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Canada

DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

EXPERIMENTAL STATION

SUMMERLAND, B.C.

INTERIM REPORT OF THE SUPERINTENDENT

R. H. HELMER

FOR THE YEAR ENDING MARCH 31, 1921

Printed by authority of the Hon. S. F. TOLMIE, Minister of Agriculture, Ottawa, 1921

29563—1

EXPERIMENTAL STATION, SUMMERLAND, B.C.

REPORT OF THE SUPERINTENDENT, R. H. HELMER

THE SEASON

The spring of 1920 opened very cold, and remained cold well into June; and there was a further cold spell in July, from the 19th to the 25th. During the year there was a precipitation of 1·41 inches more than during the previous year, but the greater percentage of this came in the fall, September showing 1·51 inches and October 1·66, as compared with a total of 1·51 inches for these two months in 1919. During the four growing months, May to August, the total rainfall was 2·16 inches only.

During the whole of the irrigation season there was a shortage of irrigation water, and it became necessary to divide this water as economically as possible. In consequence of the water shortage and the coolness of the season, the crops of cereals and beans were generally small, and the yields of the different varieties cannot be accepted as a trustworthy indication of their relative productiveness.

METEOROLOGICAL RECORDS

Month	Temperatures			Rain	Snow	Sunshine
	Max.	Min.	Mean			
				Inches	Inches	Hours
1920						
April	72	19	43·7	1·58	0·5	142·8
May	77	33	53·51	0·06	.....	239·3
June	90	40	59·7	0·98	.....	239·5
July	96	52	72·14	0·84	.....	343·6
August	98	44	71·03	0·18	.....	294·0
September	82	40	57·6	1·51	.....	186·3
October	61	25	44·9	1·66	.....	125·5
November	52	19	38·3	0·70	.....	86·5
December	45	20	33·6	0·2	3·4	31·1
1921						
January	54	12	29·05	0·05	9·6	68·2
February	50	10	21·14	0·03	0·8	79·6
March	62	19	38·97	0·21	5·4	157·4
				8·00	19·7	1,993·8

ANIMAL HUSBANDRY

HORSES

This Station at present has a total of eight horses, comprising three teams of work-horses and two drivers, all of which are in good condition.

SHEEP

The Cheviot flock has increased in numbers, but difficulty has been experienced in keeping up the quality of this breed, as there is no range land available. Very good results have been obtained, however, from crossing Cheviot rams on grade

Oxford ewes, in a considerable increase in size and also in the weight of fleece. The average weight of fleece from the pure-bred Cheviots was 5·97 pounds, while that of the grades from the crossing averaged 8·7 pounds, an increase of 2·73 pounds of wool per animal. Because of the fact that this flock is kept under conditions which are more or less artificial, a report of the cost of upkeep would be of no value.

SWINE

The Berkshire swine kept at this Station include six sows and two boars, one of which latter, being too old for further service, will have to be disposed of. No pasture was available for the young pigs last year, and, as a consequence, the feeders did not make the growth that they should have made.

A feeding experiment covering a period of thirty-six days was conducted with four pens of seven pigs each. The experiment was as follows:—

Hog Feeding Experiment

Object of Experiment.—To determine the meal ration that is conducive to the most economical gains.

Value of Feeds per ton.—Recleaned screenings, $37; shorts, $60; feed flour, $73; oil cake, $90; standard meal mixture, $54.50*; barley meal, $44; ground oats, $39; silage, $10; roots, $4.

		Lot 1	Lot 2	Lot 3	Lot 4
Number of pigs in test		7	7	7	7
Number of days in test		36	36	36	36
Total gain per lot for period	lbs.	390	358	390	302
Average gain per lot per day	"	10·83	9·94	10·83	8·39
Average gain per hog per day	"	1·55	1·42	1·55	1·19
Total screenings fed for period	"	482	687·5	.....	.....
Average screenings fed per hog per day	"	1·91	2·73	.....	.....
Total shorts fed for period	"	24	24	.....	.....
Average shorts fed per hog per day	"	·09	·09	.....	.....
Total feed flour fed for period	"	24	24	.....	.....
Average feed flour fed per hog per day	"	0·09	0·09	.....	.....
Total oilcake fed for period	"	85	.....	.....	.....
Average oilcake per hog per day	"	0·33	.....	.....	.....
Total barley meal fed for period	"	.....	.....	825·5	.....
Average barley meal per hog per day	"	.....	.....	3·27	.....
Total ground oats fed for period	"	.....	.....	.....	674
Average ground oats per hog per day	"	.....	.....	.....	2·67
Total standard meal mixture for period	"	735	735	735	735
Average standard meal mixture per hog per day	"	3	3	3	3
Total silage for period	"	156	156	156	156
Average silage per hog per day	"	0·619	0·619	0·619	0·619
Total cost of feed for period	$	35·41	35·38	39·23	34·22
Average cost of feed per lot per day	$	0·983	0·982	1·09	0·95
Average cost of feed per head per day	$	0·14	0·14	0·156	0·136
Cost to produce 1 lb. gain	$	0·0908	0·098	0·1006	0·113

These results show that ground oats, as compared with the other rations in this experiment, do not make as efficient and profitable gains when fed alone. Barley meal, on the other hand, when fed alone, produced the maximum gains at a lower cost per pound gain than ground oats, but at greater cost than the mixed meals. The mixed meal ration gave the maximum gains, and did so with the least cost. The removal of oil-cake meal resulted in lower gains even when a substantial increase of the other meals was made.

While it is unsatisfactory to draw deductions from such limited data, some information may nevertheless, be obtained. It can be assumed that a well-balanced meal ration for hog feeding is conducive to the most rapid and most economical gains, and that this is best obtained by utilizing a number of meals.

* Standard meal mixture: Feed flour, 1 part; bran, 2 parts; shorts, 3 parts.

Cost of Keeping Boar For One Year

Meal Ration.—Equal parts oat chop, barley and bran.

Value of Feeds.—Oat chop, $37.50; barley, $41.50; bran, $36.

	Per day	Per week	Per year	Value of Labour per hour	Cost per ton	Total Cost
Meal	7 lb.	.....	2,555 lb.	.....	$ 38·33	$ 48 97
Straw (bedding)	.....	25 lb.	1,300 lb.	.....	5 00	3 25
Time, feeding	8 min.	.....	48¾ hours	33 c.	.....	16 06
Time, cleaning out, etc.	.....	15 min.	13 hours	33 c.	.....	4 29
Total	.....	.....	.....	.....	.....	$ 72 57

BEEF CATTLE

During the winter a number of experiments were conducted in feeding beef cattle. The steers were a uniform lot and the gains made demonstrated that it pays to buy good feeding stock. Forty-four cattle in all were fed, these being divided into four lots of ten each and one lot of four, respectively. The details of the experiment were as follows:—

Value of Feeds per Ton.—Chopped oats, $39; chopped alfalfa, two-thirds, and straw, one-third, $10; corn or sunflower silage, $10; roots, $4; oil-cake meal, $90.

Rations Fed to Five Lots.—Alfalfa silage to start period; later, pen 1, corn silage; pen 1A, corn and sunflower silage; pen 2, sunflower silage; pen 3, roots; pen 4, corn silage. Chopped alfalfa and straw; grain 2 to 12 pounds per head per day; oil-cake meal, January 4 to March 7, ½ to 1½ pounds per head per day.

BEEF CATTLE.—FEEDING EXPERIMENT

Experiment started November 19, 1920, and concluded March 7, 1921

		Pen No. 1 No shelter	Pen No. 1A Tied in barn	Pen No. 2 Sheltered	Pen No. 3 Sheltered	Pen No. 4 Sheltered
Number of steers in pen		10	4	10	10	10
Weight when experiment was begun—						
Gross	lb.	10,285	3,928	10,430	10,386	10,338
Average	"	1,028·5	982	1,043	1,038·6	1,033·8
Finished weight, gross	"	13,096	4,760	12,848	13,065	12,910
" " average	"	1,309·6	1,190	1,284·8	1,306·5	1,291
Total gain for period of 108 days	"	2,811	832	2,418	2,679	2,572
Average gain per head	"	281·1	208	241·8	267·9	257·2
Average daily gain per head	"	2·6	1·9	2·2	2·5	2·4
Amount of grain eaten by group	"	6,970	2,788	6,970	6,970	6,970
" chopped alfalfa and straw	"	16,582	6,633	16,918	16,906	17,035
" silage	"	38,878	15,551	40,069	33,269	39,797
" oil cake	"	447	205	447	447	447
" roots	"	.....	.....	.....	8,215	.....
Total cost of feed	$	432·32	174·50	440·95	423·32	440·17
Cost of feed per head	$	43·33	43·62	44·09	42·33	44·02
Cost of feed per head per day	$	0·4012	0·4039	0·4082	0·3925	0·4075
Cost to produce 1lb. gain	$	0·154	0·209	0·182	0·158	0·171
Original cost of group, 8·5 c. per lb.	$	827·94	316·20	839·61	836·07	832·20
Original cost of group plus feed	$	1,261·26	490,70	1,280·56	1,259·39	1,272·37
Selling price at 8c. (less 3% shrinkage)	$	1,016·24	369·36	997·04	1,013·84	1,001·84
Net loss per group	$	245·02	121·34	283·52	245·55	270·53
Net loss per head	$	24·50	30·33	28·35	24·55	27·05

Note.—386 tons manure taken from pens at $3.00 per ton, value $1,158.

This experiment shows that steers may be fed in the open during the winter to better advantage than when confined to pens, and also that tied steers make poorer gains than those fed loose. Averaging the two lots, corn silage fed steers show slightly larger gains than the root fed lot, and these in turn made better gains than the sunflower silage steers, the cost to produce one pound gain increasing with the correspondingly lower increase in weight with the different lots.

These data are not sufficiently conclusive to base any definite conclusions on, in so far as the respective feeding value of the different roughages employed in this experiment are concerned; nevertheless they may indicate that corn silage is a superior roughage to sunflower silage for fattening steers. Sunflower silage was relished by the steers, but, when given the option, the corn silage was invariably chosen. This may have been because of the fact that the sunflower silage was less palatable, or else that the steers had not acquired a taste for this silage. These facts in themselves would be sufficient to account for the lower gains as compared with corn silage, supposing that these were of equal feeding value.

Prices generally were very disappointing this year, and the price obtained for these steers was no exception. Fairly heavy losses would have been sustained but for the fact that the manure was preserved. The 386 tons of manure, on a basis of $3 per ton, much more than paid wages for feeding.

FIELD HUSBANDRY

A seven-year rotation was commenced this year which is believed to be very useful to irrigation farmers in the Okanagan Valley. There are 35 acres of land devoted to this rotation, which will enable quite reliable records to be kept, both of the yields and of the cost of producing the crops. Five years of the rotation are devoted to alfalfa, while the remaining two years are devoted to grain and silage corn, respectively. The rotation may be illustrated as follows:

First year: Corn for silage.
Second year: Wheat and oats.
Third year: Alfalfa.
Fourth year: Alfalfa.
Fifth year: Alfalfa.
Sixth year: Alfalfa.
Seventh year: Alfalfa.

To prepare the land for corn, the alfalfa sod is ploughed in the summer just before the second cutting is ready, topworked in the fall, and prepared in the spring as required. Northwestern Dent is the variety of corn used for silage. The alfalfa is seeded without a nurse crop.

YIELDS OF CROPS IN 1920

Wheat yielded 17 bushels 52 pounds per acre. Oats yielded 54 bushels 32 pounds per acre. Corn for silage yielded 10 tons per acre. The alfalfa was cut for hay three times, yielding per acre for the first cut 2,968 pounds, for the second cut 1,699 pounds, and for the third cut 949 pounds—a total of 2 tons 1,616 pounds per acre.

The wheat and oats were seeded on April 27 and cut on August 4. The corn for silage was seeded on May 25 and cut in the period between September 1 and 3.

IRRIGATION WATER

The approximate amount of water given to the wheat, oats and corn amounted to 12 acre inches for the season. To the alfalfa 21·49 acre inches were applied in three applications of 5·8 acre inches, 15·2 acre inches and ·49 acre inches. All the water was put on the land by the furrow system of irrigation.

EXPERIMENTAL WORK WITH FERTILIZERS

TO ASCERTAIN THE RELATIVE VALUE, UNDER IRRIGATION, OF VARIOUS SOURCES OF NITROGEN

This experiment was planned in 1919.

The area, which is one of sandy loam, consisted of eight plots of one-fifth acre each; two of these were checks, the other six received a complete fertilizer in which varying forms of nitrogen were used. The crop was corn for silage.

PLAN AND RECORD OF RETURNS

Plot	Fertilizers (in lbs. per acre)					Yields per acre	
	Sulphate of Ammonia (20 N)	Nitrate of Soda (15·35 N)	Dried Blood (11·5 N)	Acid Phosphate (16 P_2O_5)	Muriate of Potash (50 K_2O)	tons	lbs.
1	C H	E	C	K	.....	3	1,950
2	.....	.....	.....	500	160	5	700
3	160	.....	.....	.....	160	7	100
4	160	.....	.....	500	.....	6	250
5	160	.....	.....	500	160	5	830
6	.....	210	.....	500	160	6	750
7	.....	.....	280	500	160	6	750
8	C H	E	C	K	.....	7	400
Average of two check plots						5	1,175

As will be observed, the results are inconclusive. On one of the checks the harvested crop was very much lower than on any of the other plots, while on the other the yield was the highest in the series. Compared with the average of the two check plots, four of the series show decided increases, and two slight decreases. There is no well marked evidence in favour of any one of the three sources of nitrogen—sulphate of ammonia, nitrate of soda and dried blood—used in this experiment.

In the following season these plots, without further addition of fertilizer, were sown with potatoes, the object being to ascertain the value, if any, of the residues from the treatment of the previous year. Unfortunately, again, the results were extremely erratic and unsatisfactory, and it is felt that it would be unwise to use them as indicating relative fertilizing values of the materials employed.

BEES

Five colonies were prepared for the winter of 1919-20. Four of these were placed in a four-colony wintering case during the latter part of October, and packed with chaff. The fifth colony was packed in a single colony Kootenay case which allowed three inches of chaff packing on the bottom and four sides, and about four inches on top. All the colonies were fed sugar syrup to provide sufficient stores for the winter. Feeding was commenced on October 24 and finished by November 1, when the top packing was placed over the hives for the winter.

The colonies were examined on April 8, when it was found that two colonies in the quadruple case were dead, while the third was very weak and had lost its queen. The fourth colony, however, was in good condition and covering about six combs. The colony in the Kootenay case was also covering six combs, but the queen was unfertilized and produced only drones, so had to be destroyed. Two fertile queens were sent for to requeen this and the weak, queenless colony.

The summer of 1920 was very unfavourable for honey production. The colonies were not strong enough to take advantage of the first flow from dandelion and fruit bloom, and the main flow from clover was extremely light; consequently, very little surplus honey was stored. The highest yield from one colony was thirty pounds, but the average crop was only sixteen pounds. No increase in bees was made.

Only two colonies were prepared for the winter of 1920-21, as the third was found to be too weak, and had to be united to the others. The bees were placed in two single Kootenay cases, enough honey being left to supply them with stores until the following spring. The colonies were examined on April 8, by the Dominion Apiarist, and were found to be in good condition and strong in bees.

CEREALS

CEREAL PLOTS

The cereal plots were one-sixtieth of an acre each. Two plots of each variety were sown, the results mentioned being the average of the two.

Seven varieties of spring wheat were tested, six of oats, and five of barley.

SPRING WHEAT—TEST OF VARIETIES

Name of variety	Date of Sowing	Date of Ripening	Number of days maturing	Average length of Straw, including head	Strength of Straw on a scale of 10 points	Average length of of head	Actual yield of Grain per acre
				Inches		Inches	Pounds
Huron, Ottawa 3	May 31	Aug. 18	79	28	9	3	2,025
Marquis, Ottawa 15	" 31	" 12	73	26	9	3	970
Pioneer, Ottawa 195	" 31	" 12	73	28	9	3	1,320
Prelude, Ottawa 135	" 31	" 12	73	29	8	3	955
Red Fife, Ottawa 17	" 31	" 15	76	27	8	3	960
Ruby, Ottawa 623	" 31	" 12	73	19	8	3	510
White Russian	" 31	" 12	73	22	8	4	420

OATS: TEST OF VARIETIES

Banner, Ottawa 49	May 31	Aug. 12	73	27	9	6	850
Banner (commerical)	" 31	" 12	73	16	7	4	390
Daubeney, Ottawa 47	" 31	" 12	73	27	8	7	970
Liberty, Ottawa 480 (hull-less)	" 31	" 12	73	23	8	6	369
Ligowo	" 31	" 18	79	28	8	6	2,100
Victory	" 31	" 15	76	28	8	5	1,200

BARLEY: TEST OF VARIETIES

Charlottetown No. 80	May 31	Aug. 12	73	9	3	1	225
Early Chevalier, Ottawa 51	" 31	" 12	73	26	6	3	1,950
Hulless White	" 31	" 12	73	18	7	2	495
Manchurian, Ottawa 50	" 31	" 12	73	25	7	3	1,035
O.A.C. No. 21	" 31	" 12	73	10	4	1	435

BEST VARIETIES OF GRAIN

Taking into consideration the results obtained through a series of years (rather than the results of the past season alone) the following varieties appear to be the most productive for conditions here:

Spring wheat—Huron, Marquis.

Oats—Daubeney, Victory.

Barley—Early Chevalier, O.A.C. No. 21.

FIELDS OF GRAIN

Under field conditions may be noted the following yields in 1920:

Red Fife wheat,	2½	acres	gave	2,680	lb.=1,072	lb.	per	acre
Banner oats,	2½	"	"	4,670	" =1,868	"	"	"
Hulless barley,	2½	"	"	4,250	" =1,700	"	"	"

BEANS

Special attention is being given to beans. The following varieties were grown, in the hoed crop year of this rotation, for seed purposes. Owing chiefly to lack of water, the results are very irregular, and no trustworthy conclusions can be drawn from them.

BEANS—TEST OF VARIETIES

Name of Variety	Length of row	Width of land occupied	Actual yield of seed per acre
	feet	feet	lbs.
Beauty, Ottawa 712	300	3	290
Bountiful Green Bunt	300	3	605
Burpee's Pole	300	3	532
Burpee's Pole (second plot)	370	3	424
Canadian Wonder	300	3	484
Golden Wax	300	3	774
Grennell's Rustless	300	3	411
Grennell's Wax	300	3	629
Hodgson's Long Pod	300	3	629
Large White, Ottawa 713	370	3	334
Monster Wax (New)	300	3	557
Navy	300	3	726
Navy, Ottawa 711	370	3	353
Navy, Summerland	300	3	629
Norwegian, Ottawa 710	300	3	750
Pearce's Improved Tree	300	3	629
Prize Winner (New)	300	3	629
Refugee	300	3	436
Refugee, Extra Early	300	3	653
Robust Navy Pea	370	3	491
Round Pod Kidney Wax	300	3	702
Round Pod Kidney Wax (Anson)	300	3	653
Stringless Green Pod	300	3	774
Stringless Green Pod (New)	300	3	557
Sutton's Scarlet Runner	370	3	18
Sutton's Wax Pod	300	3	629
Valentine, Extra Early	300	3	290
Valentine Wax	300	3	484
Vancouver Island Station No. 3	300	3	145
Vancouver Island Station No. 5	300	3	145
Vancouver Island Station No. 7	300	3	968
White Creasback	300	3	73
White Kidney	300	3	73
White Kidney (Summerland)	370	3	144
White Marrowfat	300	3	629
White Pea	300	3	581
White Wonder	300	3	1,452
Yellow Eye	300	3	532
Yellow Eye (second plot)	370	3	523

FORAGE PLANTS

ENSILAGE CROPS

Indian corn made, on the whole, good growth, and developed cobs very satisfactorily. Of the varieties tested, North Western Dent gave the highest yield, with 10 tons per acre. Longfellow followed with 19 tons per acre.

Sunflowers were tested for ensilage for the first time in comparison with Indian corn, the yield being 12½ tons per acre. It should be mentioned, though, that the yield was greatly reduced on account of a severe attack of wireworm. Many of the young plants were cut off, and efforts to fill in the vacant spaces by re-seeding were not entirely successful. The later-sown plants made rather unsatisfactory headway on account of being overshadowed by the earlier sown, and consequently larger, plants. As a result the stand was very uneven, which in turn materially contributed to a substantial reduction of the yield.

MANGELS

Twenty-eight varieties were grown for comparative tests. They were planted in rows 60 feet long with 3 feet between the rows.

Great differences in yield were obtained, as may be seen from the following table. While these differences in many instances, no doubt, were due to varietal characteristics, they may, to quite an extent, have been caused by inadequate and irregular water supply.

MANGELS—TEST OF VARIETIES

Variety	Yield per acre	
	tons	lb.
1. Sugar Mangel	71	800
2. Red Intermediate	67	1,500
3. Devon Yellow Globe	67	1,500
4. Giant White Sugar	66	1,100
5. Mammoth Long Red	65	700
6. Eckendorffer	62	1,850
7. Sutton's Prizewinner	57	1,200
8. Yellow Globe	57	1,200
9. Yellow Intermediate	57	950
10. Giant Red Eckendorffer	55	1,300
11. Golden Globe	52	50
12. Red Half Sugar	52	50
13. Giant Oval	47	400
14. Golden Tankard	47	400
15. Alfa Half Long	42	700
16. Golden Fleshed Tankard	42	700
17. Giant White Globe	38	1,450
18. Devon Yellow Intermediate	38	450
19. Rennie's Yellow Leviathan	36	600
20. Weibull's Cylinder Barres	32	1,800
21. Leviathan	31	1,900
22. Rennie's White Gumbo	31	900
23. Weibull's Rose Feeding	30	500
24. Weibull's Eckendorffer Red	30	500
25. Tankard Cream	28	150
26. Giant Half Long	26	1,700
27. Weibull's Rose Feeding	24	400
28. Giant White Feeding	22	1,000
29. Danish Sludstrup (Summerland)	18	1,050
30. Danish Sludstrup (Summerland)	15	1,000
31. Danish Sludstrup (Kentville)	13	1,600
Average	42	1,981

ALFALFA

Herewith are given the yields of an eight-acre field of alfalfa during the last four years, as follows:—

ALFALFA—YIELDS, 1917-1920

Yield	1st cutting	2nd cutting	3rd cutting	Total.
	lb.	lb.	lb.	lb.
1917	23,275	20,650	13,000	56,925
1918	26,370	26,325	25,950	78,645
1919	13,875	23,185	7,000	44,060
1920	23,740	13,598	7,590	44,928

These figures represent the following total yields per acre:—

1917	3 tons	1,115	lb.
1918	4 "	1,830	"
1919	2 "	1,507	"
1920	2 "	1,616	"

The variation in yields from year to year may be largely explained by the following table, which gives the amounts of water applied to the various cuttings during the 4-year period in question, viz:—

ALFALFA—IRRIGATION WATER SUPPLIED

Yield	1st cutting	2nd cutting	3rd cutting	Total
	acres in	acres in	acres in	acres in
1917	10·67	15·81	9·88	36·36
1918	15·80	12·27	13·73	41·80
1919	3·1	16·45	2·1	21·65
1920	5·8	15·2	0·49	21·49

Comparing the amounts of water applied with the yields, as set down in the preceding table, it is obvious that there exists an intimate relationship between yield and water supply. In other words, maximum yields cannot be expected unless the water supply is ample.

SOY BEANS

Judging from experience, so far, Soy beans can by no means compete with alfalfa as a forage producing crop. This year the yield of hay was only 2,300 pounds per acre.

Fairly good crops of beans, however, have been secured. Thus, one acre sown to Summerland Soy beans yielded 620 pounds of beans. In the variety tests the yields were as follow:—

SOY BEANS—TEST OF VARIETIES

Summerland Soy bean	519·6	lb.	per	acre
Hollybrook	303·1	"	"	"
Quebec No. 92	285·28	"	"	"

In addition, Commercial Soy beans and Black Soy beans were tested. The former germinated only 10 per cent, and the latter at a still smaller percentage. Neither of them produced any bean crop.

Concerning Soy beans, it may be recorded that it was again found that no nodules were produced when the crop was grown on new, non-inoculated land. When grown, however, on land that had previously produced a Soy bean crop that subsequently had been ploughed under, nodules were formed in abundance.

Similar observations have also repeatedly been made with Cow peas.

FIELD ROOT SEED GROWING

Only a very small quantity of seed was produced, the reason being that most of the stecklings saved for seed production were destroyed by dry rot, when stored in the cellar as well as when stored in pits outside.

HORTICULTURE

The fall of 1919, being extremely dry, irrigation water having been very scarce and the following winter long and steady, much winter injury was apparent in the orchards in the spring of 1920. The water was turned on very late in the spring, and in consequence the trees started into growth late in the season, failing to make such good growth as in previous years.

In testing varieties in the variety apple orchard the hardiest, such as Yellow Transparent, Duchess, Crabs, etc., were put in the drier part of the orchard, and, where moisture conditions were good, the tenderer varieties, such as Gravenstein, Spitzenburg, and Jonathan, were planted. In this section there was no winter injury to the tender varieties, but there was killing in the hardier varieties. This checks up very well with the Station's experience of moisture controlling winter injury. With regard to the variety tests of pears, plums, apricots, cherries, and peaches, it is yet too early to make a definite report. These trees have made good growth during the season. Some winter injury was present, and on some of the high, sandy, gravelly knolls trees died out. It is too early to obtain any definite information on the thinning and pruning tests which have been carried out, the trees being five years old only. Winesap, being a very desirable variety and, in the Okanagan, very difficult to maintain at a good marketable size, tests with manure alone and with manure in combination with fertilizers are being carried out; but at present the trees are too young to warrant the publication of definite information. Beyond aphis, there were practically no diseases in the orchards.

CULTURAL WORK IN THE ORCHARDS

There are six orchards under cultural experiments on what is known as Bench No. 2B, and the following information in regard to them should prove of interest as well as, it is hoped, of value to fruit growers:—

ORCHARD NO. 1—CLEAN CULTIVATION

This orchard suffered some winter injury, especially on one gravelly side-hill piece where water conditions are bad. During the season, however, this injury was overcome. The amount of water applied was 5·7 acre inches, and the average in this orchard over a period of five years is 4·18 acre inches. The trees this year, considering the season, made very fair growth.

ORCHARD NO. 2—ALFALFA SOD MULCH

There was less winter injury in this orchard than in No. 1, the trees are showing distinct signs of improvement, and have made satisfactory growth. The amount of water applied this year was 25·5 acre inches with an average of 18·72 acre inches over a period of five years. To date this orchard has had two furrows of alfalfa ploughed under next to the tree-rows, to keep the trees clean cultivated. Although this has been done every year, no gain has been made on the alfalfa strip. This year the tree-rows have all been seeded to alfalfa, and the sod mulch will be maintained. This orchard has taken fourth place in the standard of growth and appearance.

ORCHARD NO. 3—SOILING CROPS

This orchard has been the best grower and cropper from the outset, and has maintained its lead again this year. It is called the "nitrogen and humus orchard." In the fall it was seeded to fall vetch, and this will be allowed to grow and go to seed, when it will be disced in and the land reseeded. This orchard suffered less from winter injury than any other. Water applied during the year was 16·2 acre inches. The average over a period of five years was 14·4 acre inches.

For the best and cheapest method of bringing up a young orchard, crop, growth and appearance being the points kept in view, this is the best of all our orchards. It gives a good supply of hay of satisfactory quality, and it can be used as summer green feed. It could be recommended as a part or entire orchard practice for small or large orchard tracts.

ORCHARD NO. 4—CLOVER TURNED UNDER EVERY OTHER YEAR

This orchard is the most disappointing of all the orchards, but nevertheless serves to demonstrate that red clover in many places has rather increased winter injury than helped to prevent it. Winter injury was worse in this orchard than in any, and the trees recovered least. The clover was ploughed under and the land manured, to help growth. With red clover it is possible to establish a short-lived crop every two years, whereas in alfalfa it is being established for a much longer period, and the establishing of these small seeds under irrigation is hard on the trees and soil.

This is the last year that clover will be sown in this orchard. From now on it will be under alfalfa sod mulch system under two definite amounts of water. Water applied during the year was 13·5 inches, and the average for five years was 12·48 acre inches.

ORCHARD NO. 5—TRUCK GARDEN AND SEED WORK, MANURED EACH YEAR

Winter injury was apparent in this orchard, but it was not serious. The orchard has made very fair growth. Water applied this year was 9·3 acre inches, and the average for five years was 8·56.

This is probably the best method of bringing up a small orchard to produce cash crops every year whilst not bearing. A combination of No. 3 and No. 5 would give some feed to help supply manure. This orchard has been most economical in water, crops considered.

ORCHARD NO. 6—FARM ROTATION

This orchard is under a farm rotation—grain, mangels, and clover. There has been difficulty in maintaining and establishing clover on the land. The hoed crop year has been taken advantage of to select stock roots for mangels.

The orchard has done well, and has given feed for cows or horses, which is a consideration in orchard work when one is being established. Winter injury was not so bad as in either No. 4 and No. 5. Water applied during 1920 was 14 acre inches, and the average over five years was 12·68 acre inches.

COMPARISON OF YIELDS IN ORCHARDS UNDER SIX SYSTEMS OF CULTIVATION

As a comparison of the cropping of the orchards under the various cultural tests already described, the ten best trees of Yellow Transparent and Duchess have been taken in each orchard, with the following results:—

Yellow Transparent—	
Orchard No. 1—Clean cultivation	162
Orchard No. 2—Alfalfa	163
Orchard No. 3—Soiling crops	255
Orchard No. 4—Clover	177
Orchard No. 5—Truck crops	40
Orchard No. 6—Farm rotation	97
Duchess—	
Orchard No. 1—Clean cultivation	183
Orchard No. 2—Alfalfa	134
Orchard No. 3—Soiling crops	181
Orchard No. 4—Clover	93
Orchard No. 5—Truck crops	70
Orchard No. 6—Farm rotation	60

EXPERIMENT IN STORING APPLES

Numerous tests were made in the storing of apples—Wagener, McIntosh Red, Jonathan, Cox Orange, Grimes Golden and Rome Beauty—picked at different dates and examined on January 26 and March 16. The following statement gives the results:—

WINTER APPLE STORAGE RECORDS 1920-1921.

Variety	Plot	Picking date	Condition								Remarks	
			Jan. 26, 1921				Mar. 16, 1921				Jan. 26, 1921	Mar. 16, 1921
			B.	M.	F.	G.	B.	M.	F.	G.		
Wagener	1	Sept. 27			x				x		Tendency to shrivel	Large spots inclined to cork.
	2	Oct. 1				x			x		Excellent colour	Scalding.
	6	Oct. 5			x				x		Few browning centre	Flavour better.
	5	Oct. 8				x			x		Few tendency to scald	Scalding, best yet, shrivelled.
	4	Oct. 12				x			x			Slight shrivelling.
	3	Oct. 19				x			x+		Bright and clear	Two bad.
	1	Oct. 22				x			x+			
	5	Oct. 26				x				x		
	4	Oct. 29				x			x+		Firm but more shrivelled	
	2	Nov. 1			x				x		Water cored when picked	
	4	Nov. 3				x		x				Water cored.
	2	Nov. 3				x		x				Overmatured.
Cox Orange	6	Nov. 1			x		x				Three bad	
	6	Nov. 3	x				x				Seven bad	
	4	Nov. 3			x		x				Seven bad	
Grimes Golden	1	Sept. 27			x				x		Spotting outside	Increased spotting and shrivelled.
	2	Oct. 1				x		x			Slightly spotted	Shrivelled.
	6	Oct. 5				x		x				Badly shrivelled.
	5	Oct. 8				x		x			Much shrivelled	Badly shrivelled and pitted.
	4	Oct. 12				x			x		1 badly spotted	Badly coloured and spotted.
	3	Oct. 19				x			x+			
	1	Oct. 22				x			x		Below previous date	
	1	Oct. 26				x			x		Below colour previous date	Colouring not very good.
	3	Oct. 29				x			x		Colour excellent	More uniform colour.
	2	Nov. 1			x				x+		Water cored when picking	Good colour, crisp, flavour fair.
	1	Nov. 3			x				x		1 water cored	Water core.
	3	Nov. 3				x			x		Colour excellent	Good colour, heart poor.
Rome Beauty	1	Sept. 27			x			x			Tendency to shrivel	Immature and shrivelled.
	2	Oct. 1			x					x	More matured	
	6	Oct. 5				x			x		Matured	1 shrivelled.

	5	Oct. 8	....	....	....	x	....	....	x	....	Tendency to shrivel	
	4	Oct. 12	....	....	x	....	....	....	x	....	Distinct shrivelling	Improving, firmer.
	3	Oct. 19	....	....	x	....	....	....	x+	....	Not so good as previous date	
	5	Oct. 22	....	....	x	....	....	....	x	....	Tendency to shrivel	
	5	Oct. 26	....	....	....	x	....	....	x	....	Not best to date	Shrivelling.
	4	Oct. 29	....	....	....	x	....	....	x+	....	.....	
	2	Nov, 1	....	....	....	x	....	....	x−	....	.....	
	4	Nov. 3	....	....	....	x	....	....	x	....	.....	Water cored.
McIntosh	1	Sept. 27	....	....	x	....	....	x	....	....	Distinct shrivelling	
	2	Oct. 1	....	....	x	....	....	....	x	....	Distinct shrivelling	Less shrivelled.
	6	Oct. 5	....	....	....	x	....	x	....	....	Much shrivelled	Much shrivelled.
	5	Oct. 8	....	....	x	....	....	x	....	....	Much shrivelled	Much shrivelled.
	1	Oct. 12	....	....	....	x	....	....	x	....	.....	
	3	Oct. 15	....	....	....	x	....	....	x	....	.....	Best yet.
Jonathan	1	Sept. 27	....	....	x	....	....	x	....	....	Shrivelled at centre	Large spots.
	2	Oct. 1	....	....	x	....	....	....	x	....	Shrivelling but not so much	No spots.
	6	Oct. 5	....	....	x	....	....	x	....	....	Distinct shrivelling	Shrivelled and small Baldwin spot.
	5	Oct. 8	....	....	....	x	....	x	....	....	.....	1 rotting, slight spotting.
	4	Oct. 12	....	....	....	x	....	....	x	....	1 badly water cored	1 rotting, slight spotting.
	3	Oct. 15	....	....	....	x	....	....	x	....	1 bad apple	1 rotting, slight spotting.
	3	Oct. 19	....	....	....	x	....	....	x+	....	.....	
	1	Oct. 22	....	....	x	....	....	x	....	....	5 water cored	
	5	Oct. 26	....	....	....	x	....	....	x+	....	.....	No spots.
	3	Oct. 29	....	....	x	....	....	....	x+	....	Some water cored	
	2	Nov. 1	....	....	....	x	....	....	x	....	Water cored at picking	2 badly water cored.
	4	Nov. 3	....	....	x	....	....	....	x	....	5 bad condition	Spotting, firm.
	6	Nov. 3	....	....	....	x	....	....	x	....	.....	Water cored.
Orange	1	Sept. 27	....	....	x	....	....	x	....	....	Shrivelled, cork	
	2	Oct. 1	....	....	x	....	....	x	....	....	Shrivelled	Form shrivelled, 1 Cox gone.
	6	Oct. 5	....	....	....	x	....	....	x	....	.....	
	5	Oct. 8	x	....	....	....	x	....	....	....	5 thrown out	2 bad.
	4	Oct. 12	....	....	x	....	x	....	....	....	Small amount cork	
	3	Oct. 19	....	....	x	....	....	....	x	....	Below previous date	
	6	Oct. 22	....	....	x	....	x	....	....	....	.....	
	6	Oct. 26	....	x	....	....	x	....	....	....	5 bad	
	3	Oct. 29	x	....	....	....	x	....	....	....	11 water cored, 1 good one left	

B—Bad; M—Medium; F—Fair; G—Good.

NEW VARIETIES OF APPLES

Again during the year under review the Ottawa trees made good growth, and many of them bore fruit. Some of these are exceedingly promising, but they should be tested for another year before a conclusive statement is ventured. The collection includes a large proportion of the varieties which have been originated at the Central Farm and named. Those of McIntosh parentage are among the most promising. They are earlier in season than that variety, and, if found desirable for the Okanagan, will give apples of McIntosh character for a longer season than at present.

SMALL FRUITS

With regard to small fruits, several varieties of black, red, and white currants, gooseberries, and raspberries are being grown, but it is regretted that again this year the labour conditions did not permit of keeping accurate records on all of these. The following varieties have been found quite satisfactory:—

Raspberries.—Cuthbert.

Black currants.—Boskoop Giant and Black Champion.

Red currants.—Fay Prolific and Perfection.

White currants.—Bar le Duc Large White.

Gooseberries.—Oregon Champion and Josselyn.

The list of strawberries given in last year's report still holds good, viz: Magoon, Senator Dunlap, Glen Mary, Clark Seedling and Heritage. To this might be added Black Beauty and Kellogg Premier; while of the everbearing strawberries, Progressive, Superb and Productive are the best. The largest yields for 1920 were given by Early Ozark, Warfield, and Peerless.

EXPERIMENT WITH DIFFERENT AMOUNTS OF WATER FOR VEGETABLES

This year a series of tests was commenced on vegetable plots with varying amounts of water. A block of land is divided into eight sections of one-twentieth of an acre each. Four sections are sown to vetch the first year, vegetables the second; four sections vegetables the first year, vetch the second; i.e. each plot grows a crop of vetch every other year, which is ploughed in as a cover crop. These plots are irrigated as follows:—

Plot A— 6 acre inches spread over season.
" B—12 " " " "
" C—18 " " " "
" D—24 " " " "

This experiment has been conducted during only the one year, and, although the results are interesting, they, of course, show nothing conclusive; but the following statement shows the results:—

BEANS (STRINGLESS GREEN POD).

Date.	Plot A.	Plot B.	Plot C.	Plot D.	Remarks.
	lb.	lb.	lb.	lb.	
Aug. 3	3	¾	1½	¾	Plot A fully 6 days earlier than C. and D. but slightly less weight.
Aug. 10	16½	11½	9½	9½	
Aug. 16	12	7	15	8½	
Aug. 23	5	26	23	28	
Aug. 30	7	7	6½	3	
Sept. 8	½	4½	9½	9½	
Total	44	56½	64½	59	

CORN (GOLDEN BANTAM) Cobs stripped before weighing.

Date.	Plot A.	Plot B.	Plot C.	Plot D.	Remarks.
	lb.	lb.	lb.	lb.	
Sept. 1	5	–	–	–	Plot A:— Cobs undersized and unevenly filled at lower end of row. Earliness encouraged. Plot B—Cobs well filled ready fully a week earlier than C and D.
Sept. 9	2¾	19	–	–	
Sept. 15	–	6½	6½	3¾	
Sept. 18	8¼	20½	5	14¾	
Sept. 21	–	–	4½	2¼	
Oct. 16	–	–	39	33¼	
Oct. 26	13	34	–	–	
Total	29	80	55	54	

CABBAGE. (DANISH BALL HEAD.)

Date.	Plot A.	Plot B.	Plot C.	Plot D.	Remarks.
	lb.	lb.	lb.	lb.	
Oct. 4	–	–	19	7¾	All plots badly effected with aphis and caterpillar 60% of plants very small when cut. (under 2 lb.)
Oct. 26	10	5½	–	5	
Nov. 9	5½	7	10½	4½	
Nov. 11	23½	37	31	31½	
Total	39	49½	60½	48¾	

CARROTS (FIELD).

Date.	Plot A.	Plot B.	Plot C.	Plot D.	Remarks.
	lb.	lb.	lb.	lb.	
Oct. 2	17	34	78¾	94	Plot A rather small.
Oct. 9	29	22	27½	40	
Oct. 14	41	34	18	20	
Total	87	90	124½	154	

TOMATOES (ALACRITY).

Date.	Plot A.	Plot B.	Plot C.	Plot D.	Remarks.
	lb.	lb.	lb.	lb.	
Aug. 14	4½	½	½	1	Plot A—25% blossom end rot. Cracking only slight. Plot B—Not too much blossom end rot, not so much cracking as in C and D. Plot C—Practically no blossom end rot but much cracking.
Aug. 19	1¼	3¼	1¼	2¼	
Aug. 21	1½	2	¾	1½	
Aug. 23	9	5½	10	10	
Aug. 25	14	25	24	24	
Aug. 31	8	23	32	26	
Sept. 7	12	3¾	11	12	
Sept. 13	2	9½	8	8	
Sept. 16	½	11¾	23¾	9¼	
Sept. 21	2½	21½	24	16	
Sept. 25	1½	13	11	2½	
Oct. 2	1¼	22	17½	25½	Plot D—Practically no blossom end rot, but much cracking.
Oct. 9	¾	8½	10	13½	
Oct. 25	–	6	6	–	
Oct. 27	23	52	64	39	
Total	81¼	207½	243¾	190½	

TOMATOES (BONNY BEST).

Date.	Plot A.	Plot B.	Plot C.	Plot D.	Remarks.
	lb.	lb.	lb.	lb.	
Aug. 10	½	¼	1¼	¼	Plot A—10% blossom end rot. Cracking only slight. Plot B.—No. blossom end rot but cracking more serious. Plot C—No blossom end rot but cracking very badly. Plot D—No blossom end rot but fruit very badly cracked.
Aug. 14	2	3¼	2½	¾	
Aug. 19	3	1½	3½	½	
Aug. 21	1¼	2½	5	2¼	
Aug. 23	6	9	9	11½	
Aug. 25	14	14	12	11	
Aug. 31	22	17	15	16	
Sept. 8	13	13	12	13¼	
Sept. 13	16	10½	13¼	13½	
Sept. 16	7½	10	7	7½	
Sept. 21	9½	24	22	14	
Sept. 25	13	15	18	17	
Oct. 2	4½	30¾	19¾	30¾	
Oct. 9	6	11½	19¾	22¾	
Oct. 25	–	–	4½	13	
Oct. 26	7½	22½	80	24½	
Oct. 27	34	48	–	53½	
Total	159¾	232¼	243½	251¾	

POTATOES (RURAL NEW YORKER).

Date.	Plot A.	Plot B.	Plot C.	Plot D.	Remarks.
	Com. Small. lb.	Com. Small. lb.	Com. Small. lb.	Com. Small. lb.	Majority good size and shape. About 25% in B and C showing large cracks.
Oct. 1	56 14	86½ —22½	– –	– –	
Oct. 2	– –	– –	93 —16½	139—24	
Total	70	109	109½	163	

MELONS (HOODOO).

Date Harvested.	Plot A.	Plot B.	Plot C.	Plot D.	Remarks.
	lb.	lb.	lb.	lb.	
Sept. 23	13¾	–	–	–	Size of fruit in Plot A reduced but earliness encouraged. Plot D—One week later in ripening. Plots C and D, 2 weeks later than A.
Sept. 24	6	–	–	–	
Sept. 29	4¾	3½	–	–	
Oct. 2	6½	–	–	–	
Oct. 6	1¼	7½	3¼	7¾	
Oct. 9	3¾	3¼	1¼	4½	
Oct. 13	–	–	15	3¼	
Oct. 16	–	–	45	–	
Oct. 21	73	68	5¾	4½	
Oct. 23	–	62	–	–	
Oct. 26	26	41	47	62	
Oct. 27	–	42	39	51	
Total	135	227½	156¼	133	

CUCUMBER (DAVIS' PERFECT).

Date Harvested.	Plot A.	Plot B.	Plot C.	Plot D.	Remarks.
	lb.	lb.	lb.	lb.	
Aug. 14	–	–	5	1¾	Size of fruit reduced in Plot A. Uneven seeding probably accounts for poor germination of second sowing and consequently light yield in "C". Large number of plants of first sowing responsible for apparent earliness of Plot D.
Aug. 20	–	4½	1½	12¾	
Aug. 25	10	8	10	26	
Aug. 31	18½	38½	18	42	
Sept. 8	8½	46	37	82	
Sept. 16	2¾	39	27½	47	
Sept. 21	5½	8½	34	32½	
Sept. 25	1¼	10¼	4½	11½	
Sept. 28	–	–	–	8	
Oct. 2	62	36	32¾	31	
Oct. 5	4½	11	5½	5½	
Oct. 14	4¼	57	59	106	
Total	117¼	256¾	234	406¾	

EXPERIMENTS WITH POTATOES

This year numerous experiments were carried out with potatoes, both mature and immature seed. The potatoes were sprayed, but almost without exception they suffered severely from wilt. The results are as follow:—

POTATO TESTS, EXPERIMENTAL STATION, SUMMERLAND, B.C.

Variety	Yield. Commercial	Small	Total	Yield per acre		Average yield per acre	
	lb.	lb.	lb.	tons	lb.	tons	lb.
Haulton Rose	41	16½	57½	6	1,854½		
Haulton Rose (immature seed)*	27	25	52	6	584		
Haulton Rose (immature seed)†	30	15	45	5	890	6	442½
Early Northern	32	16	48	5	1,616		
Early Northern (immature seed)*	130	22	152	18	584		
Early Northern (immature seed)†	52	12	64	7	1,488	10	1,229½
Early Ohio	5	6	11	1	662		
Early Ohio (immature seed)*	35	7	42	5	164		
Early Ohio (immature seed)†	6½	6½	13	1	1,146	2	1,324
Rochester Rose	19	28	47	5	1,374		
Rochester Rose (immature seed)*	21	18	39	4	1,438		
Rochester Rose (immature seed)†	30	23	53	6	826	5	1,212½
New Queen	1½	1½	2¾	1	1,993		
New Queen (immature seed)*	53	21	74	10	1,490		
New Queen (immature seed)†	29	16	45	5	890	6	124½
Eureka	26	15	41	4	1,922		
Eureka (immature seed)*	30	8	38	4	1,196		
Eureka (immature seed)†	30	21	51	6	342	5	720
Irish Cobbler (immature)*	25	13	38	4	1,196		
Irish Cobbler	19	3½	22½	14	1,700		
Irish Cobbler	9	12	21	2	1,082	7	659½
Everett	33	21	54	6	1,068		
Everett	31	25	56	6	1,552		
Everett (immature seed)*	13	21	34	4	228	5	1,616
Bovee (immature seed)*	24	20	44	5	648		
Bovee	39	16	55	6	1,310		
Bovee	33	16	49	5	1,850	5	1,936

* Early dug. Late planted.

POTATO TESTS, EXPERIMENTAL STATION, SUMMERLAND, B.C—*Continued*

Variety	Yield. Commercial	Small	Total	Yield per acre		Average yield per acre	
	lb.	lb.	lb.	tons	lb.	tons	lb.
Vicks Extra Early	49	18	67	8	214		
Vicks Extra Early	56	15	71	8	1,182		
Vicks Extra Early (immature seed)*	61	20	81	9	1,602	8	1,666
Reeves Rose (immature seed)*	9½	20	29½	3	1,788		
Reeves Rose	19	13	32	3	1,744		
Reeves Rose	16	13	29	3	1,018	3	1,516⅔
Money Maker	50	14	64	7	1,488		
Immature Irish Cobbler, Pink Eye	11½	3	14½	7	1,039		
Money Maker (immature seed)*	46	18	64	7	1,488	7	1,338⅓
Million Dollar (immature seed)*	63	52	115	13	1,830		
Million Dollar	53	48	101	12	442		
Million Dollar	61	35	96	11	1,232	12	1,168
Oregon Beauty	59	20	79	9	1,118		
Oregon Beauty	69	28	97	21	680		
Oregon Beauty (immature seed)*	60	35	95	19	317	16	1,371⅔
Gold Coin (immature seed)*	25	9	34	6	658		
Immature from Immature Seed	23	7	30	10	743		
Gold Coin	50	11	61	7	762	8	54⅓
Toogoods Tremendous Seed	70	35	105	12	1,410		
Toogoods Tremendous Seed	60	50	110	13	620		
Toogoods Tremendous Seed (immature seed)*	39	37	76	11	70	12	700
Netted Gem (immature seed)*	29	29	58	4	1,438		
Netted Gem	40	40	80	5	1,858		
Netted Gem	40	40	80	7	1,705	6	3,333⅓
Mortgage Lifter	39	39	78	15	1,680		
Mortgage Lifter	14	14	28	10	1,120		
Mortgage Lifter (immature seed)*	17	17	34	2	1,324	9	1,374⅔
Table Talk (immature seed)*	75	75	150	16	1,396		
Table Talk	17	17	34	3	1,502		
Table Talk	80	80	160	13	862	11	586⅔
Dalmeny Beauty	17	17	34	3	1,018		
Dalmeny Beauty	123	123	246	22	1,254		
Dalmeny Beauty (immature seed)*	58	58	116	31	1,525	19	599
Empire State (immature seed)*	29	29	58	4	1,922		
Empire State	31	31	62	5	406		
Empire State	30	30	60	6	100	5	809⅓
Royal Russet	50	50	100	7	762		
Royal Russet	34	34	68	4	1,680		
Royal Russet (immature seed)*	50	50	100	7	762	6	1,068
Hard to Beat (immature seed)*	46	46	92	7	1,246		
Hard to Beat Seed	59	59	118	8	1,908		
Hard to Beat Seed	57	57	114	15	186	10	1,113⅓
Early Surprise	14	14	28	3	776		
Early Surprise	16	16	32	3	50		
Early Surprise (immature seed)*	21	21	42	3	776	3	534
Drought Proof (immature seed)	120	120	240	17	1,090		
Drought Proof	130	130	260	17	364		
Drought Proof	58	58	116	9	1,360	14	1,604⅔
American Wonder Seed	39	39	78	5	1,374		
American Wonder Seed (immature seed)*	47	47	94	7	762		
American Wonder Seed (immature seed)†	58	58	116	9	150	7	762

*Early dug. †Late planted.

POTATO TESTS, EXPERIMENTAL STATION, SUMMERLAND, B.C.—*Concluded*

Variety	Yield Commercial	Small	Total	Yield per acre		Average yield per acre	
	lb.	lb.	lb.	tons	lb.	tons	lb.
Tinwall Perfection	30	50	80	9	1,360		
Kerr's Pink	33	82	115	13	1,830		
Kerr's Pink	37	46	83	10	86	11	638
King Edward	32	30	62	7	1,004		
King Edward	11	29	40	7	520		
Knowles Big Cropper	38	9	47	5	1,374	6	1,632⅔
Ash Leaf Kidney (immature seed)*	39	14	53	6	826		
Ash Leaf Kidney	33	9	42	5	164		
Ash Leaf Kidney	42	13	55	6	1,310	6	100
Morgan's Seedling	37	15	52	6	584		
Morgan's Seedling	36	11	47	5	1,374		
Morgan's Seedling (immature seed)*	35	11	46	5	1,132	5	1,696⅔
Factor (immature seed)*	77	21½	98½	11	1,837		
Factor	80	13	93	11	506		
Factor	54	19	73	8	1,666	10	1,336½
Rural New Yorker	107	11	118	14	556		
Rural New Yorker	147	11	158	19	236		
Rural New Yorker (immature seed)*	142	19	161	19	962	17	1,251½
Livingstone (immature seed)*	173	29	202	24	884		
Livingstone	199	22	221	26	1,482		
Livingstone	118	13	131	15	1,702	22	689½
Carman No. 1	70	14	84	10	328		
Carman No. 1	74	12	86	10	812		
Carman No. 1 (immature seed)*	35	12	47	5	1,374	8	1,504⅔
Green Mountain (immature seed)	144	13	157	18	1,994		
Green Mountain	123	12	135	16	670	11	1,554⅔
Green Mountain	124	10	134	16	428		
Green Mountain	110	13	123	14	1,766		
Green Mountain (immature seed)*	117	12	129	15	1,218	15	1,137½
Jersey Royal (immature seed)*	80	14	94	11	748		
Jersey Royal	96	4	100	12	200		
Jersey Royal	57	6	63	7	1,246	10	731½
Jersey Royal	75	5½	80½	9	1,421		
Jersey Royal	81	4½	85½	10	691		
Jersey Royal	79	3½	82½	9	1,965	10	25⅔
Delaware (immature seed)*	72	28	100	11	687		
Delaware	79	37	116	14	72		
Delaware	76	35	111	13	422	12	1,727
Triumph	3	9	12	1	1,004		
Triumph	1	12	13	1	1,312		
Triumph (immature seed)*	14½	12½	27	3	878	2	597

*Early dug. †Late planted.

It did not seem desirable to vary the list of potatoes most satisfactory for this district as given in the previous report, viz:—

Dalmeny Beauty, Green Mountain, Million Dollar, Empire State, Table Talk, and Rochester Rose.

EXPERIMENTS WITH OTHER VEGETABLES

Numerous tests of vegetables were made. Below are particulars of the highest yields:—

Beans grown in 30-foot rows, two inches apart in the row—

1st. Kentucky Wonder	24½ lb.
2nd. Refugee	21½ "
3rd. Hodson Long Pod	20½ "

Beets, 30-foot rows—

Eclipse	82 lb.
Detroit Dark Red	71 "
Early Wonder	59 "

Brussels Sprouts.—Of the three varieties of Brussels sprouts which were grown, only Paris Market produced any sprouts. Dalkeith and Amager Market produced none.

Cabbage.—Ten varieties of cabbage were grown, the best one being Danish Ballhead, which produced good solid heads averaging about seven pounds each.

Carrots.—Five varieties of carrots were grown in thirty-foot rows, the plants being thinned to 1½ inches. The highest yields were from

Improved Danvers	131 lb.
Nantes Half Long Scarlet	80 "

Chantenay carrot was also grown in rows with plants thinned to 1½ inches, 2 inches and 3 inches, with the following results:—

1½-inch	50 lb.
2-inch	65 "
3-inch	44 "

Cauliflower.—Owing to the cool season these were more successful than usual, both Early Erfort and Early Snowball doing well.

Sweet Corn.—Of the eighteen varieties of sweet corn grown, Golden Bantam again demonstrated its superiority. The earliest to ripen was Pickaninny, on August 13.

Cucumbers.—The best cucumber was Davis' Perfect, and this, from the Station's own seed, gave the highest yield: three hills, 6 by 6, yielding 61 pounds 13 ounces.

Lettuce.—All the lettuce did very well, perhaps the most satisfactory being Grand Rapids and Iceberg.

Musk Melons.—The most satisfactory musk melon is the Hoodoo. The highest yield was obtained from Salmon Tinted Pollock No. 25—three hills 6 by 6 yielding a total of 38 melons.

Egg Plants.—New York Improved Purple and Black Beauty were equally satisfactory.

Onions.—All onions were badly attacked by maggot. The most satisfactory onions for local conditions are Yellow Globe, Yellow Globe Danvers and Southport Yellow Globe. The best yields in the variety tests for thirty-foot rows, plants thinned to two inches, were:—

1st. Yellow Globe Danvers	13½ lb.
2nd. Giant Prize Taker	8½ "

The plots with onion sets yielded as follows:—

1 inch apart	5 lb.
2 " "	4 "
3 " "	7½ "

Below are given the yields of onions grown from seed in thirty-foot rows, plants thinned to 1, 2 and 3 inches:—

Early Flat Red—		
1 inch	5½ lb.	
2 inch	6 "	
3 inch	8 "	
Large Red Wethersfield—		
1 inch	4½ "	
2 inch	7 "	10 oz.
3 inch	3 "	4 oz.
Yellow Globe Danvers—		
1 inch	5½ lb.	
2 inch	4½ "	
3 inch	4 "	
Giant Prize Taker—		
1 inch	10 "	
2 inch	8 "	8 oz.
3 inch	12 "	

Parsnips.—Hollow Crown, thirty-foot rows thinned to 2, 3, and 4 inches:—

2 inch	50 lb.	
3 inch	55 "	
4 inch	45 "	

Parsley.—Extra Curled, Double Curled, Triple Curled and Champion Moss all gave excellent results.

Peas.—In the variety tests American Wonder gave the highest yield, English Wonder coming second.

Peppers.—The most satisfactory varieties are Neapolitan and Crimson Giant.

Spinach.—Long Standing and New Zealand are most satisfactory.

Squash.—Hubbard, Golden Hubbard, Delicious, English Vegetable Marrow and Long White Bush Marrow all gave good results.

Tomatoes.—The highest yields from 5 plants were:—

Langdon Earliana (Summerland seed)	108 lb.	7	oz.
Red Head	107 "	8	"
Matchless	103 "	4	"

In the pruned and unpruned tests the following results were obtained:—

Chalk's Early Jewel—			
Pruned to 1 stem (9 plants)	93 lb.	2	oz.
Pruned to 2 stems (10 plants)	135 "	2	"
Unpruned (10 plants)	247 "	5	"
Bonny Best—			
Pruned to 1 stem (10 plants)	98 "	8	"
Pruned to 2 stems (10 plants)	135 "	3	"
Unpruned (10 plants)	208 "	9	"

Turnips.—The following varieties gave good results:—
Early Purple Top Milan, Red Top Strap Leaf, Early Snowball, Golden Ball.
The highest yield was given by Red Top Strap Leaf, one 30-foot row, 62½ pounds.

ORNAMENTAL GARDEN

Roses.—There was a severe frost on October 24, 1919. This caught most of the roses with the sap flowing freely and many of them in bloom, and they suffered severely; so that, as it was not possible to get these replaced in the spring of 1920, the display

during that year was not so good as usual. Below is a list of varieties that came through this very severe test:—

George Dickson,
Hugh Dickson,
Dorothy Perkins (Climber),
Viscountess Folkestone,
George Arends,
Frau Karl Druschki,
Captain Christy,
Soleil D'or,
Perle des Panachie,
Mrs. J. Laing,
Mme. Edward Herriott,
Coronation,
Paul Neyron,
Souvenir de President,
Carnot,
Prince de Bulgarie,
Ulrich Brunner,
Caroline Testout,
King George V,
Wakefield Christy Miller,
General Superior Arnold,
Janssen.

Bulbs.—There was a very good display of bulbs early in the season, the tulips being especially successful.

During the year there was an increased number of visitors, all of whom displayed a keen interest in the flower garden. An attractive log building for the use of such visitors has been erected. A start is being made this spring in laying out the grounds around the buildings which have been erected.

POULTRY

THE PLANT

The Summerland poultry plant is situated upon several acres of bottom land surrounded on three sides by hills from sixty to one hundred and fifty feet high. As yet no irrigation is available for the poultry plant, but it is hoped before long to have the water upon at least a portion of the area, in order to produce green feed for the flock. This location is proving quite satisfactory for the purpose, and will be even more so when water is put on. There is sufficient space so that the sun is not excluded from the houses during the winter days, and the protection from the winds afforded by the hills is beneficial. Many similar locations are found in this province which might profitably be utilized for poultry keeping.

BUILDINGS

An administration building for office, incubators, feed, etc., is situated at the entrance to the plant. Three permanent poultry houses, each to accommodate 100 layers, with breeding yards, face the south. A number of moveable colony houses are placed over the range or close to the incubator room, depending upon whether they are used for brooding chicks or breeding pens. The type of houses used for the stock, both old and young, have proved quite satisfactory, plans of which may be obtained free of charge upon application to the Superintendent, Experimental Station, Summerland, B.C.

Stock.—Nothing but the White Wyandotte is kept here. At the end of the year, March 31, there were on hand the following: 57 breeding hens, selected by trap-nest record and type from the previous year's pullets; 295 pullets in their first laying year, all of which are being trap-nested, 15 males used for breeding purposes; and 300 spring chicks hatched during the month of March.

BREEDING

Pedigree breeding, or the breeding from selected individuals, was started, and as a result of last year's work along this line, there are available cockerels for breeding this season whose dams have laid 200 eggs or over in their pullet year. The selective breeding followed last year also produced a superior lot of pullets now in trap-nests, from which there is every expectation that some good yields will be secured. The first pullet laid September 13, 1920, at 159 days of age, and 300 were laying by January 13, 1921.

The average production for these pullets up to March 31 was 75·4 eggs. The highest individual total on the same date was 154 eggs.

This is considerably the best laying that has occurred at this Station to date, and it is doubtless due to the pedigree breeding, along with the satisfactory housing and care, and the general health of the flock.

BREEDING PENS

The breeding females were divided into 6 pens, having from 12, with 1 male, to 38, with 4 males, to a pen. Three methods of using the males were followed: (1) single matings where the one male was left throughout the season. (2) Large pens for which 4 males were kept, 2 males being alternated daily; that is, 2 males in the pen to-day, out to-morrow, and two others in. (3) Medium sized pens, with 2 males each, put in day about. The result of these matings is given in the following table:—

FERTILITY AND HATCHABILITY OF MATED PENS.

No. of pen	Number females	Age of females, years	Pullet year laying record	Number males	Treatment of males	Number eggs set	Per cent fertility	Chicks hatched
1	38	3	?	4	Alternate pairs.....	333	90·1	211
2	25	2	140—160	2	Alternate single.....	247	66·0	81
3	38	1	123—277	4	Alternate pairs.....	530	76·7	231
5	12	2	178—217	1	Single mating.....	271	65·6	113
6	12	1	169—233	1	Single mating.....	269	70·6	134
7	25	2	152—177	2	Alternate single.....	384	82·5	205

A record has been kept of 140 hens' fertility and hatching results for the entire breeding season of 1920, and only birds giving a 50 per cent hatch of total eggs set, and having a first year's laying record of 150 eggs or more, will in future be used for breeding as two-year-olds.

This extra marking and recording of eggs entails a little more labour during the incubation season, but it is of great value in breeding up increased fertility in the stock, as is shown in the statement below of the earliest hatches of 1920 and 1921.

Comparison of early hatches 1920-21

April 12, 1920—64 per cent fertile. 38 per cent total eggs hatched.
March, 1921—70 per cent fertile. 57 per cent total eggs hatched.

INCUBATION

The incubators are operated in a concrete cellar under the administration building. Only the lamp type of standard makes has been used, but these have proven very satisfactory when moisture is applied

Moisture vs. no moisture.—A test was made with two hatches off the same machines. One hatch was run through with no added moisture, and one hatch under the same conditions, except that moisture was provided. This moisture was given by having moistened sand in a pan placed beneath the egg tray. The results were very greatly in favour of the moist condition.

DETAILS OF MOISTURE AND NO MOISTURE HATCHES

	No moisture	Moisture added
Fertile eggs	228	275
Dead germs	12	13
Dead in shell	99	37
Hatched	117	217
Per cent fertile hatched	51.3	78.9

NOTE.—It is possible that variation in eggs may have been the cause of some of the failures to hatch in the "No Moisture" machine, but the eggs were all from the same flock and it can safely be said that the addition of moisture in a climate such as Summerland is an advantage.

CHICK FEEDING

The success in brooding and rearing of chicks depends to no small extent upon the system of feeding. That found most satisfactory at this Station is, briefly, as follows:—

First five days feed.—The first feeds were given at 1 p.m. and 6 p.m., when the chicks averaged two days old (water not given until 24 hours later) in the form of hard boiled eggs chopped fine (shells included) stale bread crumbs, oatmeal, bran and fine sand, the whole slightly moistened with warm water. The first feed was preceded by one of sand given to the chicks on shingles.

Five to ten days old.—After the chicks were on this diet, fed sparingly but often (five times a day) for two days, it was changed gradually to one of commercial chick feed, mixed with rolled oats.

After ten days.—When the chicks were ten days old a dry mash was put before them in shallow boxes, from 10 a.m. until 3.30 p.m., with the grain fed as above, at 6.30 a.m. and p.m. Green feed, charcoal and coarse sand or fine gravel was also supplied. When seven weeks old wheat was introduced, gradually cutting out the chick feed altogether.

BUILDING AND IMPROVEMENTS

During the year new flumes have been built and measuring boxes installed where necessary, in order that accurate records may be taken of the amounts of water supplied to various crops. The boarding house and foreman's cottage have been completed, also the log building which was built near the flower garden as an accommodation for visitors. A new cottage was erected, which is being temporarily occupied by the superintendent, the bee building erected, and a new silo, 20 feet by 12 feet, put up. A building which was previously of a temporary nature has been properly equipped to house one hundred laying birds, and two new brooder houses have been built.

EXHIBITIONS AND MEETINGS

This Station had an exhibit at the following fairs:—Kelowna, Armstrong, Penticton, Naramata and Peachland, and seed exhibits were sent to New Westminster and the Provincial Seed Fair held at Victoria. The superintendent attended the Irrigation Convention at Lethbridge, the British Columbia Dairymen's Convention at Hullcar, and the Convention of the Western American Horticulturists at Vernon, meetings at Nelson, Victoria and Farmers' Institute meetings at different places in the district, and numerous other meetings connected with agricultural and horticultural organizations.