the tract. This ridge is covered with fine timber, consisting

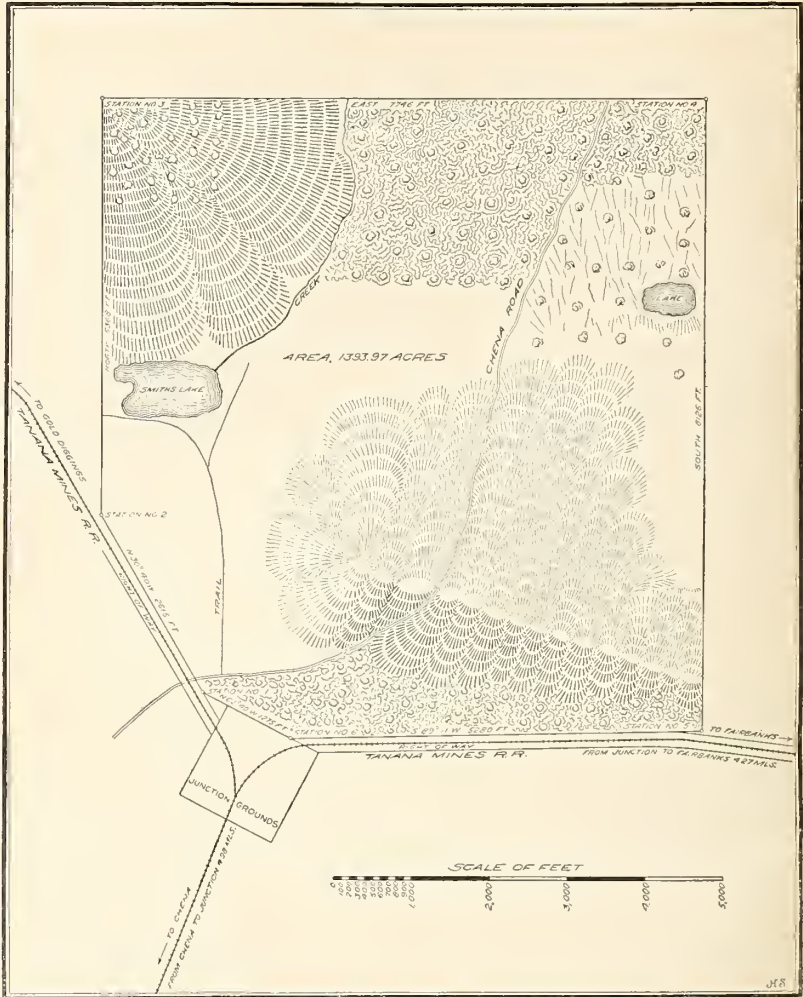


FIG. 1.—Map of proposed United States reservation for experiment station purposes between Fairbanks and Chena, Alaska.

of almost equal proportions of spruce and birch. When cleared it will afford a fine southern slope for culture. The northward slope of this ridge is more gradual than that on the south side. It is timbered in the same way, though the timber is smaller. In the northwest corner of the tract is another elevation, which affords slopes



FIG. 1.—VIEW OF TANANA VALLEY FROM HOT SPRINGS FARM.



FIG. 2.—NENANA, INDIAN VILLAGE ON THE TANANA.





to the south, southeast, and east, of excellent soil, timbered chiefly with spruce and birch. Through the center of the tract from east to west the ground is somewhat low, and there are two lakes, one named Smiths Lake, about 25 acres in extent, and the other, which is unnamed, about 5 acres in extent. Immediately surrounding these lakes is some low, swampy ground, but the waste ground of this nature, and including the lakes, will not exceed 100 acres, all told. The rest of the tract is comparatively level. It has been covered with small timber, but this timber has been destroyed by a fire, which apparently occurred some years ago, and only the dead, charred trunks now remain to tell of the former forest. More than half of these dead trunks have been overturned by the wind and lie scattered in all directions. This timber is small, from 5 to 8 inches in diameter in most cases, though there are some larger trunks. The ground is covered with a scattered growth of low bushes, very prominent among which is the black huckleberry. There are also scattered patches of grass, but there is no general or dense luxuriant growth of grass, unless the sedges on the swampy land and around the lakes be so considered. The writer saw moose tracks in several places, but squirrels were the only wild animals encountered in the woods. A road, which leads from Chena to the mines, runs through the tract, as indicated on the map, and there is also another trail running from near station No. 1, on the southwestern corner, to Smiths Lake and beyond. The shaded hillsides are covered with green timber, the rest of the tract with dead timber and bushes, as stated. The writer considers it an admirable tract of land for an experiment station, and being located on the railway, there will not be the trouble in the transportation of supplies and equipment that was experienced at the Copper Center Station. The top soil everywhere consists of a thin layer of muck, which grows thicker, reaching a foot or more in depth on the lower ground. Below this is a yellow, rather sandy loam. Portions of the tract can be cleared and broken at slight expense.

The Tanana Valley is undoubtedly well adapted to agriculture as we now understand the term in connection with Alaska (Pl. I, fig. 1). The valley is wholly distinct from that of the Yukon, being separated from it by high mountains. According to the reports of settlers and prospectors who have lived in this valley for longer or shorter periods, the climate is milder here than in the Yukon or in the Copper River valleys, and all agree that the spring is at least three weeks earlier in the Tanana Valley than it is in the Yukon Valley. Eighty-two homesteads have been taken up and recorded in the Fairbanks recording district. The proximity of the mines and the wide extent and apparently rich gold deposits make it certain that there will be a large population in this valley for many years to come, and as this population will need grain, forage, and vegetables for its support and

for work animals, it appears to be highly desirable that an experiment station should be started at this point. I recommend that this reservation be set aside as an agricultural experiment station, and that work be begun, even though it be on a small scale, during the year 1906, if possible.

#### - THE TANANA VALLEY.

The Tanana River is a stream of majestic proportions. It takes its rise in the high mountains in about latitude  $62^{\circ}$  N., near the Canadian boundary, and runs in a northwesterly direction until it joins the Yukon in latitude  $65^{\circ}$ . Including the bends and turns in the river, it is about 600 miles in length, though that portion of the valley adapted to agriculture is but about 400 miles long. The river carries a large volume of water, and in places it spreads over a large area. It is navigable to river boats of good size from its mouth to Fairbanks, a distance of 267 miles. For a distance of some 60 miles upstream from Fairbanks the river is divided into a number of shallow channels through which the water flows with great rapidity. In this portion it is navigable only by small and very powerful boats, strong enough to stem a 12-mile current; but beyond this area it is navigable again for more than 200 miles.

The valley inclosing this river has an average width of about 25 miles and consists in the main of a rolling country, densely wooded with spruce, cottonwood, and birch. At a rough estimate the valley contains 15,000 square miles, most of which can be utilized for agricultural or grazing purposes.

The principal settlement is at Fairbanks, 267 miles from the Yukon. The town itself has a population of perhaps 3,000 people, but it is estimated that there are some 10,000 or 12,000 people in that region scattered among the creeks and in the mining camps which have sprung up on the various creeks. Chena, some 12 miles farther down the stream, is a prosperous little town with a fine townsite. There are a few white settlers at Nenana (Pl. I, fig. 2), Kantishna, Tolovana, Baker Creek, and at the famous Hot Springs. At the mouth of the Tanana is Fort Gibbon, where some 200 soldiers are stationed, and a town is springing up in the neighborhood. Above Fairbanks are a few small mining camps, the principal one being at Delta.

#### HOT SPRINGS, TANANA VALLEY.

Some 80 miles from the mouth of the Tanana, a so-called slough, i. e., the stagnant water in an old closed channel, joins the Tanana. Following this slough for a distance of 6 miles one reaches the famous hot springs of the Tanana. The agricultural conditions here are so unique that, although they were mentioned in last year's report, the

writer ventures to return to the subject more particularly, because an opportunity was offered to study the characteristics of the location during the summer of 1905. There are several small hot springs bubbling out of the ground near the head of the slough. The country is strongly rolling, forming a series of knolls and hills, and between and at the bases of these are a number of seepages of hot water. A prospector named J. F. Karshner, who was formerly a farmer in Kansas, happened on these springs, and, correctly estimating their importance, located a homestead, including the springs. He began clearing land, and the following year, that of 1903, he planted his first garden. He met with such remarkable success that he has extended the clearing and continued his gardening operations.

The unique feature of the situation is that the ground over an area of some 25 or 30 acres appears to be warmed, either by the presence of the springs, or, perhaps, from the underlying hot rocks which heat the water. This ground thus forms a natural hotbed. Ordinary garden crops develop with great rapidity. When visited July 24 he had already marketed his early cabbage, cauliflower, carrots, and peas, to say nothing of radishes, lettuce, turnips, and other crops of rapid growth. His new potatoes were fully grown and of excellent quality, and the ground from which the early cabbage and cauliflower had been removed was already planted to the second crop of cabbage. For a hotbed a tent was stretched over a suitable patch of soil and seed sown under it. The natural warmth in the ground, which is not, however, so great as to be readily perceptible to the hand, was sufficient to grow the plants in the month of April to such size that they could be planted in May. The possibilities of the place are very great. Mr. Karshner grows beans, cucumbers, squash, Lima beans, and last year there were likely looking plants of both muskmelons and watermelons growing on the hill-side. It is a patch of the Temperate Zone put down near the center of Alaska.

The illustrations submitted herewith show the nature of the vegetables (Pl. II). The timber on this land is mostly poplar. Men were at work clearing when the writer was there. The accompanying statement from Mr. Karshner gives further details of his operations. He finds a market for all he can produce at Fairbanks.

Farming in Alaska will prove all right in the future when once it is understood what kinds of grains, grasses, and vegetables will do well, and we learn how to grow them. Agricultural products grown here must be managed differently from what they are in the States to make it profitable. It is especially necessary to learn what kinds are adapted to this country.

As to potatoes, seed brought from the States does not yield as good a crop as the seed raised here. I have taken note of that for the last two years, and I suppose it will hold good with all kinds of vegetables and grains. Only time and experiments can determine this with certainty. I shall try to raise more seed of my own. I must cite you another case in point, and that is peas. I

sowed peas of the earliest I had last year and planted them side by side with the same kind I had sent me by a seedsman in Wisconsin with the result that my home-grown seed produced peas fit for use at least five days earlier than the other. So also with potatoes: I got larger and earlier ones from my own seed.

Now, as to the financial side: I suppose you wish to know the prices my crops brought, and I quote as follows: Cauliflower, 40 cents per pound; cabbage, 25 cents per pound; celery, 50 cents per bunch. These held good for the season's crop, but the others fluctuated. Potatoes, 22 cents per pound, and at the end of the season 9 cents per pound; beets, 30 to 10 cents per pound; parsnips, 20 to 18 cents per pound; peas, 25 to 20 cents per pound; turnips, 20 to 8 cents per pound; ruta-bagas, 15 to 10 cents per pound. As to squash, tomatoes, and cucumbers, the cucumbers did fairly well, but I can improve the crop by a different method of planting and caring for them. The squash did not do as well as the first year's crop because the season was unfavorable, the latter part especially being too wet and cold. I had a few squashes. Corn commenced to fill out, but did not mature for the same cause. The tomatoes grew too strong in branches. I had quite a number of small green tomatoes. They did nothing but blossom until I trimmed the tops, then fruit commenced to form. People took them for potato tops. I will prune severely in future. I am satisfied I can raise them here.

### WORK WITH LIVE STOCK.

It is recommended that the small appropriation which Congress has allowed for experiments with live stock be used to purchase cattle and sheep adapted to the climate of Alaska. The Galloway and the West Highland cattle are the hardiest breeds in this country. As many head of one of these, or of both of them, as can be purchased and transported to Alaska with the available funds should be procured. What is needed is a general-purpose animal—one which makes good beef and which can at the same time be used for the dairy. The Galloways are the most numerously represented, and can be purchased for less than the West Highlanders. It is therefore proposed to select Galloway cows with good milking qualities—for, although they are essentially beef cattle, there are some good milking families among them—and, with these cows as a foundation, develop a hardy, all-purpose strain, suited to Alaska conditions.

If the appropriation will permit, it will also be highly desirable to purchase a few head of West Highland cattle. This is a purely beef breed, suited to the rigorous climate and noted for their rustling qualities. Cattle of that class will be of the highest value to Alaska in time to come.

The introduction of hardy sheep is almost equally important, and a portion of the appropriation should be used for this purpose. The Blackfaced Scotch breed, and the Danish breed, which has for long periods of years been bred in Iceland, should be purchased if they can be procured in this country. These are among the hardiest sheep, and it is safe to say that they will do better in Alaska than any so far tried here.



FIG. 1.—VEGETABLES, HOT SPRINGS FARM ON THE TANANA.



FIG. 2.—VEGETABLES, HOT SPRINGS FARM ON THE TANANA.



It is proposed, if the necessary money is appropriated for this purpose, to select from twenty-five to fifty head of sheep, either of the Blackfaced Scotch breed or Iceland sheep, or both. When animals of this character are introduced they should be bred primarily with a view to develop those qualities which are of first importance to meet Alaska conditions, namely, hardiness and usefulness for general domestic purposes. In the view of the writer, the offspring in excess of that required for the experiment stations should be sold to settlers in Alaska for breeding purposes. They would thus aid in stocking the Territory with cattle which the ordinary pioneer could not afford to introduce. Congress has appropriated something over \$200,000 for the introduction of reindeer in Alaska, a measure which in itself is very commendable and highly beneficial to the Territory, but may it not be assumed that cattle and sheep would be of equal value?

It would be greatly to the advantage of the Territory if an appropriation of \$10,000 were made for the establishment of a live-stock station on Kodiak Island, such station to be stocked with cattle and sheep of the above-named breeds. Kodiak is mentioned as the most desirable place for such a station because it affords abundant pasturage, and a breeding station could be maintained there at less cost than elsewhere in the Territory. Some buildings would be needed, but this item would not be costly. Hardy stock could run out nearly the year round, and one competent man would be all the labor needed. Kodiak is, moreover, accessible at all times. Boats touch here regularly, and stock could be shipped to all ports on the coast and from there to interior points with equal ease. If there were sufficient natural pasturage at Sitka, this point would be chosen in preference, because the headquarters for the station work are located there; but the natural pasturage is lacking. Neither can the Kenai Station be chosen, for the reasons set forth below.

#### SITUATION AT KENAI.

The economic conditions on the Kenai Peninsula, particularly as regards transportation, are undergoing an important change. The Alaska Central Railway is building from the new town of Seward, at the head of Resurrection Bay, and will run across the neck of the peninsula to the towns of Hope and Sunrise, and on northward around the head of Knik Arm and through the valley of the Snshitna to the gold fields on the Tanana (Pl. III). This railroad will doubtless carry the traffic destined for the interior and for the northern part of the peninsula, and when completed as far as Sunrise, which will be during the next few months, the traffic on Cook Inlet, which has been chiefly maintained on account of the settlers at Turn-Again Arm, will undoubtedly cease, either in part or altogether. This will

leave the Kenai Station inaccessible except by hiring special conveyance. It is therefore recommended that steps be taken to remove this station to a suitable location somewhere on the railway, the place to be selected after the road is built and in operation.

This change in transportation could not possibly have been foreseen at the time the station was located at Kenai, in 1898. It was then expected that the peninsula would be settled by people who would work in the newly discovered placer mines and in the coal fields, which were then being opened up in the peninsula; but neither the coal fields nor the placer mines have made any progress.

### HOMESTEADS.

The writer has taken pains to ascertain how many homesteads have been recorded to date in Alaska. Reports have not been obtained from all recording offices, but those heard from are as follows:

Circle.....	5
Fairbanks.....	82
Copper Center.....	11
Skagway.....	33
Juneau.....	36
Sitka.....	6
Yakutat.....	6
Catalla.....	3
Valdez.....	39
Seward.....	59
Total.....	280

It is probable, however, that many of these homesteads have been taken up for the value of their timber rather than for the purpose of utilizing the land for agriculture.

### GRASS INVESTIGATIONS.

It is hoped that the very valuable work which was begun by Professor Piper in the summer of 1904, by his investigations of the grass lands along the coast region of Alaska, can be continued. The native grasses and forage plants of the interior have never been investigated by a specialist. The force employed by the Alaska stations can not be spared from their regular duties for this work. It is therefore respectfully recommended that steps be taken to continue cooperation with the Bureau of Plant Industry in this work. If that Bureau could send a man to do the work, Alaska stations might possibly undertake to defray half of his expenses while so engaged in Alaska, the resulting information to be at the disposal of the Bureau of Plant Industry and the Alaska stations.





FIG. 1.—VIEW ON ALASKA CENTRAL RAILWAY.



FIG. 2.—TOWN OF SEWARD, RESURRECTION BAY, TERMINUS OF ALASKA CENTRAL RAILWAY.



## IMPORTS OF FARM PRODUCTS.

During the fiscal year ending June 30, 1904, farm products were imported into Alaska to the value of \$3,340,899. This total includes many things grown in tropical regions, as coffee, rice, sugar, tobacco, nuts, etc., and it also includes whiskey, wines, beer, etc., which are manufactured from farm products, but deducting all of these, the following interesting figures show the imports into Alaska for the year named:

### *Imports into Alaska during the year ended June 30, 1904.*

Animal products:	
Live animals .....	\$190,900
Dairy products .....	454,736
Eggs .....	164,471
Beef, fresh, cured, and canned.....	272,536
Pork .....	241,111
Other meat products .....	84,962
Miscellaneous animal products.....	118,806
Total animal products.....	\$1,527,522
Vegetable products:	
Vegetables, fresh, dried, and canned.....	333,550
Grain and grain products.....	392,922
Fruits .....	231,062
Hay .....	120,084
Total vegetable products.....	1,077,628
Total animal and vegetable products.....	2,605,150

This will give an idea of the market that Alaska affords for these products, a very large percentage of which could be produced in the Territory.

## FORESTS IN THE INTERIOR.

The writer desires to call special attention to the forests in the interior. They are of such importance that they should, in his opinion, be accorded Government protection for the benefit of coming generations. The chief forest belt of the Territory lies in south-eastern Alaska, and the most valuable portion of this belt has already been set aside as a forest reserve. This is highly commendable; but it is even more necessary to preserve the smaller timber of the interior. The forests make life possible there. Without them the white race would have to live as do the Esquimo. To import the timber needed for fuel, for mining, for buildings, and for structural purposes of all kinds would be well-nigh impossible, and the prices would be prohibitive. At interior settlements, right in the midst of the forests, lumber is worth \$100 per thousand board feet, and at the mines, as, for instance, on Cleary Creek, less than 20 miles from the

sawmills at Fairbanks, the writer was informed that it was regularly sold at \$225 per thousand feet. What it would be worth if it had to be imported can scarcely be imagined. While the forests appear to the pioneer of the present to be an impediment to progress, their value will be increasingly appreciated as the country settles and years pass. It is the forests of the interior that have the greater value and should receive the most fostering care. Enormous areas of timber in that region are annually destroyed by forest fires, to say nothing of that consumed for steamer fuel and other legitimate purposes. Coming generations will sorely miss this timber. It can not be replaced. Growth is slow in those latitudes. If the indiscriminate destruction is not stopped, or at least regulated, and existing forests jealously guarded, development must suffer and be retarded, if not made impossible. In the timber belt of the coast region there is but little danger from forest fires. The rains are an efficient preventive. And the forest-clad gorges and mountain sides in that region are, as a rule, so inaccessible that the timber does not readily fall a prey to the woodman's ax. Nature herself protects the forests there. In the interior they are open to every sort of destruction and their loss will be grievously felt.

The spruce (*Picea alba*) is the dominating tree. It covers practically all the best land; only the swamps and steeper hillsides and the tops of the hills are void of it. Intermixed with the spruce is a liberal sprinkling of birch and cottonwood, especially on the higher ground. The timber is not large. In the Tanana Valley spruce ranges in size all the way from mere saplings to trees which measure 18 to 20 inches in diameter. Logs from 12 to 15 inches in diameter are abundant. On the basis of \$100 per thousand feet, the stumpage in the Tanana Valley is worth all the Government paid for the whole Territory. It is an invaluable asset. The building of towns and the operations of placer mining would be well-nigh impossible in the absence of timber. It is being utilized. At Fairbanks the writer found three sawmills in constant operation, sawing an average of 30,000 feet of lumber a day. The question arises if it would not be wise for the Government to make forest reservations in the interior also, with a view to preserving a portion, at least, of this timber for the use of future generations. After a somewhat careful study of the situation, the writer ventures the opinion that what is needed is supervision to avoid waste, rather than withdrawal from use. The waste is not so much from destructive lumbering as it is from ravages by fire. Fires are of frequent occurrence, and with the influx of prospectors and settlers their frequency will increase unless the Government takes active measures to prevent them. Lumber is indispensable to the development of the country, and, if reservations

were made, free use of the timber by miners and settlers should not be prohibited. Rather the whole forest area should be treated as a trust fund, administered for the benefit of the people who live in the country. Regulations could be formulated for the use of timber and for the prevention of fires, and supervisors should be on the ground to enforce them; but care should be taken that they in no wise work a hardship on the people or deter the development of mining and agriculture. Fines for violations should go toward the cost of administration, and, if necessary, a very small stumpage fee might be charged for the same purpose. The use of the timber should be limited strictly to the needs of the people who live there and develop the country. No pulp mills or other manufacturing plants, which would consume timber for purposes alien to the needs of the dwellers on the soil, should be permitted.

The writer believes that a policy applicable only to the interior, along the lines here roughly indicated, would be of great benefit to Alaska.

#### ANALYSES OF SOIL FROM SITKA STATION.

The following report by Dr. Milton Whitney, Chief of the Bureau of Soils, on analyses of samples of soils sent him from the Sitka Station, are submitted because they throw light on the quality of much of the soil in the coast region:

No. 1. Sample of subsoil which is frequently thrown to the surface, and, in places where knolls have been leveled, now constitutes the surface soil.

	Per cent.
Nitrogen.....	0.05
Acid digestion:	
C <sub>2</sub> O.....	Trace.
P <sub>2</sub> O <sub>5</sub> .....	Trace.
K <sub>2</sub> O.....	.67

No. 2. Sample of subsoil found somewhat deeper than No. 1.

	Per cent.
Nitrogen.....	0.08
Acid digestion:	
C <sub>2</sub> O.....	.47
P <sub>2</sub> O <sub>5</sub> .....	.12
K <sub>2</sub> O.....	.67

No. 3. Peaty subsoil found in hollows and spots. Sterile to agricultural plants.

	Per cent.
Organic and volatile matter.....	93.8
Nitrogen.....	.46
Acid digestion:	
C <sub>2</sub> O.....	.46
P <sub>2</sub> O <sub>5</sub> .....	Trace.
K <sub>2</sub> O.....	.17

No. 4. Surface sample on peaty land which had been cleared and put in cultivation. The sample sent has been on the surface of the ground for one year. It is sterile until lime is added.

	Per cent.
Organic and volatile matter-----	96.42
Nitrogen-----	.50
Acid digestion:	
C <sub>3</sub> O-----	.47
P <sub>2</sub> O <sub>5</sub> -----	.07
K <sub>2</sub> O-----	.13

### ANGORA GOATS AT COPPER CENTER.

The following letter from Judge Andrew Holman shows some possibilities regarding Angora goat production in Alaska:

DEAR SIR: Early in August this year we received from Monmouth, Oreg., 26 Angora goats—25 grade ewes and 1 registered buck; for the latter we paid \$25, and for the ewes we paid \$4 apiece. It took nearly a month to get them here, but they stood the trip better than I had expected; not one showed any signs of exhaustion. But of course they ran down in flesh and were pretty thin when they came here.

They commenced to pick up at once, however, and now they weigh easily 20 per cent more than they did when they came; and the beauty of it is that they are not at all inclined to be roving and give us absolutely no trouble. They have been left entirely to their own free will, but they keep close to their camp. Only once have they gone over 500 yards from camp, and then they were driven by dogs.

It was my fear at first that we should have everlasting trouble with dogs, but we found it took only a few days to train the dogs living around us to let them alone, and the Indians have instructions to keep their dogs away, with which they comply very well. But if they do get after them, they only chase them and the goats run for camp, so we have had very little trouble in that way.

Now, as for the future prospects for their propagation here, I will give my opinion just as I have studied it out. I have come to the conclusion that we have here in the Copper River Valley an almost ideal place for their propagation, as it seems that the most important thing with them is to have a dry climate with plenty of young brush, which is just what they have here. In the first place, most of the land in the valley runs in benches from the Copper River and its tributaries, and all this land, up to quite recently, or until the white man commenced to come in, has been covered with more or less heavy timber. But lately a great deal of it has been burnt off, and as soon as a fire runs through the timber a second growth of cottonwood and willow grows up just as thick as it can stand; consequently there are thousands of acres of such land, seemingly just what the goats want. Of course the most important thing is what they will do in the winter, but this much I have already learned: It is now along in October, and the feed for other kinds of stock is of very little help and has been so for some time, but the goats are doing as well now as they were during the summer, and it will not be any different until the snow gets deep. It is evident, therefore, that if they are not wholly self-sustaining, they are at least much more so than any other kind of stock; and if we have to provide feed for them during midwinter, that can be done much cheaper than for other stock.

Goats are browsers and eat principally brush. I had two natives for two

days to cut and put up this young second growth into bundles, and in two days they put up enough feed to last my 25 goats at least six weeks; it is therefore quite certain that goat raising will be a profitable industry here. It stands to reason that the fleece will be better here than at any other place farther east, because of the climate. As a meat industry it surely will be profitable for a long time to come. A goat will dress from 40 to 60 pounds, and 25 cents per pound here is cheap. From what I have already seen of the experiment, I have concluded to go exclusively into the Angora goat-raising business, with a little farming on the side. Next summer I shall get a couple of hundred more ewes to begin with.

Yours, respectfully,

ANDREW HOLMAN.

COPPER CENTER, *October 5, 1905.*

## NOTES ON GARDEN AND NURSERY, SITKA STATION, 1905.

### APPLES.

#### DWARF TREES, IN BREWERY LOT.

Sweet Bough: June 1, three trees in good condition. July 1, leaves somewhat affected with a fungus; sprayed with Bordeaux mixture. August 1, 5 inches new growth; leaves somewhat burned by the spray. September 15, trees vigorous, with no indication of leaves falling. October 1, leaves yet green; tips too tender to withstand hard freezing.

Tetofsky: June 1, three trees in good condition. July 1, sprayed with Bordeaux mixture for leaf fungus. August 1, 4 inches growth. September 15, made very little growth since August 1. October 1, tips too tender for hard-freezing weather.

Golden Sweet: June 1, three trees in fine condition. July 1, sprayed with Bordeaux mixture. August 1, 1 foot growth; vigorous. September 1, 18 inches growth; very vigorous. October 1, yet holding the leaves; tips tender.

Primate: June 1, two trees, both looking well. July 1, sprayed. August 1, 6 inches growth. September 15, one tree 18 inches new growth; other tree looks well, but has made little new growth. October 1, not well hardened for winter, yet holding the leaves.

Early Harvest: June 1, three trees, very good. Sprayed on July 1. August 1, 1 foot growth; thrifty. September 15, 2 feet growth. October 1, new wood not hardened sufficiently for winter.

Fauny: June 1, three thrifty trees. Sprayed on July 1. August 1, 2 inches of growth; very backward. September 15, 3 inches growth; trees look vigorous, but have made poor growth. October 1, leaves remain.

Keswicks Codling: June 1, three trees growing nicely. Sprayed on July 1. August 1, 9 inches growth; looking well. September 15, 1 foot growth. October 1, wood yet tender.

Yellow Transparent: June 1, three trees; leaves somewhat affected with fungus; sprayed with Bordeaux mixture. July 1, resprayed. August 1, growth uneven, average 6 inches. September 1, 15 inches growth on two trees; other tree looks well, but made little growth. October 1, tips of new wood very tender.

Red Astrachan: June 1, three trees; doing nicely. Sprayed on July 1. August 1, uneven growth; one tree vigorous. September 15, 1 foot new growth; looking well. October 15, new wood tender.

## STANDARD TREES.

Fanny: June 1, five trees; tips of two winterkilled; otherwise all vigorous. August 1, 3 inches of new growth. September 15, 1 foot new growth. October 1, new wood very tender for cold weather.

Golden Sweet: June 1, five trees growing vigorously. August 1, 1 foot growth. September 15, 2 feet new growth. October 1, one tree nearly destroyed by ravens breaking off the branches; others vigorous, but too tender for hard-freezing weather.

Sops of Wine: June 1, five trees growing; do not look vigorous. August 1, 3 inches growth. September 15, 1 foot growth; looking much more vigorous than earlier in the season. October 1, tips very soft.

Summer Rose: June 1, five trees; looking well. August 1, very little new growth. September 15, made but little growth this season. October 1, yet holding leaves.

Sweet Bough: June 1, five trees; doing nicely. August 1, 6 inches growth. September 15, 1 foot growth. October 1, tips of new wood very tender.

Early Strawberry: June 1, five trees; very thrifty. July 15, leaves somewhat spray-burned. August 1, 1 foot growth. September 15, vigorous; 18 inches new growth. October 1, very tender.

Primate: June 1, five growing, but unthrifty looking. August 1, 4-inch growth; looking more vigorous. September 15, 6-inch growth; many leaves for so short a growth. October 1, trees yet holding their leaves.

Williams Favorite: June 1, three trees; rather unthrifty. August 1, 3-inch growth. September 15, 6 inches of growth; not looking vigorous. October 1, new wood tender.

Benoni: June 1, four doing well, one unthrifty. August 1, 1 foot of growth. September 15, 2 feet of growth; very vigorous. October 1, too tender for hard freezing weather.

NOTE.—These trees were all more or less injured by ravens. They were sprayed twice in July with Bordeaux mixture for a leaf fungus and given one washing with a stiff brush, using kerosene emulsion for cottony-cushion scale which had attacked them.

## APPLE, ON THE STATION GROUNDS.

Duchess (block 1): June 1, seventeen trees; growing but not thrifty. August 1, very backward. September 15, only thirteen trees alive; very poor.

Martha: June 1, eighteen trees; none doing well. August 1, making but little growth. September 15, sixteen trees alive; three have made growth.

Hibernal (block 1): June 1, seven trees very thrifty. August 1, 2 inches of growth. September 15, 6 inches of growth; looking well. October 1, new wood tender.

Whitney Crab: June 1, sixteen trees looking well. August 1, new growth very short, but trees look thrifty. September 15, 1 foot of new wood. October 1, new wood appears too soft for freezing weather.

Red Astrachan: June 1, fifteen trees give good promise. August 1, but little new growth. September 15, more thrifty than earlier in the season. October 1, new wood very short.

Lowell: June 1, twelve trees making feeble growth. August 1, very little new growth. September 15, leaves of good color but short growth.

Tetofsky: June 1, twenty trees look well. August 1, new growth very short; trees look fine. September 15, leaves of good color but growth short. October 15, trees yet holding leaves.

Yellow Transparent: June 1, eighteen trees looking well. August 1, growth



short; leaves spray-burned. September 15, very little growth; leaves of good color. October 1, leaves yet on the trees.

Eureka: June 1, fourteen trees; five give good promise. August 1, all trees about equal; very short growth. September 15, 4-inch growth; good color. October 1 leaves yet hanging.

Sylvan Sweet: June 1, sixteen trees doing nicely. August 1, 3-inch growth. September 15, 4-inch growth. October 1, leaves green; tips very tender.

Byers Sweet: June 1, eleven trees very backward. August 1, all nearly dead. September 15, no growth; leaves have good color. October 1, leaves yet green.

Raspberry: June 1, eighteen trees thrifty looking. August 1, 4 inches of growth. September 15, 6 inches of new growth. October 1, leaves dropping; more promise of hardening new wood than with other varieties.

Red June: June 1, sixteen trees look well. August 1, very little growth. September 15, one tree made 1 foot of new growth; others made but little growth, some being nearly dead.

Maiden Blush: June 1, seven trees; three seem thrifty. August 1, not doing well. September 15, one tree made 12 inches of growth; four nearly dead; two look well, but have made little growth this season. October 1, leaves yet green.

Early Harvest: June 1, sixteen trees; seven thrifty. August 1, very backward; no growth. September 15, three trees made 6 inches of growth; others made no growth though the trees are of good color.

Patten: June 1, seven trees; five of them vigorous. August 1, 4 inches of growth. September 15, very little additional growth. October 1, leaves yet of good color.

Jessie: June 1, seven trees; not doing well. August 1, two trees made 6 inches of growth; others making no growth. September 15, two trees made 15 inches of growth; others look poorly. October 15, wood on vigorous trees too soft for winter.

Hibernal (block 2): June 1, seven trees give good promise. August 1, growth 2 inches. September 15, not doing well. October 1, very poor.

Peerless: June 1, six trees give good promise. August 1, 4 inches of growth; looking well. September 15, 6 inches of growth. October 1, wood very soft.

Yellow Transparent: June 1, nine trees doing nicely. August 1, one tree made 9 inches of growth; others 2 inches. September 15, one tree 18 inches, others from 4 to 6 inches. October 1, leaves yet hanging.

Duchess (block 2): June 1, eight trees; looking well. August 1, new growth very short. September 15, 3 inches of growth; color, good. October 1, leaves yet hanging.

Red June: June 1, three trees making good start. August 1, very little growth. September 15, leaves of good color; no growth. October 1, leaves hanging.

Hyslop: June 1, five trees look vigorous. August 1, have grown very little, but look well. September 15, 18 inches of growth; very strong. October 1, leaves yet retained.

Native Crab: June 1, five trees making good start. August 1, 9 inches of growth; two trees which dropped their leaves after being sprayed have again leafed out. September 15, 15 inches of growth. October 1, leaves have turned and wood promises to harden.

Transcendent: June 1, two trees doing well. August 1, 5 inches of growth. September 15, 8 inches of growth; very good.

NOTE.—All these trees were transplanted this spring (1905) to ground that had been thoroughly plowed, and limed at the rate of 2 tons per acre. They were sprayed twice in July with Bordeaux mixture for leaf fungus.

## APPLE TREES GRAFTED AT THE STATION, 1904.

Lowell: June 15, whip graft on native stock growing nicely; crown graft on native stock doing nicely also. August 1, all doing well. September 15, 2 feet of growth; leaves of good color. October 1, wood too soft for hard frost.

Red June: June 1, whip graft on native stock, vigorous looking. August 1, growth very short, looking well. September 15, 6 inches of growth. October 1, tips soft.

Northwest Greening on native crab stock: June 1, growing nicely. August 1, looking well, but growth is slow. September 15, good color; no additional growth.

Okabena, one-year grafts. June 1, growing. August 1, 2 inches of growth. September 15, 1 foot of growth; very good.

Whitney Crab: June 1, giving good promise. August 1, looking well; 3 inches of growth. September 15, two trees very vigorous; others not looking so well.

Princess Louise: June 1, one-year grafts giving good promise. August 15, 4 inches of growth. September 15, 1 foot of growth; good color. October 1, wood very soft.

Duchess, one-year grafts: June 1, giving good promise. August 1, 3, inches of growth; most of them doing poorly.

Hibernal, one-year grafts: June 1, giving little promise. September 15, one tree 6 inches growth; others doing nothing.

Martha: June 1, one-year grafts giving some promise. August 1, growing nicely; 3 inches of growth. September 15, but little additional growth; not looking well.

Walbridge, one-year grafts: June 1, giving promise. August 1, new growth short, but looks well. September 15, one tree 8 inches growth; others appear thrifty, but the growth is short.

North Star, one-year grafts: June 1, giving promise. August 1, 5 inches of growth; September 15, growth 6 inches; doing well.

Patten, one-year grafts: June 1, starting well. August 15, 6 inches of growth. September 15, growth of one tree, 18 inches; others have made no additional growth.

Minnesota, one-year grafts: June 1, well started. August 1, 6 inches growth. September 15, one tree made a growth of 2 feet; others of 9 inches.

Jewett, one-year grafts: June 1, good promise. August 1, 13 inches of growth. September 15, growth 18 inches; very vigorous.

## NEW GRAFTS, 1905.

Sixteen hundred trees of many varieties: June 1, very slow in starting, weather being cool and extremely dry. August 1, 70 per cent doing nicely. September 15, all have made good growth. October 1, very few hard enough to stand hard frosts.

Duchess and Tetofsky, top-worked on native stocks are doing well and have made a growth of 2 feet.

*Pyrus baccata*: June 1, fifteen small trees all doing well. August 1, strong 12-inch growth; very thrifty. October 1, leaves falling; wood promises to harden for winter.

Juneberry: June 1, nine plants making a vigorous start. July 1, strong 8-inch growth; bloom buds set. August 1, 14-inch growth; some fruit set. September 15, 18 inches of growth; fruit ripe. October 1, leaves turning.

## CHERRIES.

English Morello, nine trees: June 1, very backward. August 1, one tree dead; others made an average growth of 10 inches. September 15, growth 15 inches; thrifty looking. October 1, leaves yet green.

Ostheim, fifteen trees: June 1, doing well; in bloom. August 1, some fruit set, but dropped when small; 6 inches of growth. September 15, growth 18 inches; trees looking well. October 1, leaves yet retained.

Early Richmond, nineteen trees: June 1, growing nicely. August 1, 5 inches of growth. September 15, three trees not doing well; others made 15 inches growth.

Dyehouse, nineteen trees: June 1, doing well. August 1, 5 inches growth. September 15, 10 inches growth.

Sand Cherry, six bushes: June 1, slow to start. August 1, very thrifty; 15 inches growth. September 15, 18 inches growth.

Compass, four trees: June 1, vigorous start. August 1, 6 inches growth. September 15, growth spindling.

## PLUMS.

May Day, three trees: June 1, 4 inches of growth; strong. August 1, growth 15 inches. September 15, two trees very strong; other one not doing so well. October 1, leaves falling.

Forest garden, two trees: June 1, very weak. August 1, growth 8 inches; looking well. September 15, a growth of 1 foot. October 1, leaves falling.

Tomahawk, one tree: June 1, very backward. August 1, growth short, but tree looks well. September 15, 2-inch growth; good color; vigorous. October 1, holding its leaves.

Sayles, two trees: June 1, very weak growth. August 1, 12 inches growth. September 15, leaves yellow; growth 15 inches.

Hawkeye, three trees: June 1, very weak. August 1, 12 inches growth. September 15, 18 inches growth; thrifty. October 1, leaves coloring.

Wyant, two trees: June 1, starting nicely. August 15, 3 inches of growth. September 15, very yellow; growth, spindling, 6 inches.

Odegard, six trees: June 1, leaves very yellow. August 1, doing well; growth 6 inches. September 15, good strong 8-inch growth. October 1, leaves coloring.

De Soto, June 1, four trees nearly dead. August 1, three trees growing some. September 15, three trees made 15 inches growth and promise well.

Rollingstone: June 1, one tree; making very poor start. August 1, a growth of 15 inches. September 15, 18 inches growth; vigorous. October 1, leaves dropping.

Aitkin, thirteen trees: June 1, doing well. August 1, 12 inches growth. September 15, 18 inches growth; vigorous. October 1, leaves coloring.

*Prunus besseyi*, fifty trees: June 1, looking vigorous. August 1, 50 per cent looking well. September 15, 6 inches growth. October 1, leaves dropping.

Seedling Americana, one hundred trees: June 1, thrifty. August 1, 6 inches growth. September 15, 15 inches growth; very vigorous. October 1, leaves coloring.

Seedlings of Wyant, twenty trees: June 1, doing nicely. August 1, growth rather spindling. September 15, average growth 15 inches; very vigorous. October 1, leaves coloring.

Seedlings of Cherry Plum, eighty-seven trees: June 1, doing nicely. August 1, a growth of 15 inches. September 15, average growth 18 inches; some 3-foot growths; most trees strong.

## BUSH FRUITS.

High-bush Cranberry, one plant: June 1, growing very well. August 1, very short new growth. September 15, new growth very short, but plants look strong.

Buffalo Berry: June 1, few plants living; very poor. August 1, doing nicely. September 15, new growth short; plants look well.

Sand Cherry (Western): June 1, growing slowly; good promise. August 1, making very vigorous growth. September 15, 12 inches of growth; looking thrifty. October 1, leaves yet green.

## CURRANTS.

Red Native from Sunrise, Alaska: June 1, some growing. July 1, very backward. August 1, very little growth. September 15, nearly all dead.

Red Cross, ten plants: June 1, growing nicely. July 1, looking well; 6 inches growth. August 1, 9 inches growth. September 15, leaves falling; 1 foot of growth.

Black Champion, ten plants: June 1, vigorous start; some bloom. July 1, 5 inches growth; no fruit. August 1, 8 inches growth. September 15, 15 inches new growth; leaves coloring.

Lee Prolific, ten plants: June 1, doing well; some bloom. July 1, 6 inches growth. August 1, 10 inches growth. September 1, 15 inches growth. October 1, leaves dying.

Wilder, eleven plants: June 1, thrifty. July 1, 4 inches growth. August 1, 6 inches growth. September 15, leaves coloring.

Russian Black, five plants: June 1, vigorous. July 1, 8 inches growth. August 1, 15 inches growth. September 15, 18 inches growth.

Common Red: June 1, growing nicely. July 1, 6 inches growth. August 1, 12 inches growth. September 15, not vigorous.

Ruby Castle, seventeen plants: June 1, doing nicely. July 1, 3 inches growth. August 1, very little additional growth. September 1, plants do not appear thrifty.

Black Currants, twenty-five plants: June 1, good growth; in bloom. July 1, 15 inches growth; leaves somewhat affected with fungus—sprayed with Bordeaux mixture. August 1, 20 inches growth. September 15, leaves coloring.

Native Currant: June 1, growing vigorously. July 1, strong growth. August 1, 5 inches growth. September 15, leaves coloring.

Amber-Colored, four plants: June 1, growing nicely; in bloom. July 1, 10 inches growth. August 1, 15 inches growth. September 15, leaves dropping.

Victoria, eighteen plants: June 1, thrifty; in bloom. July 1, 8 inches growth. August 1, fruit small, ripe; 12 inches growth. September 15, leaves falling.

Crandall, five plants: June 1, vigorous growth; in bloom. July 1, some fruit set; 6 inches growth. August 1, fruit not good; 10 inches growth. September 15, strong plants; leaves falling; 2 feet of growth.

Fay Prolific, two bushes: June 1, thrifty growth; in bloom. July 1, fruit set; 5 inches growth. August 1, 8 inches growth. September 15, leaves falling.

White Currant: June 1, growing well; in bloom. July 1, fruit set; 5 inches growth. August 1, 8 inches growth; very little fruit. September 15, plants thrifty; leaves falling; 1 foot of new growth.

Currant cuttings of various varieties, 3,500 plants: June 1, doing very well. July 1, making fair growth. August 1, not making the desired top growth. September 15, top growth rather short; excellent root system developed.

## BLACKBERRIES.

Snyder, one plant: June 1, growing nicely. July 1, making slow growth. August 1, 8 inches growth. September 15, too tender for winter weather.

Taylor, seventeen plants: June 1, looking well. July 1, making good growth. August 1, new canes 15 inches long. September 15, canes short, will require winter protection.

## RASPBERRIES.

Turner, twenty plants: June 1, not vigorous. July 1, have better color; in bloom. August 1, new canes long. September 15, no fruit; canes 3 feet tall; very tender.

Miller, twelve plants: June 1, growing slowly. July 1, making slow growth; few bloom. August 1, new canes 18 inches long. September 15, canes 2 feet long, but too tender for freezing weather.

London: June 1, making good growth. July 1, in bloom; growing slowly. August 1, new canes 2 feet long; fruit poor. September 15, 3-foot canes; very tender.

Red Raspberries (common) grown for propagating only: Have done exceedingly well.

## GOOSEBERRIES.

Whitesmith, nine plants: June 1, vigorous; in bloom. July 1, average growth 10 inches; no fruit set. August 1, 15 inches growth. September 15, little additional growth; leaves coloring.

Columbus, eight plants: June 1, growing nicely. July 1, average growth 2 inches; very backward; good color. August 1, 5 inches growth. September 15, 10 inches growth; one plant much more vigorous than the others.

Industry, eight plants: June 1, making good start. July 1, good color; making slow growth. August 1, 3 inches growth. September 15, unthrifty. October 1, leaves dropped.

Smith Imperial, five plants: June 1, thrifty start. July 1, 6 inches growth. August 1, very little additional growth. September 15, 1 foot of growth.

Red Jacket, six plants: June 1, vigorous start. July 1, 4 inches growth. August 1, 6 inches growth. September 15, 14 inches growth. October 1, leaves coloring.

Triumph, five plants: June 1, doing well. July 1, good color; very little new growth. August 1, 3 inches growth. September 15, 6 inches growth. October 1, leaves well colored.

English, six plants: June 1, vigorous. July 1, growing nicely; some fruit. August 1, growing slowly. September 15, new growth very short; fruit ripened. October 1, leaves dropping.

Houghton, eighteen plants: June 1, growing nicely; in bloom. July 1, fruit well set; medium size. August 1, 3 inches growth. September 15, fruit ripened; very little additional growth. October 1, leaves dropping.

Champion, thirteen plants: June 1, vigorous, in bloom. July 1, very little fruit set; 3 inches growth. August 1, 5 inches new growth. September 15, 6 inches growth.

## STRAWBERRIES.

Bismarck: June 1, growing nicely; in bloom. August 1, fruit ripening; plants vigorous. September 15, many new plants. October 1, young plants in abundance. This is the best variety grown at this station.

Enhance: June 1, in bloom. August 1, no berries set, plants growing nicely. September 15, vigorous new plants.

Michigan: June 1, growing nicely; plants blooming. August 1, no fruit; plants making vigorous growth. September 15, strong new plants; promising.

Saunders: June 1, in bloom. August 1, fruit ripening; poor. September 15, many new plants.

Native: June 1, vigorous growth; in bloom; perfect flowers. August 1, no fruit; Vigorous growth. September 15, new plants in abundance.

#### ORNAMENTALS.

*Caragana arborescens*: June 1, doing well. August 1, growing slowly. September 15, plants look well; very short growth.

*Caragana microphylla*: June 1, not thrifty. August 1, growing slowly. September 15, few plants growing.

Eglantine, nine plants: June 1, doing well. August 1, making vigorous growth. September 15, 18 inches growth; very strong.

Lilac (common), six plants: June 1, growing nicely. August 1, very short new growth. September 15, new growth very short; plants look strong.

*Lonicera alba rosca*, four plants: June 1, growing nicely. August 1, 6 inches growth. September 15, 8 inches growth; good color.

*Lonicera bella albida*: June 1, starting nicely. August 1, 4 inches growth. September 15, vigorous strong plants; 10 inches growth. October 1, leaves yet hanging.

*Lonicera tatarica rosca*: June 1, started well. August 1, 5 inches growth. September 15, plants strong and vigorous; 15 inches growth.

*Lonicera tatarica splendens*: June 1, thrifty growth. August 1, 6 inches growth. September 15, strong vigorous plants, 15 inches growth. October 1, yet holding the leaves.

*Lonicera tatarica*, twelve plants: June 1, not thrifty. August 1, making slow growth. September 15, growth very short; not doing well.

*Lonicera tatarica grandiflora*: June 1, growing nicely. August 1, 3 inches of new growth. September 15, plants strong; 15 inches growth.

Mountain Ash: June 1, thrifty. August 1, 3 inches growth. September 15, very little additional growth.

Niobe Willow: June 1, doing nicely. August 1, 15 inches growth. September 15, 3 feet of growth. October 1, wood too soft for hard freezing weather.

*Rosa rugosa*: June 1, doing nicely. August 1, growing slowly. September 15, 8 inches growth; doing very well.

Siberian Sandthorn: June 1, not vigorous. August 1, very little growth. September 15, very backward.

Spear Eiderberry, four plants: June 1, just starting growth. August 1, 8 inches growth. September 15, 1 foot of growth. October 1, wood too soft to stand hard freezing weather.

Ural Willow, six plants: June 1, growing vigorously. August 1, 6 inches growth. September 15, 10 inches growth. Cuttings of this have made a strong growth this season.

#### VEGETABLES.

The season was on the whole quite favorable to the growth of vegetables and the commoner sorts—potatoes, turnips, radishes, lettuce, etc.—did very well. (Pl. VII, fig. 1.) Excellent reports have been received from various parts of the Territory. These are noted under reports from the seed distribution.

At the Sitka Station the soil continues to be so uneven in quality that the

experiments we have undertaken with vegetables are not reliable. The soil is acid and requires to be dressed with a still heavier coating of lime than has been so far applied. A summary of the results obtained follows:

## BEANS.

Broad Windsor (seed procured from a Seattle seed house): Of this three rows were planted. They all grew splendidly, attained a height of 3 to 4 feet, and were loaded with pods, which were ready for use in the latter part of September, but none of the seed matured.

A few beans of each of many varieties sent to the station from the Department of Agriculture for trial were also planted, but none of them compared to those raised as above stated. Many of them failed to grow and none of them amounted to anything worth mentioning. These varieties were imported from Europe and elsewhere. They were sent out under the following numbers: 2455, 2463, 2465, 2466, 10413, 10414, 10415, 10416, 10431, 10432, 10433, 10435, 10437, 10440, 10443, 10436, 10445, 10434, 10430, 10438, 10418, 10441, 10432.

Wax beans, Pole beans, and Lima beans were not tried, as they have heretofore proved unsuccessful.

## BEETS.

Early Egyptian: A short row was planted and did very well, making roots from 3 to 4 inches in diameter.

French White Sugar: A short row of this variety was planted, but it proved a failure.

## BROCCOLI.

Large White French: Seed sown in cold frame April 22, producing strong plants, which were set in open ground June 9. Plants set in a small plat of good garden soil developed heads of good size, 6 to 7 inches in diameter. Other plants set in soil not so good developed only very small heads.

## BRUSSELS SPROUTS.

Dwarf Improved: Seed sown April 20, with cabbages in flats—that is, shallow boxes in the greenhouse. Only 40 per cent of the seed grew. The plants were set out the first week in June and developed satisfactorily. Brussels sprouts can be grown successfully in the Alaska coast region.

## CABBAGE.

All the following varieties were sown in shallow boxes on April 20. These boxes were kept under glass in the greenhouse, which, however, was not heated artificially. They made a good growth. In the middle of May the boxes were set outdoors to harden the plants. This gave us good strong plants by June 1, and they were transplanted between June 1 and 8. One hundred plants of each variety were set out with a view to comparing the different sorts. The experiment was only a partial success, because the soil at the station is not yet in proper condition for culture; although it has been limed it remains acid and is very spotted in character. Early, medium early, and late varieties were represented in about equal numbers.

Extra Early Express: Many plants failed to head. September 1 a few heads were ready for use, but they were small, averaging but 2 pounds in weight.

Early Spring: September 1, a few heads were ready for use. They averaged but 1 pound each, and many plants failed to head.

Early York: This variety did better than either of the two foregoing, though some plants failed to head. By September 1 the heads then ready averaged 3 pounds in weight.

Henderson Early Summer: A larger proportion produced heads, though they were not solid. They were later than those already named and averaged but 2 pounds in weight, though some of the best weighed 4 pounds.

All-Head Early: Only 20 per cent formed heads, but these were good and solid. By November 1 they averaged 3 pounds in weight, and some of the best weighed 5 pounds.

Early Etampes: A French variety. Nearly half of the seed failed to grow. By September 1 a few heads were large enough for use. Some of them weighed  $\frac{1}{2}$  pounds each.

Early Large York: Only 30 per cent of the plants headed. By October 15 some of the heads were large enough for use. The best weighed 6 pounds each. Most of them were small but solid.

Early Dwarf Savoy: About 40 per cent of the plants headed. The growth was slow; none were ready for use until November 1, when the largest averaged  $3\frac{1}{2}$  pounds.

Early Jersey Wakefield: Of all the early varieties in the tests made at the station up to this time, this is on the whole the most satisfactory. It is a reasonably sure header, although the heads are small. The plants are large and spreading, and one is led to expect larger heads from the size of the leaves. But all things considered, it is a fairly reliable sort. In the present test 70 per cent of the plants produced heads. It is not the earliest sort; none were ready for use until the middle of October, and they continued to grow until November 8. A few heads reached the weight of 5 pounds; 33 heads averaged 3 pounds; the rest were still smaller.

Early Drumhead: Only 40 per cent headed. The growth was slow and they were not ready for use until the last of October. Average weight of heads,  $3\frac{1}{2}$  pounds.

Early Dwarf Flat Dutch: A small variety that did not prove to be highly commendable. Its growth was slow; the heads were small, but solid.

All Seasons: About 40 per cent of the plants of this variety produced small heads. The largest weighed 5 pounds.

Premium Drumhead: Only about 30 per cent of this variety produced marketable heads. The largest weighed  $2\frac{1}{2}$  pounds. Growth was slow.

Sure Head: Its growth did not justify its name in this case. Less than 30 per cent of the plants formed heads, and these were small and soft.

Short-Stemmed Brunswick: Growth was slow and the heads were small, but they were of even size and quite firm. About 75 per cent of the plants headed.

Fotller Drumhead: Did very poorly throughout. Only 25 per cent of the plants headed. The growth was slow and backward. The best head weighed 3 pounds.

Winnigstadt: Has been grown at the station before, and has been more satisfactory in former years than the present season. It produces firm, conical heads of small size. Only 30 per cent of the plants headed.

Charleston or Large Wakefield: Similar to Jersey Wakefield but later and did not do so well as that variety. Average weight of heads, 2 pounds.

Succession: Only a small percentage of plants formed heads and the best of these weighed 3 pounds.

Danish Bald Head: This did not prove a success. Only a small percentage of the plants headed and the heads were very small.

Drumhead Savoy: It was backward and many plants failed to head, and the heads which did grow were not solid.



**Large Late Flat Dutch:** Though only 36 per cent of the plants headed, this appeared, nevertheless, to be a promising sort. The best head weighed 6 pounds.

As stated at the outset, it would not be fair to pass judgment on this test. The soil is to blame, and it requires time to get the raw peaty soil into condition to produce fair garden crops.

#### CAULIFLOWER.

The following six varieties were grown: Early London, Early Snowball, Early Favorite, Extra Early Dwarf Erfurt, Early Paris, and Le Normand Short Stem. Like the cabbages, these were sown in flats April 24, kept under glass in a cold greenhouse until the middle of May, and then gradually hardened. Transplanted June 6. In a small patch of good garden soil in town they did well, but those planted on station ground produced but small heads. Those grown on good soil gave results as follows:

**Early Snowball:** An early and sure header, of even size, and of excellent quality. They were ready in early August.

**Extra Early Dwarf Erfurt:** A desirable variety but somewhat uncertain. Several plants failed to head.

**Early Paris:** A fairly good variety.

**Early Favorite, Le Normand Short Stem, and Early London:** These ranked about together. Early London produced large plants, several of which failed to head and the heads produced were small.

#### CARROTS.

All the following varieties were planted May 18 and gathered October 9:

**French Forcing:** This is a short stump-rooted variety producing small roots, but they grew to normal size and can be recommended for early use.

**Half Long Scarlet:** This variety likewise grew to normal size and was on the whole satisfactory.

**Ox Heart:** Made a slow growth and yielded but few and small roots. It is not so good as either of the foregoing.

**Chantenay:** This variety has given good satisfaction at Sitka Station in former years. The present year it did not do so well owing to the soil in which it grew, but it has done well in other parts of Alaska.

**Half Long Stump-Rooted:** This, too, grew in poor soil, but it made a satisfactory yield and was ready for use in August. It can be recommended for Alaska.

#### CELERY

**Improved White Plume:** The past season this variety gave very good satisfaction. It was grown in the cold frame where the soil was rich, but it will also develop normally in the open ground. By September 15 the plants in the cold frame were nearly ready to blanch.

#### KALE.

**Tall Green Scotch and Dwarf German:** The plants were started in flats in the same manner as the cabbage plants and transferred to open ground early in June. They developed normally. Kale is one of the crops than can be grown with certainty in Alaska, and when properly cooked there is no more delicious form of greens than Scotch kale. It should be grown in every garden in the Territory.

## PARSNIPS.

Hollow Crown: This is a standard variety. In good soil it develops large tender roots. The present year roots  $2\frac{1}{2}$  inches in diameter were grown.

## PEAS.

Half the pea crop was treated with a commercial inoculating preparation, in order to ascertain the effect, if any, on the yield.

Alaska: Planted May 18. July 1,  $2\frac{1}{2}$  feet high, and in bloom by July 15. Pickings were made at various intervals from August 1 to 25. The total yield of pods from a row 60 feet long weighed 21 pounds. The same variety not inoculated developed normally, and there was but little, if any, difference in appearance between those treated and those not treated; but there was a decided difference in yield. A 60-foot row not treated yielded  $15\frac{1}{4}$  pounds.

First and Best: Seed inoculated. Planted May 18. July 1,  $2\frac{1}{2}$  feet high and beginning to bloom. They appeared to be a little in advance of Alaska. A 60-foot row yielded 23 pounds between August 1 and 25. Yield of a 60-foot row planted alongside but not treated was but 14 pounds. This and Alaska variety have been very satisfactory at the Sitka Station, and can be recommended for use in Alaska.

Marblehead Mammoth: Planted May 18. July 1, 3 feet high. July 15, a few blossoms showing. August 1, 5 feet high and in full bloom. Pods ready for use August 17. Between this date and September 19 a 60-foot row yielded  $42\frac{1}{2}$  pounds. The seed was not inoculated. The pods of this variety were affected by a fungus growth, which did not attack other varieties growing alongside of it. It is a later and larger sort than the two first named, but it also appears to give heavier yields.

Premium Gem: Seed planted May 18. July 1, 2 feet high. Beginning to bloom August 1. Made but poor growth; only a few pods were large enough for use; was almost a failure. The yield of a 60-foot row was  $4\frac{1}{2}$  pounds.

## POTATOES.

The following varieties were grown: Extra Early Ohio, Early Ohio, Freeman, Burbank, Hamilton Early, Extra Early Triumph, Banner, Lincoln, Early Harvest, Bovee, Red River White Ohio, White Mammoth, Pat's Choice, Extra Early Pioneer, Early Michigan, Vornehm, Vigensia, Irish Cobbler, Ohio Junior, White Beauty, Early Andes, Garfield, Extra Early, Carman No. 3, White Kenai, and Red Kenai.

Most of these were grown on a very small scale. The seed was procured by the pound, and only from 1 to 4 pounds were planted, and the yields of these small plats can not be compared with any profit. Those grown on a larger scale from seed raised at the station the previous year were Freeman, Garfield, Burbank, White Kenai, and Red Kenai. Of these the Freeman was by far the best, one-nineteenth of an acre yielding 1,446 pounds, or at the rate of 550 bushels to the acre, and 94 per cent of the crop was marketable.

Burbank: Yielded at the rate of 288 bushels per acre, and 86 per cent of the crop was marketable.

Garfield: Yielded at the rate of 54 bushels to the acre, of which 80 per cent was marketable.

White Kenai: Yielded at the rate of 117 bushels per acre, of which 65 per cent was marketable.

Red Kenai: Yielded at the rate of 89 bushels to the acre, of which 76 per cent was marketable.

This great difference in yield is partly due to inequalities in the soil, a condition we have not yet been able to rectify, but in the main the difference is due to the varieties. Up to this time the Freeman is the best potato grown at the station. It is medium early, white, oblong, of medium size and quite uniform, shallow eyes, and excellent quality, being dry and mealy when boiled. The two varieties—named, respectively, the White and Red Kenai—were obtained from the village of Kenai, on Cook Inlet, where it was claimed that they had been grown by the Russian settlers for at least fifty years. These potatoes have no special merit, except the fact that they have been thoroughly acclimated, but they are not early, nor are they of first quality.

It is to be noted that seed potatoes imported from the States usually do not do well the first year. They do not compare in yield or vigor with potatoes of the same varieties raised from Alaska-grown seed. This fact has been observed also by many settlers, who have commented upon it. The varieties here named will be grown again next year from the present crop of seed, and it will then be possible to make a better estimate of their comparative value.

#### KOHL-RABI.

-Planted in open ground May 15. By September they gave promise of a fair crop, and October 8 we gathered 124 pounds of marketable roots from 280 feet of row, which was a very small yield.

#### RUTA-BAGA.

Purple Top Yellow Swede: Seed planted in open ground May 15. October 8, 210 pounds of marketable roots were gathered from 280 feet of row.

#### TURNIPS.

No. 1678, Imported Finnish Seed: Seed sown May 15. The crop yielded 160 pounds of marketable roots from 140 feet of row. This is a small white turnip of good quality. No. 6176, Imported Finnish Seed: Seed sown May 15. Yield, 240 pounds of marketable roots from 120 feet of row. This is a small yellow turnip of very fine quality.

## WORK AT THE COPPER CENTER STATION.

### OUTLINE OF OPERATIONS.

Since the last report little has been done in the way of building, except the addition of a shed, 14 by 30 feet in size, on the south side of the barn, which is ready for the roof; also a frost-proof root cellar is nearing completion.

Having no help from October until February, when the freighting season opened, the superintendent spent his time in making the cabin (Pl. IV, fig. 1) and barn a little more comfortable for cold weather, whipsawing some lumber, building a hay press, making a roll-top office desk, baling and freighting 5 tons of native hay from Willow Creek to the station, and freighting 1,900 feet of lumber 20 miles down the Klutena River.

The frost being sufficiently out of the ground, stirring the soil was begun April 25. The first plats were seeded May 9, as 25 acres were then ready for the drill. The last seeding was done May 25. Thirty acres were seeded to the various grains, 3 acres of which were seeded to awnless brome grass (*Bromus inermis*).

After the seeding was done attention was given to clearing and breaking 4 acres of low wet ground for the purpose of seeding it to timothy and other grasses. Seven acres of new ground which had already been broken, with the 3 acres broken later, make 14 acres of new ground broken this season. There are now 36 acres of ground broken and about 5 acres cleared, which could not be broken until the ground became too dry. The 4 acres broken for grasses could not be got in shape in reasonable time for seeding, and it was thought best to defer seeding till next spring, and at the same time sow oats or some kind of grain with the grass seed. Clearings of last year had to be fenced, and it was also due time to fence off the pasture lands, as travel is rapidly increasing from year to year over this trail. Enough stock passed here this season to graze off our entire pasture in a single day; the last herd of beef cattle passing numbered 76 head.

One mile of barbed-wire fence was built, two-thirds of a mile of stake-and-rider fence, and a picket fence inclosing about 1 acre around the cabin. The yard was then cleared of moss, plowed, graded, and laid out with 5-foot walks to be graveled and the remainder seeded to grass, leaving a good-sized kitchen garden on one side and a small grass plat in the rear.

#### WEATHER CONDITIONS.

This season has varied somewhat from either of the two previous years of our field operations. The precipitation has been so light that crops made very short growth. Even the wild grasses in open places were seen to be withering in midsummer and did not make their usual growth.

The snowfall was also very light last winter, amounting to but 25 $\frac{5}{8}$  inches, making but 1.64 inches actual precipitation of melted snow. The rainfall from the last snow until September 1 was but 3.05 inches, and this was distributed in light showers, usually just laying the dust and doing crops little good.

Other conditions remained very favorable to growing crops until August 1, when cool, damp, cloudy weather set in. From this time on most of the grains made very little advance toward ripening. August 14 the temperature fell to 26° F. on the main bench and 23° F. on the upper bench, seriously injuring the crops. This frost was followed by killing frosts on August 19, 21, and 24, the coldest being 20° F. on the lower bench and 16° F. on the upper bench.

#### CULTURE WORK AND FIELD NOTES.

It is becoming apparent that grain growing is not to be the chief industry in this section of the Copper Valley, owing to the early frosts, and especially those through the month of August. However, under usual conditions, any amount of rough feed can be grown. Crops were light this year owing to the lack of rain.

It has been thoroughly demonstrated for the third time that new land broken and seeded the same year does little more than return the seed sown, and even this is difficult to save on account of short growth. New land, however, may be made to produce heavy crops by using some fertilizer. Experiments this year, in almost every instance, proved that new ground just broken and fertilized with guano at the rate of 500 or 600 pounds per acre—the greater amount giving the best results—produced from 50 to 90 per cent better crops than where no fertilizer was used. Where brush or logs were burned in some quantity, the result was about the same as where the fertilizer was used. Third-year ground also responded to fertilizers, but of course not to so marked a degree. Wherever the fertilizer was used the growth was more vigorous and the crops

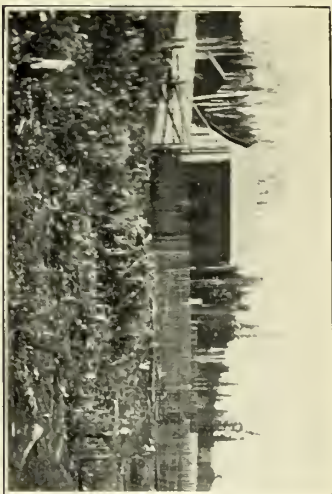


FIG. 1.—STATION BUILDING.



FIG. 2.—FALL PLOWING.

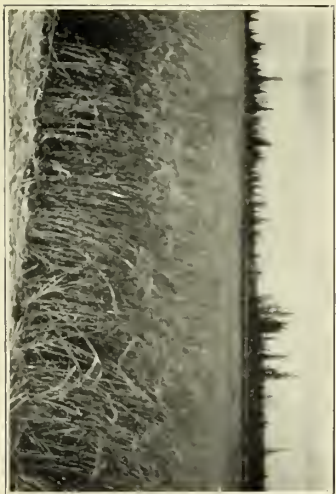


FIG. 3.—BARLEY FIELD.



FIG. 4.—SWEDISH SELECT OATS.

VIEWS AT THE COPPER CENTER STATION.



had a better color from the first, and invariably the heads were much larger and the growth more uniform on both old and new ground. On these fertilized plats and burned spots the grain stood well, and this dry season I counted as many as 18 large heads from one grain of barley and 26 heads from one grain of oats where the seed was scattered sparingly. New ground broken and let lie to the weather one year gave very good returns even in this dry year. (Pl. IV, fig. 2.) It produced fully 1 ton of hay per acre, while third-year ground alongside the summer-fallowed new ground did not produce more than half that amount. It should be said, however, that this summer fallow was very rich sod and more capable of holding moisture than the old ground.

For convenience in this report the several tracts seeded are designated as follows:

Tract A, third-year ground, used last season as the main culture tract. The soil is rather light and dry.

Tract B, third-year ground on the same bench, but heavier soil.

Tract C, new ground on a bench probably 150 feet higher than tracts A and B. This soil is somewhat heavier than the majority of that on the lower bench, having more of a clay subsoil.

Tract D represents the large field plats on either bench.

On tracts A, B, and C half of each plat or variety was fertilized at the time of seeding with guano, at the rate of about 500 pounds per acre. Tract A was laid out exactly as last year in order to refertilize a portion of each plat, leaving a portion of last season's fertilizing undisturbed, and fertilizing half of the ground not fertilized last year, leaving the remainder unfertilized from the beginning. The fertilizer used was the same kind and quantity each year. There being no visible results from the fertilizing of last year on the present crop, there is no mention of that fertilizing in my notes on this year's crop.

Tracts A and C were seeded with a small hand drill. Tract B was seeded in open drills by hand and covered with a hand rake. Tract D was seeded with a horse drill unless otherwise mentioned. In tract D the summer fallow mentioned is a deep black soil on the willow ground, broken in the fall of 1903 and not seeded last year.

The results of the fertilizer experiment on tract C were in some measure obscured, owing to the fact that the tract was new ground broken before the small culture tract was selected, and unfortunately a portion of the tract had considerable brush burned on it, the effect of which was in evidence as soon as the grains were up a few days. Therefore, the unfertilized portions gave much better results than they otherwise would have done, judging from the growth over the main field.

#### WHEAT.

Kharkov Winter: Sown August 3, 1904. Seed germinated very quickly, making a good stand, and covered the ground with the vesture of an eastern wheat field by the end of September. Spring growth started early in May. The fall growth was nearly all dead, but by June 1 the drills were again thickly covered and some stood 5 or 6 inches high. A few spots, however, were suffering from drought and winter injury. June 15, 8 to 10 inches of height had been gained, and the grain looked well. July 1, 16 to 18 inches high; some heads showing; the soil getting very dry. July 15, grain 20 to 38 inches high; the blooms falling and the grain forming. July 28, the grain well filled and nearly in the milk. August 14, grain in dough and beginning to harden when injured by a heavy frost. The straw was turning and ripened very rapidly after the frost. Several severe frosts followed within a few days. This grain was cut for thrashing, as it is thought some grains will grow.

Padui No. 9129: A bearded variety of winter wheat, seeded July 16, 1904. It acted about the same as the Klarkov, except that much of this variety was winterkilled, and it was not quite so far advanced when injured by the same frost.

Romanow: Sown in tract A, May 9. The seed germinated rather slowly, and probably only 75 per cent came up. May 24, coming up. July 1, that on fertilized ground was 16 to 17 inches high; that on unfertilized, 12 inches high. August 14, spoiled by frost. No seed matured. The fertilized ground produced fully 25 per cent more straw than the unfertilized.

Saskatchewan Fife: Sown in four different tracts.

Tract A.—Seeded May 10. May 23, coming up. July 28, on fertilized portion averaged 28 inches high, best 30 inches high; on unfertilized, 18 inches high; grain two-thirds filled. August 14, frosts spoiled the grain and no seed matured. This variety, as with all the wheats in tract A, was sufficiently matured for good hay by August 30, and when cut cured very quickly.

Tract B.—Seeded May 25. June 3, coming up. July 29, that on fertilized ground averaged 30 inches high; best, 36 inches high; that on unfertilized ground averaged 24 inches high. August 14, grain about filled when spoiled by frost.

Tract C.—Seeded May 23. June 1, coming up. July 28, on fertilized portion, averaged 38 inches; best, 40 inches; on unfertilized, averaged 20 inches. August 14, frost spoiled the grain when about filled. September 1, cut for hay. The fertilized plot yielded about 50 per cent more straw than the unfertilized.

Tract D.—Seeded May 10, with horse drill on both old ground and summer fallow of the first seeding. Coming up May 23. July 28, 24 inches high on the old ground and the grain a little more than half filled, heads rather small; on the summer fallow, straw very thick on the ground, standing 38 inches high and about heading, grain just forming. August 14, frost spoiled the grain. At that date, most of the grain on old ground was in the dough.

Velvet Chaff Blue Stem: This variety was also sown in four different tracts.

Tract A.—Seeded May 10. Coming up May 23. July 28, best 38 inches high, average 34 inches on the fertilized plot, grain about half filled; on unfertilized plot, average 24 inches high, heads smaller, and the grain not so much filled. August 14, frost spoiled the grain. Would have ripened in a few days of favorable weather.

Tract B.—Seeded May 25. Coming up June 2. July 29, the best was 36 inches high, the average 33 inches, on the plot fertilized; on the unfertilized, average height about 20 inches, grain just forming. August 14, the grain was about filled when spoiled by frost.

Tract C.—Seeded May 23. Coming up June 1. July 28, on fertilized ground, averaged 36 inches high, best 40 inches high; on unfertilized, averaged about 26 inches, grain just forming. August 14, frosts spoiled the grain when about filled.

Tract D.—Seeded May 10 on both old ground and summer fallow of the first seeding. Coming up May 23. July 28, 18 to 24 inches high on the old ground, and the grain about half filled, heads small; 30 to 40 inches high on the summer fallow and the grain nearly one-third filled. Frost spoiled the grain August 14. The grain on the old ground was well filled and in the dough. That on the summer fallow was several days later, the growth rank and yet green.

Early Riga: This variety was sown May 10 only in tract A. Coming up May 23. July 28, the grain was well filled and about in the milk. August 14, the grain was in the dough when spoiled by a heavy frost. A few heads were nearly matured.

Romaow, No. 8892: This variety was seeded in four different tracts.



Tract A.—Seeded May 10. Coming up May 24. July 28, the best was 31 inches high, averaging about 30 inches on fertilized plat, grain being well filled and nearly in the milk; on unfertilized, averaged about 24 inches, and a day or two later in filling. August 14, spoiled by frost.

Tract B.—Seeded May 25. Coming up June 3. July 29, the best was 42 inches high, averaging about 40 inches on the fertilized plat, grain half filled; on unfertilized, averaged about 28 inches high, grain one-third filled. August 14, spoiled by frost.

Tract C.—Seeded May 23. Coming up June 1. July 28, best 44 inches high, with an average of 42 inches on the fertilized plat; on the unfertilized, averaged about 23 inches high. The grain was one-third filled. August 14, spoiled by frost.

Tract D.—Seeded May 10 on old ground and summer fallow of the first seeding. Coming up May 23. July 28, 18 to 24 inches high on the old ground, grain about half filled; on the summer fallow, 30 to 40 inches high, headed, and the grain one-third filled. August 14, the grain on the old ground was in the dough and well filled when spoiled by frost; that on the summer fallow was some days later.

\*Romanow, seed of first importation: A small amount of this seed was held over from last year's seeding. Sown on tract A May 10. Coming up May 25. July 28, 35 to 38 inches high; grain about two-thirds filled; heads of fair size and quite uniform. August 14, grain well filled and in dough when spoiled by frost.

Romanow, imported seed: Sown on tract A May 10. Coming up May 25. July 28, 30 inches high; grain about two-thirds filled. August 14, the grain was well filled and in the dough when spoiled by frost.

Romanow, Sitka Experiment Station seed: Two plats of this variety were sown.

Tract B.—Seeded May 25. Coming up June 3. July 28, on the fertilized portion the best was 40 inches high, with an average height of 36 inches, and the grain was one-third filled; on the unfertilized portion average height about 28 inches, and the grain was filling a little later. August 14, spoiled by frost.

Tract C.—Seeded May 23. Coming up June 2. July 28, on the fertilized ground the best was 38 inches high, with an average height of 36 inches; grain about filled; average height on the unfertilized, 27 inches, and grain filling a day or two later. August 14, spoiled by frost.

Stanley: This variety was sown in tract A only on May 10. Coming up May 23. July 28, on the portions fertilized the best was 34 inches high, with an average height of 33 inches, grain being about three-fourths filled; on the unfertilized, average height, 24 inches, filling at about the same stage. August 14, spoiled by frost.

Ladoga: This variety was sown in tract A only on May 10. Coming up May 22. July 28, on the fertilized portion, the best was 28 inches high, with an average height of 26 inches; on the unfertilized, average height, 20 inches. This variety was so far advanced that some heads matured fair grain.

Preston: This variety was sown in tract A only on May 10. Coming up May 24. July 28, on the portion fertilized, the best was 34 inches high, with an average height of 32 inches; average height on the unfertilized, 26 inches. August 14, the grain was well filled and in the dough when spoiled by a frost.

Ebert: Sown in tract A May 10. Coming up May 24. July 28, the average height on the portion fertilized was 30 inches, the grain being about two-thirds filled; on the unfertilized, average height about 22 inches. August 14, grain just in the dough when spoiled by frost.

Plumper: This variety was sown on 3 tracts, A, B, and C.

Tract A.—Sown May 10. Coming up May 25. July 28, on the portion fertilized, the best was 30 inches high and the average 28 inches, grain more than two-thirds filled; on unfertilized, average about 23 inches high, grain filling a little later. August 14, grain in the dough when spoiled by a frost.

Tract B.—Seeded May 25. Coming up June 3. July 29, the fertilized portion averaged 36 inches high, grain one-third filled; the unfertilized averaged 26 inches high, grain filling a little later. August 14, spoiled by a frost.

Tract C.—Seeded May 23. Coming up June 2. July 28, that on fertilized ground averaged 38 inches, the best 40 inches; that on unfertilized averaged 26 inches, grain about half filled. Spoiled by frost.

Glyndon No. 661: This variety was also sown on three tracts.

Tract A.—Sown May 10. Coming up May 25. July 28, that on fertilized ground averaged 30 inches high, best 32 inches high, grain half filled; average height on unfertilized ground was about 27 inches, grain one-third filled. August 14, the grain was in the dough and spoiled by a frost.

Tract B.—Seeded May 25. Coming up June 3. July 29, on fertilized plat averaged 35 inches high, best 38 inches high; on unfertilized averaged 24 inches high, grain just forming. August 14, frost spoiled the grain.

Tract C.—Seeded May 23. Coming up June 2. July 28, the best 36 inches high on the fertilized portions, average height 33 inches; on the unfertilized, average 18 inches high, headed and blooming. Spoiled by frost when about filled.

Harold: Sown in three different tracts, as follows:

Tract A.—Seeded May 10. Coming up May 24. July 28, average 27 inches high on the portions fertilized; on the unfertilized averaged 20 inches high. August 14, grain injured by frost, but some heads were so far advanced that the grain seemed to have escaped without injury. The crop was cut for seed.

Tract B.—Seeded May 25. Coming up June 3. July 29, that on fertilized portions averaged 34 inches high, that on unfertilized ground averaged 26 inches high. Grain one-fourth filled when killed by frost.

Tract C.—Seeded May 23. Coming up June 2. July 28, that sown on fertilized ground averaged 43 inches high, on unfertilized 26 inches high; grain just forming on both plats. Spoiled by frost.

Kubanka: This variety was sown in two tracts.

Tract B.—Seeded May 25. Coming up June 4. July 29, fertilized 34 to 40 inches high, grain just forming; unfertilized 20 to 26 inches high; grain the same. Spoiled by frost.

Tract C.—Seeded May 23. Coming up June 2. July 28, fertilized 40 to 46 inches high; unfertilized 20 to 24 inches high; grain just forming in both. No seed matured.

Russian wheat, No. 2955: Sown on tract C May 23. This seed was old and germinated very slowly. June 15, a small percentage was up 3 inches high. July 28, that on fertilized ground was 20 to 30 inches high; on unfertilized 12 to 18 inches high; grain just forming in both. No seed matured.

Of all the wheats tried this year Ladoga and Harold were the furthest advanced when the first killing frost came. These two varieties matured many heads sufficiently for making flour, and a part of the seed will grow. But even of these varieties the greater portion was spoiled by frost. Next to these was Ebert, with many heads almost matured. Plumper, Stanley, Early Riga, and Roumanian were next, with many heads nearly ripe. These were all on tract A, the earliest seeded.

## BUCKWHEAT.

Silver Hull: Home-grown seed from 1903 crop was sown on tracts B and C with the following results:

Tract B.—Sown May 25. Coming up June 3. July 15, excellent color and filled with bloom. The fertilized portion was slightly injured July 19 by frost, the top leaves being killed. Nothing else on the station showed any effects of this frost. The minimum temperature registered was 34° F. on that date. July 29, partially recovered injury from the frost and was in full bloom. August 14, killed to the ground by frost; some seed had nearly matured.

Tract C.—Seeded from the same seed May 23. Coming up June 3. July 28, about the same on both plats, being 20 to 24 inches high, covered with bloom. August 14, killed to the ground by frost; some of the grain was almost matured.

## RYE.

Schlansted Winter: Sown July 16, 1904. Did not come up. The seed evidently was old.

Excelsior Winter: Sown July 16, 1904. Came up quickly and covered the ground well by winter. June 1, jointing; some stalks 8 to 9 inches high; a few spots showed winter injury. July 15, grain about half filled, straw beginning to ripen. July 28, grain well filled and in the dough. August 14, grain injured by frost; some grain seemed matured, and the crop was cut for seed.

Another winter variety (not named): Seeded at the same time behaved about the same as Excelsior Winter. June 15, 18 inches high, heads about showing. July 28, grain well filled and in the dough. August 14, grain injured by frost. Some grain seemed matured, and the crop was cut for seed.

Spring rye, True Stock: Seeded in Tract D May 25. Coming up June 3. July 29, that on fertilized ground, 40 to 44 inches high, grain one-third filled; on unfertilized, 36 to 40 inches high, grain filling a day or two later. August 14, the grain was about filled when spoiled by frost.

Another plant of this same variety was seeded the same day, farther up the flat and near the winter wheat. It behaved about the same and yielded a good crop of hay. It was reasonably thick on the ground and stood from 3 to 4 feet high alongside of oats sown some days earlier, which stood but 12 to 16 inches high. The point of interest rests in the fact that the spring rye yielded fully two-thirds more forage than the oats under like conditions, the soil being the same.

## BARLEY.

Champion: This variety was tried on three different tracts with the following results:

Tract A.—Seeded May 11. Coming up May 24. July 28, on the fertilized ground, 24 to 30 inches high, grain in the dough, straw golden color; on the unfertilized, 16 to 20 inches high, grain well filled, but not so far advanced by some days. August 14, grain hardening, frost injured it some. The crop was thrashed for seed (Pl. IV, fig. 3).

Tract B.—Seeded May 25. Coming up June 3. July 29, on fertilized ground, 24 to 33 inches high; on unfertilized, 12 to 18 inches high; grain one-third filled in both plats. Spoiled by frost.

Tract C.—Seeded May 23. Coming up May 31. July 28, on fertilized portion, 40 to 48 inches high; on unfertilized, 24 to 34 inches high; grain half filled in both plats, straw turning. August 14, grain spoiled by frost.

Hanna Two-Row (fall): This variety was tested on Tracts A and D.

Tract A.—Sown May 11. Coming up May 24 July 28, on the fertilized plat, grain well filled and nearly in the dough, straw turning; on the unfertilized, 16 to 18 inches high, grain about filled, straw not turning. August 14, all in the dough, but most advanced on the fertilized plat; damaged by frost.

Tract D, on lower bench.—Second-year ground; seeded May 13. Coming up May 25. July 28, 18 to 24 inches high, grain nearly filled. August 14, grain spoiled by frost.

Tract D, on the upper bench.—New ground, seeded broadcast May 23. Coming up June 1. July 28, 40 to 44 inches high, grain half filled. August 14, grain spoiled by frost; straw thick on the ground and matured sufficiently for good hay August 22.

Chevalier (beardless) : This variety was tried on tracts A, B, and C.

Tract A.—Seeded May 11. Coming up May 24. July 28, on the fertilized part, 18 to 24 inches high, grain in the dough and straw semigolden; on the unfertilized, 10 to 14 inches high, grain and straw ripening a little later. Grain damaged by frosts and shriveled some.

Tract B.—Seeded May 25. Coming up June 3. July 29, on fertilized portion, 20 to 28 inches high, grain half filled; on unfertilized, 12 to 20 inches high, grain about the same. Grain spoiled by frost.

Tract C.—Seeded May 23. Coming up June 1. July 28, that on fertilized ground, 30 inches high, grain half filled; on unfertilized, 20 to 26 inches high, grain filled about the same. August 14, grain spoiled by frost.

Odessa : This variety was sown on three tracts with the following results:

Tract A.—Seeded May 11. Coming up May 24. July 28, on the fertilized portion, 24 to 28 inches high, grain well filled and in the dough, straw turning fast; on the unfertilized, 14 to 20 inches high, grain a little later. August 14, frost damaged the grain, causing it to shrivel some.

Tract B.—Seeded May 25. Coming up June 2. July 29, on the fertilized plat, 27 to 33 inches high, grain half filled; on the unfertilized, 18 to 27 inches high, grain one-third filled. August 14, spoiled by frost.

Tract C.—Seeded May 23. Coming up May 31. July 28, on fertilized ground, 36 inches high, grain nearly filled; on unfertilized, 30 to 35 inches high, grain the same. August 14, grain spoiled by frost.

Black Hulless: This variety was also tried on three different tracts.

Tract A.—Seeded May 12. Coming up May 24. July 28, fertilized, 20 to 25 inches high, grain well filled in the dough, straw nearly golden; unfertilized, 15 to 19 inches high, grain filled about three days later. Damaged by frost.

Tract B.—Seeded May 25. Coming up June 2. July 29, on fertilized ground, 30 to 32 inches high; on unfertilized, 18 to 24 inches high; grain in both plats about three-fourths filled. Spoiled by frost.

Tract C.—Seeded May 23. Coming up May 31. July 28, that on the fertilized portion was 30 to 36 inches high; on unfertilized, 20 to 30 inches high; grain about filled in both plats. August 14, the grain was damaged by frost. It was thrashed and sacked with that from tract A.

Sisolsk : This seed was sown for testing on three tracts.

Tract A.—Seeded May 12. June 1, none showing. July 1, a small percentage came and was 15 to 16 inches high. July 28, on fertilized ground, 25 to 32 inches high; on unfertilized not quite so high; grain one-fourth filled in both plats. Damaged by frost.

Tract D.—Seeded May 25. Coming up June 3. July 29, on the fertilized portion, 20 to 27 inches high, grain one-third filled; on the unfertilized, 14 to 20 inches high, grain filling a little later. August 14, grain was spoiled.

Tract C.—Seeded May 23. Coming up June 2. July 28, that on the fertilized area was 36 to 38 inches high, grain about half filled; that on unfertilized

ground, 20 to 30 inches high, grain filling a little later. Grain spoiled by frost.

Lapland: Sown on tract A, May 12. Coming up May 25. July 28, 25 to 30 inches high, grain well filled, and nearly in the dough; straw turning. August 14, almost ripe. The grain shriveled some.

Primus No. 10586: This was sown on two tracts with the following results:

Tract A.—Seeded May 12. Coming up May 25. July 28, on fertilized portion, 25 to 28 inches high, grain well filled and in the dough; on unfertilized, 20 to 22 inches high, grain filled a little later; straw ripening fast on both plats. August 14, grain damaged by frost.

Tract B.—Seeded May 25. Coming up June 3. July 29, on fertilized ground, 24 to 33 inches high, about all headed, grain one-fourth filled; on unfertilized, 18 to 24 inches high, grain filling a little later. August 14, grain spoiled by frost.

Manchuria: This variety was tested on all four tracts.

Tract A.—Seeded May 12. Coming up May 25. July 28, where fertilizer was applied it was 26 to 30 inches high, grain well filled and in the dough, straw turning yellow; on unfertilized portion, 14 to 18 inches high, grain filled a little later. Frost caused the grain to shrivel some.

Tract B.—Seeded May 25. Coming up June 3. July 29 on the fertilized area 26 to 32 inches high, grain about half filled; on the unfertilized, 12 to 18 inches high, grain filled a little later. Grain spoiled by frost.

Tract C.—Seeded May 23. Coming up June 1. July 28, where fertilized, 36 to 40 inches high, grain half filled; where unfertilized, 24 to 34 inches high, grain one-third filled. Spoiled by frost.

Tract D.—Seeded May 12 on new and second-year ground. Coming up May 24. July 28, 18 to 32 inches high, grain about filled, straw ripening fast. August 14, grain spoiled by frost.

Hanna, No. 9133: This variety was also sown on all four tracts.

Tract A.—Seeded May 12. Coming up May 24. July 28 where fertilized was 24 to 28 inches high, grain well filled and in the dough, straw nearly golden; where unfertilized, 16 to 18 inches high, grain filled a little later. Grain damaged by frost; shriveled some.

Tract B.—Seeded May 25. Coming up June 2. July 29 on the fertilized portion 20 to 32 inches high, grain about half filled; on the unfertilized, 18 to 25 inches high, grain one-third filled. Spoiled by frost.

Tract C.—Seeded May 25. Coming up June 1. July 28, where fertilized, 36 inches high; where unfertilized, 24 to 30 inches high; grain about one-half filled in both plats. Spoiled by frost.

Tract D.—Seeded May 11, broadcast on summer fallow and newly broken ground. Coming up May 25. July 28, 26 to 30 inches high, grain about half filled, heads good size, uniform; on burned spots, 32 to 40 inches high, grain filling a little earlier. August 14 grain spoiled by frost.

Manshury: This seed was sown on each of the four tracts.

Tract A.—Seeded May 12. Coming up May 26. July 28, where fertilized, 24 to 30 inches high, heads large, uniform, grain nearly filled; where unfertilized, 22 to 26 inches high, grain filling a little in advance. August 14 grain in the dough but damaged somewhat by frost.

Tract D.—Seeded May 25. Coming up June 3. July 29, on fertilized ground, 30 to 34 inches high, grain one-fourth filled; on unfertilized, 18 to 23 inches high, grain filling a day or two later. Spoiled by frost.

Tract C.—Seeded May 23. Coming up June 1. July 28 on the fertilized portion 36 to 41 inches high; on the unfertilized, 20 to 24 inches; grain one-fourth filled in both plats. Grain spoiled by frost.

Tract D, lower bench.—Seeded May 9 and 10 on old and new ground. A part of this new ground was fertilized with guano at the rate of 500 to 600 pounds per acre, also a part with new stable manure, covering the ground liberally. The season proved too dry for the stable manure to show any effect. Coming up May 23. July 28 on old ground 20 to 36 inches, grain nearly filled; on guano plat averaged nearly 36 inches high, thick on the ground, grain filled and in the dough, straw nearly golden color; on burned spots 24 to 36 inches high, nearly as good as on guano plats and quite as far advanced; remainder very short and quite green. Somewhat damaged by the frost. The spots furthest advanced were thrashed for seed.

Trooper: Seed of this variety was sown on tracts A, B, and C.

Tract A.—Seeded May 12. Coming up May 25. July 28 on fertilized portion 25 to 28 inches high, grain well filled and nearly in the dough, straw turning; on the unfertilized, 14 to 20 inches high, grain filled a little later. Damaged by frost.

Tract B.—Seeded May 25. Coming up June 3. July 29 on fertilized area 24 to 32 inches high, grain one-third filled; on unfertilized, 12 to 18 inches high, grain filling a little later. Spoiled by frost.

Tract C.—Seeded May 23. Coming up May 31. July 28 on fertilized area 36 to 42 inches high, grain nearly half filled; on unfertilized, 24 to 32 inches high, grain filling about the same.

Royal: Sown on tract C May 23. Coming up June 1. July 28 on the fertilized plat 30 to 35 inches high; on the unfertilized, 24 to 30 inches high; grain two-thirds filled in both plats. Spoiled by frost.

Several of the barleys in tract A were almost ripe when the first killing frost came, August 14, which caused them to shrivel some. Champion was the furthest advanced, closely followed by Chevalier, Odessa, Black Husless, Manchuria, Manshury, Hanna No. 9133, and Primus No. 10586. The several varieties in this tract were thrashed to ascertain what part, if any, of the seed will grow. The later sowings were unquestionably lost and were therefore cut for feed. The unfavorable weather from August 1 prevented both the wheats and barleys from hardening.

#### OATS.

Finnish Black (Rampart Experiment Station Seed): This variety was tested on each of the four tracts.

Tract A.—Seeded May 12. Coming up May 25. July 28 where fertilized 30 to 36 inches high, grain well filled, in the milk, straw turning yellow; where unfertilized, 18 to 22 inches high, grain filling a little later. August 14 grain hardening. Harvested for seed August 30, no visible injury from frost (Pl. V, fig. 1).

Tract B.—Seeded May 25. Coming up June 4. July 29 on fertilized ground 30 to 38 inches high, grain one-third filled; on unfertilized, 18 to 20 inches high, grain nearly half filled. August 14, frost damaged the crop, most of the grain shriveled.

Tract C.—Seeded May 23. Coming up June 2. July 28, on the fertilized plat, 40 to 42 inches high, grain about formed; on the unfertilized, 24 to 30 inches high, grain about the same. Frost of August 14 damaged the crop somewhat.

Tract D (Sitka Experiment Station seed).—Seeded on lower bench May 9, third-year ground. Coming up May 23. July 28, 20 to 30 inches high, grain well filled and nearly in the milk. August 14, frost damaged a small percentage. The crop was thrashed for seed.

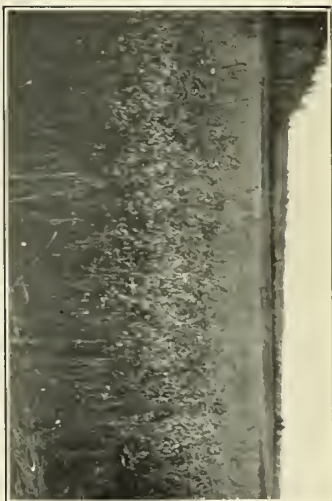


FIG. 1.—FINNISH BLACK OATS.

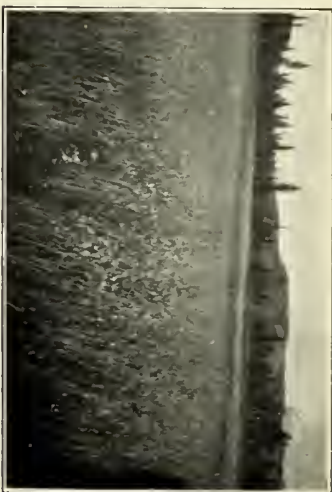


FIG. 2.—BURT EXTRA EARLY OATS.



FIG. 3.—CUTTING GRAIN.



FIG. 4.—HAULING GRAIN HAY.

VIEWS AT THE COPPER CENTER STATION.





Two other field plats of these oats were seeded from home-grown seed saved from 1904 crop; only about 15 per cent grew, the seed having been exposed to severe frosts when ripening.

**Banner:** Seed of this variety was sown on tracts A, B, C, and D.

**Tract A.**—Seeded May 12. Coming up May 23. July 28, on the fertilized part, 20 to 24 inches high, grain filled and nearly in the milk; on the unfertilized, 12 to 15 inches, grain filled a little later. August 14, grain hardening; seems to have escaped the frost with little visible damage. Harvested for seed August 30.

**Tract B.**—Seeded May 25. Coming up June 3. July 29, on fertilized area, 30 to 34 inches high, grain just forming; on the unfertilized, 12 to 18 inches high, grain forming a little earlier. Frost of August 14 caused some of the grain to shrivel.

**Tract D.**—Seeded May 11, on third-year ground, also on summer fallow of the first seeding, lower bench. Coming up May 22. July 28, on old ground, 10 to 18 inches high, grain in the milk; on summer fallow, 24 to 30 inches high, grain half filled. This sowing covered a tract of new ground, and at this date, on burned spots, it was 40 to 41 inches high, with the grain half filled. August 14, frost spoiled the greater portion. It was much the furthest advanced on the driest and poorest soil, and there only a small percentage showed any injury. This portion of the tract was harvested and thrashed for seed.

**Russian No. 2800:** Sown on each of the four tracts.

**Tract A.**—Seeded May 12. Coming up May 25. July 28, where fertilized, 25 to 28 inches high; where unfertilized, 16 to 19 inches high; grain well filled and in the milk. Straw turning in both plats. August 14, grain hardening. The grain was thrashed for seed, as the frost did not seem to hurt it.

**Tract B.**—Seeded May 25. Coming up June 3. July 28, where fertilized, 30 to 36 inches high, headed, grain one-third filled; where unfertilized, 14 to 18 inches high, grain filling a day or two later. August 14, frost damaged the grain; much of it shriveled.

**Tract C.**—Seeded May 23. Coming up May 31. July 28, on the fertilized part, 35 to 40 inches high, grain well formed; on the unfertilized, 25 to 35 inches high, grain one-fourth filled. Damaged by frost; the straw cut for feed.

**Tract D.**—Seeded May 9. Coming up May 22. July 28, 16 to 32 inches, grain well filled and much of it in the milk; straw turning. August 21, cut for seed, a small percentage shriveled by frost August 14.

**Tartar King:** Sowings made on the four tracts.

**Tract A.**—Seeded May 12. Coming up May 25. July 28, on fertilized portion, 24 to 30 inches high, grain well filled and in the milk; on unfertilized, 15 inches high, grain filled a little later. August 14, grain hardening, frost did no visible harm. The crop was thrashed for seed.

**Tract B.**—Seeded May 25. Coming up June 4. July 29, where fertilized, 30 to 34 inches high; where unfertilized, 16 inches high; grain half filled in both plats. August 14, frost damaged the grain; later frosts spoiled the crop.

**Tract D.**—Seeded May 23. Coming up June 1. July 28, on fertilized ground, 33 to 36 inches high; on unfertilized, 24 inches high; both heading and grain forming. August 14, frost damaged the grain.

**Sixty-Day:** Sowings of this variety were made as follows:

**Tract A.**—Seeded May 12. Coming up May 25. July 28, on the fertilized portion, 28 to 33 inches high, grain well filled and in the milk; on unfertilized, 12 to 16 inches high, grain filled a little later. August 14, grain in the dough. Harvested August 30 for seed. The heavy frost did no visible damage.

**Tract B.**—Seeded May 25. Coming up June 4. July 29, on fertilized area, 30 to 33 inches high; on the unfertilized, 16 to 20 inches high; grain in both crops one-third filled. Frost of August 14 damaged the grain.

Tract C.—Seeded May 23. Coming up June 2. July 28, where fertilized, 34 to 38 inches high; where unfertilized, 20 to 30 inches high; both plats heading and grain just forming. August 22, grain in the dough and no visible damage from frost of August 14. Later frost damaged it some, and it was cut for feed.

Tract D, lower bench.—Seeded May 11, broadcast on new ground and summer fallow of the first seeding. Coming up May 24. July 28, on summer fallow, 26 to 33 inches high; on burned spots of the new ground, 34 to 38 inches high; grain in both plats nearly filled. August 21, grain about ripened, showing some damage from frost. The crop was harvested and thrashed. The new ground plat was not worth cutting.

Improved Ligowo: Sown on tract A May 12. Coming up May 25. July 28, where fertilized, 26 to 32 inches high; where unfertilized, 15 to 25 inches high; grain in both plats filled and in the milk; fertilized plat a little furthest advanced. August 14, grain in the dough; the grain did not show any damage from August frost. Harvested for seed August 30.

Duppaur: Sown on tract A, May 12; all fertilized. Coming up May 26. July 28, 30 to 36 inches high, grain two-thirds filled. August 14, grain in the milk. August frost spoiled the grain.

Burt Extra Early: The seed of this variety was sown on all four tracts.

Tract A.—Seeded May 12. Coming up May 25. July 28, on fertilized part, 30 to 33 inches high, grain well filled and in the milk; straw turning; on unfertilized, 20 to 24 inches high, grain-filled a little later. August 14, grain hardening. Grain not visibly damaged by August frost. Crop thrashed for seed (Pl. V, fig. 2).

Tract B.—Seeded May 25. Coming up June 4. July 29, on fertilized portion, 24 to 28 inches high; on unfertilized, 12 to 18 inches high; grain in both plats three-fourths filled. August 14, heavy frosts damaged the grain and the crop was cut for feed.

Tract C.—Seeded May 23. Coming up June 2. July 28, on fertilized plat, 36 inches high, grain half filled; on unfertilized, 20 to 24 inches high, grain filling a little later. August 14, grain damaged by frosts. August 22, straw about ripe, cut for feed.

Tract D, lower bench.—Seeded May 10 on summer fallow of first seeding and third-year ground. Coming up May 23. July 28, on old ground, 18 to 20 inches high, grain nearly in the dough, straw about ripe enough for hay; on summer fallow, 24 to 33 inches, grain well filled and in the milk, straw turning. August 7, grain on the old ground ripe and cut for seed; summer fallow a little damaged by frosts August 14, part cut for hay and part allowed to ripen which was thrashed to test for seed. The summer fallow ground made a 50 per cent larger crop than the old ground.

Burt Extra Early was the first to ripen by several days and was thrashed before any frost. Finish, Swedish, Select, Sixty-Day, Improved Ligowo, and Tartar King ripened about together. The early seedings of these varieties showed no injury from frost of August 14.

#### GRASSES (THIRD SEASON'S GROWTH).

The grasses all did poorly, the season being too dry.

Tall meadow fescue (*Festuca elatior*): June 1, poor stand and new growth backward. July 1, 20 inches high; heading. July 29, seed stalks about 36 inches high; scattering. September 1, no seed matured.

Timothy (*Phleum pratense*): May 5, new growth started. June 1, looking fair. July 1, 12 to 18 inches high; headed; suffering for moisture. July 15, blooming; growth uneven. July 29, bloom falling and seed well formed. Sep-

tember 1, seed ripened. Guano was scattered on a portion of the plat in the spring, but there was not sufficient rain to carry it into the soil until late in the season; this part is much greener at the close of the season.

Meadow foxtail (*Atopocurus pratensis*): June 1, stand very thin; growth well started and throwing out seed stalks. July 1, seed stalks scattering, 24 inches high. July 15, bloom falling; crop very light. July 29, seed nearly matured. August 15, seed was ripe.

Brome grass (*Bromus inermis*): May 15, up enough for good pasture. July 1, 12 to 18 inches high; some seed stalks 29 inches high and headed. July 15, stalks scattering, 24 to 30 inches high; good lower growth. July 29, stalks 30 inches tall; lower growth shorter than last year. September 1, seed did not ripen. Three acres were seeded to this variety May 12 of this year. It being very dry, the grass did not make much growth; however, the ground is quite well covered at the close of the season.

Redtop (*Agrostis vulgaris*): June 1, getting quite green; seed stalks showing. July 1, 12 to 18 inches high. July 15, good stand; heads opening. July 29, 24 inches high; seed formed. September 1, seed ripened.

Blue grass (*Poa pratensis*): May 15, showing green. June 1, seed stalks started, some heads showing. July 1, 20 to 24 inches high; very thin stand. July 28, seen nearly matured. August 14, seed ripened.

Orchard grass (*Dactylis glomerata*): June 1, getting green very slowly, partly winterkilled. July 1, little growth, very thin. July 29, good bunches thinly scattered over the ground; no seed stalks thrown out this season.

Tall meadow oat grass (*Avena clatior*): June 1, started late, a few stalks showing. July 1, 24 inches high; a few heads showing; looking poorly. July 15, 36 to 42 inches high; very thin on the ground; heads opening. July 29, seed formed. August 15, seed ripened.

Small plats of timothy, meadow fescue, orchard grass, brome grass, and hassock grass seeded in 1904 all made about the same growth as those of the 1903 seeding. Hassoek grass of both seedings dead. The same sown this year did not come up. Red, white, and alsike clover of the 1903 and 1904 sowings were killed by the winter. The plats were reseeded this year, but made very little growth. Perennial rye grass was winterkilled and the plat was reseeded, but it also made very little start. *Holcus lanatus* was sown June 6, of this year. The soil kept so dry that the seed germinated very slowly and made a poor stand and little growth.

## VEGETABLES.

### PEAS.

Marblehead Mammoth: Planted May 12. Coming up May 23. July 15, vines thrifty, 24 inches high; supported with brush. July 23, blooming. July 29, 36 inches high; good setting of pods. August 14, just ready for first picking when heavy frost killed the whole vine.

Alaska: Seeded May 12. Coming up May 23. First picking July 20. The first setting ripened for seed. August 14, the frost killed the vines.

Prolife Early Market: Seeded May 12. Coming up May 22. July 15, full of bloom; some pods. First picking July 20. The first setting matured seed. August 14, frost killed the vines.

### LETTUCE.

Early Curled Silicia, Philadelphia Butter, and Big Boston all sown in the open ground May 26. Were ready for the table July 1. The first named did the best; all made large plants.

## SPINACH.

Long Standing: Coming up June 2. July 1, quite ready for the table. The plants became very large, and where not cut back the stalks were covered with seed, although it did not mature.

## KALE.

Dwarf German: Only a few seeds grew. August 15, the few stalks were looking fine, 12 inches high and 18 inches across; very brittle.

## RUTA-BAGA.

Purple Top Yellow Swede: Sown in boxes and open ground. Box plants set out June 8. Both seedings made excellent growth, showing large tops. Roots did not develop much till late in the summer. Those sown in the open were pulled September 2 to clear the field for pasture. The roots averaged of good size; the largest with top weighed 7 pounds. Those transplanted from boxes made a handsome crop; roots nearly all good size; largest weighed 7½ pounds. The crop was pulled late in September. A few plants from the box seeding sent up seed stalks.

## TURNIP.

White Strap-Leaf: Roots were large enough for table use July 15; tops large. This variety did well; still growing when pulled September 2 to open the pasture. The largest weighed 8 pounds. This variety suffered from a slight attack of the root maggot.

Purple Top White Globe: Large enough for use July 15. The crop was pulled September 2, for same reason as above. This variety did unusually well; roots averaged 5 to 6 pounds; largest with top weighed 11 pounds; sweet and tender.

## RHUBARB.

Old plants from seed sown in 1903 made stalks of fair size for use June 15 and furnished three cuttings.

Winter Crimson Forcing: Seeds planted in the open garden June 3. July 1, up with fourth leaf. July 15, plants looking well and getting to be of good size. September 1, the stalks from these young plants would almost do for use; some seed stalks were sent up 12 inches high.

## CUCUMBER.

Early Cluster: Seeded in the open May 26. July 1, plants looking fair, fourth leaf forming. July 15, plants thrifty; about vining. July 29, vines started; blooming and some cucumbers setting. August 14, some cucumbers 1 inch long when the vines were killed by frost.

## BEANS.

Broad Windsor: Seed planted May 26. Coming up June 10. June 15, plants 1 inch high; healthy. July 1, average 9 inches high; looking well; branching out some. July 15, blooming. July 29, many pods showing, some filled enough for table use; still blooming. August 14, frost killed the vines. From August 1 until the vines were killed they were full of large pods well filled and excellent for green beans; only a few had been used, as we hoped that the seed would mature.

Horse Bean No. 7024: Seed planted May 26. Coming up June 9. June 15, 2 inches high. July 1, 9 to 12 inches high; not healthy looking. July 15, looking better; blooming. July 29, pods filled and about ready for use as green beans. The crop was light and all the beans had been saved, hoping to mature seed, but a heavy frost August 14 killed the vines.

## CORN.

Early Crosby Sweet No. 10: Seed planted May 26, on lower bench near cottage. Coming up June 10. July 29, some stalks 16 inches high; many suckers. August 14, frost killed all the stalks. Another planting, on the upper bench, May 24. Coming up June 9. July 28, stalks 10 to 12 inches high. August 14, all killed by frost.

Pride of the North No. 8: Planted May 26, on lower bench. Coming up June 8. July 29, 15 inches high. August 14, all killed by heavy frost. Another planting, on the upper bench, was made May 24. Coming up June 7. July 28, many stalks strong and healthy; 12 inches high. August 14, all killed by frost.

No Plus Ultra No. 9: Planted May 25, on lower bench. Coming up June 12. July 29, 6 to 7 inches high; many suckers. August 14, killed by heavy frost. Another planting, on the upper bench, made May 24. June 15, none up. July 28, stalks 6 to 7 inches high. August 14, all killed by the frost.

## POTATOES.

Extra Early Ohio: Planted May 26, on lower bench. First coming up June 9. July 1, tops getting good size and looking healthy. July 15, looking fine; making top fast; some bloom showing. July 29, tops of good size, very dark and of healthy color. August 14, vines killed by frost. September 5, 21 hills yielded 10 pounds, mostly small marketable potatoes, a few the size of goose eggs.

Garfield: Planted May 26, on lower bench. Coming up June 11. July 1, tops thrifty and getting good size. July 15, looking fine; making top fast; some bloom showing. July 29, vines strong and healthy. August 14, frost killed the vines. September 8, 40 hills yielded 22 pounds of potatoes, many of good marketable size.

Freeman: Planted May 26, on lower bench. First coming up June 1. July 1, making good tops and looking healthy. July 15, blooming some days. July 29, vines large and healthy. August 14, vines killed by frost. September 8, 57 hills yielded 36½ pounds of potatoes. About half of the crop was of fair marketable size; many the size of hen's eggs.

The three varieties were also represented on the upper bench; the land was new and the yield was somewhat lighter. The vines were killed by frost August 14, as on the lower bench. All the potatoes grown here have been of the finest quality, but the yield so far has been light.

## CABBAGE.

We did not try cabbage this year, but a number of small heads were grown in private gardens. The seed was planted in open ground as soon as soil could be prepared. The largest head seen was from G. S. Clevenger's garden, and weighed 2¾ pounds.

## OTHER VEGETABLES.

Radishes, carrots, onions, beets, parsnips, cress, and parsley all did fairly well in the station and in the neighboring gardens.

### NURSERY.

A small collection of nursery stock was sent through the mail from Sitka Station. Stock seemed to be in fair condition when received, and was set in the ground at once. Most of the rooted trees are alive, but they made little growth. Two gooseberry, three raspberry, and nine currant plants lived, but made little growth. Early in September the rabbits invaded the garden, and before they were detected the nursery trees had been eaten to the ground. It is evident that if anything is to be done in the line of horticulture, the trees will have to be protected from rabbits.

#### STRAWBERRIES.

Judge Holman presented the station with 12 plants, reserving the same number for his own garden, but none of the plants in either garden started.

### FLOWER GARDEN.

The flower garden was small and received little attention; yet it was admired by many.

The pansy bed of plants 1 year old has supplied the neighborhood with blossoms throughout the entire summer. Crimson Flax, Candytuft, and Nemophila began blooming about July 25, continuing through the summer. Poppies and Larkspur both did well.

### FALL SEEDING.

Several varieties of winter wheat and winter rye were sown on both the upper and lower benches July 27 and August 3. The several varieties came up quickly and made excellent growth, soon covering the ground. About the middle of September observations were made on the growth and it was found that the upper bench plats had been destroyed by rabbits since my last visit a week before. There were five plats covering one-fourth acre. The lower bench plats were also attacked, but it was discovered in time to make a temporary rabbit-proof fence around some small plats before they were seriously damaged. The rabbits were very numerous this fall, and the vegetation was killed by frost unusually early, which probably accounts for their invading our fields. Winter grains were grown the two previous years and the rabbits, though plentiful, did not damage our crops.

### LIVE STOCK.

The station now has a team of two fine bay horses and one milch cow and a heifer calf. The horses were wintered at the station last winter principally on native hay, with a small daily allowance of grain hay (Pl. V, figs. 3 and 4). The team kept in good flesh until put to work February 15, freighting in the station supplies. From that time the animals were reduced some in flesh, having had no grain feed through the winter before being put to work.

The cow and calf were brought to the station August 20 of this year. The cow was then giving about 20 pounds of milk daily. The trip overland from Valdez was hard on the calf and the cow gave a very poor quality of milk for some days. The milk is now of good quality. A few days after the cow arrived the milk flow increased to about 28 pounds per day; but the early frosts spoiled the feed so much that we had to begin feeding all the stock early in September, and the milk flow has dropped back to 15 or 18 pounds per day. The total yield of milk from August 21 to September 20 (thirty days) was 644 pounds.

## WORK AT THE RAMPART STATION.

### WEATHER CONDITIONS FOR THE YEAR.

By residents of the interior the winter of 1904-5 was considered mild. Only once did the thermometer indicate 50° below zero, the average temperature for the winter months being, on an estimate, between 30° and 35° below zero. Thin ice began running in the river October 16, but it was not until October 20 that it seemed as though winter had begun. November 9 the ice blocked in the river, and in a few days it was frozen over solid and so remained until May 16 of this year. The maximum thickness of the ice was 4 feet.

The first snow to remain on the ground fell October 2, and by the end of that month there were 6½ inches. The total snowfall for the winter was about 18 inches, and half of this did not fall until early in February. This snowfall is considerably below normal, as there is often 4 feet in this locality.

Early in April conditions seemed to point toward an early spring. The days were bright and clear and the sun warm, but toward the middle of the month it got colder again and the snow stopped melting for a while. By May 5 the snow had disappeared from the plowed ground, and by May 10 it was all gone except in sheltered spots. By May 15 part of the ground broken up in the fall was dry enough to harrow, and on May 18 the first sowing of grain was made.

Taken as a whole the summer was the most unfavorable one from an agricultural standpoint since the station was established in 1900. It was characterized by cloudy, rainy, windy weather and cool nights. The rainfall, 6.7 inches from June 10 to September 15, inclusive, was above normal, but was not excessive, had it not been accompanied by so much cloudy weather and such cool nights during July and August, the best growing months. Once during July the thermometer dropped to 32° F., and several times to 33°, the average minimum daily for the month being 42.9° and the average maximum 68.6°. During the first week of August occurred the warmest weather of the summer, the highest temperature recorded being 96°. From June 10 to September 15, inclusive, a period of ninety-eight days, there were forty-two cloudy, thirty-four partly cloudy, and twenty-two clear days. The number of cloudy days is much above normal, according to common report.

The first frost came August 19, when the temperature fell to 29°. Between that time and the end of the month there were five more, but all were so light that only the tenderer things were injured. The first killing frost did not occur till September 13, the thermometer falling to 17°. During the last week of September there were several wet snowfalls, an unusual occurrence so early in the season, but most of it melted.

Persons who have been residents of Rampart since 1897 say this has been the most unfavorable summer since their arrival.

### PROGRESS OF STATION WORK.

During the winter some 175 logs were cut for use in station buildings, and 35½ cords of wood, which were exchanged for team work in doing the spring seeding, etc. Other work during the winter and spring was done as the weather would permit.

From July 19 to August 10 the superintendent, Mr. F. E. Rader, accompanied by the special agent in charge, made a tour through the lower Tanana River Valley and helped survey a reservation near Fairbanks.

No help was hired prior to July 1, but since that time one man has been employed by the day. In addition to routine work and caring for the crops,

2½ acres have been added to the cleared land, making a total of 5½ acres available for crops next year. The weather permitting, all of the cleared land will be plowed this fall and put in readiness for seeding next spring.

No station buildings were erected this year with the exception of a small temporary stable. The lumber is on hand for the erection of a frame cottage next summer, the foundation for which will be prepared this fall. The lumber was obtained from the post sawmill at Fort Gibbon, 75 miles down the river from Rampart. By permission of the War Department, and through the courtesy of the commanding officer and the quartermaster at Fort Gibbon, 10,000 feet of logs were sawed into lumber at the post sawmill at the actual cost of the labor required. The lumber was delivered by the United States transport *Jeff C. Davis*, the station furnishing the necessary fuel for the trip.

Early in September a small consignment of freight was received from Seattle consisting of harness, wagon, drag, scraper, nails, etc.

### FIELD CROPS.

The 2½ acres cleared last year was nearly all seeded to different varieties of spring grain and common oats for feed. Seeding was begun May 18 and continued at intervals, as the ground became dry enough to harrow, till June 6. As compared with last year, the first seeding was nearly two weeks later, the half acre in grain having been seeded in May 5.

Being practically all virgin soil without fertilizer of any kind, the stand of grain was very irregular on much of the land. On the spots where stumps had been burned the grain made a fine growth, but elsewhere the stand was thin and the straw short and spindling.

Following are the varieties sown and the notes on their growth:

#### BARLEY.

Manshury (Sitka-grown seed): Seed sown May 19. June 1, up. June 15, good stand, 3 inches high. July 15, best 24 inches high; occasional heads appearing. August 1, height 48 inches; fully headed and beginning to bloom; fine appearance. August 15, grain in medium dough. September 1, ripening. September 6, harvested; heads of good length and well filled.

Manshury (Rampart-grown seed): Sown May 19. June 1, up; looking well. June 15, good stand; 3 inches high. July 15, height 18 inches, best 27; partially headed. August 1, best 50 inches high; all headed and in bloom; best in the field. September 1, nearly ripe. September 6, harvested; fine well-filled heads. Last year this variety was ripe and harvested August 15, but the straw was neither so tall nor the heads so large. There seem to be very little difference between the growth of the Sitka and of the Rampart seed.

Minnesota, No. 105: Sown May 18. June 1, up. June 15, fair stand; 2½ inches high. July 15, height of best, 24 inches; occasional heads showing. August 1, height 42 inches; headed and in bloom; one end of the plot very good. August 1, filling well. September 1, nearly ripe. September 6, harvested; heads of good length.

Lapland (Sitka-grown seed): Sown May 18. June 1, coming up. June 15, fair stand; 2½ inches high. July 15, average height of best, 24 inches. August 7, height 42 inches; headed and blooming. August 15, filling. September 1, grain in hard dough and nearly ripe. September 15, harvested; heads fair.

Flying Dutchman: Seeded May 20. June 1, up. June 15, fine stand; 3 inches high. July 15, heading; height 21 inches. August 1, all headed, but not filling yet. August 15, fairly well filled. September 1, grain in hard dough. September 5, harvested; straw and heads rather short.



## OATS.

Burt Extra Early: Seed sown May 19. June 1, coming up. June 15, fair stand, 3 inches high. July 15, height of best, 22 inches, one-half headed. August 1, in bloom; height of best, 36 inches. August 15, filling. September 12, ripe. Several short rows of this variety was sown in ground under cultivation for several years. It did better and ripened by September 5. The straw of this variety was rather small and short and the heads were heavy.

Finnish Black: Seed sown May 19. June 1, up. June 15, rather poor stand; 3 inches high. July 15, height of best, 21 inches. August 1, heading; height, 36 inches. August 15, just beginning to fill; height, 48 inches. September 1, grain in the dough, and occasional ripe head. September 12, partially ripe. This variety ripened fine heavy grain by September 1 last year.

Swedish Select: Seed sown May 18. June 1, up. June 15, fair stand; 2½ inches high. July 15, best 18 inches high. August 1, heading; 36 inches high. August 15, just past blooming. September 1, grain in the milk. Did not ripen.

## SPRING WHEAT.

Saskatchewan Fife (Canadian seed): Sown May 19. June 1, coming up. June 15, good stand; 2½ inches high. July 15, height 15 inches; best 24; looks fairly good. August 1, height 32 inches; headed; looks well. August 15, in full bloom. September 1, filling slowly. Did not ripen.

Velvet Chaff Blue Stem (Canadian seed): Seed sown May 19. June 1, up. June 15, excellent stand; 3½ inches high. July 15, height 18 inches; looks well. August 1, all headed. August 15, in full bloom; looks fine. September 1, 48 inches; grain in soft dough. Partially ripened.

## RYE.

Spring rye: Sown May 19. June 1 up in fine shape. June 15 extra fine stand; 4 inches high. July 5, beginning to head. July 15, height 34 inches; fully headed. August 1, height 50 inches; in bloom; looks fine. August 15, beginning to fill. September 1, grain in medium dough. September 13, partially ripe. This variety began to head forty-seven days from time of seeding, and gave promise of maturing in good season, but it filled so slowly that it did not fully ripen.

## BUCKWHEAT.

Russian: Seed sown June 2. June 15, just coming up. July 1, very good stand; average height about 1½ inches. July 15, average height 4 inches; yellowish; doing quite well. August 1, height 18 inches; in bloom; yellow color has disappeared. August 15, forming grain. One of the very few things killed by frost August 19.

## WINTER GRAIN.

A small plat of each of the following varieties of winter grain was seeded August 17, 1904. It came up in good shape, but was eaten off once by the rabbits before a fence was completed. It made a fairly good growth again before the cold weather set in. During the winter the plats were covered with snow varying in depth from 8 to 24 inches. As soon as the snow left the grain it began to grow, and it was soon apparent that the varieties covered the deepest stood the winter the best. It began to head in good time but was very slow in filling and ripening.

Amber Winter Rye: Seed sown August 17, 1904. June 1, 1905, fine stand; 6 inches high. July 1, fully headed; height 42 inches. July 15, height 50 inches;

in full bloom. August 1, height 54 inches; grain in the milk; good appearance. August 15, filling slowly. September 1, ripe; grain plump. September 5, harvested.

Excelsior Winter Rye: Sown same as above. June 1, badly winterkilled; one-fourth standing; height 6 inches. June 15, average height 18 inches, best 24; heading. July 15, in full bloom; 48 inches high. August 1, grain in the milk; filling slowly. August 15, grain in the dough. September 1, about ripe. September 5, harvested.

Giant French Winter Rye: Seeded same as above. June 1, height 4 inches; partially winterkilled; two-thirds of a stand. July 1, fully headed; average height 36 inches. July 15, in full bloom; 42 inches high. August 1, just through blooming. August 15, grain in soft dough. September 1, ripening slowly. September 5, harvested.

Kharkov Winter Wheat: Seeded same as above. June 1, almost all winterkilled; height 2 inches. July 1, height 12 inches. July 10, beginning to head. July 15, two-thirds headed; height 24 inches. August 1, mostly through blooming; height 32 inches. August 15, grain in the milk. September 1, grain in soft dough. Did not fully ripen. This variety did not have a fair chance.

A plat of each of the same varieties of winter grain was seeded again this year, August 18, on ground broken up a year ago. It has made a fairly good growth.

#### VEGETABLES.

With the exception of the potatoes, the vegetables were planted on ground under cultivation since 1900, but which has never been fertilized. The slow growth is attributed mostly to the unfavorable season.

#### POTATOES.

Burbank: This was Rampart seed grown by Capt. A. H. Mayo, who raises a good crop every year.

Early Rose: Seed obtained from Mr. Peter Lundien, Eagle, Alaska, who raises a good crop of potatoes every year.

These potatoes were planted on new ground without any fertilizing. They were slow in coming up and made a poor growth. The tubers were mostly small and the yield about equal to the seed planted. A few of the Early Rose were planted on old ground. They did much better, the yield being fivefold and the tubers of good size. All were dug September 13.

#### PEAS.

Prolific Early Market: Seed planted May 29. June 8, coming up; June 15, 1 inch high. July 1, height 6 inches; doing well. August 1, in bloom; injured by high winds. August 15, some pods fit for use. September 1, injured some by frost, but still blooming; fair yield of peas.

#### BEETS.

Crimson Globe and Eclipse: Seed planted May 29. June 12, coming up. July 1, good stand; 1 inch high. July 15, growing quite well; height 3 inches. August 1, doing well. September 8, beets pulled. They were small, many not being large enough for use.

#### ONIONS.

Extra Early Brown Spanish: Planted May 29. June 20, coming up. They grew very slowly all summer and attained a size of from one-half to three-fourths of an inch in diameter. Will make good sets for next year.

## LETTUCE.

Big Boston and Philadelphia Butter: Seed sown thickly in the open ground May 29. June 10, up; grew very slowly and was not ready for use until July 20; then furnished all we could use till covered by snow.

## RADISHES.

Scarlet Turnip: Planted in the open ground May 29, and at several intervals during the summer. They grew large enough for use in four or five weeks.

White Strasburg: Seed planted May 29. June 8, up. July 15, growing very rapidly. July 20, large enough for use.

## RHUBARB.

Seeded June 1. About a dozen and a half seeds germinated and made a very satisfactory growth. They will be taken up and reset in the spring.

## SPINACH.

Long Standing: Seeded June 1. By June 12 it was up, and ready for table use by July 15. Cut five or six times during the summer.

## SALSIFY.

Seed planted June 1. June 20, up. July 1, quite good stand; 2 inches high. Grew very slowly, and by September 8 the roots were not yet large enough for use.

## PARSNIPS.

Early Round: Planted June 1. June 23, up. Grew too slowly; did not get large enough for use.

## CARROTS.

Scarlet Horn: Seed planted June 1. June 20, up. July 1, growing very slowly. Did not get large enough for use. Usually a sure crop.

## TURNIP.

Large White Norfolk: Seed sown June 1. June 10, up. July 1, fair stand; 1½ inches high; leaves full of small holes caused by an insect. July 15, growing very rapidly; insects still working some. August 15, many roots large enough for use. Pulled September 8; did exceedingly well; very tender and sweet; a sure crop here.

## RUTA-BAGA.

Champion: Seed sown June 1. June 10, up. July 1, fine stand; 1½ inches high. July 15, growing very rapidly; not attacked by insects. September 1, some roots of good size, but the majority rather small. Pulled September 8. Should have been planted earlier; usually a sure crop.

## BRUSSELS SPROUTS.

Dwarf Improved: Seed sown in window boxes about May 5. Transplanted June 12. Grew very slowly; sprouts just beginning to form at the end of the growing season.

## CABBAGE.

Early York, Early Jersey Wakefield, Surehead, and Early Winingstadt: Seed sown in window boxes about May 5. Transplanted June 12. Slow in starting and slow in growth; only Early Jersey Wakefield made small heads.

## CAULIFLOWER.

Extra Early Paris: Seed sown in window boxes about May 5. Transplanted June 12. Grew very slowly. Just beginning to head at close of the season.

Early Snowball: Seed sown in hotbed May 10. Transplanted June 19. Grew quite well and produced several nice heads.

## FLOWERS.

The flower garden was quite a success in spite of the unfavorable season. The following varieties were started in the window boxes during May and transplanted during June: Pansies, poppies, cornflower, and nasturtiums. The following were planted in the open ground: Sweet peas, gillia, and candytuft. They began blooming about July 20, and many of them continued to bloom profusely till the frost of September 13.

## DISTRIBUTION OF SEED.

In addition to the garden seed sent directly from the Department to residents of the interior of Alaska, there is quite a demand among the miners and prospectors who have no fixed abode for such seed as radish, lettuce, turnip, and ruta-baga—things that grow quickly and require no particular care. The stores do not have seeds for sale, and these persons have to depend on the station for their supply. The several hundred packages distributed last winter and spring through the Rampart Station have been the source of considerable satisfaction to the miners and others.

## WORK AT THE KENAI STATION.

## WEATHER CONDITIONS.

The snow was gone by April 9, which was unusually early. The season advanced slowly, with frequent southwest winds, which held vegetation in check. After July 15 the weather was more favorable than the normal for that season of the year, and heavy showers alternated with sunshine. A heavy frost August 26 and 27 injured grain to a considerable extent.

May had twelve clear and six cloudy days; precipitation, 0.84 inch. June, sixteen clear, seven cloudy, with 0.84 inch precipitation. July, thirteen clear, twelve cloudy, with 1.06 inch precipitation. August, twelve clear, twelve cloudy days; precipitation, 6.26 inches; this is the greatest precipitation for any one month on record at this station. The number of clear days was normal, however, the increased precipitation being due to heavier showers than usual.

## WORK ACCOMPLISHED.

Twenty-three acres of land are now under cultivation. The greater part of this was seeded to oats and barley to provide forage for the live stock, which now consist of 11 cows. (Pl. VI, fig. 1.) The remainder of the land was used for the cultivation of legumes, grasses, vegetables, bush fruits, and



FIG. 1.—STATION HERD, KENAI STATION.



FIG. 2.—CUTTING GRAIN AT KENAI STATION.



fruit trees. Milk and butter have been sold and a record kept of the sales. Records have also been kept of the milk yields, weather, and soil temperatures. No additional land clearing was attempted this season. All the time which could be spared from growing crops was used in improving the house and grounds. A road was made to the beach, and over this gravel was hauled to make walks from the house to the outbuildings. Old bricks were used as border for the walks. A number of spruce and birch trees were transplanted in the yard. The house has been recalced, lined with building paper, and all of the downstairs rooms have been repapered, which will make the house more comfortable than heretofore.

### ADDITIONAL EQUIPMENT.

A mowing machine was added to the equipment August 2, and this will greatly lessen the time necessary to gather the hay. (Pl. VI, fig. 2.)

Six hens were purchased of a native of this place, and during August they laid 8 dozen eggs. These hens were fed on table scraps.

### GRAIN.

#### FIELD OATS.

Field A.—Seeded May 22. June 15, 3 inches high; fair stand. August 1, 8 to 30 inches high; 50 per cent headed. August 15, 24 to 36 inches high. Grain was in the milk when injured by frost August 26 and 27.

Field B (first planting).—Seeded May 27. June 15, 2 inches high; fair stand. July 1, 4 inches high; good stand. August 1, 24 inches high; 25 per cent headed. August 15, 26 inches high; fully headed. September 1, 40 to 48 inches high; in the milk when injured by the frost.

Field B (second planting).—Seeded June 10. July 15, 4 inches high; fair stand. August 1, 12 inches high; no heads. August 15, 24 inches high; 50 per cent headed. September 1, 24 to 40 inches high.

Field C.—Seeded May 30 and 31. June 15, 1 inch high; uneven stand. July 1, average 4 inches high; good stand. August 1, 30 inches high; some heads showing. August 15, 36 to 40 inches high; 75 per cent headed. September 1, 48 to 60 inches high. Some of the grain was injured by frost.

#### BARLEY.

Hanna Two-Row: Seed sown May 26. June 15, 3 inches high; good stand. July 1, average 4 inches high. August 1, 36 inches high; 75 per cent headed. August 15, 36 inches high; fully headed. September 1, 40 inches high; some in milk and some in dough when injured by frost.

#### BUCKWHEAT.

Seed sown May 26. June 15, just coming up; good stand. July 1, 2 inches high; not thrifty. July 15, 2 to 10 inches high; some in bloom. August 1, 20 inches high; in full bloom; looking well. August 15, 30 inches high; seed formed. There was a small percentage of ripe seed when killed by frost August 26.

### LEGUMES.

#### BEANS.

Horse Bean No. 2453: Seed planted May 4. June 15, 1 inch high; excellent stand. July 1, 4 inches high. July 15, 10 inches high. August 1, vines 24

inches long. August 15, vines 30 inches long; 50 per cent in bloom. September 1, vines 36 inches long; in full bloom; no seed formed.

Horse Bean No. 2455: Seeded May 4. June 15, 1 inch high; good stand. July 1, 4 inches high. July 15, 6 inches high. August 1, 18 inches high; a few blossoming. August 15, in full bloom; vines 24 inches long. September 1, vines 30 inches long; no seeds formed.

Horse Bean No. 7024: Seed planted May 26. June 15, only a few shoots showing. July 1, 2 to 6 inches high; poor stand. July 15, 12 inches high. August 1, 20 inches high; in bloom; beaten down by rain. August 15, pods formed; beans one-half the size of peas. Killed by frost August 26.

### GRASSES.

Meadow foxtail (*Alopecurus pratensis*): Seed sown 1902. June 15, 24 inches high; fully headed. July 1, 30 inches high. Cut for hay July 1.

Timothy (*Phleum pratense*) of 1902: June 15, 6 inches high. July 1, poor, uneven growth; average 10 inches high. Cut for hay July 1.

Awnless brome grass (*Bromus inermis*), sowing of 1902: June 15, 12 inches high; July 1, 20 inches high. Cut for hay July 1.

Awnless brome grass (*Bromus inermis*), 1903: June 15, 12 to 16 inches high; good sod. July 1, 20 to 30 inches high; thrifty. July 15, 20 to 36 inches high. Cut for hay July 23.

Meadow foxtail (*Alopecurus pratensis*), 1903: June 15, 24 inches high; fully headed. July 1, 30 inches high. July 15, 20 to 36 inches high. Cut for hay July 22.

Timothy (*Phleum pratense*), 1903: June 15, 6 inches high. July 1, 12 to 18 inches high; headed. July 15, 18 to 24 inches high. Cut for hay July 22.

Tall fescue (*Festuca clatior*), 1903: June 15, 5 inches high. July 1, 12 to 18 inches high. July 15, 24 inches high; headed. Cut for hay July 22.

Redtop (*Agrostis vulgaris*), 1903: June 15, 6 inches high. July 1, 10 inches high. July 15, 18 to 24 inches high; heading. Cut for hay July 22.

Meadow fescue (*Festuca pratensis*), 1904: June 15, 6 inches high; good stand. July 1, 12 inches high; heading. July 15, 18 inches high. Cut for hay July 22.

Haddock grass (*Aira caespitosa*), 1904: June 15, 4 inches high; poor stand. July 1, 5 inches high; heading. July 15, 18 inches high. Cut for hay July 22.

Blue grass (*Poa pratensis*), 1904: June 15, 3 inches high; poor stand. July 1, 12 to 18 inches high; heading. July 15, 18 inches high. Cut for hay July 22.

Perennial rye grass (*Lolium perenne*), 1904: Winterkilled.

Awnless brome grass (*Bromus inermis*), 1904: June 15, 8 inches high; thrifty. July 1, 18 inches high; excellent stand. July 15, 18 to 24 inches high. Cut for hay July 22.

Tall oat grass (*Avena clatior*), 1904: June 15, scant growth; 3 to 6 inches high. July 1, 12 inches high. July 15, 24 inches high; heading. Cut for hay July 22.

Tall fescue (*Festuca clatior*), 1904: June 15, 4 inches high; greater part winterkilled. July 1, 12 inches high. July 15, 30 inches high. Cut for hay July 22.

Orchard grass (*Dactylis glomerata*), 1904: June 15, 3 to 6 inches high. July 1, 4 to 12 inches high; very uneven. July 15, 12 inches high.

Tall fescue (*Festuca clatior*), 1905: Seed sown May 25. June 15, just coming up. July 1, 1 inch high; good stand. July 15, 2 inches high. August 1, 6 inches high. August 15, 12 inches high; a few heads showing. September 1, 18 inches high.



Timothy (*Phleum pratense*), 1905: Seed sown May 25. June 15, just coming up. July 1, well up; heavy stand. July 15, 3 inches high. August 1, 9 to 12 inches high. August 15, 12 to 18 inches high; a few heads. September 1, average 18 inches high.

Orchard grass (*Dactylis glomerata*), 1905: Seed sown May 26. July 1, just up; stand not good. July 15, 1 inch high. August 1, 5 inches high; heavy stand. August 15, 6 inches high. September 1, 12 inches high.

Italian rye grass (*Lolium italicum*), 1905: Seeded May 26. July 1, 1 inch high; good stand. July 15, 2 inches high. August 1, 4 inches high. August 15, 6 inches high. September 1, 10 inches high.

Mixed grasses: A mixture of all the grasses planted this season was sown June 13. July 1, just coming up. July 15, 2 inches high; good stand. August 1, 4 inches high. August 15, 6 inches high. September 1, 10 inches high.

Silver tussock grass (*Poa cuspitosa*): Seed sown in sandy bed; failed to germinate.

Native grasses: Of the native grasses sown, wild rye, wild barley, and one species popularly, but incorrectly, known as redtop, failed to grow. On August 15, the following notes were taken on native grasses: June grass, 12 inches high; bunch grass, 12 inches high; wheat grass, 3 inches high, poor looking; *Calamagrostis langsdorfi*, popularly known in this region as redtop, 5 to 12 inches high. The seeds of all these grasses were very slow in germinating, much more so than imported seed.

#### VEGETABLES.

The season was very favorable to the growth of vegetables until the frost of July 26. This year as well as last a large percentage of the cabbages and some of the radishes were killed by maggots. Wood ashes, which had been recommended, were applied but failed to check the ravages of the insect. This is the only native insect pest. The following is a detailed account of the growth of the vegetables:

##### KALE.

Improved Siberian: Sown in hotbed May 1. Transplanted to open ground June 7. A few of the plants died after being planted, but those that survived made a splendid growth and at present some of the plants measure 36 inches from tip to tip of the leaves.

##### LETTUCE.

Big Boston: Planted in hotbed May 1. Was not transplanted, and, since June 1, has furnished all we could possibly use on our table.

California Cream Butter: Planted in open ground June 8. Growth retarded during first month by dry weather, but was large enough for table use July 15.

Morse: Planted in open ground June 12. Large enough for table use July 20. All varieties of lettuce seem to do equally well.

##### CABBAGE.

Early Jersey Wakefield: Sown in hotbed May 1. A large percentage of the seed failed to germinate. Transplanted to open ground June 7. Grew splendidly until attacked by maggots, which to date have destroyed about 75 per cent of the plants.

##### RADISHES.

Early Scarlet Turnip: Sown in hotbed May 1. Edible June 1.

French Breakfast: The same as above.

Improved Chartier: Planted in open ground June 12. Ready for table use July 15. This is a long-rooted variety; tender, and of excellent flavor.

Long Scarlet Short-Top: Planted in open ground June 12. Ready for table use July 12.

White Icicle: Planted in open ground June 6. Ready for use July 20. This variety is pure white in color, long-rooted, excellent quality.

## ONIONS.

Yellow Globe Danvers: Sown in hotbed May 1, and not transplanted. They have attained a diameter of about 1 inch.

## CELERY.

Improved White Plume: Planted in the hotbed June 11. As the other plants were transplanted to open ground the celery was transplanted to their places in the hotbed. Boards were placed on either side of each row and the space around the plants was filled with earth. The plants are now 16 inches in height, have blanched nicely, and are crisp and delicious.

## PARSLEY.

Planted in the hotbed May 11. Made a vigorous growth and is now 10 inches high.

## PEAS.

Marblehead Mammoth: Sown June 24. A late variety making a rank, rapid growth. Large enough for table use at the end of August.

## TURNIP.

Purpletop Strap-Leaf: Sown June 23. None have become extraordinary in size, but are very uniform and of excellent quality. The maggot that attacked the cabbage also attacked the turnips, but as the latter became larger the maggots disappeared.

## RUTA-BAGA.

Thorburn Improved: Planted in open ground June 23. Were not attacked by maggots as turnips were. Have attained an average diameter of about 4 inches.

## RHUBARB.

Became large enough for use during the first week in June and has not deteriorated in quality up to September 1. Close cutting keeps it from seeding or getting woody.

## CARROT.

Scarlet Horn: Planted in open ground June 8. September 1, about 1½ inches in diameter.

## BEETS.

Crimson Globe: Planted June 8. September 1, about 2 inches in diameter.

## PARSNIPS.

Long Round: About 1 inch in diameter.

## POTATOES.

In the spring no seed potatoes were on hand, so it was found necessary to plant from a supply brought from Seattle for table use. They proved to be a late variety, though they were of edible size by August 14. The plants were nipped by frost August 26 and 27, but continued to grow. The tubers are small in size, but a good quantity is found in each hill.

## FLOWERS.

Poppies, sweet alyssum, sweet william, nasturtiums, nemophila, and sweet peas were planted June 25. The plants all grew well, and throughout the month of August furnished a profusion of bloom. Pansies sown in a box were in bloom September 1.

## FRUITS.

Ten trees of each of the following varieties of apple (grafts) were planted, and the following number of each variety made more or less growth: Florence, 5; Whitney No. 2, 3; Iowa Beauty, 4; Okabena, 8; Tetabaski, 6; Charlinoff, 6; Day, 7; Whitney, 7; Early Strawberry, 8; Dutchess, 8; Yellow Transparent, 8; Brovina, 2; Sweet Russet, 6; Dutchess, 7; Wealthy, 8; Illinois Siberian crab, 9.

Twelve red raspberry plants were set out, and 11 made a good growth. Five sweetbrier plants were set out, and all grew. Seven gooseberry plants were put out, but only one made any growth. Forty-three red currants were set out, and 28 have made a very good growth.

A number of native raspberry plants were set out in June, and without exception grew. Native red and black currants show a growth of 50 per cent of the plants set out. Seeds of the native strawberry and red and black currants have been gathered. Part of the seed will be sown here, and the remainder will be sent to the Sitka Station.

## LIVE STOCK.

Nine head of cattle were wintered besides the three calves that were dropped during the winter months. Nothing but native feed was fed, and all the cattle were in excellent condition in the spring. The work oxen remained in good condition throughout the spring work. The increased number of animals will necessitate the sale of two steers in order to obtain sufficient stable room. These yearlings are in prime condition, and will weigh between 500 and 600 pounds each. On August 2 a 3-year-old cow and a calf were sold to Mr. O. H. Sleeper, of Sunrise, for \$60. In view of the fact that the present cost of bringing cattle into Alaska is so great as to be almost prohibitive to individuals, it is believed that the development of animal industry in the country can be greatly facilitated by the station disposing of its surplus increase of stock to prospective stock raisers in the Territory at the cost of production.

A record of the milk yield has been kept as heretofore.

*Milk yield of three cows.*

Month.	First cow.		Second cow.		Third cow.	
	Monthly yield.	Average daily.	Monthly yield.	Average daily.	Monthly yield.	Average daily.
	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>
November .....	587	24.05	-----	-----	-----	-----
December .....	705	24.07	-----	-----	-----	-----
January .....	669	21.57	-----	-----	-----	-----
February .....	406	14.5	-----	-----	-----	-----
March .....	356	11.5	619	19.96	204	22.63
April .....	298	9.93	577	19.26	575	19.16
May .....	362	10.7	599	19.32	584	18.83
June .....	392	13.06	701	23.36	718	23.93
July .....	369	10.9	646	20.83	685	22.1
August .....	295	9.77	586	18.77	602	19.41
Total yield .....	4,439	-----	3,728	-----	3,368	-----
Daily average .....	-----	14.6	-----	20.3	-----	19.41

The feed used for dairy cows has been native pasture in the summer and native hay in the winter. If the winter feed were supplemented with silage, the yield would undoubtedly be greatly increased. In the case of cow No. 1 we have the opportunity to note the effect of winter feed. The calf was dropped in early November, and for the first three months after calving the average daily yield amounted to 22.78 pounds. The marked decrease in yield during the month of February was probably due to a change of milkers which took place at that time. The improvement owing to modern methods of milking is shown in the yield of cows Nos. 2 and 3. As explained in my last report, these cows were formerly owned by the Russian priest at this place. The Russian method of milking consists in allowing the calf to begin and finish the operation, a procedure neither economical at the time nor conducive to a heavy milk yield in the long run. In the case of the two cows the increase in the average daily yield of this year over that of last year is very marked. It is believed that the average can be raised still higher by next year.

No addition to dairy equipment has been made to date, all appliances used being homemade. No accurate work can be done until the station is equipped with up-to-date dairy utensils.

The silo has not been given the attention it should receive at this station. In the fall of 1902 a so-called silo was built of logs and filled with peas. As was to be expected, most of the peas spoiled. The first essential of a silo is that it should be air-tight, and this is hardly possible with rough-hewn logs. A silo should be built and the practicability of feeding silage in this latitude be tested. Hay is not easily cured in the fall on account of frequent showers. This fact at once suggests the silo, and the immense amount of forage that can be raised per acre here would seem to make the building of one imperative.

### REPORTS FROM SEED DISTRIBUTION.

The following reports from the seed distribution tell of results obtained under ordinary conditions in all parts of the Territory, and contain valuable information which will be especially serviceable to new settlers. As noted elsewhere, the season of 1905 was very favorable in the coast region, and the gardens here gave general satisfaction (Pl. VII, fig. 2). In parts of the interior, on the contrary, the season was very unfavorable. At Rampart and for 100 miles south of the sixty-fifth parallel, and generally along the Yukon, the spring



FIG. 1.—VEGETABLES AND MEAT AT SITKA.



FIG. 2.—VEGETABLE GARDEN ON LA TOUCHE ISLAND—A TYPICAL PROSPECTOR'S GARDEN.



was late, wet, and cold; in the Copper River Valley, on the other hand, the spring and early summer were too dry.

*James Wallace, Metlakatla, Alaska.*—June was warmer and drier than I have ever seen it in this locality; hence it was very favorable for garden purposes. Strawberries ripened six weeks earlier than last year, and everything else from two to four weeks earlier. The soil here is decayed moss and does very well if sufficient fertilizer is applied. This season I used barnyard manure, fish offal, and seaweed, and found that fish produces the best results. On two-fifths of an acre I raised 110 bushels of potatoes of excellent quality, the best crop resulting from fish fertilizer. Ruta-bagas and yellow field turnips did well; some of the former weighed 5 pounds, and one of the latter weighed 9½ pounds. Early cabbages do well, but the season is too short for maturing late varieties. This season they have been ruined by worms boring the heads. The trees and bushes which you sent me have all taken root and are doing well, but I hardly think the climate is favorable for fruit trees. There are several cherry trees in the village. Some seasons they bear a few cherries and some seasons none.

Cattle seem to thrive on the native grasses. We got a cow and a calf from Seattle in May, 1904. The cow was very thin when she arrived, but at once began to fatten, and has been in good condition ever since. They wintered on 1½ tons of hay and a little shorts, and were out every day last winter.

*Dates of planting and first use, season of 1905.*

	Sown or planted.	Ready for use.		Sown or planted.	Ready for use.
Cabbage, early, sown in hothouse.	Mar. 1	.....	Lettuce .....	May 5	July 4
Cabbage, early, trans- planted.	May 5	July 30	Turnips, Early White .....	May 10	July 27
Peas, Telephone .....	May 13	July 22	Carrots .....	do	July 21
Peas, Prolific Market .....	Apr. 12	Aug. 1	Beets .....	do	July 24
Onion sets .....	Mar. 13	Apr. 1	Gooseberries .....	.....	June 11
Rhubarb .....	.....	Apr. 7	Strawberries .....	.....	June 13
Potatoes, Burbank .....	Apr. 12	July 24	Raspberries .....	.....	July 15
Camflower .....	May 5	July 22	Currants .....	.....	Aug. 1
			Celery .....	June 19	Aug. 25
			Radishes .....	May 10	June 12

*J. Pittenger, Ketchikan, Alaska.*—I received the fruit trees you sent last spring about May 1, and planted them at once. They made growths as follows: One red Astrachan, 2 feet; 1 Sylvan sweet, 2 feet; 2 Duchess, 1 foot each; 4 seedlings, 1 foot each; 2 Barovinka, both died; 2 Strawberry, both died. The raspberry, currants, and gooseberries all grew and are doing well. I am also growing strawberries and pieplant, and both are doing well. The strawberry plants came from Metlakatla, and the pieplant is from roots sent up from Seattle. I tried raising pieplant from seed, but it was not satisfactory, as the seed does not come true to kind. I grew a great many plants, but none of them were of large variety, so I think it is best to send and get roots that are known to be of a large kind.

In the line of vegetables I have raised this year cabbages, radishes, lettuce, carrots, and turnips; they all did well. I also sowed onion seed, which made nice green onions, but none of them were large. I also raised some very nice ruta-bagas. I planted a patch of Late Rose potatoes about May 27, and in two weeks they were nicely up and in six weeks I had a photograph taken of them, which I inclose, showing that they grew very rapidly. Till early in September they did exceedingly well, the potatoes being of good size when the vines were killed by what one of my neighbors says was potato blight. The potatoes are now decaying very badly.

*Nathan B. Whitfield, Ketchikan, Alaska.*—I received several kinds of seeds from you last year for experimental growth, but failed to write my report of the results in time. This year I planted as nearly the same kinds as I could obtain from the stores here. They were planted during the first week in May in two different gardens. Garden No. 1, 20 by 40 feet; fertilized the year before with manure from the cow stable; no other stimulant. Garden No. 2, 20 by 20 feet, was of virgin soil not manured.

In garden No. 1, I planted beets, cabbages, collards, kale, lettuce, dwarf peas, radishes, spinach, parsley, and White and Red Strap-Leaf turnips. They all did well. The beets grew 4 inches in diameter. The cabbage—Early Wakefield—grew to be 8 inches in diameter with firm heads; the collard—large-leaved—became 18 inches tall; the kale was not so large; the lettuce was 12 inches across from tip to tip; the dwarf peas, 2 feet high, were loaded with pods; the radishes were from 1 to 2 inches in diameter; the spinach, 10 inches across from tip to tip; the parsley was 6 inches in diameter; and the turnips, from 4 to 6 inches in diameter, solid, and with rich green tops.

In garden No. 2 I planted lettuce, peas, potatoes, strawberries, sunflowers, and the trees you sent me. Five of the trees died, being in bad condition when received. Considering the little attention paid them owing to my necessary absence, the vegetables did well, making a growth beyond my expectation and equal to those in garden No. 1. The peas grew 5 inches high and were loaded with pods; the potatoes were from 1 to 3 inches in diameter; the strawberries produced a heavy green foliage and fruit; the sunflowers became 6 feet high, are now in bloom, and will probably mature seeds before severe frost; lettuce, radishes, and peas were planted, but never matured.

The trees were received May 2, and planted May 3. Some of them were in bad condition when received. Seven of them are living and range from 12 inches to 2½ feet high. The Red Astrachan apple, apparently dead when received, was not planted. Two Borovinka, a Sylvan Sweet, and 2 Early Strawberry apples are living and have a rich green foliage. The seedlings and young grafts died. Four currant bushes, 2 feet high, and 8 red raspberry bushes 2½ feet high, are growing nicely.

The mint I planted near a stream, and it is now a bunch 18 inches across and 2 feet high.

The experiment thus far I consider a success, and with proper attention this part of Alaska can produce as fine vegetables as any other part of the world in the same latitude.

*Fred Patching, Fortmann Salmon Hatchery, Loring, Alaska.*—Just a few lines to let you know how the garden grew at this place this season.

The apples and raspberries you sent me last spring grew as follows: One Red Astrachan apple grew 5 inches, and one (Sylvan Sweet) grew 6 inches; four raspberries grew shoots 3½ to 5 inches long; currants grew several sprouts about 2 feet long; three seedling apples grew 18 to 21 inches long; sand cherry made a growth of from 18 to 30 inches, and fruit formed, but did not mature; the root of mint made big growth.

Cabbage, Windsor beans, lettuce, radish, ruta-baga, rhubarb, horse-radish, celery, and onions from seed all did fine, in fact, could hardly be beaten.

All of the foregoing were raised on land that has been in cultivation two or three years, and was well fertilized with fish and stable manure. On a piece of ground that measured one-third acre we raised 78 sacks of potatoes, which seems to me to be a pretty good yield. This potato land was cleared in the spring of 1904, and some vegetables were raised on it. In the spring of 1905 it was planted to Burbank potatoes, with the above result. The soil was not fertilized, but it has the appearance of having been cultivated years ago.



*Dorman Newman and I. Wheeler, Game Cove, Admiralty Island, Alaska.*—We sowed in hotbed on April 1 cabbage of both early and late varieties. They were slow coming up, and were not fit to set out till about May 25. On that day there were set out about 300 plants, which were watered, as we had no rain whatever here in late May or June. They grew well, and out of the lot there were not more than 10 or 12 that did not head well. The Early Jersey Wakefield gave the best results, giving a nice hard head weighing from 4 pounds up. The Flat Dutch gave larger heads, but not as solid. The beans did not come up at all, just three or four stalks showing.

Onions came very slowly, but were good for green onions when they did come. We have saved some, and intend trying them as sets next year. Both kinds of beets did well, giving some nice roots 3 to 4 inches in diameter, but rodents of some kind spoiled quite a lot of them. Carrots did well and were of quite good size. Radishes did remarkably well, and from a small patch there were more than we could use. Lettuce also did well. Turnips of any kind do well here. We had four different kinds—ruta-bagas, Purple Top Strap-Leaf, Golden Yellow, and another kind. Turnips and cabbage seem to do well in this new ground. Potatoes grow well, but are not marketable. We got better results from the seed grown here last season than from fresh seed potatoes bought in Juneau, and we are going to try the same seed again next year and use seaweed as fertilizer. So far we have used no fertilizer of any kind, but will do so next year.

We received the reports you sent, and thank you very much for them, as information of any kind on gardening is acceptable.

*Edward J. Lawrence, Tree Point Light Station, Alaska.*—The seeds you sent me last spring were received in due time, and I gave most of them a good trial.

I am surprised at the good results obtained at gardening for this part of the country, especially with second-year ground which had been fertilized with fish, ashes, and henhouse manure.

Radishes, lettuce, and turnips grew quickly and were of good quality.

Onions (Extra Early Brown Spanish) planted May 1 were large enough for table use July 4, and by September 19 they were 2 inches in diameter.

Cauliflower (Extra Early Paris) did exceedingly well, and was, in fact, the best I ever ate.

Peas (Prolific Early Market) were planted May 10 and did well both in quantity and quality. The first mess was picked August 6. The vines grew too rank, some of them reaching over 6 feet in height.

Beets and carrots did well; beets reached 4 inches in diameter.

All the flower seed grew and bloomed well; sweet peas and candytuft were especially fine.

*C. E. Peterson, Keeper Sentinel Light-House Station, Alaska.*—I herewith submit a report of my attempt at garden work with the different kinds of seeds which you sent me last fall, also of the several apple seedlings and berry bushes.

I sowed peas as early as April 25, as the weather was extremely fine and warm, but they did not show up till May 11. We picked the first peas for table use August 10; the vines were then standing 4 feet high. Out of one package of seed two families were supplied with about five meals from the crop.

I sowed ruta-bagas and turnips, white and purple-top. The white turnips did the best, and were as large as saucers. Some of the ruta-bagas weighed 4 pounds, were 13 inches long and 2½ inches through, and very sweet. Parsnips did not appear till late in September and were as small as one's little finger. Carrots (Scarlet Horn) did not show up much till September 1, but at the time

of this writing the average weight is about one-half pound. Radishes and lettuce grow wonderfully here considering that the ground is poor; in fact, all my vegetables did well considering the fact that they were put into ground that never had a blade of grass in it till I started the garden last spring. There was no fertilizer used except one small box of heu manure which I had saved up last winter.

The apple seedlings grew from a 5-inch stem to from 10 to 20 inches in height. The Red Astrachan made the largest growth; after it the Sylvan Sweet and four seedlings grew from 10 to 15 inches high. The two Duchess had only a few leaves. The two Boroviuka did not do well, probably owing to the fact that there was not enough soil, as the soil on this island is in patches.

Flowers did remarkably well, sweet peas and nasturtiums especially. The berry plants you sent me are doing well, especially the currants, and the mint is 20 inches high.

I believe we could raise, with good fertilizer, almost anything on this rocky island. This being my first attempt, I shall no doubt do better next year. My assistant brought a few half-grown vegetables with him from Tree Point Light Station and planted them in the patch from which I had taken my turnips, and now he has cauliflower, ruta-bagas, beets, and kale. The beets from the seed you sent me are as large as my two fists and are still growing. Nothing but rotten stumps for soil, and a little rock weed covered the rocks. Whoever saw my garden this summer said I did well for a beginner with such soil. This winter we will make fertilizer with fish and rock weed or sea grass. Our potatoes were not plentiful, but some were quite large, and in taste the best I ever ate.

*Gust Grundler, Douglas City, Alaska.*—The following is a report of my experiments for the season:

Lettuce: Salamander; seed sown in hotbed April 1; transplanted May 15; grew very well, making large heads.

Kale: Dwarf Green Curled Scotch; seed sown in hotbed April 1; transplanted May 15; started slowly; maggots attacked the roots in July; I sprinkled sulphur around the roots, which relieved the plants of maggots, and they grew well after that; leaves about 16 inches long.

Cauliflower: Extra Early Snowball; seed sown April 1, in hotbed; transplanted May 15; started slowly; attacked by maggots the same as kale; some plants died, all the small roots being eaten off; heads 8 inches across the top.

Cabbage: Early Jersey Wakefield; seed sown April 1, in hotbed; transplanted May 15; had the same trouble with the maggots; heads 3 to 8 pounds.

Ruta-baga: Laing Improved; seeded April 1, in hotbed; transplanted June 1; roots attacked by maggots when about 1½ inches thick, eating all round the roots. After being relieved with sulphur the injured plants began to grow again, but the roots are small.

Beets: Detroit Dark Red; seed sown in hotbed April 1; germinated very slowly; transplanted June 15; after starting to grow, all the plants sent up seed stalks and did not form roots.

Radish: Glass; seed sown April 15; did not do well. The same variety sown June 10 started to grow, but maggots got the best of them, and only left the shells for me.

Turnips: White Dutch; seed sown June 10; came up fine, but are all wormy.

Onions: Extra Early Brown Spanish; seed sown June 10; roots became from one-fourth to three-fourths inches thick.

Carrots: Scarlet Hori; seed sown June 10; grew fine; good crop; no maggots on them.

Peas: Marblehead Mammoth; seed planted May 27; first picking September 10; a good bearer.

Beans: Early Red Valentine; seed planted June 1. I raised eight plants from one package of seed; the rest rotted in the ground. The plants died when 4 inches high. Everybody here who experimented with beans had the same result.

Parsley: Plain, or Single; seed sown April 1; grew fine; I have cut it three times, to dry for winter use.

Spinach: Curled Savoy; about one-fourth of the seed came up and went to seed stalks. I have had the same experience for three years.

Rhubarb: Rhubarb did fine this year; cut the last time October 1.

I have used some horse manure as fertilizer in my garden, and I blame that for producing all the maggots there. Sulphur seems to be a good remedy for them; I think it is unwise to use any horse manure as fertilizer in this section of the country. I shall put some lime in the garden; it may kill the eggs of the insects, if any are left; I shall also use some different fertilizer next year, but no fish fertilizer. A gentleman here bought some fish fertilizer in Juneau and put it in the garden just before planting; soon afterwards his garden was alive with maggots, which destroyed many plants.

The following is my experience with the apple trees you sent me: Every one of the seedlings grew about 4 inches; Early Harvest, 8 inches; Okabena, 6 inches; Borovinka grew below the grafts, new shoots about 6 inches high; the Early Strawberry died.

I gave three seedlings—one Early Strawberry, one Early Harvest, and one Okabena—to Mr. McDonald here; about two of the grafts died. Following your advice I sent to a nursery for two plum trees and four cherry trees. I selected 4-year-old trees; it is a little expensive, as the express charges on them cost me \$3.40, but I shall have an early result. The plum trees have done well making a new growth of about 10 inches. The cherry trees look healthy, but did not grow any.

The berry bushes you sent me took well to the ground. New canes on the raspberries grew 2 feet; currants the same, but they did not bear any fruit. I had ten currant, ten gooseberry, and twelve strawberry plants sent from Seattle. Five of the gooseberry and four of the currants died, the rest grew very little; the strawberries grew fine and bore a few berries; I raised about forty healthy plants from them.

I had eight rose bushes and some Japanese chrysanthemums from Seattle. I have two climbing roses; they started slowly, but grew fine after they had once got a start; the new shoots are 5 feet high, but there are no roses on them; one of the other six died; the rest started again and did well. The first rose opened July 25. Every plant had from three to five roses. There are some buds yet, but they will not open.

Of the chrysanthemums I have two growing, but there are no buds on them yet. On the dahlias the first flower opened August 15. I have a row of sweet peas along the south side of the house; they grew fine and are full of buds; in July about a dozen flowers opened, then the buds turned yellow, and I have not seen a flower on them since. The plants are still healthy looking and full of buds, but they will not open. I have seen them planted in other gardens and they were blooming all summer.

Dwarf nasturtium, mignonette, poppies (double and mixed), marigold, aster, amaranth, zinnia, and sweet alyssum did well, blooming since August 1. Daisies and pansies have been blooming all summer. Carnation, wallflower, and four o'clocks made good plants, but will only flower the second year. Double balsam are no good to raise in the garden; they are better indoors.

*H. D. Clark, Skagway, Alaska.*—I am glad to be able to report a better season for myself and other Skagway agriculturists than last year.

The report of my potato crop in the Daily Alaskan was not exaggerated. I planted  $3\frac{1}{2}$  acres of land to Early Ohio, White Ohio, Early Michigan, and Vermont Gold Coin potatoes. With the exception of the White Ohios our potato crop was a better one than I have ever seen either here or in the States. I have tried the White Ohio for three years in a small way, and I shall have nothing more to do with them. While the original potato which I used for seed was a very fine potato in every way, the potatoes raised from them have never been satisfactory either in quality or quantity. The Early or Red Ohio potato has been very satisfactory with us. I have raised it here for the past six seasons and have always been able to begin marketing in July; this season I began July 19. The Early Michigan, while not as early a potato as the Ohio, gives better satisfaction to the general market than the Early Ohio. I have raised it for four seasons and consider it one of the best varieties for this place. It is smooth skinned, white, mealy, and dry when cooked. Last winter I purchased 210 pounds of Alaska-grown Gold Coin potatoes. They planted a plat of ground measuring just  $36\frac{1}{2}$  square rods. This fall the crop dug from that plat lacked 40 pounds of being  $\frac{1}{2}$  tons, which is a yield of 576 bushels to the acre. The Gold Coin is a late potato, but it fully matures in this climate. It is white, mealy, and very fine flavored. With us it is of good size, no overgrown ones, and few small ones. The large yield results from there being so many in a hill. Mr. Hogan, one of our neighbors, had on a small scale a greater experience with Gold Coin than I. From five hills in his little garden he raised 55 pounds. They were very large potatoes, and he pronounced them of poor quality. The largest hill that we weighed in our patch weighed  $7\frac{3}{4}$  pounds. Our other varieties of potatoes have always been somewhat affected with blight, or stem rot, but we found the Gold Coin so far absolutely free from it. From the  $3\frac{1}{2}$  acres of different varieties of potatoes I raised a few more than 1,000 bushels.

We set out about  $3\frac{1}{2}$  acres of cabbages. The cabbage maggot damaged them to such an extent that we got very unsatisfactory returns. When I found the maggot was so bad we cleaned the soil away from the stem and applied air-slaked lime. While it checked them somewhat, it was not a satisfactory remedy. This same maggot ruined all our outdoor radishes and turnips.

I raised about a fourth of an acre of carrots, which were of fine quality, very large, and the yield was enormous.

I did not pay much attention to celery this year, but there was some very fine raised in Skagway this year. Our neighbor, Mr. Wildt, raised a patch of the finest celery I have ever seen.

We set out the nursery stock which we received from you last spring and gave it the best of care, but find that only a part of it has grown or is alive this fall. The live plants consist now of 2 apple, 2 cherry, 2 currant, and 1 raspberry. What the story will be next spring time will tell.

We have been experimenting with tame currants and red raspberries for the past few years and find that they do well. We set out 300 of the Cuthbert raspberries last August and expect to set out several other varieties next spring.

I can not close without speaking of the great crop of wild berries which grew on the hills and in the valley around Skagway this year. First in season came the currants, then the red raspberry, then blueberries (or huckleberries) and the high-bush cranberry. There were bushels of these berries picked, and bushels of them went to waste. The cranberries are largely used in making catsup,

which seems to be fully as popular as the tomato catsup, which it closely resembles.

Skagway's flower gardens grow more numerous and finer every year. There has been no snow or weather colder than 26° above zero as yet, and the pansies are still blossoming out of doors, though somewhat spoiled by the rains.

*James Germansen, Kayak, Alaska.*—I want to thank you for the seed you sent us at Middleton Island. You must excuse us for not reporting to you our success. We have had no mail facilities. We were bottled up on Middleton Island one year and twenty days, and all the news we received was from the whaler *Monteray*. We had no way but a small canoe to come to the mainland. We ran out of provisions, and starvation was staring us in the face. Finally the whalers gave us a little "grab" to tide us over until we could hear from the mainland. My partner and I have located a ranch a piece, but if we can't get any mail we are going to leave the island.

We have dumped tons of potatoes on the ocean beach just to make a little more mud. The same potatoes are selling at Catella for 3½ cents per pound. Middleton Island is the finest island in Alaska. We are past experimenting. We can raise anything they can raise in the Temperate Zone. Last summer we gathered 4 pounds of ruta-baga seed from volunteers we left in the garden all winter. Our cabbage has grown all winter in the garden. The coldest we have seen since we have been on the island was 20° above zero, the warmest 71° above. The deepest snow we have had was 14 inches. It lasted twenty days. Last winter we had no snow. The grass was green all winter. Middleton Island is the finest stock island in Alaska, but unfortunately from 45 to 60 miles from the nearest islands. But we have no harbor where we can leave a boat. It would be only 35 miles out of the regular route of the steamers. If we could get seven mails a year we could get along nicely. We have not been able to raise any carrot, beet, or onion seed. We want some Garnet Chillum potatoes, pure seed, for late potatoes. We could furnish this part of Alaska with potatoes if we had transportation.

*Fred Liljegren, Little Naked Island, Prince William Sound.*—Having the seeds and plants you so kindly sent me this spring, I will therefore let you know the results.

Apple grafts, apple seedlings, currants, and raspberries all took root nicely, except one Strawberry apple and one Charlimoff apple graft that died.

Stone Mason and Early Flat Dutch cabbage, set out May 19, made good solid heads, the first variety named being the largest. There being no frost yet I still keep them in the ground.

Curled Scotch kale grew to about 2 feet in height and was fine, dark, and tender.

Early Snowball cauliflower headed nicely. Peas, American Wonder and Pacific Early Market, planted May 13, did splendidly, the vines averaging 4 feet and the pods being large and well filled.

Half Long Stumprooted carrots did very well, some being 2½ inches in diameter.

I planted some parsnip seed, but they did not come up.

Ruta-bagas and beets proved a failure with me this year, as they mostly went to seed.

I tried several varieties of lettuce and radishes, and they all did very well. I also planted some potatoes May 10. The latter part of July we commenced to use them. I have just dug them, and we prefer them to those brought from Puget Sound, as they are more mealy.

I have sown a small quantity of barley each year for the last three years. Last year wind and rain laid it to the ground, but I cut the heads and dried them indoors and tried again this year. The grain ripened nicely.

*Mrs. J. Garigan, Valdez, Alaska.*—Most of the nursery stock you sent me is doing well. I have ten apple trees and one seedling which are 25 inches high. Of the six currants one is 32 inches high, and four of the raspberries are growing rapidly.

Beets (Detroit Dark Red) were a disappointment this year, as they went to seed very early; but carrots (Early Scarlet Horn) grew to medium size. Onions (Extra Early Brown Spanish) were fit for table use early in August. Broccoli (Mammoth White) was killed by late frosts, while cabbage (Early Jersey Wakefield) wilted a little, but pulled through. White turnips I do not plant, as they do not keep as well as the yellow turnip.

Sweet alyssum blooms early and more profusely than other annuals.

*G. S. Clewenger, Copper Center, Alaska.*—I sowed last spring 6 acres of oats, of which 4 acres was on a flat about 20 feet above the Copper River. These I put in with the drill and rolled the ground carefully afterwards. I cut about 2½ tons of good oats hay from this piece. The oats were nearly ripe when I cut them. I put in 2 acres on a high beach and broadcasted them and rolled them after sowing. These were not worth cutting. This was wholly new ground that had been burned over years ago, and the soil appeared to be good. Of the 4 acres first mentioned, 2 acres were new and the other 2 had been plowed once before. The plowing was all done in the spring.

I raised what might be termed a good garden. I had no potatoes to plant. I raised peas, onions, carrots, parsnips, ruta-bagas, lettuce, radishes, and cabbage. The growth was luxuriant. Some said it was the best garden they had ever seen in Alaska. My garden plat is 50 by 100 feet. I put ashes in the furrows before dropping the seeds, and it certainly did work well. I noticed on the field that wherever there had been a log pile burned there was a luxuriant growth of grain. I found the same thing was true on the experimental farm. I noted also the fact that the old land on United States experimental farm did not produce well. All this has forced the conviction upon me that the difficulty in raising crops here does not lie primarily in either the drought or frost, but in the fact that there is some element lacking in the soil. I did not water my garden, and the growth was excellent.

I have my cow and a 2-year-old heifer this winter. It is nearly two years since the cow was fresh, and we have our milk and make butter sufficient for the family. The cows will not be fresh until March. I think the smaller cows, that give very rich milk and are easily kept, are the cows for this country. It does not pay to raise beef here and will not for years. It can be driven in cheaper. Butter and milk is what is absolutely needed.

I brought three Wyandotte hens and a rooster in with me. They have done well. The hens have been great layers. I raised a half dozen chickens. We never had chickens do better. We can keep a dozen at little or no expense.

*A. L. Hills, Seward, Alaska.*—In compliance with your request I herewith hand you a report of my success with agricultural seeds furnished me by your Department.

I wish to note, in the first place, that the land on the 1st of January last was covered with heavy timber and moss. As soon as the frost was out of the ground I commenced grubbing the roots out of the ground. I planted two rows of peas 40 feet long, from which I gathered fully 2 bushels of peas in the pod.

I grew three crops of radishes on the same ground, and all were sound, crisp, sweet, and tender. Lettuce never tasted better than that grown here.

It lasted longer in its tender state than that which is grown in the States. Parsley was as fine as that raised in any country. Broccoli is as good as anyone could desire. Beets did not do well, but I think it was on account of the seeds being old. Carrots did well. Cabbage did as well as could have been expected; I was not able to plant them until very late. Cauliflower as fine as anyone need want was grown. Many cones or heads were 8 inches in diameter. Ruta-bagas grew very fine; roots 4 to 6 inches in diameter, tender and firm. Turnips never grew finer. In fact, for my own use I do not want turnips so large as some I have grown. Many of them are 8 to 10 inches in diameter, but they are solid and crisp. Onions were planted late, but I have many bulbs as large as half dollars. The celery was planted late, but did well. The parsnip seed did not germinate. I had the same experience with one paper of onions and one of beets.

In reference to the clover, I should say that this is the home of clover, either red or white. I see no reason why in the near future we should not be shipping forage instead of buying it, as we now do.

Potatoes do well, but I am of the opinion that they will mature better in the interior than they do on the coast.

*Herman Stetter, Seward, Alaska.*—Your favor January 18, 1905, received, also the seed you sent me, for which I thank you. The country in which I live is nearly all timbered. There is very little grass land, as it is a mountainous country and we have only creek bottoms to cultivate. It can not be made into dairy farms. It rains much more here than on the coast. There is some pasture over the foothills and mountain sides, but of the kind that grows in timber. There are no trails through the country and the river is too swift for use. My provisions cost me at least 10 cents per pound at my home. Produce shipped out would cost as much.

My garden did well this year. One ton of potatoes were produced from 800 plants. Carrots, Scarlet Horn variety, did well. Ruta-bagas, parsnips, and turnips did well; beets, Bassano variety, did well; kale, Scotch and Siberia varieties, did well and will winter with little care. Cabbage, Flat Dutch variety, did not do very well; it was too late. Onions, beans, and cucumbers are failures. I raised my own turnip, parsnip, and radish seeds this year. My peas did well.

*F. Martin, Sunrise, Alaska.*—The apple trees you so kindly sent me last spring have done fairly well. The grafted trees made but a few inches growth of new wood, but the seedlings grew very swiftly and made about 9 inches of growth. The raspberry and currant bushes did well, and I expect fruit from them next year.

The clover seed came up and made a good stand. This winter will prove whether it will winterkill or not.

*A. Laurson, Sunrise, Alaska.*—Many thanks for the packages of seed just received and also for the seedlings and berry bushes you sent me last spring. Every one of these bushes rooted nicely and they have made quite satisfactory growth.

The past summer has been very favorable for the various vegetables, and as a consequence I have a fine lot of potatoes, cabbage, turnips, beets, onions, carrots, parsnips, and winter radishes. I had an abundant crop of lettuce, radishes, spinach, parsley, cress, and flowers, and I took a good crop off my rhubarb plants. The potatoes in particular are solid and mealy; they grew quite large in size and the yield was as large as any previous year. This is the first season that my onions raised from seed have attained marketable size, but hereafter I feel reasonably certain of raising good onions in my garden.

Owing to sickness during the planting season and to the fact that I could not secure any help, I could only utilize a fraction of my cultivated ground. Had to abandon the grain crop, which otherwise would have been the most interesting part of my efforts.

*Henry S. Tibbey, Coal Harbor, Unga Island, Alaska.*—I again thank you for the various slips and cuttings you sent me in the spring. Allow me to report that of the apple slips four took root and made about 4 to 6 inches growth. Of the currant two took root, did well, and grew at least 2 feet. Of the raspberries four took root and reached about a foot above the ground. None of the rest made any sign and declined to be reported. The encouraging success met with in the case of the berries tempts me to ask for a further donation next spring.

*Edwin E. Sholin, Jarvis City, Alaska.*—In acknowledgment of the seed we received I shall first state that we did not receive it till the 1st of June, which was very late. Notwithstanding this we are having good results.

The radishes (Improved Chartier) are of the best quality and grow the largest of any I have ever seen. Lettuce (Hanson) is also fine. Turnips (Purple-Top White Globe and Purple-Top Strap-Leaf) did well. Ruta-baga (Thorburn Improved) and mustard (Ostrich Plume) are growing splendidly. Cabbage (Early Flat Dutch) and onions (Extra Early Brown Spanish) were planted late but they are doing well. The peas (Marblehead Mammoth) are growing splendidly and beginning to bud. The beets (Dirigo) grew very poorly, and the beans (Improved Golden Wax) came up, but would not grow, and soon died.

The flower seeds came too late to be planted this season. They will be planted this fall or next spring.

I will also mention that potatoes grow splendidly here, and that I believe that carrots, parsnips, and other vegetables will do well in this locality.

*A. W. Newhall, Unalaska, Alaska.*—The seeds sent out by the Department of Agriculture were received and planted in due time. Owing to the warm summer and also to the moderate rainfall the garden has done well—better than any previous year. The kale, lettuce, and radishes grew rapidly. The turnip crop was a good one, some of the turnips measuring  $2\frac{1}{2}$  inches in circumference. Rhubarb also does well in this place. This season I have also planted a few strawberry plants.

*Mrs. T. D. Elliott, Council City, Alaska.*—I put out a garden this spring on June 4, but did not have very good success. I do not know whether it was the fault of the seeds or the cold weather. The lettuce was the only vegetable that was fit to use. The beets, radishes, and turnips went right to seed. There was not a garden in Council that amounted to much. I shall try again next spring and hope to have better success.

*S. A. Shea, Council City, Alaska.*—I send you my report on vegetables growing here. On June 6 radishes, turnips, kale, spinach, onions, cabbage, ruta-bagas, mustard, potatoes, peas, beets, parsnips, and carrots were all up doing well. June 21 we had a flood here. The water came over my vegetables and ruined all. I planted over again and have good turnips and cabbage. Lettuce, onions, beets, and ruta-bagas are small. Next spring I will try again.

I have sent to New York for seed. Thanks for the seed you sent me. We have had a cold summer, ice in August. To-day ice is 1 inch thick. I have 2 acres of land in cultivation.

*Mrs. A. V. Dedrick, Council City, Alaska.*—Will you please send as many seeds, both flower and vegetable, as possible? I have tried some of the Government seed for the last three years with very good results. This season has been



very wet and cold, not more than six sunny days in all. But I have small cabbages, turnips, kale, spinach, mustard, radishes, lettuce, parsley, and beets. Beets and onions are both very small. Parsnips and carrots were a failure, but everything else is doing well. Peas and beans were too late in coming to plant this year.

As for my flowers, I have a bank of double poppies of all colors 4 feet wide and 11 feet long growing from one package of seed. Nasturtiums did well, growing 4 feet high; plenty of blossoms came out, but an early frost killed them. Sweet peas are budded, but I am afraid they will not bloom. All the flowers were grown in new ground, a mixture of loam and beach gravel with very little manure.

I tried two kinds of radishes. The Early French Breakfast was the best, maturing in twenty-nine days in a light sandy soil. I tried one bed with manure, but they ran to tops. The long radish did not do so well; it was six weeks before it was ready for the table and then it was tough. Turnips, Purple-Top Strap-Leaf, has been the best. I burnt over the chip yard in the spring, turned the ground, put in a little manure, and sowed the seeds broadcast. We thinned them well, using the tops for greens, and they have done much better than those in the garden. I asked for a quantity of seeds, as we have about fifty natives here during the summer. They are all very much interested in the garden. I gave seeds to three of the younger men, and they all have fair gardens. Next year, with the experience of this, I think they will do well enough to have something to sell. They are an industrious, good, capable people, and I think once started would do very well with gardens here, as there is a demand for all kinds of garden stuff and high prices paid for it.

One boy brought me a nasturtium blossom as large as the top of a tumbler, and having eight petals instead of five. I had told him about using the offal of the squirrels and the bones—of which they had a good deal after the spring catch—as fertilizer; so when he planted his flower seed he put two seeds inside of a dead squirrel and planted it. They were longer in coming up than the others, but I think all the blossoms are double, like the one he brought.

I think it would be very easy to raise strawberries, as there is plenty of good sandy soil. Last year I sent out for some plants, but they came in after the boats had stopped running between Golovin and Nome. They were a long time reaching me, but we packed them in sand and stored them in the cellar till spring. I saved only a few plants, but they have done well, although it is too cold for the berries to ripen. The native red currant pays well for transplanting; it yields double the next year.

I also have good results from bulbs, and we have plenty of flowers in the house all winter. Pansies do the best of anything. I have some plants that are 3 years old, and one has borne over 300 blossoms this year. I cut them down every fall, put them in the cellar till April, and set them out in the garden as soon as it is warm enough. I hope you will be able to let me have plenty of seeds, for home use as well as for distribution, as early as possible.

Vegetables grown at Council City, Alaska, during the summer of 1903 are shown in Plate VIII.

*Correspondent, Holy Cross Mission, Alaska.*—Last year I told you that our crops were not as satisfactory as usual, and this year I can say so with greater reason, owing to our very short and cold season.

We had very cold weather and rain most of the time till the middle of July; then a few warm days and sunshine, followed by dark, cold weather again. Hard frost in the beginning of September put an end to all growth; still we left our crops out till September 13. We were expecting a few days of sun-

shine to dry our potatoes before bringing them in, but finally had to take them out the best we could; the ground being already frozen pretty hard on the top, it was not safe to wait longer.

What I can not understand is that nearly everything grew to seed this year—turnips, ruta-bagas, beets, celery, onions, etc. In past years only the beets grew to seed. The turnip field was a mass of yellow flowers. I should be very thankful to know the cause of vegetables going to seed before their time.

I raised some parsnips and onions under glass, and transplanted to open ground in June. These did fairly well. I succeeded better with celery this year, as it had an early start indoors in the beginning of April. Most of the celery measured 3 feet in length and 7 inches in circumference at its thickest, near the root. What grew to seed measured 4 feet. I tried tomatoes again, but after transplanting they did not even produce blossoms. I have fresh seed of an early variety, and I mean to try again. I may hit sometime on a warm season and astonish everybody. We had a few ripe strawberries in the beginning of August, but they had been in blossom from the 1st of June and could not ripen for want of sunshine. The carrots were poorer than usual. As I mentioned in my last letter, our cucumber and melons melted away by some kind of invisible frost the first week of July. Different varieties of oats, barley, wheat, etc., were tried.

I am happy to acknowledge the receipt of a good supply for next year's trial. I distributed a good deal of it among the Indians, especially turnip, radish, and onion seed.

In the beginning of July I received by mail a few pounds of shallots, and I planted them immediately under glass, to try and have them mature before autumn. They grew rapidly to a good size. But I am not sure that they are ripe enough to keep over winter.

*John W. Chapman, Anvik, Alaska.*—It gives me pleasure to acknowledge receipt of a shipment of seeds from your office, by mail, for various native and white residents of Anvik. These have been delivered and have been gladly received.

The season has been a rather cold one, and all crops are already housed. Potatoes are of excellent quality, and average rather larger in size than last year. The carrots and beets are also better than last year. Rhubarb was perfectly successful. Onions, overlooked and left in the ground last year, renewed their growth in the spring, but did not attain to any great size. Onions from seed grew to about three-fourths of an inch in diameter. The flowers that gave the most pleasure were stocks, clarkias, nemophilas, poppies, and sweet william. The last did not mature last year, but plants left in the ground proved hardy and grew into fine flowering plants in August of this year. Pansies should have been included also in this list. They survived the winter and did exceedingly well, some of the blooms measuring 3 inches in diameter. Chinese pinks wintered, but failed to blossom, although they were full of buds and needed but a few more days to reach perfection. In a better location they would doubtless have proven successful.

A cow and a calf were imported for the mission, reaching us the last week in July. Ten tons of hay were cut along the margin of the Anvik River and stored for the winter at a cost of less than \$100. The expense should be much less next year, as the ground had not been prepared for cutting the hay. The experiment of keeping a cow must be regarded so far as successful, for in the month and a half that we have had her she has given us more than her own weight in milk—on the native forage.

*W. Wenrich, Chena, Alaska.*—Carrots planted May 18 in soil cultivated for



VEGETABLES GROWN AT COUNCIL CITY BY MRS. C. B. PHILLIPS.



two years and manured both years were ready for use the last of August; were pulled September 20, being from  $2\frac{1}{2}$  to  $3\frac{1}{2}$  inches in diameter and very nice. I transplanted some, but they did not do very well.

Onions: Seed sown May 15. Grew slowly and were as big as marbles by August 15, but did not grow much after that time. The soil was well manured. Those planted May 24 did better than the ones of May 15.

Cabbage: Seed put in May 15; transplanted June 12; ready for use from September 1 to 15; pulled September 21. About three-fourths of it headed up, the heads averaging about  $2\frac{1}{2}$  pounds. Cabbage planted April 22 in boxes and set out May 31 developed by August 20 to 30. Mostly all headed well, weighing 2 and 3 pounds. The soil was previously cultivated and was well manured the first year with horse manure and this spring with salmon offal. Most of the cabbage set out June 23 had small solid heads which averaged about  $1\frac{1}{2}$  pounds. Cabbage planted June 9 was too late to mature.

Carrots: Planted May 31, but were sowed too deep. They were about  $1\frac{1}{2}$  inches through, when dug, September 2.

Spinach: Planted May 17; ready for use in July; grew to a height of about  $2\frac{1}{2}$  feet and was very nice.

Beets: Seed sown May 15; transplanted June 17; became as large as small teacups, but they were woody, wormy, and scarcely fit to use. The ground in which they were planted was second-year ground and well manured. Beets planted May 5 replanted June 22 in the same soil were not as good. Those planted in new ground which had been well burned were small, but nicer than those in the richer soil.

Sweet peas: Planted May 16; bloomed beautifully in later August and September. I never saw such deep, vivid coloring in flowers as in these.

Ruta-bagas: Planted in rich soil cultivated two years May 17; grew to be 4 or 5 inches in diameter, but were inclined to be woody. Some which were planted in new-burned soil did not grow quite so large, but the roots were of better quality. These were replanted 8 inches apart. Ruta-bagas were sown broadcast June 9 in new-burned soil. Some grew as large as teacups, but most of them were a little too late, being planted too deeply. From experiments this year it seems that all roots did better in the new-burned soil and planted very shallow. Also that the ground spaded 6 to 8 inches deep did not produce as quickly by one week as ground barely turned over. The soil should be well pressed over the seeds.

Celery: Planted May 27 in a big box of rich soil; came up very thin and was left standing in the box. It had grown to about 2 feet high by fall.

Brussels sprouts: Planted May 22 in boxes; replanted June 4; grew about 1 foot high. We did not use them at all.

Parsnips: Planted May 22, and grew slowly. They were not over an inch thick September 1, and an inch and a half September 22. Those planted June 9, in new soil too deep, did not grow large enough to gather.

Turnips: Planted June 14, in new-burned soil. The ground was barely turned, the seeds planted shallow, and did well. They were 6 to 8 inches thick. These were planted at the right time for the fall crop; they would have done well for summer market.

Cauliflower: Planted April 22 in boxes in the house; replanted June 17; August 10, was heading, and well developed by August 20; the heads were 10 inches across. When not pulled the heads shot up into branches and spoiled.

Onion: Seed planted June 6, but was too late. Beans were planted June 6, but frosted August 14. Sweet corn planted June 9, grew 9 inches, and was frosted August 15.

Oats: Sown June 19 and headed out August 12, about 2½ feet high. It was planted on good soil and made good feed on October 1. A few seeds scattered around on the snow in the spring turned yellow before frost and the seed fell to the ground. We shall see if any of it turns up volunteer next spring.

Timothy: Seed scattered around in the fall of 1904 came up well and grew 2½ feet high this year, but last winter was very mild.

Millet: Seed sown July 5: grew 6 inches high, but was killed by frost August 22.

Potatoes: Planted June 23; 15 pounds of seed produced 75 pounds of very small potatoes. I shall keep part of this seed and try it in the spring.

I replanted wild raspberries June 26; July 27 I filled in and planted more—about 125 plants in all—and have cultivated them several times. I found wild berries ripe July 26, and they lasted till September 1. They grow in abundance on the hillsides, where the sun strikes them, and should respond to cultivation. I shall manure these next winter and cultivate them next summer.

I also took up and replanted about 50 plants of red and black currants; they are found wild along the small ravines and creeks. I am afraid the place I planted them in is too exposed, though I covered their roots well with grass mulch. Everything planted in the open field before May 10 did not do as well as a few days later.

September 30 I buried in holes 2 feet deep or more and covered 1 foot deep, heaping well on top, so as to drain in the spring, a few pounds of each of the following: Carrots, turnips, cabbage, beets, home-grown carrots, onions, potatoes, and ruta-bagas. I shall see how they winter and report it.

For two years I have had volunteer pansies.

Lettuce did very well, some heading up almost like cabbage, at least a foot across.

Radishes did well, but, like the other roots, did better in the new soil, which had a coat of 2 inches or more of ashes of burnt vegetation. In the rich soil the radishes were wormy, but not in the new soil. They grew 2 to 3 inches thick. I saved some radish seed pods, which I think are ripe enough to grow in the spring.

I brought in a few strawberry plants from Dawson, but they did not live. They have to be taken in in the fall in Dawson or most of them winterkill.

Rhubarb did well on a ranch above me this year, and I shall plant some next year.

Parsley grew very nicely all summer.

My soil was not flooded when Fairbanks and Chena were overflowed this season. It is high and dry, and I believe excellent potato soil. I expect to put in quite a piece next year.

This year was very rainy after July 1. Before that time we carried water for cabbage and cauliflower. Next year I shall try to irrigate with a water wheel, as the Tanana River runs past my place.

## REPORTS FOR 1904.

The following letters, which refer to the season of 1904, were received too late for publication in the report for that year. They are printed here because many of them are of much value in that they give the reader a good insight in the prevailing conditions. The season of 1904 was backward and unfavorable in the coast region, but it was, on the contrary, quite favorable in the interior. The re-

ports for 1905 are the reverse. The season was favorable in the coast region, while the results in the interior were not satisfactory, owing to more than the average amount of cold and wet weather.

Special attention is called to the following valuable report from Judge Howard, of Coldfoot. That vegetable growing can be made a success 60 miles north of the Arctic Circle is a fact which will interest all who are friends of Alaska. The further fact that potatoes have a market value of 30 cents per pound will suggest the possibility that a market garden might pay better than a fairly good gold mine. The price also gives a hint of the economic conditions which exist, and, inferentially, the need of roads and transportation facilities.

*Frank E. Howard, United States commissioner, Coldfoot, Alaska.*—In reply to your request that I report results of my efforts at gardening in this section of Alaska during 1904, I submit the following:

Coldfoot is situated near the head of the Middle Fork of the Koyukuk River, 67° 20' north and 150° 20' west, about 60 miles above the Arctic Circle.

In the spring several small gardens were planted in Coldfoot and on the adjacent creeks from seed sent me from your Department. But I shall report the results from my garden only and the prolific crop of the one that was planted by our deputy marshal, J. H. Johnson.

The summer of 1904 was the third planting of my patch No. 1. The soil has proven not as prolific as my other patches, owing to its being clayey and retaining the cold. It is slow to thaw in the spring, and when I spade it up about May 1 the shovel touches frozen ground at a depth of from 6 to 8 inches. When I first cleared this patch it was covered with a foot of moss, and my experience leads me to the conclusion that moss-covered ground, for some years at least, is decidedly unfavorable to garden growths. At least ground that was not covered with moss produced far better results. For three seasons patch No. 1 has produced a fair crop of turnips, with an increase of worms each year that did some damage. The turnips planted were Purple-Top Strap-Leaf, and White Milan. Yellow Goldenball turnips did fairly well, and I think in more favorable ground would produce excellent results. They are the best turnips for winter storage. Ruta-bagas were a failure. Lettuce (Boston Market) did fairly well. Radishes were destroyed by the worms. On May 12 I transplanted cabbages (Early York) when the plants were 2 to 3 inches high. As a protection from freezing nights, occurring at intervals up to June 1, I covered the plants with white-glass beer bottles, first cutting off the bottoms and necks. In such jackets the plants flourished well, and by June 10 had grown to such size as to fill the bottles, when I uncovered them. Most of these plants headed to about the size of a cocoanut, many of them being quite solid. I harvested my crop the first week in September, and have cabbages for all winter and a keg of fine sauerkraut.

My experience during two seasons with patch No. 1 led me to believe that garden stuff would grow here with some degree of luxuriance in more favorable ground. I therefore selected a patch almost free from the usual heavy covering of moss, cleared it in the first week in May, spaded it the third week, and planted lettuce, radishes, peas, beets, ruta-bagas, and turnips the last week. About June 1 I transplanted a bed of kale when plants were 2 inches high.

Lettuce (Boston Market) I planted in two remote beds. One bed was a complete failure, but the other one produced abundantly in large and exceedingly fine heads, tender and sweet. Such a contrast in the growths from the same

seed in practically the same soil I can not account for. Radishes (a globe-shaped variety) could not be excelled, as also the White Milan turnips. Beets (Crimson Globe) grew to goose-egg size, tender and sweet. The tops were large enough to make excellent greens. I believe that with careful attention a reasonably good crop could be raised. Peas grew from 2 to 3 feet high, blossomed and podded abundantly, but were killed by frost before they reached edible size.

Kale grew from 2 to 2½ feet high. When the ground began to freeze I pulled the plants and stored them for winter greens. They keep well as long as they remain frozen.

I had four very small potatoes, which I cut in half and planted in eight hills. They sprouted quickly, and produced healthy vines that blossomed and yielded a crop that was a pleasant surprise. The one-half pound of seed potatoes, probably less, yielded 28 pounds of average-sized tubers, some being quite large, and I never before ate potatoes that tasted quite so delicious. Now it is a question whether or not these potatoes matured. They show eyes, but faintly. I shall plant some of them next season and settle the question. I should like to know the particular variety of this potato, since it has proven so adaptable to this climate. They were shipped by the Northern Commercial Company to Bettles in the summer of 1903 as market potatoes. The result of this magnificent crop is that some full crates of potatoes are being carefully wrapped in blankets and stored for next spring's planting. I have cleared a new patch of ground with fine sandy loam to plant a full crate. I might add the price of fresh potatoes in Coldfoot is 30 cents per pound, and the supply scarce. The result of my crop was 56 pounds to 1 pound of seed potatoes. From one crate (100 pounds) I can expect a crop of 5,600 pounds; value, \$1,680. Potato raising 60 miles above the Arctic Circle looks quite alluring.

Ruta-bagas in patch No. 2 produced but little in the root line, but supplied the town with greens with their abundant growth of tops, that remained tender until damaged by successive frost.

During June and the first week in July my meteorological record gives only four "traces" of rainfall. Therefore during that period I watered my garden two or three times per week.

I have a cellar underneath the floor of my office room filled with turnips and ruta-bagas, and a winter supply of cabbage and kale in my cache. Therefore I can say that gardening in this section of Alaska is a lucrative industry.

The garden of our deputy marshal excelled my own in point of crop, especially in ruta-bagas and turnips. The largest turnip, a White Milan, weighed 5½ pounds and was 25 inches in circumference. Turnips weighing 4 and 5 pounds were quite common. Carrots (Scarlet Horn) did fairly well, some being 4 and 5 inches in length. Parsnips did fairly well. Beets made a good showing, with indications that with careful training and attention a reasonably good crop could be raised.

This garden was cleared and manured in the spring and immediately planted in its first year. It is a rich, sandy loam several feet in thickness, with an underlying stratum of very dry sand and gravel, and is termed "not frozen" ground. Years ago fires burned off all timber and moss, leaving the soil, it seems, in a perfect condition.

*Henry A. Stade, Twelve-Mile-Road-House on Birch Creek, post-office Circle City, Alaska.*—Last winter I wrote and asked you to send me a few seeds, which you very promptly did. They arrived in good time and in good condition. I shall give you my first year's experience in farming in Alaska:



I planted 700 pounds of potatoes, commencing on the 1st day of May, 1904, and planted some as late as the first of June, on ground which I cleared during May. I was surprised this fall to see that the last planting was just as large and good as the first. I harvested in all 20 tons of potatoes, for which I have a ready market at \$11 per 100 pounds. Next I planted four papers of Scarlet Horn Carrots. They were the largest and best that anyone ever saw in this country. Some of them were three inches across the top end. I raised 900 pounds in all, and sold them at 15 cents per pound. I planted four papers of parsnips of the Early Round variety. These were as fine and large as the carrots, but I raised only 300 pounds. They sell for 25 cents per pound. I planted four papers of Crimson Globe beets. They also grew to perfection. Some of them weighed 4 pounds, and in all I gathered 620 pounds. These sell at 25 cents per pound. I also planted four papers of turnips of the White Flat Strap-leaf and the Purple-top. Both kinds did well and grew to good size; the largest one weighed 10½ pounds; I gathered 1,500 pounds. I planted four papers of ruta-bagas, which did well; the largest weighed 12 pounds, but these did not yield as well as turnips by 200 pounds; they sell for 8 cents per pound. Four papers of Extra Early Brown Spanish onions came up well, but grew slowly and did not amount to much. Three papers of peas did well, and kept bearing till frost came, September 3. These seeds were all planted in open ground during the month of May.

I planted two papers of Stonemason cabbage and also one paper of cauliflower in the hothouse in April and transplanted them in June, but they did not do at all well. I also planted two papers of beans, select variety, and one Early Red Valentine, but neither of them matured. You will see that I did remarkably well, and I must say that farming in Alaska on a small scale is a success, and I have made more money this year farming than before in mining.

I must not forget to mention my radishes and lettuce, for they were the pride of the table all summer. Many thanks for the seed you sent me last spring, and also for that you also sent me this fall. As this was my first year farming, I am again without seed, but next spring I shall set out carrots, turnips, ruta-bagas, parsnips, and other vegetables and try and raise my own seed.

I will experiment with any seed you would like me to try, and I shall take great pleasure in doing so, for I do think the time is coming very fast when Alaska will produce her own vegetables of all kinds, probably not every year in all places, but when one place should fail the supply in another place would suffice.

*A. A. Turnbarye, Fairbanks, Alaska.*—I send you samples of grains in this mail which I raised this past season (1904) at this place. I took no pains at all with it, but scratched up a small patch on very poor soil, and also harvested it a little too early. I sowed it May 8 and harvested it August 15. The season was very backward, and we had two light frosts during the summer, but I am satisfied that grain will do all right here with fair attention. I did not put fertilizer on the soil. My vegetables were very good, considering the season and the attention given them. I sowed a little of everything for an experiment, and I am sure that in time this will be a farming and self-supporting district. I have sowed Alsike clover and timothy seeds, and will know if the winter is too severe for it by another season.

*J. F. Karshner, Magic Hot Springs, Baker Creek Station, Alaska.*—This year (1904) I have red currants, black currants, and red raspberries growing wild at my place, also the service berry, or cherry as some call it. I shall try each by cultivation and see what results follow.

When it came to taking care of my potatoes in the latter part of September I found plenty that would weigh from  $1\frac{1}{2}$  to 2 pounds; two weighed 3 pounds each. My grain did well. The wheat stooled to from 10 to 14 stalks, the barley from 8 to 12. I never saw grain do better; the grains were of a good size, and the heads were well filled. I shall try sweet corn, tomatoes, water-melons, and muskmelons this year. Celery did well. I shall make it a special crop in 1905. I must tell you of a variety of cabbage that did the best. The Government sent it to a neighbor, and I tried some of it at my place. It has a short solid head and is called Stonemason. I just had one paper for this year; it is a sure header for this place. So is the Jersey Wakefield, but it is not so large or heavy as the Stonemason.

*Edgar Crompton, Tanana, Alaska.*—The following are the results for 1904 of your seeds planted by me at my station on the banks of the Yukon, opposite the mouth of the Novikakat River, 6 miles above Kohrine's old post and 90 miles below Tanana:

Last year we dug up a considerable plat on a bench about 50 feet above the river and succeeded in raising a fair crop of turnips, carrots, and radishes, which were all the seeds we had to plant. This year nothing seemed to flourish there except the carrots, which yielded a very good crop.

This summer I was able to get a small plat dug and fenced alongside of our buildings in a willow bottom, which has been richly manured. Here everything seems to thrive to perfection, as, indeed, might be expected, as the place has a warm southern slope and the low hills serve as a break to the winds, which are very cold toward fall.

The flowers were grown beneath our cabin window in a small bed about 10 by 15 feet. I gave them more attention than anything else.

Peas (Prolific Early Market) were planted as soon as the ground was thawed sufficiently to dig it. They were well cultivated, but only watered a few times. They grew about 5 feet high, and yielded a very fine crop. I left some for seed, but the pods were still green when they froze.

Beans (Early Red Valentine) were planted at the same time as the peas and close by them. All rotted in the ground. Some others were planted a month later on a hill and yielded a small crop.

Parsnips (Early Round) were planted on the hill and grew about the size of carrots. I believe they will thrive in better soil. Beets (Crimson Globe) were planted on the hill. Most of them were very small. Spinach (Long Standing) did splendidly. We had more than we could use. They did not need watering. Radish (French Breakfast) grew to perfection everywhere it was planted, and was better than any of the other varieties planted. They did not require watering. Mustard (White London and Ostrich Plume) grew a good crop and was cut early in the spring for salad. Cress (Curled) grew a very heavy crop and sprouted up as fast as cut down. It was used all summer. Rhubarb—17 hardy young plants—has been set out in shape for next year.

Lettuce (Morse and California Cream Butter) was started early under cover and transplanted. Both varieties did well, but the latter seemed to me to surpass anything I ever saw before. We found it excellent when boiled like cabbage. Many people who saw them remarked that they never knew of any lettuce before having such huge solid heads. Carrots (Early Horn and Chantenay) were a heavy crop.

Phlox, shirley poppy, sweet alyssum, corn flower, sweet peas, candytuft, nemophila, nasturtium (Madam Gunter and Dwarf), and stocks all did well and bloomed till frost killed them. They were planted early, under cover. The stocks, poppies, and nasturtiums were most admired.

*Correspondent, Holy Cross Mission, Alaska.*—Last year's crop (1904) was about one-fourth less than the usual quantity. We had a long, cold, dry, and windy spell right after planting season, May 15 to 25, lasting till the beginning of July; then almost continual rain for about three weeks. We had very few real warm days.

The turnips and cabbage did fairly well, but the potatoes were very poor and watery. Barley, oats, and wheat were sown, but nothing matured. I took the greatest care of the new variety of Windsor beans you sent me, giving them the best spot in our little front garden, but the ground kept so cold that it took weeks for them to come above ground, and at frost, September 20, they were only beginning to form pods.

Toward the middle of August we transplanted some strawberry plants, both bush and running varieties. The plants were very strong and healthy. They had been raised in cold frames under glass and had already blossomed when put in the open ground, where they remained all winter with a slight protection of straw. All the running varieties stood the frost bravely, but nearly all the bush varieties perished. The former began to bloom in the beginning of June, but everything is now at a standstill on account of cold weather.

We had real May weather in the month of April. The snow had disappeared about the 15th of that month. The entire month of May was cold with the exception of a few days. We had snow as late as May 25, when most of our planting was over. Ever since that we have had constant rain and dark, cold, showery weather. On July 16 we had a hail shower. The strong winds almost uproot the young plants which are trying to push their way up. These two last summers are the coldest we have seen since we have been in Alaska. There are no two years alike.

I sowed some melons and cucumbers in the hotbeds, and they came up nicely and were doing well till I was obliged to remove the sashes on account of other plants. The air became too cold for their delicate natures. They stopped growing and turned yellow. I have some more cucumbers which I started June 10 in a hotbed by themselves, and they are doing well, but I am careful to keep the glass on at night. I have about 200 strong plants of celery about 7 inches high which I shall plant in trenches as soon as our first crop of radishes is finished, and that will be in a few days.

*E. R. Brady, Wickersham, Alaska.*—At this time we have prepared for cultivation upward of an acre, and last year Mr. J. R. Anderson, who owns and conducts a large roadhouse here, raised a fine crop of oats. At that time the ground was new, but this year he expects to have a still better crop. He is clearing more ground now, and by this fall we shall have perhaps 5 acres ready for use.

I have a small hotbed which has been in operation since March 20, and at this time has radishes, etc., almost ready for use. This has been a very cold spring in this section, but we hope to have it warm from now until fall. The rainfall here is about the average for the Yukon Valley.

The soil in this section of the country is the same as I have found in all parts of the interior of Alaska. It is of a sandy nature, with some black loam and yellow clay. After the removal of the vegetable growth it is very mellow, and the second year it will produce fine crops. I have never planted anything in this country that did not prove entirely satisfactory. But it may be that I gave more attention to my work than a person would who plans for commercial returns.

The number of acres available for cultivation, or for pasturage, I can not estimate, for many sections of the Forty-mile district are yet unexplored. However, the Mosquito Fork of the Forty-mile is almost entirely good agricultural

land. It is about 5 miles wide on an average and about 40 long. This is estimated. Also the Dennison Fork of the same river is as large and of the same character. A number of homesteads have been taken on the Mosquito Fork. There was a large quantity of wild hay harvested on the Mosquito Fork this last year. One farmer has a mowing machine, rake, etc., and he expects to cut more this year.

[Attention is called to the foregoing description of the valley of Mosquito Fork. It has long been known as an extensive natural meadow, and according to all reports the soil is well adapted to cultivation. In the report for 1901 Mr. Isaac Jones gave a more general description of that portion of the Forty-mile country, which borders on the Eagle-Valdez trail, and then estimated that there were 750,000 acres available for agriculture and pasturage in the valleys of the various branches of the Forty-mile and the Ketchem stock flats. Until a railroad shall penetrate this region it is practically inaccessible.]

*Joseph L. Braxton, Tanana Crossing, Alaska.*—I have started to farm in the Tanana Valley, and I write for some seed as well as for some information as to what will grow here. We have a fine climate and very good soil. I started to clear off land last July (1904) and I think I shall have 10 acres this spring ready for the plow. I have a cabin 18 by 24 feet, inside measure, and a stable 12 by 18 feet. The only drawback I find is that it costs so much to live and get farm implements. I pay \$50 or \$60 for flour and \$50 per 100 for rice and beans; \$75 per 100 for bacon. I should be pleased to hear from the station at any time, and any seed you send will be highly appreciated.

[Tanana Crossing is on the Eagle-Valdez trail, north of the Copper River Valley.]

*Adolf Stecker, superintendent Moravian Mission, Bethel, Alaska.*—Concerning our garden, we are happy to report good success. In early spring (1904) I worked much in the garden, but it paid me well. We raised the plants in hotbeds first and set them out in the middle of June. Potatoes were planted in the ground May 28 and harvested September 22. While those raised from potatoes brought from the States were good, but small, those we grew from seed raised here last year were large and very good. On one plant we counted 14 potatoes, the largest the size of my fist, the smallest the size of hen eggs.

Cabbage, cauliflower, kale, ruta-bagas, radishes, and turnips did very well. We also had very nice flowers—pansies, stock, cornflower, and others. Everyone who saw our garden wondered at it, and Mrs. Stecker and myself have had much enjoyment in seeing everything do so well.

About 100 yards west of our station is a lake, and in the spring I started a garden there. The ground was all covered with moss, which I removed. I found under it about 6 inches of soil and below that was sand. I put out some potatoes, cabbage, ruta-bagas, and turnips there. The turnips came up in very short time, but they withered away. The cabbage and ruta-baga plants looked fine and green at first, but did not grow, and are now almost as when we put them out. The potatoes grew a little.

If we were only a few miles farther up the river among the trees it would be much better. I went with some Finns up a mountain stream, and there we found some most excellent land. Grass on both sides of the river grew 5 feet high. The Finns thought it a pity that such beautiful land was not used for farming, and that is my opinion, too.

*Joseph Kahlen, Carmel, Nushagak River, Alaska.*—The months of June and July (1904) were most delightful; August and September were rather wet. Winter set in by the middle of October, but so far has not been unpleasant at all. I could not always find out the actual snowfall; it often seems to snow

when it does not. The air is at times filled with particles of snow carried along by a strong wind and drifting in all directions.

Our gardens have done fairly well. We had a fair crop of good potatoes and exceptionally fine cauliflower. Rhubarb, kale, turnips, cabbage, carrots, ruta-bagas, and radishes did fairly well.

Mr. Rock had planted some rye; it grew to a normal height, but the seed did not mature; it turned black. Peas stood in bloom for a long time; they formed pods, but the peas did not ripen. We keep two cows, a calf, and a horse. We have in places a luxuriant growth of nutritious grasses, and our stock can support itself during the summer. Our supply of hay was cut after the first frost had set in.

In July we tried a new incubator sent us from Philadelphia. Mr. Rock put in 50 eggs, of which number 17 were hatched. It was rather late in the season, much wet weather followed, and only four of the chicks survived. A few of our hens began to lay about the middle of November.

I came here on the last day of May. Shortly afterwards I began cultivating a small piece of land and had the satisfaction of raising a good crop of radishes, kale, and a fairly good supply of fine turnips.

Last summer we made a trip up the Wood River to the lakes and were delighted at the beautiful scenery and luxuriant character of the vegetation. It is a magnificent timber region, in sharp contrast with the treeless region of the lower Nushagak. This lake country will make an excellent grazing country for reindeer.

*Elizabeth Schwab, Jesse Lee Home, Unalaska, Alaska.*—Your package of seed came to-day, reminding me that I had not as yet given you any of my experience with last year's (1904) seed. Last spring was very late and the summer was cool. I started cabbage in tin cans in March, transplanting them in the latter part of May, and succeeded in having some small heads ready for the table late in September. We have had such nice lettuce and greens. The beets not growing very large, we used the tops for greens. They were nicer than spinach. We started some rhubarb in the hotbed last year and it grew to 2 feet. We transplanted it into the garden this year and inclosed it in boxes. I was afraid it would spoil, as we tried transplanting it before, but the boxes preserved it from its enemies and it was well manured with chicken manure.

I can not tell how the children enjoyed the turnips and ruta-bagas from their gardens and what a blessing and health-preserving benefit our garden is to our flock.

We have also used much of the flower seed. Sweet peas, sweet alyssum, stocks, and many other flowers make our home more beautiful and give their joy and gladness.

*Alexander Friedolin, Afognak, Alaska.*—I have sown the seeds I received from you as follows:

Cauliflower and cabbage were planted in the box April 14, 1904, transplanted to open ground June 2. I planted turnips, onion sets, and sowed cabbage, kale, celery, radishes, and salsify in open ground on May 11, and transplanted kale and cabbage on June 2. I sowed Romanow wheat, Swedish Select oats, and Manchuria barley, all imported seeds, on May 12. I sowed flowers, ruta-bagas, peas, and cauliflower on May 12 and transplanted the cauliflower June 2. I planted potatoes May 17 and 27. Onions (Extra Early Brown Spanish), beets (Crimson Globe), carrots (Scarlet Horn), ruta-baga (Champion), turnip (White Strap-leaf), parsnip (Early Round), parsley (Early Curled), and radish (French Breakfast), were all sown on May 21. Lettuce and dill were sowed May 29. The result was unsatisfactory this year. The potatoes were

fair. The turnips turned out to be excellent, as also did the ruta-bagas. Radishes, kale, rhubarb, cauliflower, lettuce, and garden flowers were partially a success.

As the packages you sent us contained no cabbage seed, I had to use old seeds, a late variety, and they are growing yet with big leaves and no heads. All vegetables except those mentioned above were a total failure. The season was not favorable, and being away from home nearly the whole summer trying to earn my living somewhere else, I had no opportunity to give them proper attention; hence the failure.

I commenced to take up vegetables, with the exception of cabbage and kale, September 29 and had them all in the cellar by October 1. Romanow wheat is in the milk yet and still growing. Manchuria barley and Swedish Select oats were sowed late and in a cold ground. They are nearly matured, especially the former, although the straw is green yet. The winter wheat and rye matured all right. The heads of rye are not full. They have few seeds, but the wheat is better. I sowed winter wheat and rye in the latter part of August last year. They came up and grew satisfactorily and were of a right height when snow covered them before frost, but early in the spring the snow left the ground and the plants were left exposed, after which we had frost and rain intermittently.

In your report for 1903 you have come to the conclusion that grain can not be grown successfully along the coast. However, I believe that certain grains can be grown successfully on favorable spots, not exactly on the coast, but a mile or so inland. And when the time comes a man can make his living by farming on a small scale. I have grown barley suitable for home use for the last five years without failure, and I have by no means the best ground around here, nor am I giving it extraordinary cultivation.

*G. W. Palmer, Knik, Cook Inlet, Alaska.*—The seed you sent me last fall were received and planted in the spring of 1904. I gave the natives all that I did not use myself. The summer has been very cold and wet, and very unsatisfactory for gardening. Potatoes have done fairly well. I had about 2 tons on about half an acre of ground. Turnips, ruta-bagas, and carrots did fairly well; cabbage did not head firm and hard as they did last year. Lettuce was fine. Beets, parsnips, radishes, and onions were failures.

The natives' gardens were almost a failure from lack of attention.

*Herman Steller, Lower Kenai Lake, via Seward, Alaska.*—In the fall of 1902 I obtained from Mr. Nielsen, in charge of Kenai Station, some Department seeds which were planted in 1903, with the following results:

My gardens were planted on the banks of the Kenai River about 2 miles above the Lower Lake, where they were sheltered from the cold winds from all sides and the open river gives a southern exposure. The soil is alluvial, overlying a gravel deposit to a depth of 16 to 24 inches, well drained and loamy.

The first year, 1903, no manure was used, but this year a compost of fish, grass, leaves, etc., was prepared which added materially in the growth of the vegetables. In 1903 only a small area, perhaps 50 feet square, was planted. The result being so encouraging I was induced to experiment further this season. The first year there was more sunshine and the beets and parsnips did better than they did this season, and the peas (Alaska and Earliest of All) ripened, but the seed when planted did not produce well, half of them not coming up at all and the others very late. The few potatoes I grew I saved for seed and they did much better than those from the States.

This year I planted my potatoes May 5 on manured ground. The other seeds—turnip, beets, carrots, kale, cabbage, lettuce, and radishes—were planted

between that date and May 15, before the ground was thoroughly thawed out, on fertilized soil. Such care was given them as a lone prospector could find time for and the results were entirely satisfactory.

From less than one-fourth of an acre I grew 3 sacks of potatoes besides what was used, 5 sacks of ruta-bagas, 8 sacks of White Egg turnips, 1 bushel of carrots, and 100 heads of cabbage. Beets and parsnips were very poor, not over one-half bushel together. Besides this we had plenty of kale, lettuce, radishes, and some peas, the latter did not do well. On enriched land the tendency was for the peas and potatoes to go to vines.

The season was exceptionally cold and rainy, not at all favorable to vegetable growth, but the following sizes of some turnips will demonstrate the possibilities of our section in the garden line. One Purple Top turnip  $29\frac{1}{4}$  inches in circumference,  $3\frac{1}{2}$  inches thick; 12 or more White Egg turnips were 13 inches long, 20 to 23 inches around; cabbage which weighed 5 or 6 pounds; ruta-bagas weighing 4 to 5 pounds. Cabbage and ruta-bagas were transplanted. Kale grew very thrifty, as did the lettuce and radishes.

*Mrs. J. M. Stewart, Valdez, Alaska.*—I wish to tell you how successful I was during the season of 1904 with the garden planted with seed you sent me in the spring.

I had lettuce and radishes on June 2, beautifully crisp and tender. We thought the curled lettuce a nicer variety than the Big Boston, which we planted this year. We found the French Breakfast radishes matured more quickly and were more tender than a longer variety of which I forget the name. We raised five different crops of radishes.

I was more successful with onion sets than with seed, as I left the seed till it was too late for planting.

I had 30 beautiful heads of cauliflower from plants started March 20 in the house and transplanted May 15. I had turnips, large ruta-bagas, and beets, which were not very large but very sweet and good. We had plenty of kale and rhubarb, which I had started the year before.

Then I had lots of flowers. I found sweet alyssum and pansies the most satisfactory, as they blossom early and are not injured easily by the frost. I picked the last bunch of flowers October 28. There were, besides candytuft, mignonette, cornflower, asters, and some English daisies started in the house, of which I was especially proud.

I felt much encouraged with my garden, for the season though early was very rainy and cold.

*W. H. Marrett, Haines, Alaska.*—Wheat, oats, barley, and buckwheat just barely matured during the last season (1904), which has been the coldest I have known in Alaska. Of such vegetables as potatoes, turnips of numerous varieties, cabbage, cauliflower, carrots, beets, parsnips, radishes, lettuce, celery, and peas I have raised an abundance for table use, and several tons surplus of potatoes, turnips, carrots, and cabbage, but in no case was the yield per acre at all remarkable. This year and also last the first frost was not until October. I plowed last season 12 acres in December, finishing the 12th of the month. Most years I could plow nearly or quite as late. Spring plowing is always best, however, on my farm, as the fall of snow prevents much freezing, so that the root crops if left in the ground come out in the spring uninjured by the cold.

Hay has been my only large crop. I have harvested and thoroughly cured this past season a little over 60 tons. Every year there has been some excellent weather for making hay, but it can not be counted on at any particular time. During 1903 there was several weeks of clear sunshine and no rain. The previous year there was not two successive days during July and August without some rain, but that year the really good hay weather was in June.

This year it was late in August and September. I have a silo, but prefer putting my entire crop of grass into hay when I can hit suitable weather for making it.

My attention has been called several times to the fact that the cultivated grasses, such as timothy and clover, have winterkilled badly in some sections. Has not this been chiefly on account of insufficient drainage? All along those many miles of trail the pack train traversed during the Yukon rush the volunteer clover and timothy grow most luxuriantly and does not appear to winter-kill in the least. The large parade ground at the military post which was sowed last July with varieties and proportions of seed recommended by you wintered perfectly and is looking remarkably well, though it has been much used, and for several months the horses and cattle were not kept off.

*Henry Partridge, Hoonah, Alaska.*—I received from the Department beet, carrot, pea, turnip, parsnip, ruta-baga, lettuce, and onion seeds. They all grew very well. With 600 turnip plants I raised 1,800 pounds of nice, juicy turnips; 650 ruta-baga plants weighed 1,920 pounds—the finest ruta-bagas I ever tasted; 250 carrot plants yielded 118 pounds; some carrots were 12 inches long and 9 inches in circumference; 80 parsnip plants yielded 50 pounds; 100 onion plants yielded 18 pounds, the largest being about 2 inches in diameter; 100 beets weighed 70 pounds, and were of the best quality one could wish to see. Peas and lettuce grew fine.

I also planted 50 pounds of potatoes which I took from a sack which we had bought to eat. To my great surprise the 50 pounds grew to 490 pounds of the best and mealiest potatoes I ever ate.

This little garden is located about 20 miles from Hoonah village, near Swanston Harbor. It is 80 by 100 feet. The soil is a deep black loam. To fertilize the ground I used decayed seaweed and old salmon from the streams. I expect too add a little to the patch every year until it is a modern farm. I am satisfied that farming can be made a success in Alaska.

*Charles B. Bohm, Tree Point Light Station, Alaska.*—This year's (1904) crop has not been exceedingly good on account of using new ground and no fertilizer. I have been trying to catch fish for use as fertilizer with a view to improving the soil.

I have a few onions, some lettuce, some Extra Early Paris cauliflower, and some potatoes, but they all grew very slowly. I also have a little Early Curled parsley and a few heads of cabbage. The Crimson Globe beets grew up a few inches and then stopped. Champion ruta-bagas and Tall Curled Scotch kale are growing fine.

Flowers have done well. The wallflower is 3 feet high, but without blossoms. The poppies are 3½ feet and full of blossoms.

*G. W. Gervais, Hollis, Alaska.*—In regard to the growth of seed planted in 1904, I will say that it was a very backward year, and nothing did as well this year as last. The Early Jersey Wakefield cabbage and the cauliflower were fairly good; also the Early turnip and Long Red radishes and the Mammoth Red Leaf lettuce. Onions from sets did well. Rhubarb is a great success. I shall try again in 1905.

*Nathan B. Whitfield, Ketchikan, Alaska.*—Owing to the backward and cool spring in 1904, gardening did not begin here till the last of May or the first of June. The seed sent me were planted on the same soil which last year produced better results than it did this year with the same amount of attention.

Last year (1903) lettuce grew 14 inches across the head, this year from 10 to 12 inches; last year turnips grew to 5 inches in diameter, this year 4 inches; last year beets grew to 3½ inches in diameter, this year 2½ inches; last year



carrots reached 1½ inches in diameter, this year 1 inch; last year radishes grew to 1½ inches in diameter, this year 1 inch; last year onions were 2 inches in diameter, this year 1 inch; last year cabbages headed, this year they did not; the beans bloomed last year, this year they did not, being a very tender plant; this climate is too cold for them to mature. Kale grew well, bloomed, but the seeds would not ripen. Peas grew 5½ feet high, and were loaded with fruit, which did not ripen.

The flowers did not do well. They all came up, but only the sweet peas bloomed. I have three plants of sunflower 2 feet high, which are protected. One has a bud, but I do not think it will bloom.

From information derived from the natives and old white settlers this has been an unusually wet and cold year, and is not a good criterion of the productive qualities of Alaska horticulturally.

### SOIL TEMPERATURES.

Readings are taken at 7 a. m. Thermometers record the temperature at depths of 6 and 24 inches, respectively. The radiation thermometer shows the daily minimum temperature 6 inches above the surface of the ground where the soil thermometers are planted.

#### Soil temperatures.

#### SITKA EXPERIMENT STATION.

Temperature.			Temperature.			Temperature.					
Date.	At 7 a. m. 6 inches below surface.	At 7 a. m. 24 inches below surface.	Minimum at 6 inches above surface.	Date.	At 7 a. m. 6 inches below surface.	At 7 a. m. 24 inches below surface.	Minimum at 6 inches above surface.	Date.	At 7 a. m. 6 inches below surface.	At 7 a. m. 24 inches below surface.	Minimum at 6 inches above surface.
1905.	° F.	° F.	° F.	1905.	° F.	° F.	° F.	1905.	° F.	° F.	° F.
May 8	45	42.5	38	June 13	49	48	38	July 19	56.5	52	49
May 9	44	42.5	37	June 14	50.5	48	37	July 20	58.5	52	50
May 10	46	42.5	38	June 15	51.5	48	45	July 21	58.5	52	52
May 11	45.5	43	37	June 16	51	48	46	July 22	58.5	52.5	54
May 12	46	43	41	June 17	52	48	47	July 23	58	52.5	50
May 13	45	43.5	35	June 18	51	48	45	July 24	57.5	52.5	44
May 14	45	43.5	31	June 19	51.5	48.5	44	July 25	57	53	43
May 15	45	43.5	34	June 20	52	48.5	47	July 26	57	53	44
May 16	44	43.5	40	June 21	52.5	48.5	47	July 27	58	53	48
May 17	44	43.5	36	June 22	53.5	48.5	42	July 28	57	53	52
May 18	45.5	43.5	39	June 23	53	49	49	July 29	57	53	52
May 19	45.5	43.5	41	June 24	56	49	47	July 30	57	52	52
May 20	45.5	44	39	June 25	58	49.5	50	July 31	57	53	44
May 21	46.5	44	30	June 26	57	49.5	42	Aug. 1	58	53.5	46
May 22	47	44	31	June 27	56	50	50	Aug. 2	58	53.5	52
May 23	47.5	44	36	June 28	55	50	47	Aug. 3	58.5	53.5	51
May 24	48	44	37	June 29	54.5	50.5	48	Aug. 4	57	53.5	52
May 25	48	45.5	35	June 30	54.5	50.5	48	Aug. 5	57	53.5	42
May 26	48.5	45	35	July 1	55.5	50.5	51	Aug. 6	58	53.5	48
May 27	50	45	35	July 2	55	50.5	48	Aug. 7	58	53.5	48
May 28	50.5	45	41	July 3	54.5	50.5	49	Aug. 8	57.5	54	51
May 29	50	45.5	36	July 4	54	51	50	Aug. 9	57.5	54	51
May 30	50	46	36	July 5	54	51	47	Aug. 10	57.5	54	49
May 31	50	46	36	July 6	52	51	44	Aug. 11	57	54	52
June 1	50.5	46	36	July 7	53	51	47	Aug. 12	57	54	51
June 2	50.5	46	37	July 8	53	51	47	Aug. 13	57	54	41
June 3	50.5	46.5	35	July 9	54	51	47	Aug. 14	57	54	42
June 4	50.5	46.5	41	July 10	55	51	49	Aug. 15	56	54	42
June 5	50.5	47	34	July 11	55	51	46	Aug. 16	56	54	45
June 6	51.5	47	40	July 12	55	51	47	Aug. 17	56	54	47
June 7	52	47	49	July 13	54.5	51	48	Aug. 18	56	54	44
June 8	52	47.5	47	July 14	55	51	49	Aug. 19	55.5	54	45
June 9	51.5	47.5	46	July 15	55	51	52	Aug. 20	55	54	41
June 10	50.5	47.5	37	July 16	56.5	51	50	Aug. 21	55	54	46
June 11	50.5	48	37	July 17	56	51.5	50	Aug. 22	54	54	46
June 12	49.5	48	41	July 18	55.5	52	50	Aug. 23	54	53.5	46

## Soil temperatures—Continued.

## SITKA EXPERIMENT STATION—Continued.

Temperature.			Date.	Temperature.			Date.	Temperature.			
At 7 a. m. 6 inches below surface.	At 7 a. m. 24 inches below surface.	Minimum at 6 inches above surface.		At 7 a. m. 6 inches below surface.	At 7 a. m. 24 inches below surface.	Minimum at 6 inches above surface.		At 7 a. m. 6 inches below surface.	At 7 a. m. 24 inches below surface.	Minimum at 6 inches above surface.	
1905.	° F.	° F.	° F.	1905.	° F.	° F.	° F.	1905.	° F.	° F.	° F.
Aug. 24.	54	53.5	46	Sept. 12.	53.5	52	49	Oct. 1.	46	49.5	42
Aug. 25.	56	53.5	46	Sept. 13.	53.5	52	44	Oct. 2.	45.5	49	41
Aug. 26.	55	53.5	49	Sept. 14.	53	52	41	Oct. 3.	44	49	43
Aug. 27.	54.5	53.5	45	Sept. 15.	53	52	48	Oct. 4.	46	49	40
Aug. 28.	54	53.5	38	Sept. 16.	52.5	52	48	Oct. 5.	46.5	48.5	41
Aug. 29.	53	53.5	35	Sept. 17.	50.5	52	40	Oct. 6.	46.5	48.5	38
Aug. 30.	53	53.5	36	Sept. 18.	50.5	52	39	Oct. 7.	46.5	48.5	38
Aug. 31.	53	53	50	Sept. 19.	51	52	46	Oct. 8.	46.5	48.5	35
Sept. 1.	53	53	49	Sept. 20.	51	52	44	Oct. 9.	45	48	39
Sept. 2.	53	53	46	Sept. 21.	50	51.5	39	Oct. 10.	46	48	48
Sept. 3.	53	53	44	Sept. 22.	48	51	39	Oct. 11.	47.5	48	42
Sept. 4.	53	53	44	Sept. 23.	47.5	51	32	Oct. 12.	47	48	40
Sept. 5.	53	53	39	Sept. 24.	48	51	40	Oct. 13.	48	48	41
Sept. 6.	53	53	35	Sept. 25.	48.5	50.5	45	Oct. 14.	48	48	33
Sept. 7.	52.5	53	38	Sept. 26.	48	50	35	Oct. 15.	43	48	27
Sept. 8.	52	52.5	35	Sept. 27.	48	50	38	Oct. 16.	43	48	24
Sept. 9.	52	52	49	Sept. 28.	48	50	40	Oct. 17.	42.5	47	29
Sept. 10.	53	52	41	Sept. 29.	47	49.5	40	Oct. 18.	40	47	32
Sept. 11.	53	52	45	Sept. 30.	46	49.5					

## COPPER RIVER EXPERIMENT STATION.

May 10.	38.5	32		June 27.	59	48.5	38	Aug. 14.	49	46.5	7
May 11.	41	32	24	June 28.	57.5	48.5	30	Aug. 15.	53	46.5	26
May 12.	43	32	21	June 29.	55.5	48.5	38	Aug. 16.	52	46.5	32
May 13.	37.5	32	14	June 30.	53	48.5	35	Aug. 17.	53	46.5	31
May 14.	36	32	6	July 1.	55	48	33	Aug. 18.	52.5	46.5	19
May 15.	39	32	15	July 2.	56.5	48	38	Aug. 19.	51	47	17
May 16.	40.5	32	14	July 3.	57.5	48	37	Aug. 20.	54	47	24
May 17.	39	32	9	July 4.	56	48	36	Aug. 21.	49	47	9
May 18.	41	32	21	July 5.	51	48	33	Aug. 22.	50	46.5	8
May 19.	38	32	8	July 6.	52.5	47.5	39	Aug. 23.	49	46	3
May 20.	40	32.5	10	July 7.	52	47	32	Aug. 24.	49.5	46	5
May 21.	43.5	32.5	31	July 8.	50	47	30	Aug. 25.	49	46	30
May 22.	43	32.5	31	July 9.	51.5	46.5	22	Aug. 26.	44.5	45.5	10
May 23.	42	33	31	July 10.	55.5	46	23	Aug. 27.	43	45	8
May 24.	44	33	28	July 11.	56	46.5	37	Aug. 28.	41	43.5	0
May 25.	45	33.5	34	July 12.	54.5	47.5	33	Aug. 29.	47	43.5	24
May 26.	44.5	33.5	31	July 13.	52.5	47.5	35	Aug. 30.	43.5	43.5	29
May 27.	45.5	33.5	35	July 14.	54.5	47.5	21	Aug. 31.	47.5	43.5	24
May 28.	43.5	34	15	July 15.	56	47.5	37	Sept. 1.	44	43.5	6
May 29.	44.5	34	18	July 16.	53	47.5	30	Sept. 2.	43.5	43.5	5
May 30.	43.5	34.5	14	July 17.	54	47.5	50	Sept. 3.	47	43.5	20
May 31.	45.5	35	30	July 18.	52	47.5	17	Sept. 4.	44	43.5	10
June 1.	46	35.5	25	July 19.	55	47.5	18	Sept. 5.	43.5	43.5	22
June 2.	48	36	24	July 20.	58	48	21	Sept. 6.	43	45.5	4
June 3.	47.5	37	24	July 21.	58.5	48.5	40	Sept. 7.	43	43.5	9
June 4.	45	37	13	July 22.	55	48.5	21	Sept. 8.	44	43.5	16
June 5.	47.5	37	26	July 23.	58.5	49	22	Sept. 9.	44.5	45.5	20
June 6.	50	37.5	30	July 24.	60.5	49.5	37	Sept. 10.	43	43.5	9
June 7.	47.5	38	18	July 25.	60.5	50	26	Sept. 11.	43.5	44	23
June 8.	50	38.5	32	July 26.	61	50.5	24	Sept. 12.	43.5	42	14
June 9.	48	38.5	18	July 27.	62.5	51	34	Sept. 13.	43.5	43	16
June 10.	48.5	39	20	July 28.	62	51	27	Sept. 14.	43	43	20
June 11.	47	39.5	12	July 29.	56	51	25	Sept. 15.	44	43	17
June 12.	48	39.5	29	July 30.	57	51.5	21	Sept. 16.	43	43	18
June 13.	45.5	39.5	29	July 31.	59	51.5	24	Sept. 17.	44	43	14
June 14.	47	39.5	28	Aug. 1.	57	51	31	Sept. 18.	40.5	42.5	15
June 15.	48.5	40	26	Aug. 2.	56	51	32	Sept. 19.	39	42.5	6
June 16.	50	40.5	19	Aug. 3.	56	50	34	Sept. 20.	38	42	13
June 17.	48	41	32	Aug. 4.	55	49.5	27	Sept. 21.	38	41	14
June 18.	46.5	41	22	Aug. 5.	54	49	34	Sept. 22.	38	40.5	13
June 19.	50.5	41	35	Aug. 6.	53	48.5	30	Sept. 23.	38	40.5	5
June 20.	51	41.5	21	Aug. 7.	54	48.5	24	Sept. 24.	34.5	39.5	- 5
June 21.	51.5	42	18	Aug. 8.	55	48.5	33	Sept. 25.	33	39	- 5
June 22.	57	43	39	Aug. 9.	54	48.5	34	Sept. 26.	33.5	38	- 3
June 23.	58	44.5	38	Aug. 10.	53	48	36	Sept. 27.	33	37.5	- 2
June 24.	58.5	45.5	28	Aug. 11.	53	47.5	30	Sept. 28.	33	37	- 3
June 25.	60.5	47	31	Aug. 12.	50.5	47.5	23	Sept. 29.	33.5	37	- 1
June 26.	59	48	36	Aug. 13.	49.5	47	15	Sept. 30.	32.5	36.5	- 4

## Soil temperatures—Continued.

## KENAI EXPERIMENT STATION.

Temperature.			Temperature.			Temperature.		
Date.	At 7 a. m. 6-inch ther- mome- ter.	At 7 a. m. 24-inch ther- mome- ter.	Date.	At 7 a. m. 6-inch ther- mome- ter.	At 7 a. m. 24-inch ther- mome- ter.	Date.	At 7 a. m. 6-inch ther- mome- ter.	At 7 a. m. 24-inch ther- mome- ter.
1905.	° F.	° F.	1905.	° F.	° F.	1905.	° F.	° F.
May 4	35.5		June 13	46.5	38	Aug. 23	51.5	50
May 5	33.5		June 14	46.5	38.5	Aug. 24	52.5	50
May 6	33.5		June 15	48.5	38.5	Aug. 25	53	50
May 7	34		June 16	46.5	39	Aug. 26	50.5	50
May 8	34		June 17	46	39.5	Aug. 27	48.5	50
May 9	34		June 18	46	39.5	Aug. 28	49	49.5
May 10	35		June 19	47	39.5	Aug. 29	51	49.5
May 11	35.5		June 20	48.5	40	Aug. 30	51	49
May 12	35		June 21	48	40	Aug. 31	49.5	49
May 13	35		June 22	48.5	40.5	Sept. 1	51.5	49
May 14	36		June 23	47.5	40.5	Sept. 2	51	49
May 15	36		June 24	49.5	41	Sept. 3	47.5	49
May 16	37.5		June 25	52	41	Sept. 4	48	49
May 17	38.5		June 26	51.5	42	Sept. 5	47.5	48.5
May 18	37.5		June 27	52.5	42	Sept. 6	47.5	48.5
May 19	41.5		June 28	53	42.5	Sept. 7	48.5	48
May 20	39		June 29	52	43	Sept. 8	49	48
May 21	39.5		June 30	51.5	43	Sept. 9	49	48
May 22	39		Aug. 1	57	50	Sept. 10	50	48
May 23	40.5		Aug. 2	55.5	50	Sept. 11	48.5	47.5
May 24	40.5		Aug. 3	55	50.5	Sept. 12	45	47.5
May 25	40		Aug. 4	55	50.5	Sept. 13	46.5	47
May 26	42		Aug. 5	55	50.5	Sept. 14	48.5	46.5
May 27	42		Aug. 6	57	50.5	Sept. 15	48	46.5
May 28	40.5		Aug. 7	55.5	50.5	Sept. 16	48	43.5
May 29	42		Aug. 8	56	50.5	Sept. 17	45	46.5
May 30	42		Aug. 9	54.5	50.5	Sept. 18	45	46
May 31	43		Aug. 10	53	50.5	Sept. 19	43.5	45.5
June 1	44	35	Aug. 11	52.5	50.5	Sept. 20	43.5	45.5
June 2	44.5	35	Aug. 12	53	50	Sept. 21	42.5	45
June 3	44.5	35.5	Aug. 13	52.5	50	Sept. 22	42.5	44.5
June 4	44	35.5	Aug. 14	53	50	Sept. 23	40	44
June 5	46	36	Aug. 15	52.5	50	Sept. 24	39	43.5
June 6	45	36.5	Aug. 16	53	50	Sept. 25	37.5	43
June 7	45	37	Aug. 17	51.5	50	Sept. 26	37	42.5
June 8	44.5	37	Aug. 18	54	50	Sept. 27	36.5	42
June 9	47.5	37.5	Aug. 19	54	50	Sept. 28	36.5	41.5
June 10	43.5	37.5	Aug. 20	53	50	Sept. 29	35.5	41.5
June 11	43.5	37.5	Aug. 21	52.2	50	Sept. 30	35	41
June 12	44	38	Aug. 22	53	50			

## METEOROLOGICAL REPORTS.

As in former years, the special agent has had general supervision of the voluntary weather observers of the Weather Bureau of Alaska. In the following tables are given condensed reports taken from the daily records of the different observers:

*Meteorological observations.*

SITKA. C. C. Georgeson, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1904.								
October .....	° F. 59	° F. 33	° F. 46.39	Inches. 10.38	4	11	15	25
November .....	59	30	40.20	8.68	1	6	23	24
December .....	51	24	38.95	8.08	0	5	26	25
1905.								
January .....	55	22	36.40	3.12	7	8	16	9
February .....	53	20	37.12	4.78	5	6	17	13
March .....	65	31	43.63	4.21	7	7	17	22
April .....	57	25	42.80	7.52	10	4	16	20
May .....	65	32	47.11	2.44	11	12	8	16
June .....	84	40	52.80	2.25	8	7	15	13
July .....	73	44	56.38	2.83	15	5	11	14
August .....	69	45	56.12	7.38	8	5	18	16
September .....	64	35	50.70	8.80	6	17	7	7

KENAL. P. H. Ross, observer.

1904.								
October .....	56	9	35.92	1.71	10	2	19	24
November .....	39	-21	17.08	.26	10	7	13	9
December .....	39	-20	14.99	.63	13	5	13	11
1905.								
January .....	39	-14	16.07	.29	20	5	6	5
February .....	48	7	31.22	.92	1	4	23	8
March .....	59	10	34.17	.57	8	9	14	4
April .....	68	8	38.64	.46	5	16	9	5
May .....	63	22	44.22	.84	12	13	6	11
June .....	69	28	31.59	.84	16	7	7	10
July .....	81	36	55.75	1.06	13	6	12	10
August .....	78	27	54.94	6.25	12	7	12	19
September .....	72	13	43.64	.78	15	7	8	6

COPPER CENTER. J. W. Neal, observer.

1904.								
October .....	55	0	30.51	0.48	15	8	8	6
November .....	34	-29	-3.33	.36	14	6	10	9
December .....	32	-31	-4.69	.68	3	15	13	6
1905.								
January .....	39	-44	-7.93	.29	16	4	10	4
February .....	44	-32	9.81	1.01	14	10	4	2
March .....	47	1	21.82	2.00	22	2	7	1
April .....	56	6	31.46	.00	13	8	9	0
May .....	69	20	44.32	.48	3	16	12	7
June .....	88	27	55.95	.50	4	18	8	5
July .....	88	33	59.19	1.35	7	12	10	7
August .....	74	20	52.22	.72	6	10	15	8
September .....	67	12	38.86	1.94	9	4	16	10

RAMPART. Fred E. Rader, observer.

1905.								
June <sup>a</sup> .....	80	31	54.7	1.33	2	8		
July .....	86	32	55.7	1.99	8	8	15	13
August .....	96	26	54.5	2.19	9	10	12	13
September .....	60	13	35.10	1.70	3	5	22	11

<sup>a</sup>Ten days.

## Meteorological observations—Continued.

LORING (FORTMANN SALMON HATCHERY). Fred Patching, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1904.								
July	76	36	53.36	7.79	5	9	17	23
August	82	41	58.48	1.15	13	4	14	8
September	72	34	50.5	20.20	5	1	24	22
October	67	28	45.74	26.01	5	3	23	23
November	58	30	41	32.10	-----	6	24	30
December	54	15	38.36	20.01	-----	6	25	27
1905.								
January	41	7	25.5	5.18	5	9	17	13
February	48	9	32.1	13.27	-----	6	22	15
March	63	25	40	16.53	-----	4	27	23
April	66	21	42.4	11.65	7	16	7	21
May	93	29	50	9.46	15	4	12	15
June	91	41	58.6	.84	14	3	13	4
July	87	42	60.2	5.26	18	2	11	14
August	85	39	57.93	13.43	3	5	23	23
September	70	35	50.5	13.85	3	10	17	21
October	55	23	43.65	17.94	3	9	19	23

PETERSBURG. J. A. Goding, observer.

1904.								
October	69	31	45.15	13.89	6	-----	25	6
November	61	25	31.04	13.52	4	11	15	4
1905.								
April	62	21	42.36	7.17	14	4	12	16
May	72	28	49.91	3.03	15	8	8	12
June	80	39	55.73	1.95	11	3	16	9
July	76	39	56.67	4.46	14	3	14	10
August	80	35	26.7	10.76	6	5	20	4

JUNEAU. S. J. Sharick, observer.

1904.								
October	63	29	48.54	10.14	12	-----	19	22
November	53	22	38.93	8.79	12	-----	18	28
December	52	17	38.56	9.88	11	-----	20	23
1905.								
January	47	14	32.76	3.28	25	-----	6	7
February	51	14	34.14	2.85	23	-----	5	9
March	56	30	41.06	8.40	18	-----	12	18
April	66	30	40.93	6.76	14	-----	16	15
May	74	33	49.31	3.83	27	-----	4	12
June	84	41	57.06	3.68	21	-----	9	12
July	83	49	59.91	1.93	23	-----	8	11
August	73	38	27.39	8.83	14	-----	17	18
September	68	35	50.44	6.11	12	-----	18	25
October	56	27	43.66	12.74	11	-----	20	15

SKAGWAY. H. D. Clark, observer.

1904.								
October	61	24	43.3	5.35	6	15	10	16
November	44	20	32.5	3.73	1	16	13	13
1905.								
January	39	2	24.5	-----	15	7	9	-----
February	49	9	28.5	1.14	9	8	11	2
March	54	26	38	1.14	7	14	10	9
April	58	25	41.5	1.27	10	17	3	3
May	75	25	50	1.11	16	10	5	3
June	84	35	57.7	.10	10	11	9	1
July	83	43	59.3	.16	18	6	7	5
August	75	32	55.5	2.14	5	16	10	6
September	64	32	48.6	2.67	4	15	11	15
October	55	26	41.06	2.17	6	10	15	5

## Meteorological observations—Continued.

KILLISNOO. Joseph Zuboff, observer.

Month.	Temperature.			Total precipitation. <i>Inches.</i>	Weather conditions (number of days).			
	Maxi- mum.	Mini- mum.	Daily mean.		Clear.	Partly cloudy.	Cloudy	Rain or snow.
1904.	<i>° F.</i>	<i>° F.</i>	<i>° F.</i>					
October .....	51	29	41.8	0.20	7	21	4	20
November .....	52	28	37.6	9.20	2	26	2	24
December .....	53	16	36.2	8.55	2	23	6	23
1905.								
January .....	43	12	29.10	1.90	9	17	5	9
February .....	50	14	32.6	2.80	1	25	2	16
March .....	53	26	39.49	2.60	4	13	14	16
April .....	61	24	41.2	2.20	7	14	9	9
May .....	64	31	47.7	3	16	7	8	8
June .....	83	40	53.2	1.20	10	9	11	6
July .....	71	41	55	1.60	9	12	10	5
August .....	74	36	54.05	4.30	4	10	17	14
September .....	62	35	48.4	4.75	3	4	23	16
October .....	55	26	42.62	4.10	6	5	20	16

ORCA. W. J. Shephard, observer.

1904.								
October .....	53	30	40.38	27.57	6		25	25
November .....	46	15	32.51	9.66	6	11	13	14
December .....	47	21	32.53	19.05	5	11	15	17
1905.								
January .....	45	21	31.17	8.20	12	8	11	11
February .....	45	22	33.94	11.55	6	9	13	11
March .....	61	22	38.86	12.51	9	4	18	18
April .....	70	27	41.69	8.60	12	2	16	14
May .....	72	30	45.91	10.41	8	11	12	16
June .....	83	37	53.6	6.51	11	11	8	12
July .....	84	43	58.9	5.02	10	18	3	7
August .....	80	40	56.30	14.59	12	4	15	17
September .....	79	30	71.06	9.54	15	8	7	13
October .....	64	31	42.46	6.54	9	13	9	18

FORT LISCUM. C. J. Steadman, observer.

1904.								
October .....	53	13	35.5	9.35	10	2	19	21
November .....	40	11	18.3	2.21	9	5	16	13
December .....	42	9	19	8.31	5	5	21	22
1905.								
January .....	44	7	13.44	2.12	18	2	11	8
February .....	45	9	29.07	1.93	7	4	17	12
March .....	58	11	32.07	1.64	10	8	13	9
April .....	57	10	36.23	3.41	12	7	11	12
May .....	63	27	43.51	.84	9	8	14	15
June .....	76	31	51.7	.69	11	12	7	11
July .....	75	38	56.6	1.40	6	15	10	14
August .....	70	31	53.34	4.52	9	2	20	20
September .....	65	20	42.2	1.86	14	4	12	11

TYONEK. Durell Finch, observer.

1905.								
June .....	67	37	52.06	1.27	16		14	6
July .....	80	42	58.47	.92	16	3	12	5
August .....	75	40	57.27	4.75	15	2	14	9
September .....	79	22	47.63	.92	17	5	8	3

## Meteorological observations—Continued.

WOOD ISLAND. S. A. Coldwell, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
	° F.	° F.	° F.	Inches.				
1904.								
October .....	57	24	42.27	4.84	12	-----	19	11
November .....	52	12	34.7	5.20	7	-----	23	11
December .....	55	10	32.74	3.64	10	-----	21	11
1905.								
January .....	53	20	33.33	4.80	10	-----	21	7
February .....	50	28	38.8	3.90	4	-----	24	12
March .....	65	30	40.42	2.60	10	-----	21	7
June .....	74	42	54.29	3.10	8	-----	22	11
July .....	74	32	36.72	2.10	11	-----	20	3
August <sup>a</sup> .....	74	31	53.88	-----	7	-----	14	-----
September .....	55	32	43.95	1.80	5	4	21	2

SUNRISE. A. Lawson, observer.

1904.								
October .....	53	13	35.5	9.35	10	2	19	21
November .....	40	-11	18.3	2.21	9	5	16	13
December .....	42	-9	19	8.31	5	5	21	22
1905.								
January .....	44	-7	13.44	2.12	18	2	11	8
February .....	45	9	29.07	1.93	7	4	17	12
March .....	58	11	32.07	1.64	10	8	13	9
April .....	57	10	36.23	3.41	12	7	11	12
May .....	63	27	43.51	.84	9	8	14	15
June .....	76	31	51.7	.69	11	12	7	11
July .....	75	38	56.6	1.40	6	15	10	14
August .....	70	31	53.34	4.52	9	2	20	20
September .....	65	20	42.2	1.86	14	4	12	11

COAL HARBOR, UNGA ISLAND. Henry S. Tibbey, observer.

1904.								
September .....	64	33	48.33	3.73	10	8	12	9
October .....	57	23	39.61	3.08	7	10	14	18
November .....	43	17	31.91	2.51	11	7	12	6
December .....	39	4	25.4	2	10	13	8	14
1905.								
January .....	42	4	31.3	.17	8	14	9	5
February .....	42	11	33.11	9.03	6	9	13	19
March .....	49	11	32.7	1.20	10	16	5	6
April .....	56	19	38.7	18.92	5	14	11	27
May .....	56	29	42.7	6.76	1	18	12	23
June .....	69	37	48.8	4.44	4	8	18	20
July .....	74	40	55.1	1.75	10	8	13	6
August .....	70	40	55.6	2.20	13	11	7	9
September .....	66	35	48.8	2.95	12	9	9	11

DUTCH HARBOR. F. Schroder, observer.

1905.								
May <sup>b</sup> .....	55	30	42.8	3.66	4	6	10	10
June .....	62	37	47	4.69	3	12	15	14
July .....	69	49	52.26	1.73	2	15	14	8
August .....	68	42	52.78	3.39	3	5	23	12
September .....	61	33	46.1	3.46	5	8	17	14

<sup>a</sup> Twenty-one days.<sup>b</sup> Twenty days.

## Meteorological observations—Continued.

NUSHAGAK. J. Kahlen, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maxi-mum.	Mini-mum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1904.	° F.	° F.	° F.	Inches.				
August .....	67	37	51.39	4.52	5	2	24	18
September .....	73	24	46.84	4.16	14	1	15	9
October .....	54	3	33.22	1.66	13	6	12	11
November .....	37	-15	15.4	-----	15	4	11	-----
December .....	42	-54	10.5	.56	15	1	15	4
1905.								
January .....	38	-15	16.9	.20	18	3	10	2
February .....	44	-7	25	1.45	7	1	20	4
March .....	47	-18	23	.40	16	4	11	1
April .....	52	7	32.8	.40	12	3	15	1
May .....	61	-----	41	2.51	10	4	17	12
June .....	71	18	22.93	2.75	10	3	17	14
July .....	78	36	56.77	3.84	14	2	15	11

KOTZEBUE. Dana Thomas, observer.

1904.								
May .....	55	9	30.5	-----	-----	-----	-----	-----
June .....	-----	-----	-----	-----	-----	-----	-----	-----
July .....	70	40	55.8	-----	-----	-----	-----	-----
August .....	-----	-----	-----	-----	-----	-----	-----	-----
September .....	65	24	41.16	-----	-----	-----	-----	-----
October .....	57	5	27.70	-----	-----	-----	-----	-----
November .....	22	-25	8.16	-----	-----	-----	-----	-----

TEIKHELL. J. H. Embleton, observer.

1904.								
October .....	50	9	31	2.82	9	-----	22	14
November .....	40	-23	4.54	.90	14	-----	16	10
December .....	35	-22	2.34	2.94	20	-----	11	8
1905.								
January .....	34	-26	.27	.98	18	1	12	2
February .....	42	-21	.11	.49	15	-----	13	2
March .....	50	-5	23.46	1.31	15	4	12	2
April .....	51	1	30.59	-----	-----	-----	-----	-----
May .....	68	21	43.05	-----	20	3	8	-----
June .....	70	34	53	.80	18	6	6	1
July .....	80	32	57	1.05	21	3	7	4
August .....	75	24	51	.72	9	3	18	8
September .....	66	15	38.5	1.01	9	1	20	11

CHESTOCHENA. John A. Gustofson, observer.

1904.								
October .....	47	4	28.20	-----	9	10	12	-----
November .....	35	-26	7.53	-----	19	8	3	-----
December .....	32	-29	7.82	0.2	21	8	2	1
1905.								
January .....	45	-33	8.26	.5	23	2	5	1
February .....	38	-1	33.40	.25	15	5	7	2
March .....	50	-8	22.52	-----	15	11	5	-----
April .....	55	10	31.89	-----	20	6	4	-----
May .....	68	20	29.14	.48	3	17	11	3
June .....	87	31	35.74	.90	14	6	10	11
July .....	80	37	56.93	3.19	19	2	10	12
August .....	81	27	52.48	3.20	12	3	15	18
September .....	59	16	38.41	3.11	10	8	12	12



## Meteorological observations—Continued.

KETCHEMSTOCK. Daniel B. McCarthy, observer.

Month.	Temperature.			Total precipitation. <i>Inches.</i>	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1904.								
August	75	28	53	0.94	12	16	3	4
September	64	0	34.3	.59	7	28	2	2
October	51	10	22.5	.30	7	21	2	2
November	34	41	7.5	.03	4	26	-----	1
December	25	41	4.1	.18	3	22	5	3
1905.								
January	10	52	4.1	.9	12	13	6	1
February	34	44	14.6	.10	6	10	12	1
March	45	0	8.99	.5	11	12	8	1
April	35	0	9.9	4	23	3	4	3
May	67	27	21.01	.2	13	10	8	1
June	86	21	56.4	1.58	14	10	6	3
July	83	31	55.1	.4	12	13	6	3
August	78	17	49.4	1.48	-----	22	9	7
September	62	9	33	2.16	-----	21	9	9

## TANANA CROSSING.

1904.								
October	53	8	18.04	-----	16	10	5	-----
November	-----	37	-----	-----	20	-----	10	-----
December <sup>a</sup>	-----	20	-----	-----	13	1	17	-----
1905.								
January	-----	45	-----	0.24	21	3	7	3
February	-----	41	-----	1.5	8	4	16	1
March	-----	19	-----	.10	11	7	13	1
April <sup>a</sup>	-----	2	-----	-----	15	10	3	-----
May <sup>b</sup>	-----	21	-----	.14	14	8	5	-----
June <sup>c</sup>	83	30	-----	.43	15	12	3	4
July	85	30	57.17	.67	15	10	6	8
August	40	32	64.36	2.95	16	9	6	5
September	78	10	41.50	2.80	15	7	8	5

FORT EGBERT. Herman B. Olson, observer.

1905.								
May	75	25	47.3	0.33	9	11	11	6
June	88	33	53.98	1.95	1	9	20	12
July	91	40	64.16	1.52	1	10	20	13
August	82	29	50.56	2.68	-----	20	11	12
September	75	52	47.05	2.43	3	8	19	17

FAIRBANKS. Hudson Stuck, observer.

1904.								
September	62	17	39.4	-----	15	3	9	6
October	52	7	29.1	-----	19	2	10	-----
November	28	35	9.79	-----	21	3	6	-----
December	23	47	12.08	-----	-----	-----	-----	-----
1905.								
January	20	48	16.93	-----	25	-----	6	-----
February	32	30	5.23	-----	27	-----	1	-----
April	60	6	34.6	2	-----	-----	-----	-----
May	72	22	47.05	-----	13	1	10	-----
June <sup>d</sup>	80	34	28.78	-----	16	-----	7	-----
July	80	18	55.6	.30	13	8	10	3
August	82	30	54.8	2.73	16	4	11	13

<sup>a</sup> Twenty-eight days.  
<sup>b</sup> Twenty-three days.

<sup>c</sup> Twenty-five days.  
<sup>d</sup> Twenty-seven days.

## Meteorological observations—Continued.

FORT GIBBON (Signal Corps). L. M. Hathaway, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy	Cloudy.	Rain or snow.
1904.	° F.	° F.	° F.	Inches.				
September .....				0.35	20	5	5	2
October .....				.39	16	12	3	2
November .....				.07	22	5	3	1
December .....				.06	17	4	10	5
1905.								
January <sup>a</sup> .....				.04	23	2	6	4
February .....	35	-24	44.3	.55	13	6	9	4
May .....	81	12	48	.84	18	3	10	7
June .....	78	35	56.05	1.85	16	4	10	15
July .....	77	32	56.5	5.59	10	4	17	18
August .....	80	31	52.23	3.23	20	1	10	10

FORT GIBBON (hospital observations). Charles W. Heideman, observer.

1905								
January .....	32	-44	-2	0.37	16	2	13	2
February .....	38	-22	6	.47	10	5	13	3
March .....	53	-26	14	.....	26	4	1	.....
April .....	63	7	33	.32	22	.....	8	3
May .....	81	12	48	.34	15	2	14	7
June .....	90	32	57.23	1.50	15	3	12	14
July .....	83	34	56.2	4.90	8	.....	23	17
August .....	81	28	52.28	3.02	20	.....	11	10

HOLY CROSS MISSION. B. Constantine, observer.

1905.								
May .....	64	16	41.18	.....	8	4	19	.....
June .....	68	32	45.50	0.08	7	15	8	2
July .....	78	35	53.51	4.89	12	3	16	12
August .....	71	35	51.62	1.66	10	13	8	5
September .....	58	17	38.43	1.38	13	4	13	5

KENNICUT MINES, COPPER RIVER VALLEY. Stephen Birch, observer.

1903.								
September .....	60	18	40.08	.....	22	.....	3	5
October .....	48	-1	26.65	1.65	14	.....	10	7
November .....	44	-9	3.63	.9	17	.....	11	2
December .....	32	-10	10.14	2.6	14	.....	9	8
1904.								
January .....	37	-32	2.88	1.85	12	.....	15	5
February .....	26	-22	5.34	.65	20	.....	5	4
March .....	44	-20	12.46	.7	22	.....	5	4

<sup>a</sup> Fourteen days.







