DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

EXPERIMENTAL STATION

SUMMERLAND, B.C.

REPORT OF THE SUPERINTENDENT

R. H. HELMER

FOR THE YEAR 1922

Printed by Authority of the Hon. W. R. Motherwell, Minister of Agriculture, Ottawa, 1923

TABLE OF CONTENTS

EXPERIMENTAL STATION, SUMMERLAND, B.C.

Report of the Superintendent, R. H. HELMER

THE SEASON

The season of 1922 opened with a very backward spring following what was probably the longest and steadiest cold of any winter recorded in the Okanagan. The severe weather started in November, the mercury going down to 2 degrees below zero on the 19th of that month, and continuing until the end of March. At no time was there any depth of snow on the ground and the frost penetrated to a greater depth than has been known before. The total winter precipitation was light and the amount of moisture in the soil in the early spring was not so plentiful as usual. April and May were cold, and the precipitation light, ·75 inches and ·26 inches respectively, made up of numerous light showers. Irrigation water was not turned on until May 15. For a time the supply was good but with the approach of hot, dry days in early June the amount gradually dwindled. June, July and early August were very dry, but two good rains about August 12 and 19 relieved the situation to some extent. Further good rains occurred in September and October, which were of benefit to the roots and other late crops. The fall precipitation was heavier than usual and with the approach of winter, the soil was well supplied with moisture. Severe winter conditions set in during the second week in December and continued for about two weeks.

Evaporation.—To obtain data on the amount of evaporation from an open water surface, a tank six feet square by two feet deep with a vernier was installed to permit of recording variations in rise or fall as nearly as one-hundredth of an inch. The figures are interesting. For April (eight days) the average daily evaporation was ·13 inch; May, ·14; June, ·22; July, ·22; August, ·15; September, ·12; October, ·6. The total evaporation from April 23 to October 31 was 28·54 inches; the rainfall over the same period was 5·12 inches.

Atmospheric Relative Humidity.—The atmospheric relative humidity was taken every morning at nine o'clock during the summer months, the averages being as follows: May, 61 per cent; June, 46 per cent; July, 51 per cent; August, 62 per cent; September, 65 per cent; October, 79 per cent.

Wind.—The following is a summary of wind records:—

SUMMARY OF WIND RECORDS—1922

1922—Month	Total mileage for month	Greatest mileage in 24 hours	Maximum velocity	Average velocity	Prevailing direction
January	6,811	511	39	9·2	South
February	6,577	761	45	9·8	West
March	6,854	597	46	9·2	South
April	6,200	363	35	8·6	Southeast
May	6,060	434	51	8·1	North
June	6,676	329	28	9·3	Northwest
July	6,490	330	27	8·7	Northwest
August	5,917	387	30	8·0	Southwest
September	6,054	354	29	8·4	Southwest
October	5,665	452	36	7·6	South
November	7,048	500	42	9·8	Southeast
December	7,578	533	36	10·2	South

A SUMMARY OF RECORDS ON TEMPERATURES, PRECIPITATION AND SUNSHINE FOR THE YEAR 1922

Month	Temperature F.			Precipitation			Average per month for past five years	Total Sunshine
	Mean	Highest	Lowest	Rainfall	Snowfall	Total		
	°	°	°	Inches	Inches	Inches	Inches	Hours
January	20·88	37·0	2·0	–	4·0	0·40	0·99	70·8
February	20·625	43·0	−1·0	0·04	5·2	0·56	0·46	105·8
March	34·145	50·0	12·0	0·13	14·9	1·62	0·80	128·6
April	45·08	68·0	26·0	0·67	0·8	0·75	0·83	195·1
May	54·37	85·0	29·0	0·26	–	0·26	0·52	269·2
June	67·47	94·0	47·0	0·20	–	0·20	0·77	327·0
July	70·75	98 0	48·0	0·15	–	0·15	0·57	321·1
August	67·83	91·0	50·0	1·56	–	1·56	0·94	245·7
September	60·03	82·0	42·0	1·03	–	1·03	0·83	206·7
October	48·89	62·0	31·0	1·50	–	1·50	1·00	158·2
November	34·46	46·0	25·0	0·35	0·7	0·42	1·16	51·1
December	22·09	49·0	−5·0	0·23	7·6	0·99	0·76	43·5
Total for year	–	–	–	6·12	33·2	9·44	–	2,122·8
Average for 5 years	–	–	–	6·704	29·31	9·64	–	2,040·6

ANIMAL HUSBANDRY

STEER FEEDING EXPERIMENTS

As in past years experiments in steer feeding were carried on during the winter months, three pens of steers being fed. As these experiments, however, will extend into the year 1923, the results will be shown in the report covering that year.

HORSES

There are nine horses on this Station, three teams of work-horses, one heavy single horse and one team of drivers. The latter are also used on the farm when needed, especially for single cultivating in orchards and elsewhere. No breeding work is carried on.

SHEEP AND SWINE

Breeding work is being carried on with pure-bred Cheviots, pure-bred Suffolks and grade Oxfords, also with Berkshire pigs. Experiments are also being carried on in the feeding of potassium iodide as a remedy against goitre in sheep and hairlessness in pigs, but as this work cannot be reported on until well into 1923, that is, after the lambing season, it is proposed to report this also in the annual report for 1923.

FIELD HUSBANDRY

Water shortage during the seasons of 1921 and 1922 caused the stand of alfalfa on large areas to become considerably weakened, especially where the soil was of a light, dry nature. As a result, the yields of this crop in 1922 were low. The extreme dryness of the soil gave Russian thistle an opportunity to thrive and crowd out the young alfalfa plants of this year's seeding.

Grain crops in particular suffered this season through untimely irrigation caused by water shortage.

ALFALFA

The rotation in which alfalfa is grown consists of one year in hoed crop, one year in grain and five years in alfalfa. The alfalfa is seeded in the third year of this rotation on a firm seed bed, without a nurse crop, at the rate of twelve pounds per acre. In the fifth alfalfa year, the third crop or cutting is ploughed under in preparation for corn. Owing to water shortage, some fields did not give three cuttings this season. The results are as follows:—

ALFALFA—YIELDS OF ALFALFA HAY—1922

Area of plot	Year of seeding	First cutting		Second cutting		Third cutting		Yield per acre, 1922	
		Date	Yield	Date	Yield	Date	Yield		
Acres			lbs.		lbs.		lbs.	Tons	lbs.
18	1915	June 21	38,840	July 25	11,650	Oct. 13	15,800	1	1,683
½	1915	May 10	2,770	July 19	5,610	.....	.....	8	760
2	1918	June 21	9,494	.....	.....	Oct. 13	1,000	2	1,247
4	1921	June 24	15,205	.....	.....	.....	.....	1	1,801
1	1921	June 27	6,370	July 25	2,160	.....	.....	4	530
½	1915	May 10	1,650	July 15	4,150	.....	.....	5	1,600
Average yield per acre								4	270

ALFALFA—YIELDS OF HAY

Six Year Averages

The first four years of these averages were taken from the same field. The last two include averages from different fields varying in area and location. The average type of soil is gravelly loam. The general topography is high, slightly rolling with all aspects. It will be noted that the yields from year to year are not consistent with the amount of water received. More timely irrigation would have considerably increased the yield. The average results for six years are as follows:—

Year	Area of plot	1st Cutting		2nd Cutting		3rd Cutting		Season's average yield per acre 1917–1922	Irrigation	
		Date of cutting	Yield per acre	Date of cutting	Yield per acre	Date of cutting	Yield per acre		Rate of application in acre inches 1917–1922	Acre inches of water per ton of hay 1917–1922
	acres		tons lbs.		tons lbs.		tons lbs.	tons lbs.	acre inches	acre inches
1917	8	June 15	1 909	July 25	1 581	Sept. 4	.. 1,625	3 1,115	36·36	10·22
1918	8	" 6	1 1,296	" 16	1 1,290	Aug. 29	1 1,244	4 1,830	41·80	8·50
1919	8	" 3	.. 1,734	" 22	1 898	" 28	.. 875	2 1,507	21·65	7·86
1920	8	" 24	1 967	" 30	.. 1,700	" 13	.. 949	2 1,616	21·49	7·65
1921	27·75	" 13	2 388	" 14	1 803	" 13	.. 1,073	4 264	11·22	2·71
1922	26	" 23	1 859	" 21	.. 907	Oct. 13	.. 646	2 412	2·43	1·10
Average per acre for 6 years	.....	June 14	1 1,025	July 21	1 363	Sept. 1	.. 1,412	3 791	22·49	6·34

YIELDS OF GRAIN

This season, the grain crop was practically a total failure. Sandy and light gravelly loam soils, combined with untimely irrigation owing to water shortage, gave very small yields. The results are as follows:—

Variety	Date of sowing	Date of ripening	Number of days maturing	Length of straw including head	Strength of straw on scale of 10 points	Length of head in inches	Yield per acre 1922	Per cent stand	Per cent loss from any cause which did not effect the stand	Weight per measured bushel after cleaning	Irrigation		
											Rate of Application in Acre Inches		
											May	June	Total
				inches		inches	bush.						
Wheat—Marquis	May 13	July 28	76	30	9	2·5	12·0	100	55	61	.....	12·25	12·25
Burbank	" 13	" 26	74	30	9	2·5	9·0	100	55	62	.....	8·79	8·79
Barley—Hulless	" 15	" 28	74	28	9	2·5	7·0	100	60	66	6·54	12·64	19·18

Miscellaneous—9 acres—bottom land—old meadow yielded 16 tons hay.

HORTICULTURE

The orchards came through the long winter of 1921-22 in good condition. Very little rain fell during the autumn months of 1921, with the consequence that the soil was badly dried out when winter set in. Zero weather was experienced in November when much of the current season's wood was still unripened. In spite of these adverse conditions, there was no indication of winter injury except in orchards newly seeded to alfalfa.

Although the spring of 1922 was cold and backward, the supply of moisture in the soil was almost completely exhausted by the time irrigation water was available. In fact, orchards sown to permanent cover crops were suffering visibly from lack of water by May 15. Dry weather continued throughout the summer, and although every endeavour was made to maintain conditions of soil moisture favourable to tree growth, there were times when the trees were observed to be suffering from drought. This was especially the case during the first two weeks of July, when a serious shortage of irrigation water was experienced. During August, the flow of irrigation water was much improved, and this was supplemented by an unusually heavy rainfall. There was also abnormally heavy precipitation during October, which produced a condition of soil moisture very similar to that which would be brought about by fall irrigation in a dry year.

CULTURAL APPLE ORCHARDS

The cultural orchards have now reached the stage when it is possible to give a preliminary survey of the relative merits of the various systems of orchard management under test. Accordingly a comparison of growth and vigour of trees, yield of fruit, texture and condition of the soil, water requirement and cost of operation under the several methods of culture is given in this report.

The six orchards included in this experiment are all located on the same bench. Each orchard is two acres in area. There is considerable variation in the character of the soil and subsoil on different parts of the bench but in no case has any one orchard a monopoly of either the good or the bad soil. The character of the soil ranges from a sandy loam underlaid with coarse gravel to a fine silt having a clay subsoil. Such soil formations are typical of much of the bench land in the southern Okanagan. The object of this experiment is to determine the most *economical* method of bringing up a young orchard, and of maintaining it when it reaches the bearing age. The orchards are also laid out to serve as a test of varieties, systems of pruning and methods of thinning. These orchards were planted in 1916. Observations as to growth and condition of trees have been made each year and a record kept of the yield of each tree. The results of measurements taken in 1922 are shown in tabular form in this report. Tables have also been prepared showing the yield of fruit produced under the various systems of culture. In order to facilitate a correct interpretation of these data a short account of the cultural treatment received by each orchard since date of planting and notes as to the general performance of the trees in each orchard to date are given below.

ORCHARD NO. 1.—CLEAN CULTIVATION

This orchard has been carried on under continuous clean cultivation since date of planting. To date, the trees in this orchard have made good growth and have yielded satisfactory crops but the physical condition of the soil is not as good as when cover crops are in use or manure is being applied to the land. Alkali patches appear to be increasing in area and the trees are beginning to show effects of a soil depleted in nitrogen and humus. The average

water requirement of this orchard over seven years has been less than five acre-inches per season. The cost of operation is greater than is the case with the systems of vetch cover cropping and alfalfa sod mulch now in practice on other orchards in this experiment.

ORCHARD NO. 2.—ALFALFA SOD MULCH

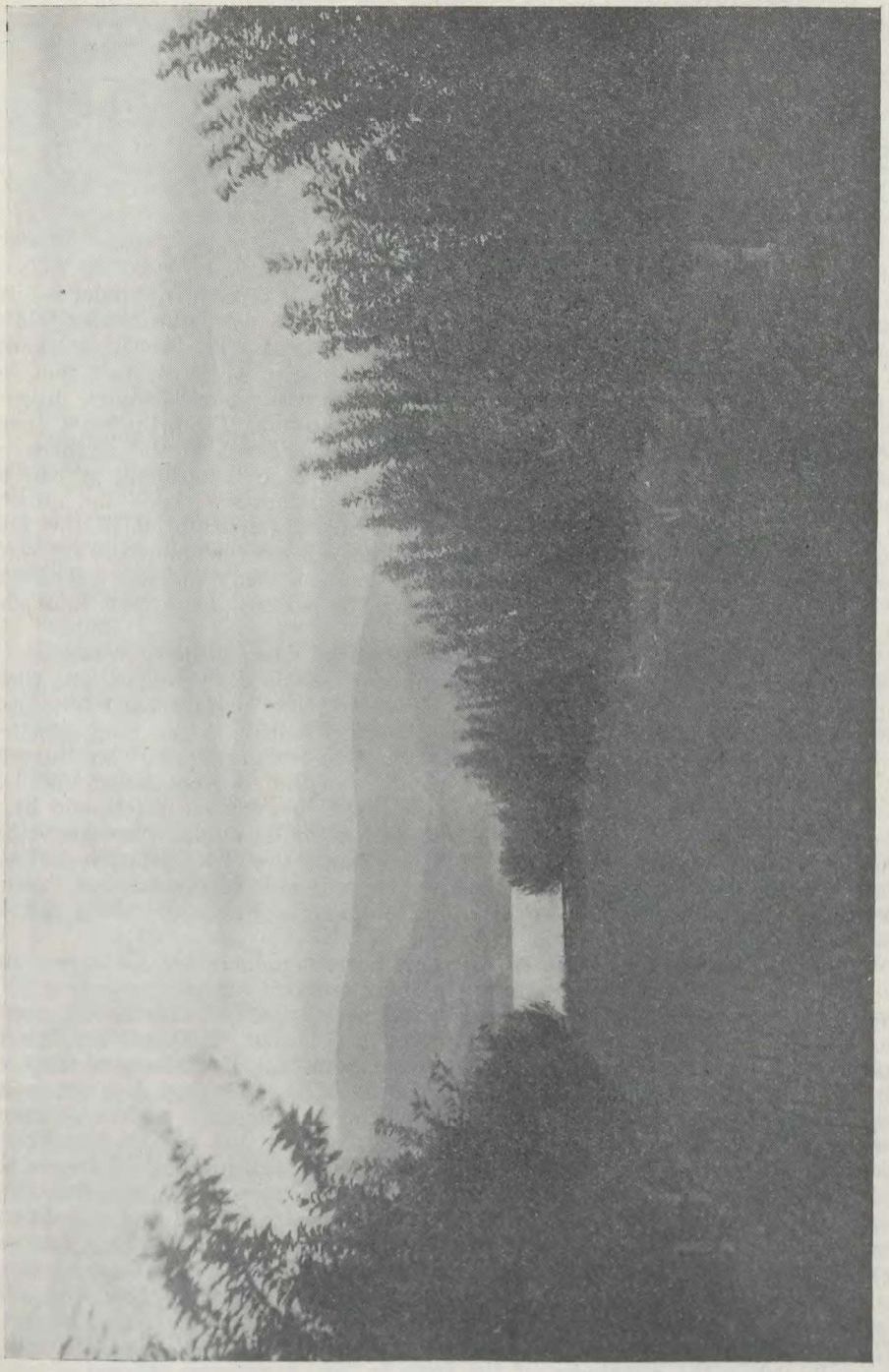
This orchard has been in alfalfa from the year when the trees were planted out. For the first five years, a strip was kept cultivated along the tree rows but in the spring of 1921 this strip was seeded down. Until 1921, the alfalfa was cut and disced each time it flowered but during that year it was left untouched.

Owing to the fact that there is considerable difference of opinion among growers with regard to the advisability of discing alfalfa in the spring it was decided to disc one-half of this orchard in the spring of 1922. This operation was performed with a team and single cut-away disc weighted down with bags of sand. The time required to disc an acre twice both ways was five hours. The discing had the effect of reseeding the alfalfa and of loosening and incorporating humus with the soil. Where the soil is compacted or the alfalfa in danger of being smothered out by grasses it is considered that this labour would be well employed. Where there is a strong stand of alfalfa and where the soil is already in a loose friable condition, the discing appears to be unnecessary.

On August 23, when the alfalfa was just beginning to set seed, a heavy levelling float was drawn over it. This had the effect of laying the crop flat on the ground, where it formed a thick carpet. The operation required the labour of a team for one and one-half hours per acre. This practice of floating permanent alfalfa in the fall prior to picking time seems highly advantageous, since the labour involved is easily compensated by the increased facility with which the operations of picking, pruning and spraying can thereafter be performed. It is also apparent that the alfalfa will rot much more readily when laid flat on the ground during the winter. It is important that the floating be done some time in August, for, if left until later, the alfalfa becomes very tough and springy, refusing to lie flat; also the trees become bent over with their load, making it difficult to get through with a float without destroying some of the crop. Floating earlier than August is inadvisable since it encourages a strong second growth from the crown of the plants.

It has been found that where alfalfa sod mulch is practised, it is necessary to exercise care in making irrigation furrows comparatively large and deep. These furrows, once made, are permanent and it is sufficient to clean them out thoroughly each spring with a single horse plough.

In the five years from 1916-20, the growth made by the trees in this orchard was less than that made by the trees under any other of the six systems of cultural treatment. During the years 1921 and 1922, however, the trees made a greater growth than those in any other of the cultural orchards—indicating that alfalfa is hard on a young orchard during the early years of its life, but that when once the trees and the alfalfa become well established the combination is beneficial to the trees provided always that there is enough water available for both crops. There was also a marked increase in the yield of fruit from this orchard in 1922. Until 1921 the yield of fruit was less than in any of the other orchards, but that year it gave the third largest crop and this year it gave the second largest, being exceeded only by No. 3. The texture of the soil has been wonderfully improved. The humus content has been greatly increased and the ability of the soil to take up moisture rapidly is in marked contrast to the condition which exists just across the flume in No. 1 orchard, where continuous clean cultivation has so injured the physical condition of the soil that great difficulty is experienced in securing a uniform distribution of moisture.



Orchard under clean cultivation.

62139—2

The water requirement of this orchard is the greatest of any system of cultivation under trial here. The amount necessary to provide good moisture conditions for growth and fruitfulness during 1922 was 30·37 acre inches, while the average for seven years was 22·25 acre inches.

Under the system of frequent cutting and discing of the alfalfa practised in this orchard up to 1921, the cost of operation was the most excessive of the six methods under test. The plan adopted this year, however, of leaving the alfalfa uncut promises to make the alfalfa sod mulch the cheapest system of orchard management practised at this station.

ORCHARD NO. 3.—SOILING CROPS AND HAIRY VETCH

For the first five years of its life this orchard was brought up under soiling crops. Peas and oats or barley and vetch were grown and cut for hay, which was fed to stock and the manure returned to the land. The use of a legume in the soiling crop provided a cheap source of nitrogen, while the fact that for every two crops of fodder which were removed one was ploughed under, insured the incorporation of a large amount of humus in the soil. From the start, these two essentials, nitrogen and humus, have been considered in the methods of culture practised in this orchard. The result has been remarkable as can be ascertained by reference to the tables showing comparative yields and growth in the various orchards. Measurements of trunk diameter revealed the fact that the trees in this orchard have made, to date, 5·8 per cent more growth than those in any of the other orchards. Furthermore, a study of crop production over the six years indicates that it has yielded 61 per cent more fruit than any of the others.

In the autumn of 1920 this orchard was seeded down to hairy vetch, which was allowed to go to seed the following summer, and in early August was thoroughly disced into the soil. That year it received only one discing but experience this year indicates that, in discing the vetch with a team, more efficient work can be done if the operation is performed in two stages, with an interval of two or three weeks. The first discing flattens the crop on the ground but does not incorporate it with the soil; if, however, this discing is followed by a thorough irrigation and the crop allowed to rot for a couple of weeks before the final application of the disc, it has been found that the partially decayed vetch works into the soil with a comparatively small expenditure of labour. Where a tractor is available it is probable that the whole operation can be most economically performed at one time.

By thus discing the vetch, the organic matter produced by the cover crop is incorporated with the soil and the vetch is reseeded at least expense. This system of orchard management has many advantages and is suitable for conditions here. An adequate supply of nitrogen and humus, the two essentials to soil fertility most lacking in our bench soils, is assured. The labour of frequent tillage involved in clean cultivation is obviated. The cover crop does not interfere with picking operations in the autumn, nor does it make a heavy demand on the soil moisture during the hot, dry months of July and August, less irrigation water being required by vetch than is the case with alfalfa. Moreover the soil in this orchard is now in excellent physical condition. It absorbs water readily and a uniform distribution of moisture can be secured and maintained more easily than is the case with any of the other orchards. The influence which the soiling crops and vetch have had in improving the texture and moisture-holding capacity of the soil was very clearly indicated in 1921 and 1922 by the behaviour of the first row of trees across the flume in No. 4 orchard. These trees, whose roots extended across into No. 3 orchard, continued to function normally while the remainder of the trees in No. 4 orchard suffered severely from drought.

The water requirement of this orchard has been larger than that of any other system except permanent alfalfa. Before 1921 less than 18 inches of water was needed. In 1921 the amount of water used was 21 acre inches and in 1922 over two acre-feet was applied. Furthermore, the actual time required to irrigate this orchard was less than that for any other except the clean cultivated orchard.

As to cost of operation, taking into account the crop produced and growth made, this plan of bringing up a young orchard appears to be the most economical of all the systems tested. During the first five years, enough hay was secured from the soiling crops to cover the cost of operation, while the trees are now bearing enough fruit to justify the adoption of a cover crop system whereby all the vetch is returned to the soil. The cover crop system, as practised in 1922, cuts down the labour of cultivation to a minimum, the horse work consisting merely of discing in the vetch and ploughing out new irrigation furrows.

ORCHARD NO. 4.—RED CLOVER AND ALFALFA SOD MULCH

During the five years from 1916-21 inclusive, three crops of red clover were grown and ploughed into this orchard. This practice had most disappointing results. Difficulty was experienced in establishing and maintaining the clover, and the process was hard on the trees and on the soil. The clover, being a shallow-rooted plant, competed with the trees for the moisture supply, while the necessity for frequent reseeding, and the long time which invariably elapsed before the young seedlings covered the ground, were conducive to soil puddling and baking.

The average growth of the trees in this orchard to date, as measured by trunk diameter, is eleven per cent less than that of the orchard under soiling crops and vetch to which it is adjacent.

This year all the fruit was removed at thinning time, in order to give the trees a chance to recuperate from their sickly condition.

In the autumn of 1920, the clover was ploughed under and the land manured, in an endeavour to improve the physical condition of the soil. Owing to the fact that the growers throughout the valley were taking such an interest in the alfalfa sod mulch system of orchard culture, it was decided in the spring of 1921 to seed this orchard down to permanent alfalfa. A good stand was secured but great difficulty was experienced in maintaining a sufficient supply of moisture for both the trees and the alfalfa. Although special attention was given to this orchard as regards irrigation, the trees went into the winter with the soil in a very dry condition. Premature defoliation occurred on some trees, while others did not mature their buds and the withered foliage remained on them through the winter.

This orchard came into the spring of 1922 in very poor condition. The trees were very slow in leafing out, and showed unmistakable signs of winter injury. In an endeavour to insure an adequate supply of moisture for the trees this year, trenches were dug on both sides of each tree about three feet from the trunk and at right angles to the irrigation furrows. These trenches were excavated to a depth of several inches below the irrigation furrows and filled full of barnyard manure. Two tons of manure per acre were used and the labour of a man digging and filling the trenches was required for two days. The trenches were so arranged that every time the orchard was irrigated the manure was thoroughly saturated with water. This procedure had most gratifying results. During the early part of the season the trees made little growth and the foliage was very small and of poor colour. By autumn, however, the foliage had turned a dark green and the trees had, to a large degree, their normal, healthy appearance. On July 30, trenches were dug across the irrigation furrows to a depth

of three feet. These revealed the fact that although two acre feet of water up to that time had been applied to this orchard, the soil below a depth of one foot was bone-dry. The only area where live feeder roots were encountered was immediately beneath the irrigation furrows and in the neighbourhood of the manure trenches. These observations emphasize the fact that special care is necessary in the establishing of alfalfa sod mulch in an orchard. The two essentials are: sufficient irrigation water available throughout the season for both the alfalfa and the trees, and the preparation of the soil in such a way that it will absorb and retain enough moisture to supply the young alfalfa during the critical period when the latter is becoming established. Experience here indicates that this desirable condition of the soil can be secured by cover cropping with hairy vetch.

The cost of operation while the orchard was under clover, considering the effect on the physical condition of the soil and the yield and growth of the trees, does not compare favourably with the other methods of culture which are being tried out. Consequently one feels justified in discouraging the growing of clover in orchards where the soil and climatic conditions are such as prevail in the Southern Okanagan.

ORCHARD NO. 5.—TRUCK CROPS—MANURED EACH YEAR

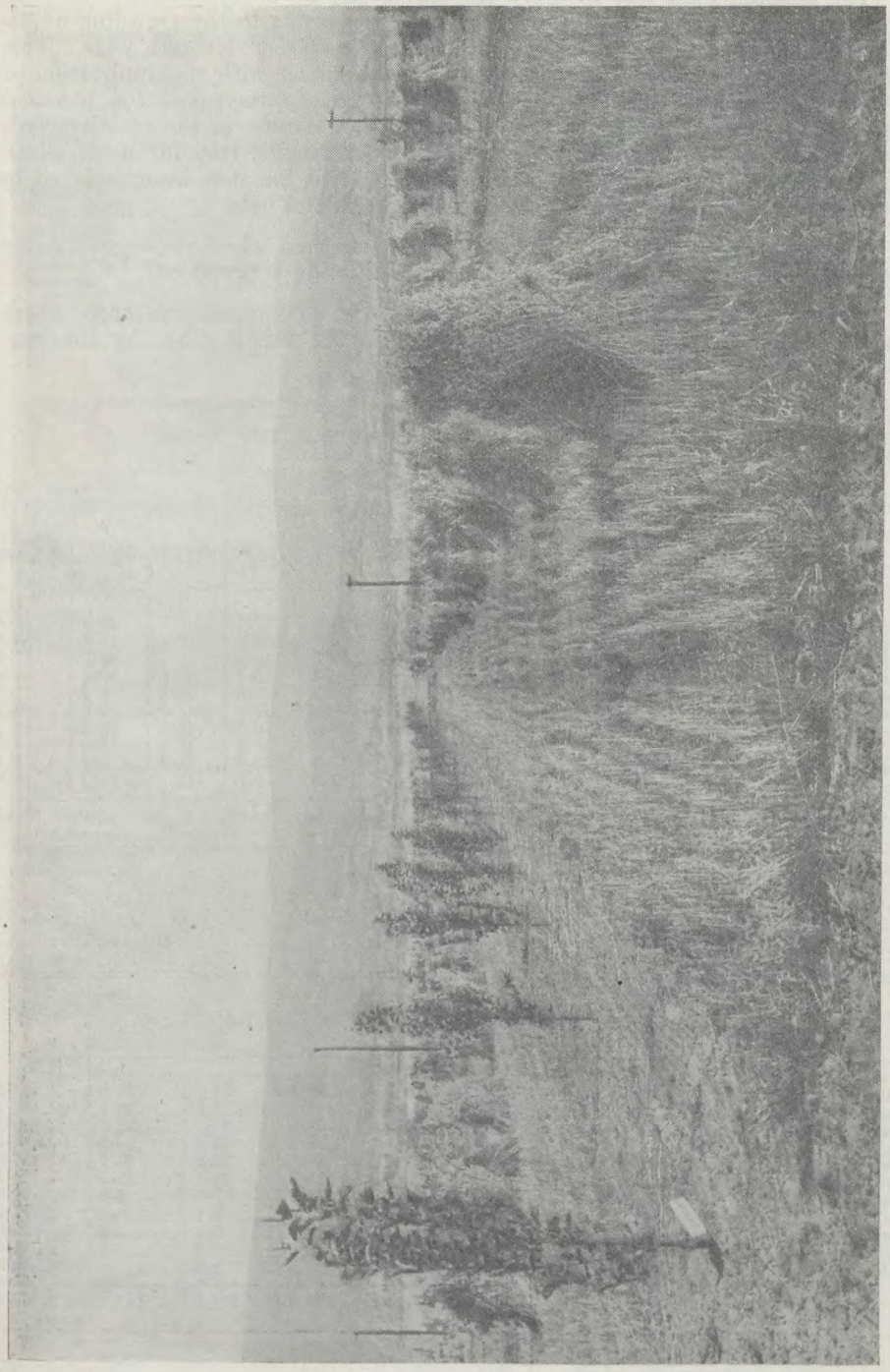
Owing to the great interest which is being taken by growers throughout the valley in the use of hairy vetch as a cover crop it was decided to modify the culture of this orchard so as to include a cover crop of vetch every two years. Accordingly, in April, 1922, every other strip was sown to hairy vetch—the remaining strips being utilized for the production of truck crops. The vetch had made strong growth by the end of June and was then ploughed under and the land kept clean cultivated for the remainder of the summer. This procedure insured the incorporation of a certain amount of humus and nitrogen with the soil and, at the same time, was most economical of irrigation water, less than an acre-foot being required during the season. The fact that every other strip was seeded to vetch also greatly facilitated the operation of spraying, for the passage of the spray wagon over the vetch did it no harm, whereas it is difficult to avoid damaging truck crops. Where there is a serious shortage of irrigation water, this method of handling vetch appears to have some advantage over permanent cover-cropping. It is, however, more costly and does not supply such an abundance of humus and nitrogen. A table showing the comparative water and labour requirement of this system of vetch cover cropping, permanent vetch, and alfalfa sod mulch, is to be found elsewhere in this report.

This method of culture has been most economical of irrigation water, being second of all the orchards in the quantity of water used.

The cost of operation is greater than where cover crops alone are used, but this is offset by the production of cash crops, which can be made to yield a return from the land before the trees come into bearing.

ORCHARD NO. 6.—FARM ROTATION

The method of culture practised in this orchard is adapted to the farmer who is raising some stock in connection with an orchard. For the first five years, a rotation was practised involving three years of clover, one of mangels and one of grain. The growth of the trees has been very satisfactory and the comparatively low yield of fruit is explained by the fact that this orchard, like No. 5, is subjected to the full force of southerly gales which blow off a good deal of fruit during the summer months.



Orchard, Second Year after Planting.

The original plan was to leave the clover down for three years, but such difficulty was experienced in establishing this crop owing to the crowding of the young plants with weeds, that the crop has been turned under each year. This frequent incorporation of a green manure crop, together with the application of barnyard manure in the hoed crop year, has greatly improved the physical condition of the soil. The reason for including a legume in the rotation was, however, not only to build up the soil but also to provide feed for stock. Since the clover failed to measure up to this requirement it has now been replaced in the rotation by a soiling crop of spring vetch, peas and oats.

The water requirement of this orchard is less than where permanent cover crops are grown but more than where clean cultivation is practised.

There is more labour involved in this system of management than where cover cropping or clean cultivation is practised but this is offset by the production of feed for stock.

TWIG LENGTH INDICATING GROWTH DURING 1922

Average growth in inches per terminal shoot

Variety	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	Variety average
Delicious	18·2	25·1	24·5	15·7	19·2	20·8	20·6
Yellow Newtown	17·3	19·9	20·0	16·8	19·4	19·6	18·8
Grimes Golden	19·7	20·2	19·7	17·9	15·2	14·3	17·8
Yellow Transparent	15·8	21·0	25·7	9·7	13·7	19·6	17·6
McIntosh Red	20·2	21·7	19·2	11·0	15·5	16·4	17·3
Rome Beauty	25·4	19·5	15·8	12·6	13·9	12·9	16·7
Wagener	21·3	17·4	20·4	6·4	16·0	18·8	16·7
Cox Orange	17·9	17·7	12·7	16·3	13·8	15·1	15·6
Jonathan	14·5	18·2	17·9	13·9	13·5	13·6	15·3
Duchess	17·3	17·1	19·6	8·6	13·1	14·2	15·0
Orchard average	18·76	19·78	19·55	12·89	15·33	16·53	17·14

APPLE YIELDS, 1922

In Boxes per Orchard

Variety	No. 1	No. 2	No. 3	No. 5	No. 6	Variety Total
McIntosh	64·7	64·7	82·8	38·5	35·6	286·3
Jonathan	26·0	34·8	54·2	31·5	20·5	167·0
Grimes Golden	27·5	33·8	51·8	28·3	19·3	160·7
Duchess	26·6	29·4	27·2	29·8	19·5	132·5
Rome Beauty	11·5	17·2	36·3	33·9	20·7	119·6
Cox Orange	13·4	10·4	13·5	11·1	15·9	64·3
Yellow Transparent	6·8	12·3	24·5	7·5	9·8	60·9
Wealthy	8·4	7·3	15·4	6·1	–	37·2
Wagener	7·3	7·3	5·4	7·9	5·0	32·9
Newtown	7·5	3·2	14·6	2·4	1·6	29·3
Delicious	2·0	2·1	4·6	1·8	–	10·5
Orchard total	201·7	222·5	330·3	198·8	147·9	1,101·2

APPLE YIELDS, 1916–22 INCLUSIVE (seven years)
Average Yield in Pounds per Tree

Variety	No. 1	No. 2	No. 3	No. 5	No. 6	Variety average
McIntosh Red	173·4	208·4	279·1	139·5	126·9	185·46
Jonathan	96·5	127·2	243·8	140·0	93·5	140·18
Duchess	138·4	122·1	141·0	111·9	92·4	121·16
Yellow Transparent	97·7	102·6	150·1	76·6	78·0	101·04
Wagener	107·8	82·7	131·7	85·9	82·6	98·18
Grimes Golden	75·4	81·8	151·8	66·6	55·2	86·18
Cox Orange	81·2	53·9	110·2	64·6	91·0	80·14
Rome Beauty	45·3	70·8	102·5	96·8	56·6	74·44
Yellow Newtown	41·0	8·7	67·6	8·2	7·9	26·66
Delicious	10·8	8·4	17·8	5·5	0·2	8·54
Orchard average	86·75	86·66	149·56	79·56	68·43	92·20

APPLE YIELDS, 1922
Average Yield in Pounds per Tree

Variety	No. 1	No. 2	No. 3	No. 5	No. 6	Variety average
McIntosh Red	129·8	129·9	175·7	76·9	71·2	116·7
Jonathan	52·1	69·5	108·5	63·0	41·0	66·8
Grimes Golden	54·0	67·6	103·6	56·6	38·6	64·1
Duchess	53·2	58·8	54·4	59·6	39·0	53·0
Cox Orange	53·6	41·7	54·2	44·6	63·6	51·5
Rome Beauty	23·1	34·4	72·6	67·8	41·4	47·9
Yellow Transparent	13·6	24·6	49·0	15·0	19·6	24·4
Wagener	14·6	14·6	10·8	15·8	10·0	13·2
Newtown	15·0	6·4	29·2	4·8	3·2	11·7
Delicious	4·0	4·2	9·2	3·6	.....	4·2
Orchard average	41·3	45·17	66·72	40·67	32·76	45·35

TRUNK DIAMETER—INDICATING GROWTH 1916–22 INCLUSIVE
Average Diameter in Inches per Tree

Variety	1	2	3	4	5	6	Variety average
McIntosh Red	4·99	4·70	5·38	4·91	5·09	5·23	5·050
Delicious	4·70	4·71	5·28	4·66	4·90	4·41	4·777
Cox Orange	4·60	4·25	4·75	4·45	4·72	4·78	4·598
Yellow Newtown	4·80	4·18	4·88	4·50	4·79	4·34	4·582
Grimes Golden	4·73	4·41	4·88	4·11	4·55	4·45	4·522
Yellow Transparent	4·20	4·20	5·11	4·51	4·51	4·60	4·522
Jonathan	4·34	4·42	4·44	4·59	4·50	4·64	4·458
Wagener	4·26	4·33	4·69	4·13	4·01	4·33	4·292
Duchess	4·28	4·15	4·44	3·80	4·25	4·40	4·220
Rome Beauty	3·79	3·93	4·58	4·05	4·24	4·04	4·105
Orchard average	4·469	4·310	4·843	4·371	4·556	4·522	4·553

INCREASE IN TRUNK DIAMETER DURING 1922
Average Increase in Inches per Tree

Variety	1	2	3	4	5	6	Variety average
Yellow Transparent	·66	·54	·74	·97	·94	·78	·772
Grimes Golden	·74	·70	·73	·77	·74	·56	·707
Wagener	·81	·74	·75	·69	·55	·69	·705
Delicious	·74	·81	·89	·67	·74	·37	·703
McIntosh Red	·78	·61	·78	·62	·73	·69	·702
Cox Orange	·30	·63	·73	·85	·82	·73	·677
Duchess	·68	·69	·64	·71	·53	·74	·665
Jonathan	·74	·95	·25	·67	·61	·63	·642
Yellow Newtown	·77	·58	·64	·50	·74	·55	·630
Rome Beauty	·52	·66	·68	·55	·60	·48	·582
Orchard average	·674	·691	·683	·700	·700	·622	·678

VARIETY APPLE ORCHARD

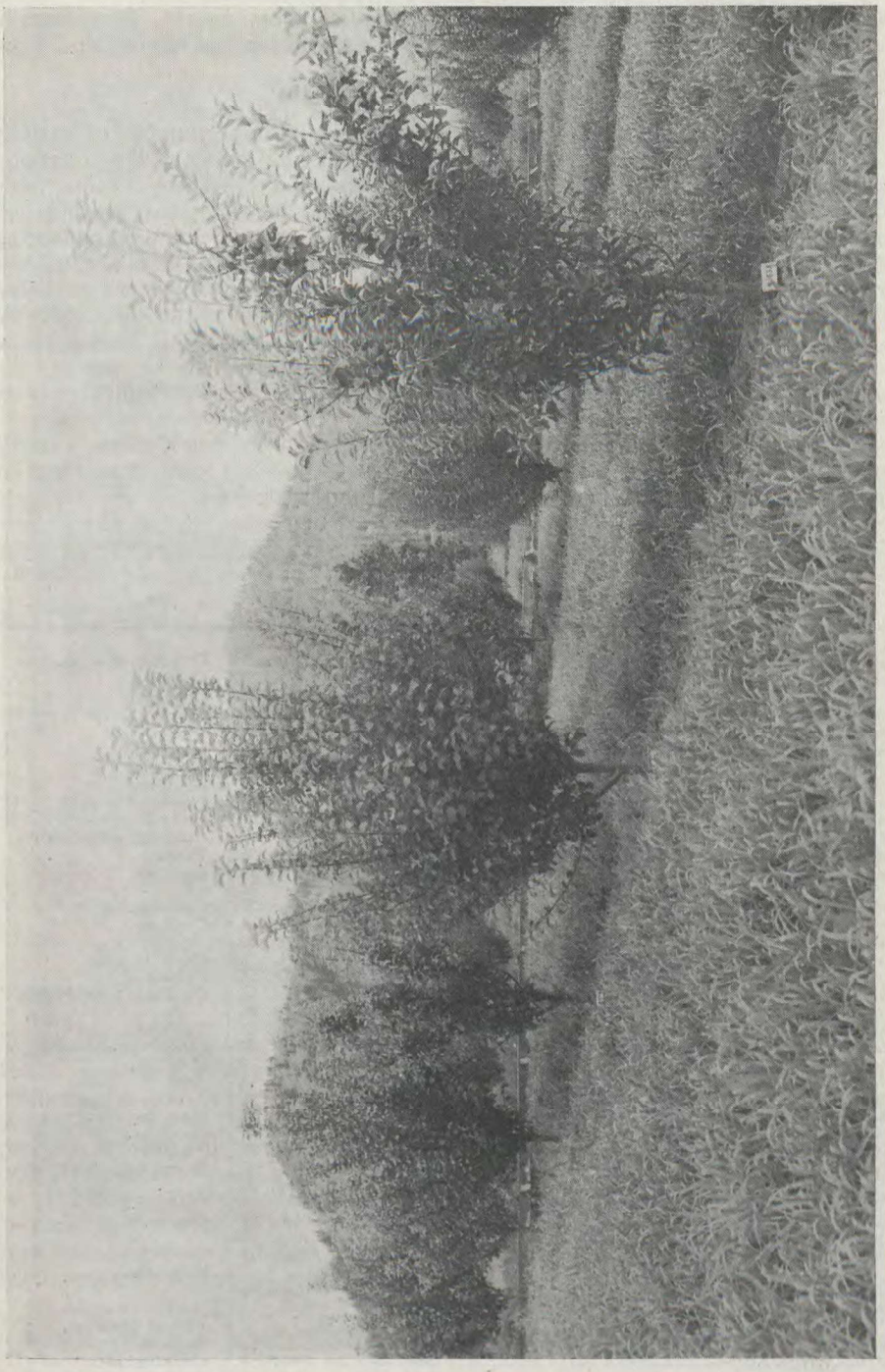
In this orchard are planted two trees each of the most important varieties grown in the district, the object being to test them for cropping, keeping quality, hardiness, and disease resistance. The experiment has not yet reached the stage where definite information can be given as to respective merits of the varieties under test. However, a number of trees fruited in 1922; the crop was harvested and kept in the storage cellar. The fruit from young trees is usually poor in keeping quality, but observations of the condition of the apples in storage were made from time to time. The following table shows the age of the trees, the average yield in pounds per tree, the date of picking and the date to which the fruit remained in good condition in storage:—

VARIETY APPLE STORAGE RECORDS, 1922-23

Variety	Age of tree	Yield in lbs. per tree	Picking date	Storage life
Winter Banana		80·0	Oct. 7	Nov. 28
Waldron Beauty		74·0	Sept. 26	Nov. 28
Gano		72·0	Sept. 13	
Stayman Winesap		61·0	Oct. 9	
Grimes		60·0	Oct. 7	Jan. 21
American Golden Russet		60·0	Oct. 7	Oct. 31
McIntosh Red		54·0	Sept. 27	Nov. 28
Cox Orange		52·5	Sept. 27	Nov. 28
McMahon White		52·0	Aug. 31	Sept. 25
Yellow Transparent		42·0	Aug. 16	Aug. 25
Red Cheek Pippin		35·5	Oct. 7	
King David		28·5	Oct. 7	Jan. 21
North West Greening		28·5	Oct. 7	Feb. 28
Opalescent		25·5	Sept. 27	Jan. 21
Fameuse		24·0	Sept. 26	Nov. 28
Rhode Island Greening		23·5	Oct. 7	Jan. 21
Rome Beauty		23·0	Oct. 7	Jan. 21
York Imperial		21·0	Oct. 9	
Talman Sweet		20·0	Oct. 9	Nov. 28
Hubbardston		19·0	Oct. 7	Feb. 28
Ortley		17·5	Oct. 7	Jan. 21
Suffield		16·5	Aug. 31	Sept. 14
Wilson Red June		15·5	Aug. 16	Aug. 25
Alexander		15·5	Aug. 31	Sept. 14
Peasgood		13·0	Aug. 31	Sept. 25
Spitzenburg		12·5	Oct. 7	Dec. 12
Scott Winter		12·0	Oct. 7	Jan. 21
Vanderpool Red		9·5	Oct. 7	
Wolf River		9·0	Aug. 31	Sept. 14
Astrachan		8·0	Aug. 16	Aug. 25
Lowland Raspberry		6·0	Aug. 16	Sept. 4
Winesap		6·0	Oct. 7	
Wagener		5·0	Oct. 9	Jan. 21
Duchess			Aug. 16	Sept. 4
Charles Ross			Sept. 13	Sept. 25
Goal			Sept. 13	Oct. 5
Wismer			Sept. 8	Oct. 5
Maiden Blush			Sept. 13	Oct. 5
Ben Davis			Sept. 13	Feb. 14
Forest			Oct. 6	

The following is a list of varieties of apples recommended for the Okanagan Valley by a committee of fruit growers, commercial men, market commissioners, horticulturists, and fruit inspectors which met at Vernon in 1921 to consider the matter.

Districts north of Kelowna and including Kelowna: Duchess, Wealthy, McIntosh, Delicious, Rome Beauty. (Salmon Arm: Duchess, Wealthy, McIntosh).



Showing unpruned Fillers Wageners with McIntosh as Standards.

Districts south of Kelowna: Gravenstein, Jonathan, Delicious, Rome Beauty, Stayman, Winesap. (Jonathan as filler trees only). (Stayman, in Penticton, Summerland and Naramata only). (Winesap in Osoyoos and Keremeos only).

NEW VARIETIES OF APPLES

The variety orchard includes two trees each of a large number of varieties of apples originated at the Central Experimental Farm, Ottawa. These varieties are being tested out for yield, quality, hardiness and disease resistance under Okanagan conditions. It will be several years yet before it can be definitely ascertained whether any of them deserves a place in the commercial plantings of the Okanagan Valley. However, a McIntosh seedling named Melba gives great promise as a summer apple. Ripening a few days later than Yellow Transparent, it has dessert and keeping qualities far superior to either this variety or the Astrachan. The fruit is attractive in appearance and possesses some of the aroma of the McIntosh. The tree appears to be healthy and vigorous, bearing annual crops and distributing its fruit uniformly over the entire bearing surface.

The following table shows some of the more promising Ottawa varieties compared with Duchess, Wealthy and McIntosh as to yield, date of picking, and date to which the fruit remained in good condition in storage.

STORAGE APPLES—OTTAWA VARIETIES, 1922-23

Variety	Yield in lbs. per tree	Picking date	Storage life	Remarks
Cobalt	18·5	Oct. 5	Nov. 28	Cooking, poor quality.
Jethro	70·0	Aug. 22	Sept. 4	Cooking.
Kildare	70·0	Sept. 1	Oct. 5	Cooking.
Brisco	61·5	Sept. 1	Sept. 25	Dessert.
Casco	61·0	Aug. 22	Sept. 4	Dessert.
Brock	55·0	Sept. 1	Sept. 25	Cooking.
Diana	55·0	Sept. 1	Sept. 14	Dessert.
Danville	54·0	Oct. 5	Nov. 28	Cooking.
Lobo	53·0	Sept. 11	Sept. 14	Dessert.
Pinto	41·0	Sept. 5	.....	Picked too soon.
Humber	40·0	Oct. 6	Jan. 21	Cooking ,poor quality.
Valerie	40·0	Sept. 1	Sept. 25	Dessert.
Joyce	40·0	Sept. 1	Sept. 14	Cooking.
Atlas	37·5	Sept. 1	Sept. 14	
Cora	36·5	Sept. 5	Sept. 25	Cooking.
Nile	36·0	Aug. 22	Sept. 4	Cooking.
Melba	34·0	Aug. 16	Sept. 4	
Rocket	32·5	Sept. 8	Oct. 5	Cooking, acid.
Luke	31·0	Sept. 5	Sept. 25	Cooking.
Moreno	30·5	Sept. 5	Sept. 25	Cooking, poor quality.
Dudley	28·5	Sept. 1	Sept. 25	
Rosalie	28·0	Oct. 6	Nov. 28	Cooking.
Vermac	25·0	Oct. 5	Feb. 28	Dessert, good quality.
Petrel	25·0	Aug. 22	Sept. 4	Cooking.
Gerald	23·0	Sept. 5	Oct. 5	Acid.
Mendel	22·0	Oct. 5	Jan. 21	Acid, poor quality.
Niobe	22·0	Oct. 5	Nov. 28	Poor quality.
Linton	20·0	Aug. 22	Sept. 4	Cooking.
Elmer	19·5	Oct. 5	Nov. 28	Tough.
Pedro	19·0	Sept. 5	Oct. 5	Dessert, fair quality.
Crusoe	15·0	Aug. 16	Aug. 25	
Ramona	9·5	Aug. 22	Sept. 4	Cooking.
Garnet	8·0	Oct. 5	Oct. 31	Coarse.
Rupert	7·0	Aug. 16	Aug. 25	
Dulcet	3·0	Sept. 5	Oct. 5	
Ascot	2·0	Sept. 5	.....	Picked too soon.
Melvin	.....	Aug. 22	Sept. 4	
Winton	.....	Sept. 11	Oct. 5	
Carno	.....	Sept. 11	.....	Picked too soon.
Holz	.....	Sept. 11	.....	Dessert.
Nemo	.....	Sept. 11	Oct. 5	Cooking, poor quality.
Severn	.....	Sept. 11	Oct. 5	Dessert, poor quality.

MANURING AND FERTILIZING EXPERIMENTS

FERTILIZER EXPERIMENT WITH WINESAP APPLES

An experiment is being conducted with nineteen trees of the Winesap variety; the object in view being to ascertain whether the size of the apples can be increased by heavy applications of barnyard manure and nitrate of soda, applied either singly or in combination.

The trees are still very young, having been planted in 1916, and have not yet come into full bearing, so that any statement made at this time as to the effect which the fertilizer is having would be premature. However, there was some fruit produced this season and the following table shows the method of treatment, yield, average size of fruit, trunk diameter and twig growth, as noted in the fall of 1922.

TABLE SHOWING THE RESULTS OF A FERTILIZER EXPERIMENT WITH WINESAP APPLES

Method of Treatment	Tree number	1922 yield in lb.	Average diameter of apples in inches	Trunk diameter of tree in inches	1922 twig growth in inches per twig
Manure dug in for ten feet around tree in spring.	352	.....	.....	4·3	12
	353	13	2 10/16	4·6	20
	354	32	2 7/16	5·0	16
Manure in spring; 5 lbs. nitrate of soda in fall.	348	44	2 3/16	4·0	13
	349	11	2 5/16	4·7	20
	350	23	2 5/16	4·2	17
	351	5	2 8/16	4·3	16
Manure in spring; 5 lbs. nitrate of soda in spring.	201	2	2 8/16	4·1	22
	202	6	2 8/16	4·4	10
	203	17	2 8/16	4·4	14
	204	26	2 8/16	5·0	14
Manure in spring; 5 lbs. nitrate of soda in fall; 5 lbs. nitrate of soda in spring.	205	6	2 7/16	4·3	12
	206	.....	.....	4·0	15
	207	7	2 7/16	4·5	15
	208	12	2 8/16	4·6	14
	209	17	2 7/16	4·6	14
Check trees: no manure or nitrate of soda.	490	2	2 9/16	4·5	20
	491	11	2 6/16	4·0	11
	492	3	2 7/16	4·1	13

STONE FRUIT ORCHARDS

There are two orchards in this experiment, each approximately two acres in area. These are planted to the varieties of stone fruits most likely to be of commercial value in this district. The object in view is to determine the most profitable varieties for home use, shipping and canning; bearing in mind cropping, quality, disease resistance, and hardiness. In the spring of 1921 the lower stone fruit orchard was seeded down to alfalfa and is being carried on under the alfalfa sod mulch system of culture, while vetch cover cropping is being practised in the upper orchard. The idea was to test out the relative merits of these two systems of orchard management as regards growth, yield, soil condition, water requirement and cost of operation.

During the summer of 1921, the lower orchard, which had been newly seeded to alfalfa, suffered severely from water shortage. This drought condition, coupled with the long winter, so injured the trees that in many cases they failed to recover in 1922. Cherries suffered the most, a number of them being killed

outright. Peaches and apricots were also seriously injured, most of the fruit wood being destroyed. Plums made the best recovery, carrying, on the average, quite a fair crop of fruit. During the irrigation season of 1922, special attention was given to this orchard, two and a half acre feet of water being applied. In spite of this fact, premature defoliation took place on many trees.

In comparison with these conditions existing in the lower orchard, the trees in the upper, where permanent vetch cover cropping has been practised since 1921, are in excellent health and bore good crops both in 1921 and 1922. It is remarkable also that less water was applied to this orchard both in 1921 and 1922 than was applied to the orchard under alfalfa. The vetch is supplying enough humus to keep the soil in good condition for absorbing and retaining moisture, and enough nitrogen to stimulate plenty of new growth in the trees.

Accordingly one feels justified in advocating the use of vetch as a cover crop in stone fruit orchards rather than the use of the alfalfa sod mulch system.

Insufficient data have been accumulated as yet to make possible a definite statement as to the relative commercial value of the varieties under test, but two peaches not at present grown to any extent in the Southern Okanagan appear to be worthy of a more extensive trial in this area. These varieties are the Rochester and the Muir.

The Rochester is a yellow-fleshed, freestone peach of the Crawford group, ripening about the season of the Yellow St. John. Storage and shipping tests of these two varieties, picked on the same date and at the same stage of maturity, showed the Rochester to have superior keeping and shipping qualities. The fruit is of high class dessert quality, having a melting flesh and an excellent flavour. In appearance this peach is attractive, though it is highly pubescent and does not take on as much colour as the St. John. A possible weakness in the Rochester is that it ripens over a comparatively long season, necessitating several pickings. There is also a tendency for the fruit to size up unevenly, unless very systematic thinning is practised.

The Muir is a yellow-fleshed, freestone peach ripening about the season of the Early Crawford. The tree appears to be quite hardy and most prolific, bearing a heavy crop of large peaches. Weaknesses of the variety are that the fruit is a dull yellow in colour with heavy pubescence, bruises easily and lacks the quality of the Crawfords. Accordingly this variety cannot be considered a serious competitor of the Crawfords in regard to quality, but appears to have a considerable advantage over varieties of this group in yielding capacity.

In 1922 there was practically no fruit produced in the lower orchard which was seeded to alfalfa in 1921, but good crops were produced in the upper orchard under vetch. The average yield per tree in 1922, with notes made at picking time, is shown in the tables below.

The following are the varieties of stone fruits and pears recommended by the Vernon conference.

Districts north of Kelowna and including Kelowna:—

Pears.—Flemish Beauty, Anjou, Howell.
Cherries.—Olivet and Morello.
Plums.—Italian Prune.

Districts south of Kelowna:—

Pears.—Flemish Beauty, Anjou, Dr. Jules Guyot, Howell, Bosc, Bartlett.
Cherries.—Bing, Lambert, with Republican or Tartarian as pollenizers.
Apricots.—Moorpark, Tilton, Blenheim
Peaches.—Yellow St. John, Early Crawford, Elberta.
Plums.—Peach, Bradshaw, Climax, Tragedy, Green Gage, Damson, Italian Prune.

Walnuts.—In 1917 a number of walnut seedlings, from a cross between the English walnut (Juglans regia) and the Black walnut (Juglans nigra), were planted in the stone fruit orchard. These are grown with the view of isolating a variety possessing the quality of kernel found in the English species, combined with the hardiness of the black walnut. A number of these trees fruited in 1921 and 1922. The nuts were very promising being of good quality with thin shells. It will be necessary, however, to test out the trees for yielding capacity, hardiness and disease resistance before it can be ascertained whether any of these seedlings compare favourably with the standard varieties now being grown to a very limited extent in the Okanagan Valley.

PLUMS—1922 YIELDS
Trees all seven years old

Variety	Number of trees	Average yield in lb. per tree	Picking dates	Remarks
Pond Seedling	10	145·0	Sept. 7, 12, 19	
Jefferson	4	131·0	Aug. 16	
Red June	2	130·0	Aug. 22	
Wickson	10	127·5	Sept. 12	
Peach	10	127·0	Aug. 9, 10	
Yellow Egg	5	114·0	Sept. 7, 12	
Imperial Gage	3	87·5	Aug. 25, 30	
Coe Golden Drop	2	86·0	Sept. 25	
Burbank	6	85·0	Aug. 22, 30	
Climax	2	82·5	Aug. 18	
Santa Rosa	5	81·0	Aug. 18	
Green Gage	2	55·0	Oct. 5	
Duarte	2	52·0	Aug. 30	
Columbia	2	47·5	Aug. 30	
Bradshaw	2	42·5	Aug. 21	
Damson	2	30·0	Sept. 25	
Maynard	2	26·5	Sept. 1	

PEACHES—1922 YIELDS IN LOWER ORCHARD ONLY
Trees all seven years old

Variety	Number of trees	Average yield in lb. per tree	Picking dates	Remarks
Hale Early	10	286·5	Aug. 22	
Muir	18	134·5	Sept. 19	
Rochester	14	119·0	Aug. 25, 30.	
Early Crawford	9	91·5	Sept. 14	Upper orchard.
Yellow St. John	6	75·0	Aug. 30, Sept 2	
Triumph	7	57·0	Aug. 17, 18.	

PRUNES—1922 YIELDS
Trees all seven years old

Variety	Number of trees	Average yield in lb. per tree	Picking dates	Remarks
Silver	6	157·5	Sept. 7, 26	Lower orchard.
Italian	12	140·0	Sept. 25, 29, Oct. 4	Upper orchard.
Sugar	7	105·0	Aug. 28	Upper orchard.
Tennant	12	65·5	Sept. 7	Lower orchard.
Tragedy	2	35·5	Aug. 10, 22	Upper orchard.

APRICOTS—1922 YIELDS FOR UPPER ORCHARD ONLY
Trees are all seven years old

Variety	Number of trees	Average yield in lb. per tree	Picking dates	Remarks
Moorpark	10	107	Aug. 1, 3, 27	Fruit large and firm. Tendency to ripen on one side only.
Superb	7	74	July 26, 27	Fruit small and soft.
Blenheim	1	62½	Aug. 3	Fruit firm.
Montgamet	2	49	July 31	Fruit inclined to be soft.
Hemskirke	1	44	Aug. 2	Fruit inclined to be soft.
Peach	2	11	Aug. 9	Fruit inclined to be soft.
Royal	1	6	Aug. 9	Fruit large but bruises easily.

CHERRIES—1922 YIELDS—IN UPPER ORCHARD
Trees seven years old

Variety	Number of trees	Average yield in lb. per tree	Picking dates	Remarks
Olivet	8	86·5	July 31, Aug. 2	
Early Richmond	1	75·0	July 5	
Royal Anne	6	66·0	July 17	
Lambert	6	28·0	July 20, 21	
Black Tartarian	8	7·0	June 28	

THINNING EXPERIMENTS, 1922

A comprehensive thinning experiment, embracing all the trees in the cultural apple orchards, was begun last year and is being carried on this year. The objects in view are: first, to determine the effect of various degrees of thinning on the yield and grade of fruit produced during the season when the thinning is done; and, second, to determine the effect of various degrees of thinning, practised consistently over a number of years, on the bearing habit of the trees. This experiment will be continued as long as the trees are in existence.

Procedure.—Thirty-six trees of each of the varieties in the cultural orchards are thinned severely, thirty-six moderately, and thirty-six lightly.

Severe thinning consists of the removal of all but one apple to a spur, alternate spurs only being permitted to bear, the apples being spaced approximately eight inches apart over the tree. This system is practised on every second, fifth and eighth standard and filler from the west end of each orchard.

Moderate thinning involves the removal of all but one apple from each spur and is practised on every third, sixth, and ninth standard and filler from the west end of each orchard.

Light thinning consists of the removal of all but *two* apples to a spur and is practised on every fourth, seventh, and tenth standard and filler from the west end of each orchard.

Results.—In 1922 the fruit was graded into one's, two's and culls. During a heavy gale on October 2, a great deal of the fruit was blown off and in order to obtain relative figures these windfalls were graded as though they had been picked ordinarily. The results can in no way be considered as conclusive, since

they represent the work of only two years and apply to trees only seven years of age which have made very vigorous growth and are exceptionally well provided with healthy foliage.

Only six varieties yielded a large enough crop to give the various systems of thinning a fair test. The yields of these varieties are tabulated below in average production per tree.

THINNING EXPERIMENTS, 1922

Table showing average yield of apples per tree where heavy, medium and light thinning were practised

Variety	Grade	Average Yield in Pound per Tree		
		Heavy	Medium	Light
McIntosh Red	1's	67·6	86·6	88·6
	2's	19·9	43·5	34·1
	Culls	1·1	3·2	23·7
	Total	88·6	133·3	146·4
Jonathan	1's	36·5	38·7	39·5
	2's	14·4	20·1	26·2
	Culls	7·9	12·9	14·8
	Total	58·8	71·7	80·5
Rome Beauty	1's	29·4	37·2	50·4
	2's	11·4	14·7	22·3
	Culls	2·2	1·9	3·6
	Total	43·0	53·8	76·3
Grimes Golden	1's	45·5	54·2	60·7
	2's	10·7	10·8	11·9
	Culls	1·0	2·0	2·3
	Total	67·2	67·0	74·9
Duchess	1's	15·1	22·3	27·8
	2's	17·7	22·9	26·4
	Culls	6·3	7·1	9·5
	Total	39·1	52·3	63·7
Yellow Transparent	1's	23·7	18·9	27·4
	2's	7·2	10·9	7·6
	Culls	3·3	6·0	5·4
	Total	34·2	35·8	40·4
Average of six varieties	1's	36·3	43·0	49·1
	2's	13·5	20·5	21·4
	Culls	3·6	5·5	9·9
	Total	53·4	69·0	80·4

SUMMARY OF RESULTS FROM THINNING IN CULTURAL APPLE ORCHARDS IN 1922

With all the six varieties which yielded a large enough crop to give a fair comparative test of the various systems of thinning:—

Heavy thinning gave a lower total yield and a lower yield of one's and two's than did medium or light thinning. The percentage of culls was considerably reduced by the heavy thinning.

Medium thinning gave a lower total yield and a lower yield of one's and two's than did light thinning except in the case of McIntosh which had a greater yield of No. 2's. The percentage of culls was greater than where heavy thinning was carried out and less than where light thinning was practised.

Light thinning gave the highest total yield and the highest yield of one's and two's, McIntosh excepted in the latter case. There was, however, the greatest percentage of culls where this method of thinning was adopted.

These results are essentially the same as those obtained for 1921.

The method of thinning appeared to have little effect on the quantity of fruit blown off by the wind.

CONCLUSIONS

The results of last and this year's work indicate that the degree of thinning which will give the greatest financial returns is determined by the condition and general vigour of the tree. Trees which are young and carrying a large amount of healthy foliage can mature more apples per foot of branch than can trees which are lacking in vitality or are deficient in foliage.

Although the results of the work for the past two years indicate that comparative light thinning gave a greater yield of marketable fruit than did medium or heavy thinning, it must be borne in mind that the trees are young and very vigorous, so that the results obtained can in no sense be taken to apply to older trees in orchards where growth conditions are not so favourable. Furthermore, the effect of various degrees of thinning on the regulation of annual bearing has yet to be determined. With a view to securing definite information as to the effect of heavy thinning in promoting annual bearing, a number of spurs on the heavily thinned trees were labelled with metal tags in 1921. This procedure will make it possible to keep a record of the actual performance of individual spurs over a number of years.

SPUR PERFORMANCE

An experiment in spur performance was begun in 1921, the object being to secure definite information with regard to the effect of heavy thinning in promoting annual bearing.

Procedure.—A hundred and eighty spurs on heavily thinned trees of each of the varieties of apples in the cultural orchards were labelled with tinfoil tags. Sixty of these tags were stamped with the number " 1," signifying that all the fruit save one were removed from the spur at thinning time. Sixty were stamped with a " 2 " to indicate that *all* fruits were removed at thinning time. The number " 3 " stamped on the sixty remaining tags served to record the fact that these spurs were carrying no fruit at thinning time.

Results.—In the spring of 1922 these spurs were examined and notes made of their performance.

The following table shows the percentage of spurs which fruited in 1922:—

TABLE SHOWING PERCENTAGE OF SPURS WHICH FRUITED IN 1922

Variety	Allowed to bear one apple in 1921	All fruit removed in 1921	Number fruit set in 1921
	Percentage of spurs fruiting in 1922		
McIntosh	35	33	98
Rome Beauty	38	39	96
Jonathan	24	20	84
Cox Orange	12	14	73
Grimes Golden	Nil	Nil	76
Duchess	"	"	64
Yellow Transparent	2	"	46
Yellow Newtown	Nil	"	22
Wagener	"	"	14
Delicious	"	"	8

Since the trees are young, the number of spurs comparatively small, and since the work has only been carried on for one year, no definite conclusions

can be drawn from these figures. The information already secured is sufficiently interesting, however, to justify a few general observations.

The fact most worthy of attention is that the removal of all fruit from a spur at thinning time did *not* encourage that spur to fruit the following year. With McIntosh, Rome Beauty, Jonathan, and Cox Orange, a certain number of spurs so tested in 1921 did fruit in 1922. An equal number of spurs, however, which were allowed to bear fruit in 1921 fruited again in 1922. On the remaining varieties in the experiment, practically no fruit was borne either on spurs which produced fruit in 1921, or from which all fruit was removed at thinning time in that year. A high percentage of the spurs that were resting in 1921 fruited in 1922, except in the case of Newtown, Wagener and Delicious. These exceptions may be explained on the ground that 1921 was an off-year for Wagener, while Newtown and Delicious have not yet come into full bearing.

The results of this experiment suggest that heavy thinning alone cannot be expected to induce annual bearing. The maintenance of uniform conditions of soil moisture and the provision of an adequate supply of humus and nitrogen are probably of greater importance than thinning in the promotion of regular bearing.

THINNING OF STONE FRUITS

Thinning tests were carried out on apricots, peaches, and plums in 1922. Fruit invariably ripened up earlier and more uniformly where thinning was practised. In many cases the fruit on thinned trees was over double the size of that where no thinning was done, and a great deal of the fruit produced on the unthinned trees was too small to be marketable. On many of the unthinned trees large branches snapped off with the overload of fruit. Overloading has also had a very noticeable effect in reducing the vitality of unthinned trees.

Accordingly it is readily apparent from this year's experiments that in order to maintain vigour in the trees, and in order to produce a high percentage of marketable fruit, thinning of apricots, peaches and plums is a necessity.

EXPERIMENT IN PICKING APPLES

The fact that many carloads of immature apples are sent out of the Okanagan Valley every year is ample proof of the need of more information on the correct time to pick apples so that they may arrive on the market in perfect condition.

With this aim in view, an experiment in dates of picking apples was started in 1920. This experiment has been continued both in 1921 and 1922. Since the exact date when apples are ready to harvest varies from one year to another according to seasonal weather conditions, no definite calendar date can be laid down as the proper time to harvest any particular variety. However, by carrying the experiment on over a period of years, it will be possible to determine approximately the date at which picking can safely be started and the length of time over which the harvesting of each variety may be extended to insure the arrival of the apples on the market in prime condition.

In 1922, three peach boxes of each variety of apples in the cultural orchards were harvested every three days throughout the picking season—one box from a tree in each of the clean cultivated, alfalfa sod mulch, and vetch cover crop orchards. This procedure made it possible to test out the keeping quality of apples grown under these different systems of culture, as well as the effect on condition due to picking at different dates. The apples were stored in a concrete basement where the temperature ranged from 26 degrees to 40 degrees F., and the relative humidity varied from 70 to 100 per cent. Owing to the fact that the trees on this Station are still young, the keeping quality of the apples might be expected to be poor and the results cannot be considered to apply to fruit from mature trees. The apples were examined at intervals during the winter, and the following tables show the condition as observed:—

STORAGE APPLES—PICKING DATES, 1922

Rome Beauty

Condition—B—Bad; M—Medium; F—Fair; G—Good

O. No.	Tree No.	Date picked	Seeds	Under Colour	Condition	December 20, 1922	Condition	January 30, 1923	Condition	March 2, 1923
1	432	Sept. 25	Not quite	Green	F	Mealy—past maturity	M	Fair flavour, mealy	G	Jonathan Spot.
2	114	" 25	Not entirely	"	F	"	M	Good flavour	G	" 1 scald.
3	452	" 25	"	"	F	Firm, past maturity	M	" , crisp	G	"
1	121	" 29	Light brown	"	F	Prime for cooking	M	" , mealy	G	"
2	447	" 29	Brown	"	G	" "	F	" , firm	G	
3	104	" 29	"	Yellow	G	" "	F	Fair flavour, crips	G	Jonathan spot.
1	432	Oct. 2	Completely	Green	G	" "	F	Poor "	G	"
2	114	" 2	Entirely br	Changing	G	" "	G	Fair " , crips	G	
3	452	" 2	Light	"	G	Mature	G	Fair " , "	G	
1	121	" 5	"	Green	G	"	G	" "	G	
2	447	" 5	"	Changing	G	"	G	Poor " , mealy	G	
3	104	" 5	Quite	Green	G	"	G	Undeveloped, flavour, tough	G	
1	432	" 9	Brown	"	G	Immature	G	Fair flavour, mealy	G	
2	114	" 9	"	Yellow	G	Mature	F	Poor " , punky	G	
3	452	" 9	"	Changing	G	"	G	" " , mealy	G	
1	434	" 12	Dark brown	"	G	No water core	G	Good "	G	
2	447	" 12	" "	Yellow	G	"	G	Fair " , mealy	G	
3	104	" 12	" "	Changing	G	Mature	G	Poor " "	G	1 breakdown.
1	432 436	" 16	Light brown	Green	G	Water core, high colour	G	Good "	G	
2	114	" 16	" "	"	G	Tendency to water core	G	Undeveloped flavour	G	
3	452	" 16	" "	"	F	2 internal breakdown	M	Poor flavour	F	1 rotten.
1	434	" 20	Dark "	Yellow	G	Tendency to water core, high colour.	G	Good "	F	
2	447	" 20	Light	"	G	Water core, high colour	G	Poor " , mealy	G	
3	103	" 20	Brown	"	G	" "	G	Fair " "	G	
1	439	" 23	Dark brown	"	G	" 1 breakdown	G	" " , hard	G	
2	114	" 23	Light "	Changing	G	" Medium colour	G	Good "	G	
3	451	" 23	" "	"	G	" high colour	G	" " , juicy	F	
1	439	" 28	Dark "	Yellow	G	" 2 broken down	G	" "	G	
2	446	" 28	" "	"	G	" "	G	" "	G	
3	103	" 28	"	"	G	" "	G	" "	G	
1	439	" 30	" "	"	G	" high colour	B	" " internal break down.	F	2 rotten.
2	114	" 30	" "	Green	G	No water core, high colour	G	" "	M	Breakdown.
3	453	" 30	Light "	Yellow	G	Water core, medium colour	G	Excellent flavour, hard	G	

1	439	Nov.	3	"	"	.....	"	"	high	"	.....	G	"	"	"	.....	G	
2	446	"	3	"	"	.....	"	"	medium colour..			G	"	"	"	.....	G	
3	103	"	3	"	"	.....	"	"	high	"	.....	G	"	"	"	.....	G	
2	111	"	7	Dark	"	.....	"	"	"	"	.....	G	"	"	"	.....	F	2 break down
3	453	"	7	Light	"	.....	"	"	medium	"	.....	G	"	"	"	.....	G	
2	446	"	10	"	"	.....	Green	"	high	"	.....	G	Insipid flavour			.....	G	
3	102	"	10	Dark	"	.....	Yellow	No water core, medium				G	Undeveloped flavour			.....	G	
2	111	"	13	"	"	.....	"	Water core, high colour				G	Good flavour			.....	G	
3	453	"	13	Light	"	.....	"	"	"	"	.....	G	Sweet	"	"	.....	G	
2	445	"	18	Dark	"	.....	"	"	"	"	.....	G	Disagreeable flavour			.....	G	
2	102	"	18	Light	"	.....	"	"	medium colour.			G	Good flavour			.....	G	

STORAGE APPLES—DATES OF PICKING, 1922

WAGENER

Condition—B—Bad; M—Medium; F—Fair; G—Good

O. No.	Tree No.	Date picked	Seeds	Under Colour	Condition	December 22, 1922	Condition	January 31, 1923	Condition	March 2, 1923
	A		*Brown*							
1	552	Oct. 2	Quite	Changing	G	Prime	F	Shrivelled, fair flavour	B	Scald.
2	156	" 2	Light	"	G	"	F	" " "	B	"
3	524	" 2	"	"	G	"	G	Good flavour, tough texture	B	"
1	141	" 5	White	Green	G	"	G	Fair flavour	B	"
2	151	" 5	Light	"	G	"	G	Good "	B	"
3	162	" 5	"	"	G	"	G	" " mealy	B	"
1	552	" 9	Brown	Yellow	G	"	G	" " "	G	
2	156	" 9	"	Changing	G	" , 1 bitter pit	G	Fair "	M	Scald.
3	524	" 9	"	"	G	"	G	" "	M	"
1	141	" 12	Light	"	G	"	G	Good "	B	"
2	151	" 12	"	Green	G	"	G	" "	B	"
3	161, 162	" 12	Dark	Yellow	G	"	G	" "	M	"
1	552	" 16	Light	Green	G	Tendency to water core	G	" "	F	"
2	156, 159	" 16	"	"	G	No water core	G	Excellent flavour	B	"
3	523, 524	" 16	"	"	G	"	G	" " bitter pit	G	1 bitter pit.
1	551	" 20	Dark	"	G	Tendency to water core	G	" "	B	1 rotten, 1 breakdown, 1 scald.
2	151	" 20	Light	"	G	No water core	G	Good flavour	M	Scald.
3	161	" 20	"	Yellow	G	Tendency to water core, high colour.	G	Excellent flavour	G	
1	552	" 23	Dark	"	G	Water core, high colour	G	Good flavour	G	
2	539	" 23	Light	Changing	G	" "	G	" "	G	
3	523	" 23	Dark	Yellow	G	No water core, high colour	G	" "	G	
1	542	" 28	Light	"	G	Water core, high colour	G	Sweet " 1 breakdown	G	
2	151	" 28	Black	"	G	" medium colour	G	" "	G	
3	526	" 28	Dark	"	G	" high "	G	Good "	G	
1	551, 552	" 30	"	"	G	" " "	G	" " 1 rotten	G	
2	538	" 30	Light	"	G	" " "	G	Sweet "	G	
3	523	" 30	Dark	"	G	" " "	G	" "	G	
1	542	Nov. 3	Light	"	G	" " "	G	" "	G	
2	151	" 3	"	"	G	" " "	G	Good "	G	
1	542, 551	" 7	Dark	Green	G	" " "	G	Sweet "	G	
2	151	" 7	"	"	G	Tendency to water core	G	Good "	G	
2	151	" 10	Light	"	G	Water core	G	" "	G	
2	151	" 13	"	"	G	"	G	" "	G	
2	151	" 18	"	"	G	"	G	" "	G	

STORAGE APPLES—DATES OF PICKING, 1922

YELLOW NEWTOWN

Condition—B—Bad; M—Medium; F—Fair; G—Good

O. No.	Tree No.	Date picked	Seeds	Under colour	Condition	February 3, 1923	Condition	March 2
1	17	Oct. 9	Brown	Changing	G	Flavour undeveloped	G	No storage troubles showing up
3	33	" 9	"	Green	G	Good flavour	G	" " "
1	405	" 12	Dark	"	G	Flavour undeveloped	G	" " "
2	18	" 12	Light	Changing	G	Good flavour	G	" " "
3	29	" 12	Dark	Green	G	Flavour undeveloped	G	" " "
1	410	" 16	"	"	G	Good flavour	G	" " "
3	388	" 16	"	"	G	" "	G	" " "
1	405	" 20	"	Changing	G	Fair " rotten at core	G	" " "
3	30	" 20	"	Green	G	Good "	G	" " "
1	410	" 23	"	"	G	" " rotten at core	G	" " "
2	388	" 23	Light	Changing	G	" "	G	" " "
3	388	" 23	"	"	G	" " immature	G	" " "
1	410, 405	" 28	Dark	"	G	" " prime	G	" " "
2	388	" 28	"	"	G	" " "	G	" " "
3	32	" 28	"	Green	G	" " "	G	" " "
3	386	" 30	"	"	G	" " "	G	" " "
3	32	Nov. 3	"	"	G	" " "	G	" " "
3	386	" 7	"	"	G	Fair " immature	G	" " "
1	410	" 10	"	"	G	" " water core	G	" " "
3	32	" 10	"	"	G	" " immature	G	" " "
3	386	" 13	Light	"	G	" " "	G	" " "
3	32, 34	" 18	Dark	"	G	" " "	G	" " "

STORAGE APPLES—DATES OF PICKING, 1922

JONATHAN

Condition—B—Bad; M—Medium; F—Fair; G—Good; Bd.—Breakdown

O. No.	Tree No.	Date picked	Seeds	Under colour	Condition	December 12, 1922	Condition	January 23, 1923	Condition	February 28, 1923
1	432	Sept. 18	Quite brown..	Green.....	G	.....	F	Shrivelled, fair flavour....	M	Jonathan spot.
2	110	" 18	Not quite.....	"	G	.....	F	Soft, shrivelled, fair flavour.	M	"
3	451	" 18	Brown.....	Yellow.....	G	.....	F	Breaking down, poor flavour	M	" 1 Bd.
1	119	" 23	Quite brown..	Green.....	G	.....	F	Shrivelled, poor flavour.....	B	"
2	446	" 23	Not quite.....	"	G	.....	F	Shrivelled, fair flavour.....	B	"
3	102	" 23	Quite brown..	"	G	.....	F	Shrivelled, fair flavour.....	M	"
1	432	" 25	" ...	Changing...	G	.....	F	Shrivelled, good flavour.....	M	"
2	110	" 25	" ...	" ...	G	.....	F	Shrivelled, good flavour..... Jonathan spot.	M	
3	451	" 25	" ...	" ...	G	.....	F	Shrivelled, poor flavour, Jonathan spot.	M	
1	119	" 29	Brown.....	" ...	G	.....	F	Shrivelled, fair flavour.....	M	
2	446	" 29	"	Yellow.....	G	.....	F	" good flavour, Jo athan spot.	F	
3	102	" 29	"	"	G	.....	F	Shrivelled, fair flavour, Jonathan spot.	F	
1	432	Oct. 2	Quite.....	Changing...	G	.....	G	Prime, good flavour, Jonathan spot.	F	
2	110	" 2	"	" ...	G	.....	G	Prime, excellent flavour, Jonathan spot.	G	
3	451	" 2	"	Yellow.....	G	.....	G	Firm, poor flavour, Jonathan spot.	G	
1	119	" 5	Brown.....	"	G	.....	G	Firm, good flavour,, Jonathan spot.	F	3 breakdown.
2	446	" 5	"	"	G	.....	G	Firm, excellent flavour, Jonathan spot.	G	
3	102	" 5	Light brown..	Changing...	G	.....	G	Firm, good flavour, Jonathan spot.	F	
1	438	" 9	Dark brown..	Yellow.....	G	.....	G	Firm, fair flavour, Jonathan spot.	F	
2	110	" 9	Brown.....	"	G	.....	G	Firm, good flavour, Jonathan spot.	G	
3	451	" 9	"	"	G	.....	B	Rotten, fair flavour, Jonathan spot.	G	
1	118	" 12	Dark.....	"	G	.....	G	Firm, good flavour, Jonathan spot.	G	
2	446	" 12	Black.....	"	G	.....	G	Firm, good flavour, Jonathan spot.	F	
3	102	" 12	Dark.....	"	G	.....	G	Firm, good flavour, Jonathan spot.	B	1 breakdown.
1	438	" 16	Light.....	"	G	.....	G	Firm, good flavour, Jonathan spot.	B	5 breakdown.

2	447	"	16	"	"	G	.....	G	Firm, excellent flavour, Jonathan spot.	B	2 breakdown
3	450	"	16	Dark.....	"	G	....	G	Firm, excellent flavour, Jonathan spot.	F	
1	118	"	20	Light.....	"	G	.....	F	Firm, poor flavour, Jonathan spot, 2 Bd.	F	
2	446	"	20	"	"	G	.....	G	Firm, good flavour, Jonathan spot.	B	Breakdown.
3	102	"	20	Dark.....	"	G	.....	G	Firm, poor flavour, Jonathan spot, 2 Bd.	B	"
1	438	"	23	Dark.....	Red all over	G	.....	B	Soft, poor flavour, Jonathan spot, 2 Bd., 8 breakdown.	B	
2	110	"	23	"	"	G	.....	M	Firm, fair flavour, Jonathan spot, 3 Bd.	B	
3	450	"	23	"	"	G	.....	F	Soft, good flavour, Jonathan spot, breakdown.	B	
1	118	"	28	"	Yellow.....	G	.....	G	Soft, fair flavour, Jonathan spot, breakdown.	B	
2	446	"	28	"	"	G	Water core, no breakdown..	B	Soft, good flavour, Jonathan spot, breakdown.	B	
3	102	"	28	"	"	G	"	B	Soft, good flavour, Jonathan spot, breakdown.	B	
1	438	"	30	"	"	G	"	B	Soft, Jonathan spot, breakdown.	B	
2	110	"	30	"	"	G	"	B	" " "	B	
3	450	"	30	"	White.....	G	"	B	" " "	B	
1	118	Nov.	3	Light.....	Yellow.....	G	"	B	" " "	B	
2	446	"	3	Changing.....	"	G	"	B	" " "	B	
3	102	"	3	Dark.....	"	G	"	B	" " "	B	
1	438	"	7	Dark.....	"	G	"	B	" " "	B	
2	110	"	7	Light.....	"	G	"	B	" " "	B	
3	450	"	7	"	"	G	"	B	" " "	B	
1	118	"	10	"	"	G	"	B	" " "	B	
2	446 447	"	10	Dark.....	"	G	"	B	" " "	B	
3	102	"	10	"	"	G	"	B	" " "	B	
1	118	"	13	"	"	G	"	B	" " "	B	
2	109 110	"	13	Light.....	"	G	"	F	" " " rotten flavour.	B	
3	450	"	13	"	"	G	"	G	Firm, Jonathan spot, no breakdown.	B	Breakdown.
1	118 121	"	18	"	"	G	"	B	Soft, Jonathan spot, breakdown. poor flavour.	B	
2	447	"	18	Dark.....	"	G	"	G	Firm, Jonathan spot, no breakdown, poor flavour.	B	Breakdown.
3	102	"	18	"	"	G	"	G	Firm, Jonathan spot, no breakdown, poor flavour.	F	Breakdown.

STORAGE APPLES—DATES OF PICKING

McIntosh Reds

Condition:—B—Bad; M—Medium; F—Fair; G—Good

O. No.	Tree No.	Date picked	Seed colour	Under colour	Condition	November 13	Condition	December 12, 1922	Condition	January 22, 1923
1	146	Sept. 4	Starting.....	Fair.....	G	Badly shrivelled, poor flavour.	.....	.....	.....	
2	160	" 4	.....	Well coloured.	G	Badly shrivelled, poor flavour.	.....	.....	.....	
3	166	" 4	Starting to brown.	Good.....	G	Badly shrivelled, poor flavour.	.....	.....	.....	
1	543	" 8	Brown.....	Good.....	G	Badly shrivelled, poor flavour.	.....	.....	.....	
2	156	" 8	Turning.....	.....	G	Badly shrivelled, poor flavour.	.....	.....	.....	
3	530	" 8	Turning.....	.....	G	Badly shrivelled, poor flavour.	.....	.....	.....	
1	146	" 11	Partly brown.	.....	G	Badly shrivelled, poor flavour.	.....	.....	.....	
2	160	" 11	Entirely brown.	Well coloured.	G	Shrivelled, poor flavour....	.....	.....	.....	
3	166	" 11	Partly brown.	.....	G	Shrivelled, poor flavour....	.....	.....	.....	
1	543	" 15	Completely brown.	.....	G	Shrivelled, poor flavour....	.....	.....	.....	
2	156	" 15	.....	.....	G	Shrivelled, poor flavour....	.....	.....	.....	
3	530	" 15	Partly brown.	.....	G	Slight shrivelling, poor flavour.	.....	.....	.....	
1	146	" 18	.....	.....	G	Shrivelled, poor flavour....	.....	.....	.....	
2	160	" 18	.....	.....	G	Very slight shrivelling, poor flavour.	.....	.....	.....	
3	166	" 18	.....	.....	G	Slight shrivelling, poor flavour.	.....	.....	.....	
1	543	" 23	Quite brown..	Yellow.....	G	Very slight shrivelling, fair flavour.	F	Slightly shrivelled, good flavour.	F	Badly shrivelled.
2	156	" 23	Quite brown..	Changing...	G	Firm, no shrivelling, fair flavour.	M	Shrivelled, fair flavour....	G	Slightly shrivelled.
3	530	" 23	Entirely brown.	Still green..	G	Firm, good flavour.....	F	Shrivelled, fair flavour.....	G	Punky.
1	146	" 25	Quite brown..	Changing...	G	Prime, fair flavour.....	F	Shrivelled, good flavour.....	G	Slight shrivelling.
2	160	" 25	Quite brown..	Yellow.....	G	Prime, good flavour.....	F	Shrivelled, insipid flavour...	G	Slight shrivelling.
3	166	" 25	Quite brown..	Yellow.....	G	Firm, good flavour.....	F	Slightly shrivelled, good flavour.	G	Very slight shrivelling.
1	543	" 29	Quite brown..	Well coloured.	G	Prime, good flavour.....	G	Slightly shrivelled, good flavour.	G	Slight shrivelling.
2	156	" 29	Dark brown..	Yellow.....	G	Prime, very good flavour...	G	Slightly shrivelled, excellent flavour.	G	Very slight shrivelling.
3	530	" 29	Dark brown..	Yellow.....	G	Prime, good flavour.....	G	No shrivelling, good flavour	G	Firm, no shrivelling.

STORAGE APPLES—DATES OF PICKING

McIntosh Reds

Condition:—B—Bad; M—Medium; F—Fair; G—Good

O. No.	Tree No.	Date picked	Seed colour	Under colour	Condition	November 13	Condition	December 12, 1922	Condition	January 22, 1923
1	146	Oct. 2	Quite brown..	Yellow.....	G	Prime, very good flavour...	G	Very slight shrivelling, excellent flavour.	G	Firm, no shrivelling.
2	160	" 2	" ..	"	F	Firm, fair flavour, 1 rotten..	G	Very slight shrivelling, good flavour.	G	" "
3	166	" 2	" ..	"	G	Firm, good flavour, high colour.	G	Firm, no shrivelling, good flavour.	G	Firm, excellent condition.
2	156 160	" 5	" ..	Completely red.	G	Firm, good flavour, high colour.	F	Punky, slight shrivelling, fair flavour.	G	Soft but not shrivelled.
3	530	" 5	" ..	Yellow.....	G	Very firm, good flavour, high colour.	G	Crisp, no shrivelling, fair flavour.	G	Firm.
3	530	" 9	Dark brown..	"	G	Hard, good flavour, high colour.	F	Firm, no shrivelling, fair flavour.	G	"

APPLE STORAGE, 1922—PICKING DATES

Grimes Golden

Condition:—B—Bad; M—Medium; F—Fair; G—Good

O. No.	Tree No.	Date picked	Seeds	Under colour	Condition	December 12, 1922	Condition	February 2, 1923	Condition	February 28, 1923
1	264	Sept. 25	Brown.....	Green.....	G	.....	B	Badly shrivelled, poor flavour.	B	
2	575	" 25	Quite.....	Changing...	G	.....	B	Badly shrivelled, poor flavour.	B	
3	585	" 25	Not quite.....	Green.....	G	.....	M	Shrivelled, poor flavour.....	B	
1	265	" 29	Brown.....	Changing...	G	.....	F	" fair flavour.....	M	Bitter pit.
2	257	" 29	"	" ...	G	.....	F	" "	B	
3	248	" 29	"	" ...	G	.....	M	" poor flavour.....	M	
1	264	Oct. 2	"	Green.....	G	.....	F	" good flavour 1 rotten.	F	
2	575	" 2	"	Yellow.....	G	.....	B	Badly shrivelled, good flavour.	B	
3	585	" 2	"	Changing...	G	.....	B	Badly shrivelled, good flavour.	B	
1	268	" 5	"	Green.....	G	.....	F	Shrivelled, good flavour.....	F	1 rotten.
2	257	" 5	"	Yellow.....	G	.....	M	Badly shrivelled, good flavour.	M	
3	248	" 5	Light brown..	Changing...	G	.....	F	Badly shrivelled, good flavour.	F	
1	264	" 9	Brown.....	" ...	G	.....	F	Badly shrivelled, excellent flavour.	M	
2	575	" 9	"	Yellow.....	G	.....	G	Firm, good flavour.....	F	2 rotten.
3	585	" 9	"	"	G	.....	G	Slightly shrivelled, fair flavour, mealy.	F	
1	268	" 12	Dark brown..	Changing...	G	.....	G	Firm, good flavour.....	F	
2	257	" 12	" ..	Yellow.....	G	.....	G	Slightly shrivelled, fair flavour.	G	
3	248	" 12	Light brown..	Green.....	G	.....	G	Slightly shrivelled, good flavour.	G	
1	264	" 16	" " ..	"	G	Water core, no breakdown..	G	Slightly shrivelled, good flavour.	F	
2	256	" 16	Dark " ..	"	G	"	G	Firm, excellent flavour.....	F	1 breakdown.
3	247	" 16	Light " ..	Changing...	G	"	G	" " "	B	4 "
1	563	" 20	Dark " ..	" ...	G	"	G	" " "	M	3 "
2	256	" 20	Light " ..	" ...	G	"	G	" good "	M	4 "
3	248	" 20	Dark " ..	Yellow.....	G	"	G	" excellent "	B	4 "
1	264	" 23	" " ..	Changing...	G	"	G	" " "	B	4 "
2	576	" 23	" " ..	Yellow.....	G	"	G	" " "	B	6 "

3	586	" 23	Light "	Changing...	G	"	G	" good "	B	"
1	563	" 28	Dark "	Yellow.....	G	"	G	" excellent "	B	"
2	256	" 28	" "	"	G	"	M	" good " break-down	B	
3	248	" 28	Light "	"	G	"	M	" fair " "	B	
1	263, 264	" 30	Dark "	Green.......	G	"	B	Breakdown................	B	
2	576	" 30	" "	Changing...	G	"	B	"	B	
3	586	" 30	" "	" ...	G	"	B	"	B	
1	563	Nov. 3	Light "	" ...	G	"	B	"	B	
2	256	" 3	" "	" ...	G	"	B	"	B	
3	247, 248	" 3	" "	" ...	G	"	B	"	B	
2	576, 579	" 7	" "	" ...	G	"	B	"	B	
3	586	" 7	" "	Yellow.....	G	"	B	"	B	
3	586	" 10	Dark "	" ...	G	"	B	"	B	

KEEPING QUALITY OF APPLES GROWN UNDER DIFFERENT SYSTEMS OF CULTURE

In 1922, an experiment was started with a view to ascertaining the effect of various methods of culture on the keeping quality of apples. Eight boxes of McIntosh, Jonathan, Grimes Golden and Rome Beauty were picked from each of the cultural orchards. These apples were wrapped, packed and nailed up as for shipment. They were then stored in the cellars of the horticultural building. At the time when these varieties would normally be on sale at fruit-stalls the boxes were opened and the fruit examined. The following tables show the orchard number, tree numbers, dates of picking and the condition of the fruit when examined.

STORAGE APPLES—COMPARISON OF CULTURAL METHODS, 1922

McIntosh Red

Condition:—B—Bad; M—Medium; F—Fair; G—Good

O. No.	Tree No.	Date picked	Date packed	Condition	December 2, 1922		
					Shrivelling	Flavour	Colour
1	549	Sept. 18	Oct. 2	M	Shrivelled	Excellent	Poor.
1	550	" 18	" 2	F	Slight, 1 rotten	Fair	Poor.
1	551	" 18	" 2	G	Firm	Excellent	Excellent.
1	547	" 18	" 2	G	Very slight	"	Good.
1	552 (1)	" 18	" 2	G	Firm	"	"
1	552 (2)	" 18	" 2	G	"	"	"
1	149	" 15	" 4	M	Shrivelled	Good, mealy	Poor.
1	150	" 15	" 4	M	"	Poor	Fair, 1 bitter pit.
2	539 (1)	Sept. 18	Oct. 3	G	Very slight	Excellent	Good.
2	539 (2)	" 18	" 3	G	Firm	"	"
2	154	" 18	" 4	G	"	"	"
2	152	" 18	" 4	F	Slight	"	Fair.
2	153	" 18	" 4	F	"	"	"
2	151	" 18	" 4	M	Bad	Fair	Good.
2	157	" 18	" 4	G	Very slight	"	"
2	159	" 18	" 4	F	Slight	Poor	Excellent.
2	155	" 15	" 4	G	Firm	Excellent	"
3	529	Sept. 18	Oct. 3	G	Firm	Fair	Fair.
3	531	" 18	" 3	G	Prime	Excellent	Excellent.
3	524	" 18	" 3	M	Shrivelled, 1 rotten	Poor	Fair.
3	526	" 18	" 3	G	Firm, 1 rotten	Good	Poor.

3	527	" 18	" 3	G	Prime	Excellent	Good.
3	161	" 15	" 4	G	Very slight	Good	"
3	167	" 16	" 4	G	Very slight, 2 rotten	Excellent	"
3	169	" 15	" 4	G	Very slight	Fair	Fair.
3	170	" 15	" 4	G	Very slight, 1 rotten	"	Good.
3	163	" 15	" 4	F	Slight	Good	"
5	506	Sept. 15	Oct. 3	F	Slight	Fair	Poor.
5	505	" 15	" 3	F	Slight, 1 rotten	Poor	Excellent.
5	510	" 15	" 3	G	Firm	Good	"
5	188	" 15	" 4	G	Very slight, 1 rotten	Fair	Good.
5	190	" 15	" 4	M	Shrivelled	Good	"
5	181	" 15	" 4	F	Slight	Poor	Excellent.
5	512	" 15	" 4	G	Firm, 2 rotten	Good	Fair.
6	494	Sept. 15	Oct. 3	G	Firm	Poor, leathery	Good.
6	496	" 15	" 3	G	Firm, 1 rotten	Good	Good.
6	497	" 15	" 3	F	Slight	Fair	"
6	498	" 15	" 3	M	Shrivelled	Fair	"
6	502	" 15	" 4	G	Firm	Excellent	"
6	194	" 15	" 4	F	Slight	Fair	Poor.
6	197	" 15	" 4	F	Slight, 2 rotten	Excellent	"

APPLE STORAGE—CULTURAL ORCHARDS

JONATHANS

Condition:—G—Good

Lot No.	Tree No.	Date picked	Date packed	Condition		December 15, 1922	
	A						
1	120–125	Oct. 10	Oct. 21	G	Fair flavour	Fair colour	2 rotten, no breakdown.
1	118–119–121–435	" 10	" 21	G	Good "	" "	1 " " 2Jonathan spot.
1	433–438–439	" 10	" 21	G	Fair "	" "	1 " " 1 "
1	430	" 10	" 21	G	Good "	" "	3 " "
2	114 (1)	Oct. 10	Oct. 13	G	Good flavour	Good colour	No breakdown, 1 Jonathan spot.
2	114 (2)	" 10	" 13	G	" "	" "	" "
2	111–112–114	" 10	" 19	G	Excellent flavour	Highly coloured	1 rotten, no breakdown.
2	106–107–110–446	" 10	" 21	G	" "	" "	No breakdown.
2	111–114	" 10	" 19	G	" "	" "	" " Jonathan spot.
2	105–444	" 10	" 21	G	" "	Good colour	1 internal breakdown.
2	107–443–448	" 10	" 21	G	Good flavour	Highly coloured	No breakdown.
2	(1) 113–444–449	" 10	" 21	G	Excellent flavour	" "	1 internal breakdown.
2	108–440	" 10	" 19	G	Good flavour	Good colour	No breakdown.
2	110–446	" 10	" 21	G	Excellent flavour	" "	" "
3	96	Oct. 10	Oct. 12	G	Excellent flavour	Highly coloured	No breakdown.
3	97	" 10	" 12	G	" "	Good colour	" "
3	99	" 10	" 12	G	" "	" "	" "
3	98 (3)	" 10	" 12	G	" "	Highly coloured	3 rotten, no breakdown.
3	95	" 10	" 12	G	" "	Fair colour	No breakdown, Jonathan spot.
3	98 (1)	" 10	" 18	G	" "	Highly coloured	2 rotten, no breakdown.
3	98 (2)	" 10	" 18	G	" "	Good colour	1 " " "
3	450–452–453	" 10	" 18	G	" "	Highly coloured	No breakdown.
3	450–452–453–455	" 10	" 18	G	" "	Good colour	" " Jonathan spot.
3	456–458	" 10	" 18	G	Fair flavour	" "	" "
3	451–457	" 10	" 18	G	Good "	" "	1 rotten, no breakdown
3	97–456–458	" 10	" 18	G	Fair "	" "	2 " " "
3	97– 98	" 10	" 18	G	" "	Fair "	2 " " " Jonathan spot.
5	79	Oct. 10	Oct. 12	G	Good flavour	Fair colour	1 internal breakdown, Jonathan spot.
5	81	" 10	" 12	G	Fair "	" "	No breakdown, Jonathan spot.
5	78	" 10	" 12	G	Good "	" "	1 rotten, 1 internal breakdown.
5	472	" 10	" 13	G	Poor "	" "	No breakdown, Jonathan spot.
5	77– 79–471–474	" 10	" 18	G	Good "	" "	1 rotten, no breakdown, Jonathan spot.

5	75- 77-477-479.....	"	10	"	18	G	" "	" "	1 rotten, no breakdown.
5	76- 77.....	"	10	"	18	G	Excellent flavour.....	Good "	2 rotten, no breakdown.
5	474.....	"	10	"	18	G	Good flavour.....	" "	1 rotten, 1 internal breakdown.
5	475-478.....	"	10	"	18	G	Excellent flavour.....	" "	No breakdown.
5	78- 79- 80.....	"	10	"	18	G	" "	Fair "	5 internal breakdown, Jonathan spot.
5	472-473.....	"	10	"	18	G	Good flavour.....	" "	3 rotten, 1 internal breakdown.
5	75- 76-473 to 479....	"	10	"	18	G	Fair "	Good "	1 rotten, no breakdown.
6	71-488.....	Oct.	10	Oct.	18	G	Poor flavour.....	Fair colour.....	No breakdown.
6	67- 69 to 72-488.....	"	10	"	18	G	Fair "	" "	2 rotten, no breakdown, Jonathan spot.
6	68-483-486-487.....	"	10	"	18	G	Good "	Good "	No breakdown, Jonathan spot, 1 bitter pit.
6	480-484.....	"	10	"	18	G	Good "	Fair "	1 rotten, 2 internal breakdown.
6	73- 74.....	"	10	"	18	G	Excellent flavour.....	Good "	No breakdown, Jonathan spot.
6	67- 69 to 74-488.....	"	10	"	18	G	Good flavour.....	Fair "	" " " "
6	68-480-481-483-484-486-487-488.	"	10	"	18	G	Excellent flavour.....	Good "	" " " "

STORAGE APPLES—CULTURAL ORCHARDS, 1922

GRIMES GOLDEN

Condition—B—Bad; M—Medium; F—Fair; G—Good

O. No.	Tree No.	Date picked	Date packed	Condition		December 8	
1	269	Oct. 10	Oct. 25	G	Excellent flavour	Fair colour	1 bitter pit.
1	267–269	" 10	" 25	G	"	Poor "	5 bitter pit.
1	262–267–571	" 10	" 25	G	"	Fair "	
1	262	" 10	" 25	G	Good flavour	Fair "	2 rotten.
1	263 to 266–564	" 10	" 25	G	"	Poor "	1 rotten, 2 bitter pit.
2	254–255–574	Oct. 10	Oct. 26	G	Excellent flavour	Excellent colour	
2	254	" 10	" 26	G	Good flavour	Good colour	
2	256–257–575–577	" 10	" 25	G	"	"	2 rotten, 3 bitter pit.
2	250–251–256–573–576	" 10	" 25	G	Excellent flavour	"	2 rotten, 2 bitter pit.
2	253	" 10	" 25	G	"	Excellent colour	1 internal browning, 4 bitter pit.
2	251–259	" 10	" 25	G	"	"	
2	259	" 10	" 25	G	"	"	1 rotten, 1 bitter pit.
3	584–588	Oct. 10	Oct. 26	G	Good flavour	Excellent colour	1 rotten, 1 internal browning.
3	245	" 10	" 26	G	Excellent flavour	Good colour	
3	246	" 10	" 26	G	Good flavour	Excellent colour	4 rotten.
3	240–246	" 10	" 26	G	Excellent flavour	Good colour	3 rotten.
3	249 (2)	" 10	" 26	G	Good flavour	"	
3	249 (1)	" 10	" 26	G	"	"	
3	242	" 10	" 26	G	"	"	2 rotten, 2 bitter pit.
3	244–249	" 10	" 26	G	Excellent flavour	"	4 bitter pit.
5	229–583	" 10	" 26	G	Good flavour	Excellent colour	1 bitter pit.
5	229	" 10	" 26	G	Fair "	Good colour	1 rotten, 1 internal breakdown. 1 bitter pit.
5	222–611	" 10	" 26	G	Poor "	Fair "	2 rotten.
5	606	" 10	" 26	G	Good "	" "	2 rotten.
5	221–224	" 10	" 26	G	" "	Good "	
5	228–605	" 10	" 26	G	" "	Fair "	1 internal browning.
5	223–603–604–608	" 10	" 26	G	Fair "	" "	1 rotten, 1 bitter pit.
5	607–609	" 10	" 26	G	Poor "	" "	1 bitter pit.
6	217–219	Oct. 10	Oct. 26	F	Fair flavour	Fair colour	3 rotten, 6 bitter pit.
6	213-218-215-612-620 (1)	" 10	" 26	G	Good "	Good "	
6	213-218-615-612-620 (2)	" 10	" 26	G	Good "	Fair "	3 rotten.
6	619	" 10	" 26	G	Fair "	Poor "	1 rotten.
6	615	" 10	" 26	G	Good "	Good "	3 rotten.
6	214 to 216-616	" 10	" 27	G	Poor "	" "	1 internal browning, 1 bitter pit.

COMPARISON OF CULTURAL ORCHARDS

Rome Beauty

Condition—B—Bad; M—Medium, F—Fair; G—Good

O. No.	Tree No.	Date picked	Date packed	Condition	January 31, 1923		
					Flavour	Colour	
2	449	Oct. 18	Oct. 27	G	Good	Good	
2	107–445–449	" 18	" 27	G	"	"	2 breakdown.
2	440–449	" 18	" 27	G	"	"	
3	456–458	" 18	" 27	G	Good	Fair	1 rotten.
3	456–458	" 18	" 27	G	"	"	2 rotten.
3	453	" 18	" 27	G	"	Poor	
3	101–453	" 18	" 27	G	Fair	Fair	
3	104–454	" 18	" 27	G	"	Poor	
3	455–456	" 18	" 27	G	"	Poor	
3	103–452	" 18	" 27	G	"	Good	1 rotten.
5	479	" 18	" 27	G	Poor	Fair	
5	80–474	" 27	" 27	G	Good	"	1 rotten.
5	471–472	" 18	" 27	G	"	Poor	
5	78–85	" 18	" 27	G	"	Good	3 rotten.
5	76	" 18	" 27	G	Fair	Good	1 rotten.
5	72–478	" 18	" 27	G	Excellent	Fair	1 rotten.
5	78–82–85	" 18	" 27	G	Good	Good	1 rotten.
5	80–474–476–477	" 18	" 27	G	Fair	Good	
6	69–70–71	" 18	" 27	G	Poor	Good	
6	73	" 18	" 27	G	Fair	"	
6	75–483	" 18	" 27	G	Poor	"	1 rotten.
6	75–473–475–487	" 18	" 27	G	"	Fair	
6	66–75–76–473–475–487	" 18	" 27	G	Fair	Good	1 rotten.
6	66–75–473–475–487	" 18	" 27	G	Excellent	Fair	3 rotten.
6	72–73	" 18	" 27	G	"	Good	1 rotten.

APPLE STORAGE

Wealthy

Condition—B—Bad; M—Medium; F—Fair; G—Good

Orchard No.	Tree No.	Date picked	Date packed	seeds	Under colour	Condition	——
1	Various.....	Sept. 4	Sept. 6	.....	.....	M	Soft—breaking down—1 rotten, 4 bitter pit, poor flavour.
1	Various.....	" 4	" 6	.....	.....	M	Soft—breaking down—3 rotten, 2 bitter pit, 1 Jonathan spot, poor flavour.
2	18A.....	" 4	" 6	.....	.....	M	Soft—breaking down—5 rotten, 4 bitter pit, 4 Jonathan spot, poor flavour.
2	28A.....	" 4	" 6	.....	.....	M	Soft—breaking down—5 rotten, 2 bitter pit, 1 Jonathan spot, fair flavour.
3	30A.....	" 4	" 6	.....	.....	F	Starting to go soft, 4 rotten, 2 Bitter pit, fair flavour.
3	37A.....	" 4	" 6	.....	.....	F	Starting to go soft, 3 rotten, 2 Jonathan spot, medium flavour.
5	53A.....	" 4	" 6	.....	.....	F	Starting to go soft, 3 rotten, 4 Jonathan spot, fair flavour.
5	48A.....	" 4	" 6	.....	.....	F	Starting to go soft, 3 rotten, 11 Jonathan spot, medium flavour.

Picking Dates, Oct. 13

3	32A.....	Sept. 4	.....	Quite.....	Light.....	M	Going soft—strong flavour.
3	29A.....	" 4	.....	Brown.....	Fair.....	M	Going soft—strong flavour.
3	32A.....	" 8	.....	.....	Fair.....	G	Firm, good flavour.
3	29A.....	" 8	.....	.....	Fully.....	G	Firm, good flavour.
3	32A.....	" 11	.....	Completely	yellow.....	G	Firm, good flavour.
3	32A.....	" 18	Overmature		.....	G	Firm.

STORAGE APPLES, 1922

Cox Orange

Condition:—B—Bad; M—Medium; F—Fair; G—Good

O. No.	Tree No.	Date picked	Seeds	Under colour	Condition	October 13, 1922	Condition	November 29, 1922	Condition	—
			Brown							
1	105A	Sept. 4	Starting to...	Brown....	F	Shrivelled, good flavour...	M	Good flavour, bitter pit...	..	
2	379	" 4	" ...	"	F	" " ..	F	" " " ..	..	
3	390	" 4	Turning.....	.....	F	" " ..	F	" " " ..	..	
1	410	" 8	Brown.....	.....	G	Slightly shrivelled.....	M	Fair " " ..	..	
2	402	" 8	Turning.....	.....	G	" "	G	" "	..	
3	391	" 8	Quite.....	.....	G	" "	F	" " bitter pit..	..	
1	105	" 11	Entirely.....	.....	F	Shrivelled.....	F	Poor " " ..	..	
2	379	" 11	.....	.....	F	" 2 rotten.....	G	" " no " ..	..	
3	390	" 11	.....	.....	F	"	G	Good "	..	
1	410	" 15	Completely...	.....	G	.....	F	Fair " bitter pit..	..	
2	402	" 15	Entirely.....	.....	G	.....	M	Good " " ..	..	
3	391	" 15	Not quite.....	.....	G	.....	F	Poor " " ..	..	
1	405	" 18	Quite.....	Yellow...	G	.....	F	Good " " ..	..	Water core.
2	397	" 18	"	" ...	G	.....	G	Poor " mealy.....	..	" bitter pit, internal breakdown.
3	390	" 18	Not quite.....	Green.....	G	.....	G	Good " prime.....	..	Water core, bitter pit.
1	410	" 23	Quite.....	Yellow...	G	.....	G	" " "	..	" "
2	402	" 23	"	" ...	G	.....	G	Poor " "	..	" "
3	391	" 23	Entirely.....	" ...	G	.....	F	Good " past prime.	..	" "
1	405	" 25	Quite.....	" ...	G	.....	F	Flavour undeveloped, prime.	..	" "
2	397	" 25	"	" ...	G	.....	F	Fair flavour, bitter pit.....	..	"
3	390	" 25	"	" ...	G	.....	G	Flavour undeveloped, prime.	..	" bitter pit.
1	410	" 29	Brown.....	" ...	G	.....	F	Fair flavour, bitter pit....	..	"
2	402	" 29	"	" ...	G	.....	G	Good " "	..	"
3	391	" 29	"	" ...	G	.....	G	Fair " "	..	"

	A		Date packed													
1	407–9–11..	Sept. 4	Sept. 8.....	.....	M	Slightly	shrivelled,	30	per	cent	bitter	pit,	flavour	not	developed.	
1	404–406...	" 4	" 8	.....	F	"	"	25	"	"	good	flavour,	1	scald.		
1	Various...	" 14	" 16.....	.....	F	Not	"	20	"	"	fair	"	2	rotten.		
2	" ...	" 4	" 8.....	.....	G	"	"	15	"	"	good	"				
2	394.....	" 4	" 8.....	.....	G	"	"	10	"	"	"	"				
2	Various...	" 14	" 16.....	.....	G	"	"	20	"	"	"	"				
3	288.....	" 4	" 8.....	.....	F	Slightly	"	25	"	"	"	"				
3	Various...	" 14	" 16.....	.....	G	Not	"	5	"	"	"	"				
3	" ...	" 14	" 16.....	.....	G	"	"	12	"	"	"	"				
5	388.....	" 4	" 8.....	.....	M	Slightly	"	35	"	"	poor	"	2	rotten.		
5	Various...	" 14	" 16.....	.....	M	"	"	20	"	"	"	"	3	rotten.		
6	318.....	" 4	" 8.....	.....	G	"	"	7	"	"	good	"				
6	261.....	" 4	" 8.....	.....	G	Not	"	7	"	"	"	"				
6	Various...	" 14	" 16.....	.....	G	"	"	2	"	"	fair	"	1	rotten.		
6	" ...	" 14	" 16.....	.....	G	"	"	8	"	"	good	"				
6	" ...	" 14	" 16.....	.....	G	"	"	6	"	"	"	"	3	rotten.		

GROWTH OF APPLES

The fact that there is some difference of opinion among growers as to the advisability of making more than one picking of their apples suggested the necessity of an experiment to determine the actual time when apples make their growth and the date to which they continue to increase in size. Accordingly caliper measurements were made of twenty apples of each of the varieties in the cultural orchards every week from thinning time until some time after the normal picking date for the variety.

The following table shows the average increase per month in diameter from July 1 to November 1:—

TABLE SHOWING AVERAGE MONTHLY INCREASE IN DIAMETER OF APPLES DURING 1922

Average diameter in 32nds of an inch

Variety	July 1	Aug. 1	Sept. 1	Oct. 1	Nov. 1
Yellow Transparent	1 18/32	2 24/32	3 6/32	.....	.....
Duchess	1 21/32	2 25/32	3 5/32	.....	.....
Wealthy	1 13/32	2 14/32	3 2/32	3 7/32	.....
Cox Orange	1 7/32	2 5/32	2 19/32	2 25/32	.....
McIntosh	1 13/32	2 12/32	2 28/32	3 8/32	.....
Grimes Golden	31/32	1 30/32	2 14/32	2 21/32	.....
Delicious	1 8/32	2 10/32	2 25/32	3 1/32	.....
Jonathan	1 2/32	1 29/32	2 11/32	2 20/32	2 27/32
Wagener	1 14/32	2 13/32	2 26/32	3 3/32	3 6/32
Newtown	1 8/32	2 6/32	2 23/32	3 3/32	3 8/32
Rome Beauty	1 5/32	2 13/32	2 31/32	3 12/32	3 17/32

SUMMARY OF ORCHARD IRRIGATION, 1922

Date	Amount in Acre Inches per Acre. Time in Hours																		Explanation
	No. 1		No. 2		No. 3		No. 4		No. 5		No. 6		3 A		Upper S.		Lower S.		
	In.	Hrs.	In.	Hrs.	In.	Hrs.	In.	Hrs.	In.	Hrs.	In.	Hrs.	In.	Hrs.	In.	Hrs.	In.	Hrs.	
May 20–31	.....	.....	5·08	31	4·33	32	5·21	54	2·92	43	3·30	41	.....	.....	2·22	34	5·50	51	Chart shows cultural apple orchards numbered 1 to 6.
June 1–10	2·35	52	.....	.....	.....	.....	3·35	44	.....	.....	.....	.....	4·36	48	2·70	69	3·70	27	1. Clean cultivation—2 acres.
11–12	.....	.....	4·53	32	3·72	32	2·48	33	2·49	41	2·50	31							2. Alfalfa sod mulch—2 acres.
21–30	.....	.....	5·58	31	3·86	33	2·83	54	2·07	33	2·22	30	.....	.....	3·00	68	4·20	30	3. Hairy vetch—2 acres.
June totals..	2·35	52	10·11	63	7·58	65	9·46	131	4·56	74	4·72	61	4·36	48	5·70	137	7·90	57	4. Alfalfa—New seeding—2 acres.
July 1–10	2·65	42	.....	.....	.....	.....	2·54	39	.....	.....	.....	.....	.....	.....	3·11	47	5·00	44	5. Vegetable inter crops and hairy vetch—2 acres.
11–20	.....	.....	4·40	29	3·18	29	2·61	44	2·05	2	1·96	22	6·87	36	2·55	56	6·10	44	6. Farm rotation—2 acres.
21–31	.....	.....	6·20	34	4·53	34	1·75	29	1·65	32	2·20	31							Variety apple orchard—3 A—3 acres.
July totals..	2·65	42	10·60	63	7·71	63	6·90	112	3·70	61	4·16	53	6·87	36	5·66	103	11·10	88	Stone fruit orchards.
Aug. 1–10	2·00	40	4·58	39	5·15	30	2·22	40											Upper S.—Vetch—2 acres.
11–20	.....	.....	.....	.....	.....	.....	4·20	78	.....	.....	0·86	36	.....	.....	.....	.....	5·53	36	Lower S.—Alfalfa new seeding—3·4 acres.
20–31	.....	.....	.....	.....	.....	.....	2·85	55											
Aug. totals..	2·00	40	4·58	39	5·15	30	9·27	173	.....	.....	0·86	36	.....	.....	.....	.....	5·53	36	
Season total.	7·00	134	30·37	196	24·77	190	30·84	470	11·18	178	13·04	191	11·23	84	13·58	274	30·03	232	
1921.....	6·32		31·75		21·22		17·29		8·42		10·625		18·70		12·70		14·64		
1920.....	5·70		25·50		16·20		13·50		9·30		14·00		18·08		11·98		8·62		
1919.....	3·66		18·00		13·55		10·15		11·61		12·27								
1918.....	1·91		20·50		15·02		16·18		7·52		13·67								
1917.....	4·39		20·21		17·33		15·21		12·87		12·14								
1916.....	5·25		9·41		9·90		7·36		6·50		11·33								
Average for 7 years....	4·89		22·25		16·86		15·79		9·63		12·44								

The amount of water applied at each irrigation is shown in *acre inches*. The time required to apply water at each irrigation is shown in *hours*. The quantity of water applied per acre and the time required to apply it, is totalled for each month and for the entire season. The season total is compared with the total water applied per acre each year since the orchards were planted and an average application for the seven years is calculated.

The most noteworthy observation is that the fall and summer apples increased in size right up until they fell from the trees, while the winter varieties continued to grow as late as November 1.

ORCHARD IRRIGATION, 1922

The above table shows the amount of water applied during each ten-day period throughout the irrigation season which, in 1922, extended from May 20 to August 30. The application of water, therefore, during and after the blossoming period had no apparent effect on the setting of fruit. This observation substantiates the statement made in the 1921 report to the effect that the condition essential to the setting of fruit appears to be the maintenance of a uniform supply of moisture in the soil. If such a condition can be maintained without irrigation during the blossoming period, it is probably safer to refrain from applying water at this time, but where there is danger of the soil drying out before the fruit is set, it would seem to be advisable to apply water regardless of the stage of the bloom.

Observations as to the conditions of soil moisture in each orchard were made every week throughout the season. A small post hole auger was used for this purpose, borings being made to a depth of three feet in various parts of each orchard. By this means it was possible to determine when irrigation was needed, and the distribution of moisture after an irrigation. We feel confident that if every orchardist would take the trouble to dig holes to find out the actual moisture conditions in his soil, it would be possible to prevent a great deal of the drought spot which has been so serious in the Okanagan this year. In the latter part of July, trenches were dug across the irrigation furrows in each orchard to a depth of six feet. This operation revealed the fact that a perfect distribution of soil moisture existed where permanent cover cropping had been practised for several years. In most cases the distribution of moisture was incomplete where the furrows were more than three feet apart. It was found also that the tree roots were functioning properly only where a uniform supply of moisture was available. From these observations it is apparent that if orchardists in the Okanagan are to make the most economical use of water available, they must get their soil into such a condition that it will absorb and retain moisture readily, and they must make sure that their furrows are close enough to insure a uniform supply of moisture to every tree root.

With a view to testing out the desirability of fall irrigation, water was applied to half of Nos. 3 and 4 cultural orchards in November, 1921. At the time of application the soil in No. 4 orchard was very dry, while there was already a good content of moisture in the soil of No. 3. The effect of this application was clearly apparent in the spring of 1922. The cover crop in No. 4 showed a distinct line of demarcation well on into the summer, being at least six inches higher where the fall irrigation had been applied. The beneficial effect of the fall irrigation on the trees was also very remarkable, and was quite noticeable even in the autumn of 1922. In No. 3 orchard the application of water in the fall had no such pronounced effect. It would appear, therefore, that the advisability of applying irrigation water in the fall depends largely on the amount of moisture in the soil at that time. Where an examination of the soil to a depth of several feet shows it to be deficient in moisture there seems no doubt that fall irrigation is not only desirable but actually a necessity. Where there is already plenty of moisture in the soil in the autumn, irrigation is not so imperative.

A comparison of the water requirement of the various orchards to date indicates that clean cultivation requires the least amount of water while the greatest demand on moisture supply has been made where the alfalfa sod mulch system is practised.

SPRAYING, 1922

This work has been confined to the application of approved protective and control sprays for insect pests and fungus diseases known to infest the southern Okanagan. The discovery of codling moth in the orchards in 1921 made the application of three arsenical sprays necessary in 1922. In applying these sprays, tests of various "spreaders" were made. The milk by-product known as Kayso, and manufactured by the California Creamery appeared to be the most efficient spreader tested. The use of spreaders deserves an extensive trial by growers since the efficiency of a spray is greatly increased thereby.

In 1922, five sprays were applied to the apple orchards. Lime sulphur, 1:9 was put on in the dormant stage for blister mite, followed by lime sulphur 1:35 and Black Leaf 40, 1:1200 in the pink stage for powdery mildew and aphids. An arsenical spray for codling moth was applied in the calyx stage; with this was included lime sulphur 1:40 for powdery mildew. Later in the season, two cover sprays were applied to insure efficient control of the codling moth.

The acquisition of a Hayes power sprayer in the spring of 1922 made it possible to keep an accurate record of the cost of applying sprays. The total cost per acre is shown in tabular form below:—

TABLE SHOWING TOTAL COST OF APPLYING FIVE SPRAYS TO ONE ACRE OF SEVEN YEAR OLD APPLE ORCHARD (100 TREES) IN 1922

Labour—	
Team, 8 hours at $1 per hour	$ 8 00
Man, 16 hours at 30c. per hour	4 80
Fuel and Equipment—	
Gasoline, 2 gal.s at 40c. per gal	0 80
Oil, 1 pt. at 40c. per qt	0 20
Depreciation, 20 per cent on investment	2 00
Materials—	
Lime sulphur, 45 gals. at 42½c	19 13
Black leaf 40, 2½ lbs. at $1.60	3 60
Lead arsenate, 12 lbs. at 24c	2 88
Kayso spreader, 3½ lbs. at 24c	0 84
Total cost per acre	$ 42 25

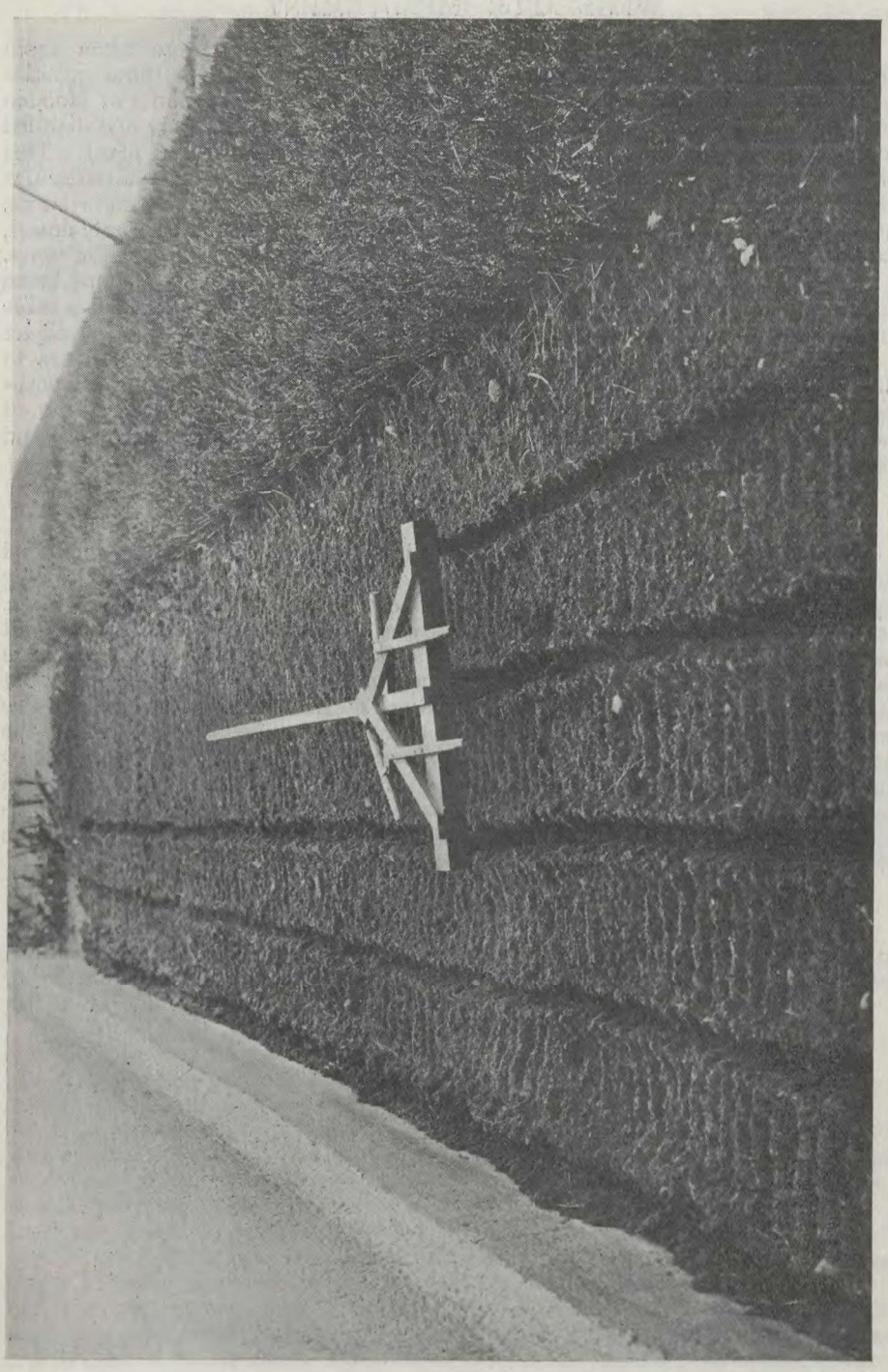
These sprays give satisfactory commercial control of blister mite, aphids, powdery mildew and codling moth.

In the stone fruits, control of peach leaf curl was effected by spraying with lime sulphur 1:9 in the dormant stage, while an application of lead arsenate to pears and cherries immediately after the hatching of the pear and cherry slug completely protected the foliage from injury.

CODLING MOTH CONTROL

In addition to the three arsenical sprays applied in 1922, banding of trees was carried out over the entire apple orchard, all pear trees were deblossomed and all apples except No. 1's were destroyed. The bands were inspected every week throughout the danger season, but only one larva was found under a band. Another larva was found in a Duchess when apples of this variety were being graded. In addition to this, four apples were found showing worm injury from which the larva had departed.

From these observations it may be inferred that practically complete control was secured by efficient spraying. The possibility that some larvae may have escaped detection will, however, necessitate similar drastic control measures in 1923.



Marking Land for Irrigation.

VEGETABLE IMPROVEMENT

Selections of Hoodoo cantaloupe and Earliana tomato were made again this year. The object of this work is to isolate superior strains of these varieties of vegetables. In 1921, seed was saved from ten outstanding plants of Hoodoo cantaloupe. The seed from each of these plants was sown separately and detailed records kept of the performance of the progeny of each individual plant. This selection will be continued in 1923. The characteristics to which particular attention is given in making the selections are: yield, size, shape, netting, ribbing, earliness, uniformity, firmness and shipping quality of fruit; colour, thickness, texture and quality of the flesh; also vigour and disease resistance of the vines.

A similar procedure is followed in the work with Earliana; selections being made with a view to isolating a strain possessing the qualities desired in a table tomato for the retail market. Further selections are also made with the object of developing another strain to meet cannery requirements. The qualities to which most importance is attached in making the selections are: yield, smoothness, uniformity, earliness, size, shape, colour, firmness and shipping quality of the fruit; colour, texture, solidity, and quality of the flesh; also vigour and disease resistance of the vines.

FERTILIZER ON TOMATOES

Frequent inquiries received at the Station regarding the use of commercial fertilizers as a means of maintaining soil fertility in the Okanagan Valley suggested the necessity for definite experimental work along this line. Accordingly, an experiment was conducted with tomatoes in 1922 to test out the effect of applying nitrogen, phosphoric acid, potash and manure alone and in combination. A block of land was ploughed in the fall of 1921. To half of it manure was applied at the rate of ten tons per acre. In the spring of 1922 this land was disced and irrigated, the irrigation furrows being made where the tomatoes were to be planted. Fertilizer was then applied in the damp furrow and worked into the soil with a cultivator. Nitrate of soda and muriate of potash were applied at the rate of 150 pounds to the acre, while super-phosphate was put on at the rate of 300 pounds per acre. Check rows without fertilizer were left on both sides of each row to which fertilizer was applied.

The following table shows the yield of marketable fruit produced per acre where various fertilizers were applied.

TABLE SHOWING YIELD OF TOMATOES PRODUCED PER ACRE WHERE VARIOUS FERTILIZERS WERE APPLIED

Yield per Acre		Fertilizer Applied
Tons	Lbs.	
11	50	Manure plus nitrate of soda.
9	1,950	Manure.
9	1,050	Manure plus superphosphate.
9	1,800	Manure.
9	1,350	Manure plus muriate of potash.
8	650	Manure.
10	1,150	Manure plus N plus P.
8	1,100	Manure.
10	700	Manure plus N plus K.
8	1,250	Manure.
10	100	Manure plus P plus K.
8	1,250	Manure.
13	100	Manure plus N plus P plus K.
9	1,300	Manure.
10	1,600	Nitrate of soda.
6	450	No fertilizer.
8	1,850	Superphosphate.
8	950	No fertilizer.
8	1,550	Muriate of potash.
7	1,300	No fertilizer.
10	550	N plus P.
6	1,200	No fertilizer.
8	800	N plus K.
6	600	No fertilizer.
8	950	P plus K.
5	350	No fertilizer.
8	1,700	N plus P plus K.
6	1,950	No fertilizer.

The most noteworthy result of this experiment as shown by the table is that the soil responded to the application of manure and nitrate of soda, but showed little effect from the application of muriate of potash or phosphoric acid. This bears out the contention of this Station that the limiting factors in the maintenance of soil fertility in the Okanagan are *humus* and *nitrogen.*

IRRIGATION OF VEGETABLES

The object of this experiment is to ascertain the most economical irrigation practice for truck crops. Information is being sought with regard to the most advantageous:—

1. Amount of irrigation water to apply per season.
2. Time to apply it.
3. Frequency with which to apply it.
4. Amount to apply at each irrigation.

The experiment is planned primarily to obtain reliable data concerning the water requirements of various truck crops grown under the soil and climatic conditions prevalent in the Southern Okanagan Valley. The project serves a double purpose, however, in that it also provides a tangible illustration of approved irrigation methods, which can be readily comprehended by visitors to the Station. Such practical demonstrations are considered to be an important factor in bringing about the efficient use of irrigation water.

This project is located on soil which is typical of a great deal of the bench land in the Southern Okanagan Valley. The top soil consists of about two and a half feet of fertile sandy loam, below which the subsoil is of a coarse sandy nature. This experiment was started in 1920, previous to which time the

cultural treatment of the block of land selected as a site had been such as to promote uniform fertility. The block had been treated as a unit, and cropped in successive years with oats, potatoes, and vetch. No barnyard manure or commercial fertilizer had ever been applied to the soil.

Procedure.—Eight plots, each one-twentieth of an acre in area, are included in the experiment. Four of these are planted to vegetables each year, the remaining four being sown to vetch, which is ploughed under to maintain the nitrogen and humus content of the soil. Thus each plot bears a crop of vegetables every other year. During the year when a plot is sown to vetch, it receives the same amount of irrigation water as it does during the year when vegetables are grown thereon.

In the selection of vegetables to be grown in this experiment, it was considered advisable to include widely divergent types, since such a procedure would permit a ready comparison of the water requirements of root crops, foliage crops, and crops grown for their fruits or seeds. Care was taken, however, to choose only types and varieties of recognized commercial importance in the Southern Okanagan Valley. Accordingly, the tests are being carried out with the following:—

Bean—Stringless Green Pod.
Cabbage—Danish Ball Head.
Cantaloupe—Hoodoo.
Carrot—Chantenay.
Corn—Golden Bantam.
Cucumber—Davis Perfect.
Potatoes—Jersey Royal.
Tomato—Earliana.

These vegetables are planted in rows three feet apart, the time and method of planting, tillage, etc., being identical for each crop series. Each crop is harvested and weighed as it reaches marketable condition. At regular intervals throughout the growing season, careful records are made of the comparative growth and condition of the plants in each plot. Drought injury and unfavourable growth conditions are noted as they occur.

Water is applied by the furrow method, and cultivation is undertaken after every irrigation as soon as the soil is in condition to be worked. For recording the water applied, a Miner's Inch Box is used. The unit of measurement is the acre-inch, the exact equivalent of an inch of rainfall. The first irrigation is applied to all plots about June 1, and subsequent applications are made at fortnightly intervals. Those plots which receive less than six irrigations are watered at the regular intervals until they have obtained their quota.

Results.—The following tables show, for each variety of vegetables, and for each plot:—

1. Amount of water applied at each irrigation.
2. Number of irrigations per season.
3. Total water applied per season.
4. Yield per plot in 1920, 21 and 22.
5. Average yield per plot.
6. Average yield per acre.
7. Relative yield per acre expressed in percentage, using as a standard the yield from the plot which received twelve inches (3 inches by 4 inches) of water per season.
8. Average yield per acre-inch of water.

9. Relative yield per acre-inch of water expressed in percentage, using as a standard the yield from the plot which received twelve inches (3 inches by 4 inches) of water per season.

TABLE SHOWING YIELDS FROM VEGETABLE IRRIGATION PLOTS

BEAN—(STRINGLESS GREEN POD)

Plot	Application of Water			Yield per Plot				Average Yield per Acre		Average Yield per Acre Inch of Water	
	Amount applied at each irrigation	Number of irrigations	Amount applied each season	1920	1921	1922	Average	Actual	Relative	Actual	Relative
	inches		inches	lbs.	lbs.	lbs.	lbs.	lbs.	p.c.	lbs.	p.c.
A	2	3	6	44·0	35·2	39·0	39·4	11,038	85·8	1,840	171·6
B	3	4	12	56·2	41·3	40·2	45·9	12,858	100·0	1,072	100·0
C	3·6	5	18	64·2	30·8	47·2	47·4	13,278	103·3	738	68·9
D	4	6	24	59·0	31·7	45·8	45·5	12,740	99·1	531	49·5
				CABBAGE—(DANISH BALL HEAD)							
A	2	3	6	39·0	12·0	47·0	32·7	9,156	62·6	1,526	125·3
B	3	4	12	49·5	16·0	91·0	52·2	14,616	100·0	1,218	100·00
C	3·6	5	18	60·5	23·0	108·0	63·8	17,872	122·3	993	81·5
D	4	6	24	48·7	33·0	127·0	69·6	19,482	133·3	812	66·6
				CANTALOUPE—(HOODOO)							
A	2	3	6	135·0	61·5	151·5	116·0	16,240	70·1	2,707	140·2
B	3	4	12	227·5	56·0	213·0	165·5	23,170	100·0	1,931	100·00
C	3·6	5	18	156·3	58·0	198·0	137·4	19,239	83·0	1,069	55·4
D	4	6	24	133·0	54·0	209·0	132·0	18,480	79·7	707	36·6
				CARROT—(CHANTENAY)							
A	2	3	6	87	101	104	97·3	13,622	90·3	2,272	180·8
B	3	4	12	90	71	162	107·7	15,078	100·0	1,257	100·0
C	3·6	5	18	124	113	150	129·1	18,071	119·9	1,040	82·7
D	4	6	24	154	157	170	160·3	22,442	148·8	935	74·4
				CORN—(GOLDEN BANTAM)							
A	2	3	6	29	68	77	58·0	8,120	74·4	1,353	148·7
B	3	4	12	80	41	113	78·0	10,920	100·0	910	100·0
C	3·6	5	18	55	55	113	74·3	10,402	95·3	578	63·5
D	4	6	24	54	60	101	71·7	10,038	91·9	418	45·9
				CUCUMBER—(DAVIS PERFECT)							
A	2	3	6	117·2	159·5	220·5	165·7	23,205	60·9	3,868	121·8
B	3	4	12	256·7	263·5	296·0	272·1	38,091	100·0	3,174	100·0
C	3·6	5	18	334·0	215·0	332·7	293·9	41,149	108·0	2,286	72·0
D	4	6	24	406·7	284·0	399·5	363·4	50·879	133·6	2,120	66·8
				POTATO—(JERSEY ROYAL)							
A	2	3	6	70	108	302	160·0	22,400	61·8	3,733	123·5
B	3	4	12	109	171	497	259·0	36,260	100·0	3,022	100·0
C	3·6	5	18	109	141	446	232·2	32,508	89·7	1,806	59·8
D	4	6	24	163	144	453	253·3	35,462	97·8	1,478	38·9
				TOMATO—(EARLIANA)							
A	2	3	6	159·7	158·0	136·7	151·5	21,210	90·3	3,535	181·1
B	3	4	12	232·3	138·0	133·0	167·7	23,485	100·0	1,957	100·0
C	3·6	5	18	343·5	229·5	159·7	210·9	29,529	125·8	1,641	83·8
D	4	6	24	251·7	226·0	130·5	202·7	28,385	120·9	1,183	60·4

SUMMARY

Although this experiment is on a comparatively small scale, and although the records extend over a period of three years only, it is, nevertheless, considered justifiable and advisable that a brief summary of the results be compiled. The following statements are an interpretation of the foregoing tables of yield. They also embody field observations made during the growing season.

1. The highest yield per acre was obtained by applying twelve inches (3 inches by 4 inches) of water to corn, potatoes, and cantaloupes; eighteen inches (3·6 inches by 5 inches) to beans and tomatoes; and twenty-four (4 inches by 6 inches) inches to cabbages, carrots, and cucumbers.

2. The highest yield per inch of irrigation water was secured, with each of the crops under test, where only six inches (2 inches by 3 inches) of water was applied.

3. Applications of 3·6 inches and 4 inches of water immediately previous to planting noticeably reduced the percentage of germination below that secured where smaller amounts, or no water, was applied near seeding time. The injurious effect of large quantities of water applied at this time was especially marked in the case of corn, beans, and cantaloupes.

4. Serious wilting of crops was observed during the month of August in the plot receiving only six (2 inches by 3 inches) inches of water during the season. As explained above, this quantity had all been applied by July 1.

5. Application of three inches (3 inches) of water at 15-day intervals was sufficient to promote satisfactory growth in the crops under test.

6. Application of three inches (3 inches) of water at a time gave a uniform distribution of water between furrows three feet apart. This was not always the case when two inches (2 inches) of water was applied.

7. The soil, although in excellent physical condition, could not, and did not, absorb more than three inches (3 inches) of water in an eleven-hour day.

8. Large quantities of water applied to such heat-loving crops as corn, beans, cantaloupes, and tomatoes postponed, for as much as fourteen days, the date when these crops reached marketable condition. Where earliness is desired this lengthening of the growing season, due to the application of large amounts of water, is a distinct disadvantage.

9. An increase in the amount of water applied was accompanied by a decrease in the prevalence of blossom-end rot of the tomato.

10. The application of large quantities of water appeared to favour cracking of the tomato.

CONCLUSIONS

There can be no finality to conclusions arrived at from a survey of results obtained in a single experiment conducted over a period of only three years. It is considered, however, that sufficient information has already been secured to justify the following general statements, which may be of interest and value to growers of truck crops in the Southern Okanagan Valley.

1. Where care is exercised in applying irrigation water, and where approved methods of soil management are followed, satisfactory yields of many truck crops can be obtained with comparatively small applications of irrigation water.

2. When the soil is maintained in good physical condition, and when proper attention is given to the preservation of soil fertility, the quantity of water necessary to give the highest yield of such crops as tomatoes, potatoes, corn, beans, and cantaloupes, is considerably smaller than generally conceived.

3. Application of water in excess of the actual requirements of truck crops is not only a wasteful practice, but actually reduces the total yield and postpones the date of maturity, particularly of such crops as corn, cantaloupes, and beans.

4. Although such crops as carrots, cabbage, and cucumbers, give an increased yield from the application of relatively large amounts of water, it is questionable whether such increase is obtained economically. The increase in yield is not always sufficiently great to cover the cost of procuring and applying the additional water.

5. In those sections of the Southern Okanagan where not more than six inches (6 inches) of irrigation water is available during the growing season, or where no water is available after July 1, it would seem inadvisable to undertake commercial production of truck crops. With proper care, however, vegetables for home use may be produced with even this small quantity of water.

6. It is inexpedient to apply large quantities of water to the soil immediately previous to, or just after, sowing seeds of truck crops. Such applications, especially in the spring when the water is relatively cold, appear to chill the soil to such an extent as seriously to reduce the percentage of germination, particularly of the warm-season crops such as corn, beans, and cantaloupes. If sufficient of the natural precipitation to insure good germination has not been stored in the soil, the land should be irrigated ten days or so before seeding t.me, cultivated thoroughly, and then allowed to warm up before planting the seeds.

7. Applications of three inches (3 inches) of water at 15-day intervals can be expected to give satisfactory results only where water is applied according to approved methods, and where cultivation is practised as soon after irrigation as the ground can be worked.

8. Application of at least three inches (3 inches) of water at a time appears to be necessary to guarantee uniform distribution of moisture in the soil most prevalent in the Southern Okanagan.

9. The type of soil most prevalent in the Southern Okanagan will not take up moisture at the rate of three inches (3 inches) per eleven-hour day unless adequate measures are taken to insure the incorporation of plenty of humus with the soil.

10. Most of the distributing systems in the Okanagan Valley are operated so as to deliver water to individual growers on only two days of each week or four days a fortnight. Consequently it is of the utmost importance that the soil be thoroughly prepared previous to irrigation, and that it be maintained in such a condition that it readily absorbs and retains moisture.

11. Irrigation should never be regarded as a substitute for cultivation.

12. Every effort should be made to conserve the natural precipitation.

13. Physiological diseases or disorders of the tomato, such as blossom-end rot and cracking, can be at least partially controlled by maintaining proper conditions of soil moisture.

14. To make the most efficient use of his available water supply, the irrigator must study the moisture-holding capacity of his soil and the water-requirements of his crops, and then apply his water accordingly.

15. In attempting to determine what is the most economical irrigation practice for his particular conditions, the grower must consider not only yield per acre but also yield per acre-inch of water applied. He must balance the cost of his water against the rental value of his land. Where water is relatively more expensive than land it will pay the grower to apply comparatively small quantities of water over a large area of land. Even where water is plentiful, and land limited, the irrigator is justified in applying large amounts of water only so long as this practice results in an increase in yield sufficient to more than offset the cost of procuring and applying the water.

POTATOES

For several years it has been observed that potatoes grown in the hot, interior, irrigated sections of British Columbia, deteriorate very quickly in vigour of plant and yield of tubers. To try this out, seed potatoes from various sections of the country were included in the variety tests. In the following years of this experiment, seed is to be renewed each year from the districts listed and tested with seed grown at this Station. Mature seed versus immature seed is also included in this project.

Thirty-eight varieties of potatoes were grown in uniform duplicate test rows. They were planted on light loam soil which had grown sunflowers the previous year. They were planted on the level on May 10 and dug on October 16. The early part of the season was favourable for potato growth and vigorous plants were made. Shortage of water in midsummer, however, caused untimely irrigation, giving the newly-forming tubers a severe check. With the advent of early autumn rains, the potatoes commenced to grow again. This irregular and unbalanced plant growth throughout the latter part of the season resulted in the high yield of unmarketable tubers that is so noticeable in many of the varieties under test. Very rigid and uniform grading was given to all varieties. The results obtained are as follows:—

POTATOES—TEST OF VARIETIES—NEW SEED

Variety	Source of Seed	Average Yield per Acre, 1922				Shape	Size	Colour	Season	Remarks
		Marketable		Unmarketable						
		Bush.	Lbs.	Bush.	Lbs.					
Green Mountain	Stonehouse, Kelowna	605	0	268	37	Oblong	Large	White	Late	Fairly smooth and even.
Early Ohio	Kapuskasing, Exp. Station	556	36	118	25	Long	"	"	Medium	Rough.
Green Mountain	Dom. Exp. Sta., Kapuskasing.	503	22	171	49	Oblong	"	"	Late	"
Factor	" " Lethbridge	484	0	177	25	Long oblong	"	"	"	Fairly smooth.
Early Eureka	" " Lacombe	469	29	77	26	Oval long	"	"	Medium	Uniform.
Irish Cobbler	Stonehouse, Kelowna	462	13	91	58	Roundish	"	"	Early	Smooth and uniform.
Carters Early Favourite	Dom. Exp. Sta., Lacombe	452	32	133	6	Roundish oval	Med. to large	"	Medium	Irregular.
Gold Coin	" " "	435	36	188	46	Oblong thick	Large	"	Late	Rough.
Wee McGregor	" " "	433	11	199	12	Oblong	"	"	Medium	Rough, irregular.
Irish Cobbler	" " Kapuskasing.	428	20	159	43	Roundish	"	"	Late	Rough.
Irish Cobbler	" " Lethbridge	416	14	106	29	"	Medium	"	Early	Uniform and smooth.
Epicure	" " Lacombe	411	24	135	31	"	"	"	Very early	Uneven.
Ashleaf Kidney	" " "	401	43	188	46	Oblong-deep	Large	"	Late	Fairly uniform and smooth.
Sutton's Abundance	" " Lethbridge	401	43	157	18	Roundish oblong	"	"	Medium	Fairly uniform and smooth.
Reeve's Rose	" " "	392	2	266	12	Long oblong	Med. to large	Pink	"	Irregular.
Early Ohio	" " Lacombe	382	22	89	32	Roundish oblong	"	"	Early	Very uneven.
Green Mountain	" " "	382	22	186	20	Oblong	Large	White	Late	Fairly uniform and smooth.
Dalmeny Beauty	" " Lethbridge	379	56	423	20	Roundish	"	"	"	Smooth, irregular.
Early St. George	Clarke, Chilliwack	370	16	174	14	Elongate-oval	"	"	Early	Rough and irregular.
Gold Coin	Dom. Exp. Sta., Lethbridge	363	0	210	32	Long oblong	Medium	"	Medium	Fairly smooth.
Early Canadian	" " Kapuskasing.	358	10	0	0	Roundish oblong	"	Pink	Early	Smooth.
Morgan's Seedling	" " Lethbridge	353	19	89	32	Roundish	Large	White	"	Fairly smooth.
Wee McGregor	" " "	350	54	278	18	Oval	"	"	Late	Rough.
Table Talk	" " "	307	20	423	20	Roundish	"	"	"	"
Sir Walter Raleigh	" " Invermere	304	55	96	48	"	Med. to large	"	"	Uniform.
Jersey Royal	Guinett, Chilliwack	304	55	128	16	Long	Large	"	Early	Rough and irregular.
Country Gentlemen	Dom. Exp. Sta., Lacombe	278	59	418	40	Round long	"	Pink and white.	Medium	" "
Duke of York	" " "	275	53	118	25	Round oblong	Small	White	Vary early	Uneven.
Table Talk	" " "	273	28	346	4	"	Medium	"	Late	Very rough.
Green Mountain	Bell, Kelowna	273	28	133	6	Oblong	Large	"	Early	Fairly smooth and even.

POTATOES—TEST OF VARIETIES—NEW SEED—*Con.*

Variety	Source of Seed	Average Yield per Acre, 1922				Shape	Size	Colour	Season	Remarks
		Marketable		Unmarketable						
		Bush.	Lbs.	Bush.	Lbs.					
American Wonder	Dom. Exp. Sta., Lacombe	251	41	404	8	"	"	"	Medium	Rough, irregular.
Empire State	" " Lethbridge	249	16	331	32	Long	Medium	"	"	Rough.
King Edward VII.	" " Lacombe	244	25	237	10	Roundish	Small	White and pink.	"	Very uneven.
Duchess of Norfolk	" " "	237	10	348	28	Round oblong	Med. to large	White	Late	Irregular and rough.
Early Hebron	" " "	225	4	384	48	Oblong	Medium	Pink and white.	"	Very rough and irregular.
Bussby Mammoth	" " "	205	42	421	5	"	Large	"	"	Rough.
Irish Cobbler	" " "	203	17	31	28	Roundish	Medium	White	Very early	Uniform and smooth.
Houlton Rose	" " "	186	20	498	31	Oval long	Large	Pink	Late	Very rough and irregular

POTATOES—TEST OF VARIETIES—OLD SEED

Fifteen varieties of potatoes from seed raised at this Station for two years were grown in uniform, duplicate test rows. They were planted on light, gravelly loam soil which had grown peas and oats the previous year. They were planted on May 25 and dug on October 12. Throughout the season, practically all varieties lacked health and vigour as compared with new seed planted from other districts. Leaf-roll, mosaic and other physiological diseases were very prevalent. Naturally, such condition of plant growth gave a decided decrease in yield per acre. The results are as follows:—

POTATOES—TEST OF VARIETIES—OLD SEED

Variety	Source of Seed	Average Yield per Acre, 1922			
		Marketable		Unmarketable	
		Bush.	Lbs.	Bush.	Lbs.
Factor	Dominion Experimental Station, Summerland.	232	19	48	24
Raleigh	" " " " "	229	54	79	52
Majestic	" " " " "	203	17	43	34
Great Scott	" " " " "	193	36	91	58
Kerr Pink	" " " " "	176	40	67	46
Edzel Blue	" " " " "	142	47	113	44
King George	" " " " "	140	22	176	40
Table Talk	" " " " "	137	56	33	53
Gold Coin	" " " " "	113	44	55	40
Early Ohio	" " " " "	113	44	21	47
Dalmeny Beauty	" " " " "	113	44	43	34
Jersey Royal	" " " " "	99	13	125	50
Morgan Seedling	" " " " "	75	1	24	12
Empire State	" " " " "	75	1	31	28
Irish Cobbler	" " " " "	50	49	21	47

IRRIGATION

Rate of application in Acre Inches

July	August	Total
10	5	15

POTATOES—TWO-YEAR AVERAGES

These varieties have been grown for two years. The following average yields have been obtained during that time:—

Variety	Average Yield per Acre for Two Years, 1921–1922			
	Marketable		Unmarketable	
	Bush.	Lbs.	Bush.	Lbs.
Factor	280	2	104	37
Raleigh	262	47	62	46
Jersey Royal	250	40	90	25
Dalmeny Beauty	245	29	238	38
Early Ohio	239	35	61	25
Green Mountain	237	26	102	32
Gold Coin	233	32	109	30
Ashleaf Kidney	216	46	103	34
Morgan Seedling	206	24	70	21
Table Talk	206	15	218	34
King George	205	31	125	20
Reeve's Rose	199	28	145	33
Irish Cobbler	195	33	56	26
Majestic	178	13	34	17
Edzel Blue	160	28	77	42
American Wonder	158	32	219	21
Great Scott	150	28	53	49
Empire State	148	20	177	31
Kerr Pink	121	40	43	48

IRRIGATION

Rate of application in acre inches

June	July	August	Total
5·66	6·66	7·27	19·59

POTATOES—YIELD OF BRITISH COLUMBIA CERTIFIED SEED

These potatoes were grown under the same field conditions as the variety tests. This is the first season for this experiment. The results are as follows:—

Variety	Source of Seed	Average Yield per Acre, 1922			
		Marketable		Unmarketable	
		Bush.	Lbs.	Bush.	Lbs.
Green Mountain	Stonehouse, Kelowna	605	0	268	37
Irish Cobbler	"	462	13	91	58
Early St. George	Clarke, Chilliwack	370	16	174	14
Jersey Royal	Guinett, "	304	55	128	16
Green Mountain	Bell, Kelowna	273	28	133	6

POTATOES—COMPARISON OF YIELDS FROM MATURE AND IMMATURE SEED

These varieties were grown under the same field conditions as the variety tests, with the exception of date of planting. Tubers to obtain mature seed were planted on May 10 and for immature seed on June 27. All varieties were dug on October 16. Untimely irrigation checked plant growth for a time; this, combined with early autumn rains, started the potatoes growing again and prevented the full ripening of the mature seed. At time of digging, eighty per

cent of the tops of the plants for immature seed showed green. The comparison of yields from one year's results are as follows:—

Variety	Source of seed	Average Yield per Acre, 1922							
		Mature Seed				Immature Seed			
		Marketable		Unmarketable		Marketable		Unmarketable	
		bush.	lbs.	bush.	lbs.	bush.	lbs.	bush.	lbs.
Early St. George	Clarke, Chilliwack	370	16	174	14	457	3	136	57
Irish Cobbler	Stonehouse, Kelowna	462	13	91	58	197	1	92	7
Jersey Royal	Guinett, Chilliwack	304	55	128	16	265	49	0	0
Green Mountain	Bell, Kelowna	273	28	133	6	346	30	384	27
Green Mountain	Stonehouse, Kelowna	605	0	268	37	118	48	0	0

VEGETABLE CULTURE

Numerous varieties of vegetables were tested with the following results:—

BRUSSELS SPROUTS

Three varieties of these were grown in 30-foot rows, viz., Amager Market, Paris Market and Dalkeith. Although these made fairly good growth, they produced practically no sprouts. This vegetable has been tested over a number of years with similar results. Under the most favourable conditions, Paris Market is apparently the most satisfactory.

BEETS

Row	Variety	Yield
ft.		lbs.
30	Detroit Dark Red, thinned to 2 inches	75
30	Detroit Dark Red, thinned to 3 inches	84
30	Detroit Dark Red, thinned to 4 inches	88½

In the variety tests 9 varieties were grown in 30 foot rows. The highest yields were given by:—

1st—Crosby Egyptian ..... 151 lbs.
2nd—Detroit Dark Red ..... 132½ "
3rd—Black Red Ball ..... 126 "

BEANS

Experiment on different dates of planting:—

Length of row	Variety	Date of planting	Date ready for use	Yield	
ft.				lbs.	oz.
30	Refugee	June 8	Aug. 14	32	5
30	"	" 23	" 30	26	15
30	"	" 15	" 30	25	10
30	"	" 30	" 30	24	4
30	Red Pod Kidney Wax	June 30	Sept. 19	24	14
30	"	" 8	Aug. 1	24	7
30	"	" 23	" 8	23	2
30	"	" 15	" 18	21	13
30	Extra Early Red Valentine	June 8	Aug. 1	41	8
30	"	" 15	" 18	36	3
30	"	" 30	Sept. 19	27	14
30	"	" 23	Aug. 18	27	9
30	Stringless Green Pod	June 15	Aug. 18	31	8
30	"	" 30	Sept. 19	25	13
30	"	" 8	Aug. 14	20	9
30	"	" 23	Sept. 19	19	4

In the variety tests, 26 varieties and strains were grown in 30 foot rows, the highest yields being obtained from the following:—

1st—Stringless Green Pod..... 34 lbs., 13 oz.
2nd—Bountiful Green Bush..... 33 " 13 "
3rd—Round Pod Kidney Wax..... 32 " 3 "

CABBAGE

In the variety tests, 19 varieties and strains were grown. The most satisfactory were:—

Extra Amager Ball Head, average heads..... 9½ lbs.
Rennies XXX, average heads..... 8¼ "
Danish Round Head, average heads..... 8½ "
Fottlers Improved Brunswick, average heads..... 8¼ "

CARROTS

Experiments on distances apart in the row:—

Length of row	—	Variety	Yield	
			lb.	oz.
30	Thinned to 1½"	Chantenay	87	..
30	Thinned to 2"	"	83	8
30	Thinned to 3"	"	59	..

In the variety tests, seven different varieties were grown, the highest yields being given by:—

Garden Gem..... 152 lbs.
Ox Heart..... 141¾ "
Improved Danvers..... 103½ "

CUCUMBERS

Davis Perfect again proved highly satisfactory. This variety has been tested here over a number of years with excellent results. The cucumber is of good size, shape, colour and quality. The yield of marketable cucumbers gathered from 3 hills 6 feet by 6 feet was 100 pounds 3 ounces. Prolific and Improved Long Green gave slightly heavier yields but the quality was not so high. From three hills of West India Gherkin 62 pounds were gathered.

CELERY

Nine varieties of this vegetable were grown. The most satisfactory being Evans' Triumph, Winter Queen and Giant Pascal. Although this vegetable did fairly well, conditions here cannot be considered satisfactory for its growth.

SWEET CORN

The variety tests included 22 sorts. Again, Golden Bantam was the most satisfactory. There are some varieties which are earlier than this, but their quality is very inferior and for commercial purposes, Golden Bantam is the only one that could be recommended.

EGG PLANTS

The yields from the two varieties tested were as follows:—

Length of row	Variety	Date planted	Date ready for use	Yield	
				lb.	oz.
30 ft., 18 in. in rows	Black Beauty	Mar. 29	Aug. 28	100	2
30 ft., 18 in. in rows	New York Improved Purple	" 29	" 28	81	0

LETTUCE

The variety tests included 9 sorts, all of which proved satisfactory. The varieties which could be recommended are Grand Rapids, Iceberg and Crisp as Ice.

WATERMELONS

Four varieties were tested, with the following results:—

—	Variety	Date planted	Date ready for use	Yield
				melons
3 hills 9' x 9'	Cole Early	June 8	Sept. 21	34
3 hills 9' x 9'	Harris Earliest	" 8	" 21	28
3 hills 9' x 9'	Ice Cream	" 8	" 21	27
3 hills 9' x 9'	Wills Sugar	" 8	" 26	27
3 hills 9' x9'	Fordhook Early	" 8	" 21	22

MUSK MELONS

Twenty varieties were tested, with the following results:—

—	Variety	Date planted	Date ready for use	Yield
				melons
3 hills 6′ x 6′	Hearts of Gold, Improved Hoodoo	June 8	Sept. 27	130
3 hills 6′ x 6′	Hoodoo, Hearts of Gold	" 6	" 27	99
3 hills 6′ x 6′	Paul Rose	" 8	" 21	93
3 hills 6′ x 6′	Select Gold Lined Netted Rock	" 8	" 27	80
3 hills 6′ x 6′	Hoodoo	" 8	" 27	79
3 hills 6′ x 6′	Paul Rose	" 8	" 21	76
3 hills 6′ x 6′	Early Hackensack	" 8	" 21	67
3 hills 6′ x 6′	Emerald Gem	" 8	" 25	57
3 hills 6′ x 6′	Cantaloupe, Pollock 25	" 7	" 27	53
3 hills 6′ x 6′	Salmon Tinted Pollock	" 6	" 27	52
3 hills 6′ x 6′	Milwaukee Market	" 8	" 27	50
3 hills 6′ x 6′	Cantaloupe, Pollock 10–25	" 7	Oct. 10	48
3 hills 6′ x 6′	Eden Gem	" 8	Sept. 27	46
3 hills 6 x 6′	Milwaukee Market	" 8	" 21	34
3 hills 6′ x 6′	Rocky Ford	" 8	" 21	33
2 hills 6′ x 6′	Honey Dew, Green Meated	" 8	Oct. 14	28
3 hills 6′ x 6′	Honey Dew	" 6	" 14	27
3 hills 6′ x 6′	Casaba, Hungarian	" 8	Sept. 21	22
3 hills 6′ x 6′	Winter Musk Melon, Golden Beauty Casaba	" 6	Oct. 14	21
3 hills 6′ x 6′	New Hybrid	" 8	" 2	8

ONIONS

Cultural tests with onions to determine the advantage or otherwise of raising plantlets in the hotbed as against seeding in the open and thinning to distances of 1, 2 and 3 inches apart in the row:—

Row	Thinned to	Variety	Date planted	Date ready for use	Yield	
feet					lb.	oz.
30	Hotbed 2″	Extra Early Flat Red	April 10	Sept. 25	4	14
30	Outside 1″	"	May 2	" 25	6	14
30	" 2″	"	" 2	" 25	7	0
30	" 3″	"	" 2	" 25	13	6
30	Hotbed 2″	Select Large Red Wethersfield	April 10	Sept. 25	28	0
30	Outside 1″	" "	May 2	" 25	23	0
30	" 2″	" "	" 2	" 25	15	0
30	" 3	" "	" 2	" 25	10	0
30	Hotbed 2″	Giant Prize Taker	April 10	Sept. 25	23	4
30	Outside 1″	"	May 2	" 25	9	5
30	" 2″	"	" 2	" 25	8	0
30	" 3″	"	" 2	" 25	10	8
30	Hotbed 2″	Yellow Globe Danvers	April 10	Sept. 25	21	0
30	Outside 1″	"	May 2	" 25	17	4
30	" 2″	"	" 2	" 25	9	6
30	" 3″	"	" 2	" 25	9	0

The following statement gives the results from sets planted at various distances apart in the rows:—

Row	Planted	Variety	Date planted	Date ready for use	Yield	
feet	inch				lb.	oz.
30	1	Onion Sets, Red	May 2	Sept. 25	4	3
30	2	"	" 2	" 25	2	14
30	3	"	" 2	" 25	3	4
30	4	"	" 2	" 25	2	10
30	1	Onion Sets, Yellow	May 2	Sept. 25	5	0
30	2	"	" 2	" 25	1	6
30	3	"	" 2	" 25	1	14
30	4	"	" 2	" 25	2	8

This year, the onion sets were badly attacked by maggot whereas the onions grown from seed did not suffer so severely. Last year the experience was just the reverse. In the tests of onion varieties grown in 30-foot rows and thinned to 3 inches, the following gave the highest yields:—

	lbs.	oz.
Large Red Wethersfield	42	5
Yellow Globe Danvers	40	2

PUMPKINS

The most satisfactory pumpkin is the Small Sugar. The yield from three hills of this variety 9 feet by 9 feet was 41 pounds. Fort Burthold yielded 55 pounds but the quality is not so high.

PEAS

Cultural tests to determine the most satisfactory date for planting. Four varieties planted at intervals of one week gave the following results:—

Length of of row	Variety	Date planted	Date ready for use	Yield	
feet				lbs.	oz.
30	Gradus	May 10	July 4	10	8
30	"	" 19	" 13	7	1
30	"	" 26	" 21	8	0
30	"	June 2	" 21	5	14
30	Stratagem	May 10	July 21	14	1
30	"	" 19	Aug. 1	6	11
30	"	" 26	July 21	4	6
30	"	June 2	Did not mat're		
30	McLean Advancer	May 10	Aug. 10	8	6
30	"	" 19	" 21	6	7
30	"	" 26	" 26	2	8
30	"	June 2	Failed.		
30	Thos. Laxton	May 10	July 4	4	10
30	"	" 19	" 10	4	0
30	"	" 26	" 26	2	0
30	"	June 2	Did not mat're		

Late plantings of peas under conditions here are invariably unsatisfactory, as the plants suffer severely from mildew. Thirteen varieties of peas were grown in the tests, the three highest yields being as follows:—

Variety	Planted	Date ready for use	Yield	
			lbs.	oz.
Lincoln	May 19	Aug. 26	13	0
Sutton Excelsior	" 10	" 4	10	8
Gregory Surprise	" 10	" 10	9	12

RADISHES

Four varieties were grown in 30 foot rows, viz., Scarlet Turnip White Tip, Olive and White Icicle. These were planted on May 4 and were ready for use on June 7; all were satisfactory.

SPINACH

The following five varieties were grown in 30 foot rows: Bloomsdale, Longstanding, New Zealand, Broad Flanders and Victoria. The most satisfactory was New Zealand, Longstanding being a good second. All were satisfactory.

SQUASH

Hills	Variety	Date planted	Date ready for use	Yield
3 hills 9' x 9'	English Vegetable Marrow	June 5	Aug. 15	85
3 hills 9' x 9'	Long White Bush	" 5	" 9	34
3 hills 9' x 9'	Mammoth White Bush	" 5	" 9	30

TOMATOES

Cultural tests to determine the advantage or otherwise of pruning the plants.

Number of plants	Variety	Pruned to	Date planted	Date ready for use	Yield	
					lb.	oz.
10 plants—						
4' x 4'	Alacrity	1 stem	April 8	Aug. 3	116	3
4' x 4'	"	2 stems	" 8	" 3	164	9
4' x 4'	"	Unpruned	" 8	" 3	346	12
10 plants—						
4' x 4'	Danish Export	1 stem	April 8	Aug. 1	96	12
4' x 4'	"	2 stems	" 8	" 3	146	11
4' x 4'	"	Unpruned	" 8	" 3	209	7
10 plants—						
4' x 4'	Bonny Best	1 stem	April 8	Aug. 3	148	12
4' x 4'	"	2 stems	" 8	" 3	243	1
4' x 4'	"	Unpruned	" 8	" 3	267	7

For cannery purposes the following varieties can be recommended: John Baer, Chalk's Early Jewel, Earliana (selected strain), Burbank and Landreth; for table use, Danish Export and Victoria Whole Salad.

ORNAMENTAL GARDEN

The lawns and ornamental gardens were very much appreciated by the numerous visitors to the Station. The log building which was erected for the accommodation of visitors was in frequent use. There were many farmers', Sunday school and other picnics to the farm, and motor parties passing through very frequently took advantage of the conveniences offered. The perennial border was extended and ornamental shrubs were planted out in various places. In last year's report a list of roses that had given satisfaction under conditions here was given and we cannot do better than repeat this here as these can be fully recommended to anyone about to set out a rose garden.

ROSES

Margaret Dickson,
Ulrich Brunner,
Juliet,
Triumph,
Paul Neyron,
Viscountess Folkstone,
Frau Karl Druschki,
Mme. Caroline Testout,
King George V.,
Mrs. John Laing,
Gruss an Teplitz,
George Dickson,
Hugh Dickson,
Mme. Ed. Herriott,
American Beauty,
Soleil d'Or,
Souv. de President Carnot,
Prince de Bulgaria,
George Arends,
Captain Christy,
Wakefield Christy Miller,
Gen. Superior Arnold.

Climbing Roses

Dorothy Perkins, white,
Captain Christy,
Kaiserin Augusta Victoria,
Hiawatha,
Tausendschon,
Crimson Rambler,
Gloire de Dijon.

BULBS

Tulips.—During the spring there was a good display of bulbs. The tulip beds presented a mass of colour and seem especially suited to local conditions. The Darwins were particularly attractive. The following varieties can be recommended.

Artus, (Early),
Clara Butt, (Darwin),
Baronne de la Tonnaye, (Darwin),
Chrysolora, (Early),
Isabella, (Cottage),
Phillippe de Commines, (Darwin),
Duchess de Parma, (Early),
Isis, (Darwin).

Narcissi

Golden Spur,
Madam de Graaf,
Barrü Conspicuuus.
Emperor,
Poeticus Ornatus,
Empress,
Sir Watkin.

Crocus

King of the Whites,
Large Yellow,
Lothair,
Baron Bruno,
Sir Walter Scott.

CEREALS

With timely and thorough irrigation, the season of 1922 was very favourable for cereal crops. Desirable growing weather prevailed until all varieties reached maturity.

Ten varieties of wheat, six of oats and eight of barley were tested out in 1922, in duplicate test plots, on one-sixtieth of an acre each. They were seeded on light, loam soil which had grown beans and carrots the previous year. Soil moisture was plentiful at time of seeding which caused rapid germination and excellent growth. The variation in dates of seeding was due to some error in the treatment of the seed for smut that necessitated re-seeding many of the plots. Timely and thorough irrigations were applied during the months of May and June, after which no water was needed. The rate of application in acre-inches for all varieties was as follows: May, 5·18; June, 5·55; total for the season, 10·73 acre-inches. The results are shown in tabular form as follows:—

WHEAT—TEST OF VARIETIES

Name of Variety — Wheat	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	Actual yield of grain per acre	Weight per measured bushel after cleaning	Average yield of grain per acre, 1922	
				inches		lbs.	lbs.	bush.	lbs.
Kitchener	April 19	July 27	99	48	8·5	3,810	60·8	63	30
Kuhanka, Ottawa 37	May 15	Aug. 17	94	45	10·0	3,240	62·6	54	0
White Russian	April 19	July 31	103	42	10·0	2,349	59·6	39	9
Burbank	May 15	Aug. 1	78	36	10·0	2,010	63·0	33	30
Huron, Ottawa 3	" 15	" 2	79	41	10·0	1,860	60·5	31	0
Red Fife, Ottawa 17	" 15	" 3	80	45	10·0	1,830	60·8	30	30
Marquis, Ottawa 15	" 15	" 3	80	41	10·0	1,620	61·2	27	0
Pioneer, Ottawa 195	" 15	July 31	77	42	9·0	1,500	62·8	25	0
Ruby, Ottawa 623	" 15	" 25	71	42	9·0	1,290	62·0	21	30
Prelude, Ottawa 135	" 15	" 25	71	36	8·0	1,050	63·2	17	30

OATS—TEST OF VARIETIES

Name of Variety — Oats	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	Actual yield of grain per acre	Weight per measured bushel after cleaning	Average yield of grain per acre, 1922	
				inches		lbs.	lbs.	bush.	lbs.
Gold Rain	April 19	July 20	92	48	7·25	2,760	42·0	81	6
Liberty, Ottawa 480	" 19	" 15	87	45	9·50	2,130	54·2	62	22
Daubenay, Ottawa 47	May 15	" 31	77	45	6·00	2,040	39·5	60	0
Iowa, U.B.C. 103	April 19	" 15	87	42	9·00	1,860	45·0	54	24
Victory	May 15	Aug. 1	78	48	7·00	1,680	43·0	49	14
Banner, Ottawa 49	" 15	" 6	83	45	9·50	1,500	39·2	44	4

BARLEY—TEST OF VARIETIES

Name of Variety — Barley	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	Actual yield of grain per acre	Weight per measured bushel after cleaning	Average yield of grain per acre, 1922	
				inches		lbs.	lbs.	bush.	lbs.
Gold	April 19	July 21	93	36	5·00	4,440	56·0	92	24
O. A. C. No. 21	May 15	July 27	73	45	8·00	2,730	54·2	56	42
Charlottetown, No. 80	April 19	" 27	99	38	9·25	2,370	55·0	49	18
Himalayan, Ottawa 59	May 15	" 27	73	36	8·25	2,190	63·0	45	30
Plumage	April 19	Aug. 14	117	36	10·00	1,910	55·5	39	38
Early Chevalier, Ottawa 51	May 15	July 23	69	40	8·00	1,890	55·0	39	18
Hull-less	" 15	" 30	76	36	8·00	1,470	64·8	30	30
Chinese, Ottawa 60	April 19	" 27	99	39	9·00	1,260	53·5	26	12

Average yields of grain on test plots over a period of seven years 1916-22 inclusive are as follows:—

BARLEY—TEST OF VARIETIES

Variety	1916	1917	1918	1919	1920	1921	1922	Average number of days maturing	Average yield grain per acre	
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.		bush.	lbs.
Himalayan, Ottawa 59	.....	.....	.....	.....	.....	2,280	2,190	83·0	46	27
O. A. C. 21	1,225	2,340	1,700	1,520	435	3,960	2,730	84·6	41	19
Early Chevalier, Ottawa 51	1,412	1,740	1,875	2,020	1,950	2,640	1,890	82·8	40	12
Manchurian, Ottawa 50	1,350	1,635	2,000	1,070	1,035	2,580	.....	85·6	33	28
Hull-less	.....	.....	.....	.....	495	1,890	1,470	82·0	26	37
Charlottetown No. 80	.....	.....	1,840	971	225	960	2,370	88·7	26	25

OATS—TEST OF VARIETIES

Daubeney, Ottawa 47	1,225	3,135	1,935	1,380	970	2,550	2,040	86·0	55	21
Victory	1,054	2,445	2,120	875	1,200	2,310	1,680	86·5	49	3
Ligowa	1,228	2,175	1,460	740	2,100	2,100	.....	89·6	48	2
Banner, Ottawa 49	1,400	1,455	1,920	1,095	850	2,160	1,500	86·1	43	21
Liberty, Ottawa 480	.....	.....	.....	900	369	480	2,130	84·7	28	18

WHEAT—TEST OF VARIETIES

Burbank	.....	.....	.....	.....	.....	1,950	2,010	89·0	33	0
Huron, Ottawa 3	1,300	1,650	1,940	1,170	2,205	960	1,860	87·3	26	24
Pioneer, Ottawa 195	1,275	1,780	1,520	1,060	1,320	2,160	1,500	86·5	25	17
Marquis, Ottawa 15	1,142	1,995	1,635	1,320	970	1,920	1,620	87·0	25	15
Red Fife, Ottawa 17	1,350	2,205	1,300	705	960	1,350	1,830	88·0	23	57
Ruby, Ottawa 623	.....	.....	1,480	1,240	510	1,590	1,290	82·6	20	22
White Russian	637	1,215	1,920	920	420	870	2,349	90·6	20	13
Prelude, Ottawa 135	.....	.....	.....	.....	855	1,230	1,050	84·1	17	25

From these averages it will be observed that all varieties have not been tested for seven years. In 1922, Manchurian barley and Ligowa oats were discarded for the more productive varieties, Gold Rain and Chinese, Ottawa 60. In the wheat and barley tests, the varieties that gave the highest yield per acre have only been grown for two years. This fact is very important when comparing results with other varieties. Of the barleys, O.A.C. No. 21 heads the list in the seven-year average, followed closely by Early Chevalier, Ottawa 51. In the variety test of oats, Daubeney, Ottawa 47, gave best results, with Victory a close second. The varieties of wheat that gave the highest yields are Huron, Ottawa 3; Pioneer, Ottawa 195 and Marquis, Ottawa 15.

BEANS—TEST OF VARIETIES

The hoed crop year in preparation for grain in the cereal five-year rotation, is given to testing out field beans. Sixteen varieties of beans were grown in uniform duplicate test rows. They were planted on May 27 on light, loam soil which had grown hay the previous year, and harvested during the latter part of August. Although germination and early growth were very irregular, development throughout the season was good, for all varieties. Even distribution of moisture and a warm soil at planting time are very necessary to give this crop a quick, uniform start. The irrigation given to this crop in acre inches was as follows:—

June	July	Total
2·3	3·1	5·4 acre inches.

The results are as under:—

BEANS—TEST OF VARIETIES

Name of Variety	Date of ripening	Number of days maturing	Average length of plant	Actual yield of seed per acre	Yield per acre	Weight per measured bushel after cleaning
			inches	lbs.	bush. lbs.	lbs.
White Navy S.D	Aug. 28	93	23	1,520	25 25	65
White Marrowfat	" 29	94	30	1,480	24 40	67
Robust Navy Pea	" 25	90	30	1,280	21 20	67
Yellow Eye	" 28	93	24	1,240	20 40	64
Norwegian, Ottawa 710	" 21	86	14	1,120	18 40	61
Beauty, Ottawa 712	" 26	91	12	1,080	18 0	67
New Prize Winner	" 26	91	24	1,040	17 20	65
Small Navy	" 28	93	30	1,040	17 20	64
Navy Ottawa 711	" 28	93	26	1,000	16 40	66
V.I.S. No. 5	" 31	96	20	960	16 0	65
Large White, Ottawa 713	" 30	90	24	920	15 20	65
White Pea	" 25	90	24	920	15 20	65
White Wonder	" 29	94	20	920	15 20	65
Pierce's Imp. Tree	" 29	94	24	880	14 40	64
V.I.S. No. 3	" 31	96	20	840	14 0	66
White Navy	" 29	94	38	720	12 0	64

BEANS—THREE-YEAR AVERAGES

Twelve of these varieties have been grown for three years.
The following average yields have been obtained during that time:—

Variety	1920	1921	1922	Average yield per acre for three years
	lbs.	lbs.	lbs.	bush. lbs.
White Wonder	1,452	292	920	14 48
White Marrowfat	692	386	1,480	14 13
White Navy, S.D.	629	310	1,520	13 40
Norwegian, Ottawa 710	750	514	1,120	13 15
Yellow Eye	528	574	1,240	13 1
Pearce's Improved Tree	629	789	880	12 46
White Pea	581	704	920	12 15
New Prize Winner	629	460	1,040	11 50
Beauty, Ottawa 72	290	163	1,080	8 31
Large White, Ottawa 713	334	263	920	8 26
Robust Navy Pea	491	633	1,280	7 48
V.I.S. No. 3	145	369	840	7 31

The varieties, White Marrowfat; White Navy, S.D.; Norwegian, Ottawa 710; and Yellow Eye have been fairly consistent in high yields each year.

FORAGE CROPS

An abundance of natural moisture in the soil during the early spring gave favourable conditions for all forage crops up to the end of May. With the occurrence of a water shortage in early summer, many of the crops under test suffered and some projects, even though well started, had to be abandoned for the season. Owing to this scarcity of water, practically no results were obtained from experiments in alfalfa seed production, grasses, clovers and alfalfa. Corn, sunflowers, sorghum, sudan grass and root crops were more fortunate and were well irrigated, although not always timely.

ENSILAGE CROPS

INDIAN CORN

Sixteen varieties of corn, and ten varieties of sunflowers were tested out this year on light, loam soil which had grown hay the previous year. They were sown in rows 36 inches apart in plots of one-fortieth acre on April 29. These were harvested on October 21, with the following results:—

INDIAN CORN FOR ENSILAGE—TEST OF VARIETIES

Variety	Source of Seed	Average height		Average stage of maturity	Yield per acre, 1922	
		ft.	ins.		tons	lbs.
Wisconsin No. 7	J. O. Duke	9	0	Glazed	9	1,720
Leaming	J. Parks	9	0	"	9	1,680
Golden Glow	Wm. Rennie Co., Vancouver	8	5	Soft	9	1,480
Bailey	J. O. Duke	9	0	Glazed	9	880
White Cap Yellow Dent		9	0	"	9	840
Wisconsin No. 7	Wm. Rennie Co., Vancouver	9	0	Soft glazed	9	120
Longfellow	J. O. Duke	9	0	"	9	0
Longfellow	Steele Briggs, Winnipeg	8	0	"	8	1,840
Crompton's Early	J. O. Duke	9	0	Ripe	8	1,680
North Dakota	Wm. Rennie Co., Vancouver	8	5	"	8	1,440
Gold Nugget	U.B.C., Vancouver, B.C	9	0	Soft glazed	8	1,360
Golden Glow	J. O. Duke	9	0	"	8	1,160
Quebec No. 28	J. O. Duke			Ripe, Aug. 30.	7	1,600
Imp. Leaming	K. O. Duke	9	0	Soft glazed	7	1,480
North Dakota	J. O. Duke	9	0	Ripe	7	760
North West Dent	Kelowna, B.C	7	0	Ripe, Aug. 30.	4	880
Average		8	0		8	1,182

IRRIGATION

Rate of application in acre inches

June	July	Total
7·38	8·60	15·98

INDIAN CORN—AVERAGE YIELDS

Five varieties have been grown for two years. The following are the average yields:—

Variety	Average yield per acre for two years, 1916-17	
	tons	lbs.
Longfellow	18	1,000
King Philip	16	1,450
North West Dent	16	300
Essex Dent	12	1,900
Golden Glow	10	1,500
Average	15	30

Seven varieties have been grown for two years. The following are the average yields:—

Variety	Average yield per acre for two years 1921-22	
	tons	lbs.
Crompton's Early	20	1,340
Longfellow	17	1,960
Leaming	16	1,590
Wisconsin No. 7	16	1,211
North Dakota	16	75
North West Dent	15	1,940
Bailey	15	1,565
Average	17	240

Corn yields are so variable from year to year that definite recommendations as to dependable varieties cannot be given. The average results of North Western Dent, although not the best of the varieties tested, show consistently good yields with the exception of this season. Reliable seed is easy to obtain, this combined with its earliness and good yield, recommends this variety for this section of the Province and especially for the districts further north. Longfellow gave a much better average than North Western Dent. Although somewhat late, it usually reaches a fair stage of maturity. As an ensilage corn it is recommended, particularly for the southern sections of this district.

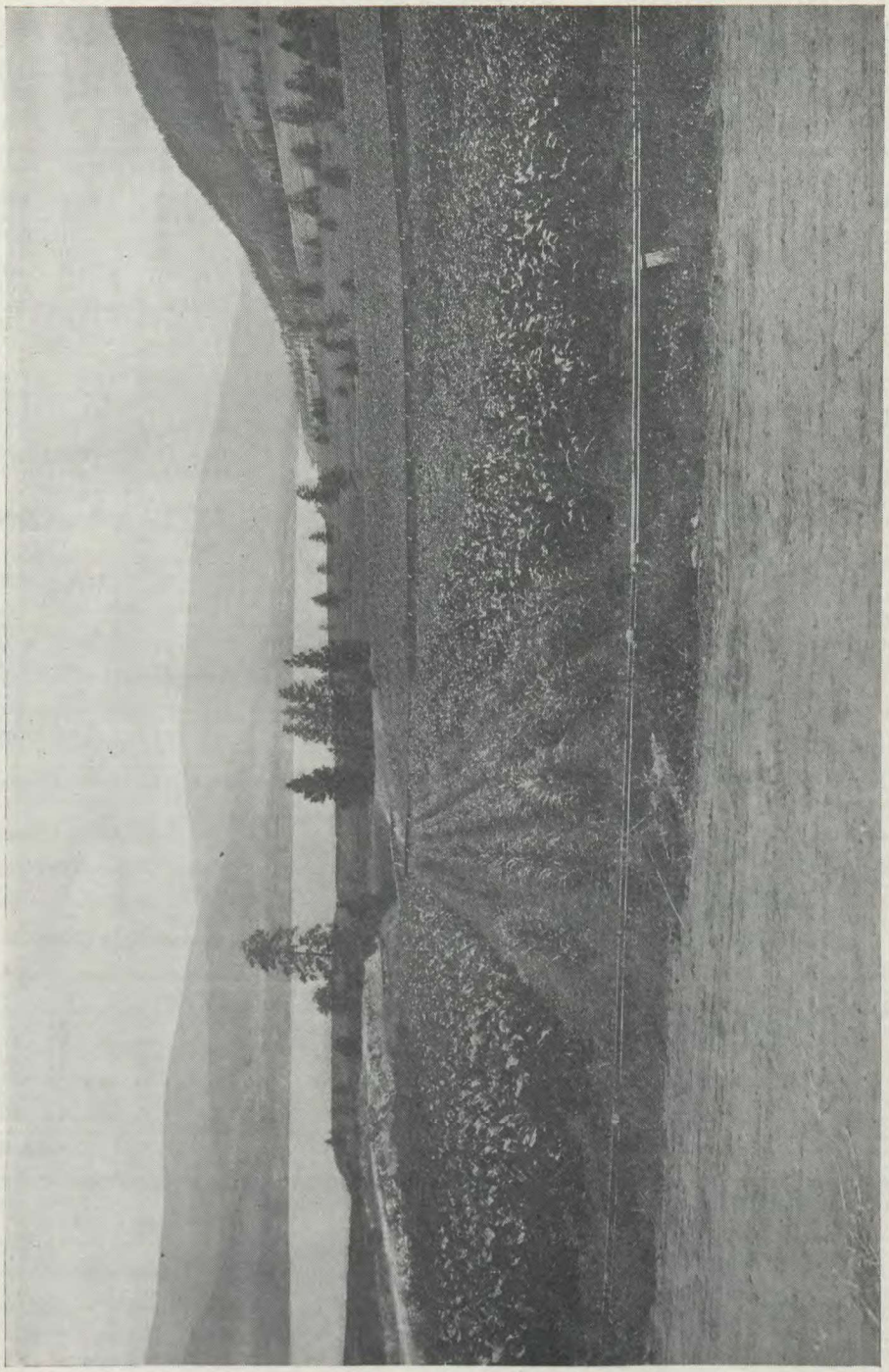
CORN, SUNFLOWERS, SORGHUM, SUDAN GRASS—COMPARATIVE TESTS

Previous work with sorghum and sudan grass have given promise of these plants being well adapted to dry belt conditions. They withstood drought particularly well and gave very fair yields. This year a definite start was made with comparative tests of corn, sunflowers, sorghum and sudan grass at different dates of planting for ensilage purposes. Six different seedings, each a week apart, were made in plots of one-thirtieth of an acre, on light, gravelly, loam soil. With the exception of the first seedings of corn and sunflowers, germination and development were good. It will be noted that corn and sunflowers gave a low yield for the earliest week of planting. This was due to insufficient moisture in the soil at seeding time for uniform and quick germination. More irrigation, if timely, would have given better results. Resistance against drought was as follows first, sudan grass, sorghum, corn and sunflowers last. The results for the first year are as under.

CORN—SUNFLOWERS—SORGHUM—SUDAN GRASS—COMPARATIVE TESTS FOR ENSILAGE

CORN—AT DIFFERENT DATES OF PLANTING

Variety	Date of planting	Date of cutting	Average height	Stage of maturity	Yield per Acre	
					Corn, 1922	
			feet		tons	lbs.
North West Dent	April 24	Sept. 1	5	Ripe	4	400
	May 2	" 1	7	"	11	50
	" 9	" 1	7	"	8	950
	" 16	" 1	8	"	11	500
	" 23	" 1	7	Soft Dough	10	1,000
	" 29	" 1	6	Soft Milk	9	1,800
Average			6·6		9	450



Sunflowers, Sudan grass, corn and sorghum, Tests for Dry Matter.

SUNFLOWERS

Variety	Date of planting	Date of cutting	Average height	Stage of Maturity		Yield per acre Sunflowers, 1922	
				Average diameter of heads	Average percentage heads in bloom		
			feet	inch	Per cent	tons	lbs.
Russian Mammoth	April 24	Sept. 1	5	5	75	7	1,600
	May 2	" 1	10	5	80	23	1,550
	" 9	" 1	8	4	50	21	1,200
	" 16	" 1	8	4	50	30	0
	" 23	" 1	9	4	20	17	500
	" 29	" 1	8	3	5	14	1,040
Average			8	4·1	46·6	19	315

SORGHUM

Variety	Date of planting	Date of cutting	Average height	Stage of Maturity	Yield per per acre	
				Average percentage ripe	Sorghum, 1922	
			feet	per cent	tons	lbs.
Sorghum	April 24	Sept. 1	7	80	16	100
	May 2	" 1	7	70	11	500
	" 9	" 1	8	65	18	1,200
	" 16	" 1	8	70	16	1,150
	" 23	" 1	8	50	17	200
	" 29	" 1	8	5	12	720
Average			7·4	53·6	16	645

SUDAN GRASS

Variety	Date of planting	Date of cutting	Average height	Stage of Maturity	Yield per acre	
				Average percentage ripe	Sudan Grass, 1922	
			feet	per cent	tons	lbs.
Sudan Grass	April 24	Sept. 1	6	85	9	1,950
	May 20	" 1	6	75	6	
	" 9	" 1	6	50	6	1,350
	" 16	" 1	7	50	6	1,500
	" 23	" 1	6	30	7	400
	" 29	" 1	7	10	4	1,750
Average			6·2	50	6	1,825

IRRIGATION

Rate of application in acre inches

Corn—Sunflowers—Sorghum—Sudan Grass

June	July	Total
4·1	3·1	7·2

MANGELS AND SUGAR BEETS—TEST OF VARIETIES

Twenty-nine varieties of mangels and six varieties of sugar beets were tested out this year on light loam soil which had grown hay the previous year. They were sown in rows thirty-six inches apart in plots of one-fortieth of an acre on April 29. These were harvested on October 21 with the following results:—

Name of Variety	Source of seed	Yield per acre, 1922		Notes on form and uniformity
		tons	lbs.	
Y.O., U.B.C. 5	U.B.C., Vancouver	30	1,200	Medium, very smooth, even and uniform.
Tankard Cream Sugar Beet	Wm. Rennie Seed Co., Vancouver.	28	100	Large, smooth and even.
Y.O., U.B.C. 6	U.B.C., Vancouver	27	1,080	Medium, very smooth, even and uniform.
Giant Yellow Half-Long Intermediate.	Wm. Rennie Seed Co., Vancouver.	26	1,856	Fairly smooth and uniform.
Golden Tankard	Wm. Rennie Seed Co., Vancouver.	26	20	Large, very smooth but varying in type.
Half Sugar White	Harris McFayden, Winnipeg	26	20	Large, very smooth, even and uniform.
Y.I. 4911	U.B.C., Vancouver	25	1,510	Medium in size, very smooth, even and uniform.
Danish Sludstrup	Dominion Experimental Station, Summerland.	24	1,980	Very smooth, even but small.
Y.I. 1111	U.B.C., Vancouver	24	960	Very smooth and even and of medium size.
Mammoth Long Red	Rennie Seed Co., Vancouver	24	960	Large, rough and very rooty.
Giant White Sugar	Steele, Briggs Seed Co., Winnipeg.	24	450	Large, smooth and very even.
Yellow Intermediate	Central Experimental Farm, Ottawa.	21	1,860	Large,smooth, even and uniform.
Giant Yellow Intermediate	Steele, Briggs Seed Co., Winnipeg.	21	1,350	Medium, rough, rooty. slightly varying in type.
Giant White Sugar Feeding Sugar Beet.	Wm. Rennie Seed Co., Vancouver	21	330	Large, very smooth, even and uniform.
Golden Tankard	Harris McFayden, Winnipeg.	20	800	Large, somewhat rough and very variable in type.
Giant Yellow Half Long Intermediate.	Wm. Rennie Seed Co., Winnipeg.	20	290	Uniform, even, smooth and large.
Giant Long Red	A. E. McKenzie Seed Co., Brandon.	18	1,740	Very large and uniform but very rough and rooty.
Giant Yellow Globe	A. E. McKenzie Seed Co., Brandon.	18	1,230	Very large, very smooth, very uniform and even.
Giant Yellow Globe	Steele, Briggs Seed Co., Winnipeg.	18	720	Rather small but very smooth and even.
Jumbo White Sugar Beet	Wm. Rennie Seed Co., Vancouver.	17	1,904	Fairly smooth and uniform.
Golden Fleshed Tankard	Steele, Briggs Seed Co., Winnipeg.	17	1,700	Large, rough and varying in type.
Sugar Beet Danish Improved	A. E. McKenzie Seed Co., Brandon.	16	1,660	Rough, rooty, varying in type and somewhat small.
Yellow Leviathan	Wm. Rennie Seed Co., Vancouver.	15	600	Smooth but irregular.
Yellow Eckendorfer	Harris McFayden, Winnipeg	14	1,580	Somewhat rough, uneven and small.
Giant Sugar Mangel	Wm. Rennie Seed Co., Vancouver.	14	1,070	Smooth, uniform but rather small.
Prizetaker	A. E. McKenzie Seed Co., Brandon.	13	1,540	Small, very smooth, even and uniform.
Yellow Intermediate Gatepost.	A. E. McKenzie Seed Co., Brandon.	13	10	Large, somewhat rooty and rough and varying in type and colour.
Golden Tankard	A. E. McKenzie Seed Co., Brandon.	13	10	Medium in size, uniform and even, but somewhat rough.
Giant Yellow Intermediate	Steele, Briggs Seed Co., Vancouver.	11	1,460	Irregular, rooty, very variable in type and colour.
Giant Yellow Globe	Wm. Rennie Seed Co., Vancouver.	10	1,930	Uneven, rough and somewhat rooty.
Average		20	684	

MANGELS—AVERAGE YIELDS

Ten varieties have been grown for two years, 1916-17. The following are the average yields:—

Variety	Average Yield per Acre for two years, 1916–1917	
	tons	lbs.
Svalof Alfa	32	225
Danish Sludstrup	29	1,025
Best of All	28	1,250
Yellow Leviathan	27	1,800
Gatepost	27	25
Golden Tankard	26	250
Perfect Mammoth Long	25	1,775
Giant Yellow Half Long	25	700
Improved Saw Log	23	25
Mammoth Long Red	21	1,975
Average	26	1,505

Seventeen varieties have been grown for two years, 1920-21. The following are the average yields:—

Variety	Average yield per acre for two years, 1920–1921	
	tons	lbs.
Yellow Intermediate	44	625
Mammoth Long Red	42	330
Giant White Sugar	40	1,670
Yellow Globe	34	1,636
Giant Red Eckendorfer	34	1,000
Red Half Sugar	33	170
Golden Globe	32	1,470
Golden Tankard	32	50
Golden Fleshed Tankard	28	1,750
Weilbulls Rose Feeding	28	185
Weilbulls Cylinder Barres	22	1,372
White Jumbo	22	760
Tankard Cream	21	1,552
Sludstrup S.D	18	1,570
Giant White Feeding	17	826
Sludstrup K	12	1,114
Weibulls Eckendorfer Red	8	30
Average	27	1,889

Twelve varieties have been grown for two years, 1921-22. The following are the average yields:—

Variety	Average yield per acre for two years, 1921–1922	
	tons	lbs.
Tankard Cream	21	1,530
Mammoth Long Red	21	1,520
Giant White Sugar	19	1,345
Half Sugar White	19	470
Yellow Intermediate	18	1,505
Golden Tankard	18	1,260
Giant Long Red	17	1,670
Giant Yellow Globe	16	1,530
Golden Fleshed Tankard	16	1,250
Prizetaker	14	1,450
Yellow Leviathan	13	1,760
Yellow Eckendorfer	13	382
Average	17	1,464

Six varieties have been grown for three years, 1920-21 22. The following are the average yields:—

Variety	Average yield per acre for three years, 1920-1922	
	tons	lbs.
Mammoth Long Red	36	573
Giant White Sugar	35	597
Yellow Intermediate	31	1,320
Golden Tankard	28	300
Golden Fleshed Tankard	25	400
Tankard	23	1,735
Average	30	154

The irregular averages with mangels are the result of many varieties not being available year after year. Results have been so variable that it is difficult to make definite recommendations as to dependable varieties. It will be noted, however, from the above list of averages, that Giant White Sugar, Mammoth Long Red and Yellow Intermediate types have usually yielded well. Early and thick seeding, on soil having plenty of moisture, is strongly recommended.

MANGELS FOR SEED

Selected roots of Mammoth White Feeding mangel were grown this year and a good crop of seed was harvested. Stecklings of the Sludstrup variety were also grown for seed next year. Selection for yield, quality of root and type is being continued.

SUGAR BEETS

Six varieties of true sugar beets for sugar content analysis were grown under the same field conditions as the mangels. The yields were as follows:—

Variety and Source of Seed	Yield per acre, 1922	
	tons	lbs.
Vilmorin's Improved, Vilmorin's Andrieux, France	17	808
Waterloo, Ontario	16	756
Dominion Experimental Station, Sidney, B.C.	14	576
British Columbia	14	500
Denmark	10	292
Chatham, Ontario	9	1,912
Average	13	1,474

Irrigation of Beets

Rate of application in acre-inches

June	July	Sept.	Total
2·83	1·00	0·72	4·55

Samples of each were submitted to the Dominion Chemist, Central Experimental Farm, Ottawa, for analysis, with the following results:—

Variety	Sugar in juice	Solids in juice	Co-efficient of purity	Average weight of one root	
	p.c.	p.c.	p.c.	lbs.	oz.
Vilmorin's Improved	17·65	20·66	85·41	3	3
Waterloo	16·54	19·66	84·14	5	5
Sidney	18·28	21·50	85·04	2	10
British Columbia	16·09	19·08	84·31	4	5
Denmark	18·29	21·10	86·68	3	8
Chatham	17·42	20·88	83·41	3	14

FIELD CARROTS—TEST OF VARIETIES

Eleven varieties of field carrots were tested in duplicate one-forty-ninth acre plots on late spring ploughed loam soil which had been in alfalfa for several years. The varieties were sown on May 4, in rows thirty six inches apart. The plants were thinned to approximately ten inches apart. All were harvested on October 30, and the following yields obtained:—

Variety	Source of seed	Average yield per acre, 1922		Remarks
		tons	lbs.	
White Intermediate	Dominion Experimental Station, Summerland.	28	1,165	Very smooth and uniform.
Large White Belgian	Wm. Rennie Seed Co., Vancouver.	26	175	Very rough, 1 rooty and uneven.
Short White	Steele, Briggs Seed Co., Winnipeg.	12	1,480	Large, smooth and uniform.
Mammoth White Intermediate.	Wm. Rennie Seed Co., Vancouver.	12	1,235	Large, small neck, smooth.
Giant White Vorges	A. E. McKenzie Seed Co., Brandon.	12	745	Large, uniform but somewhat rough.
Mammoth Short White	Wm. Rennie Seed Co., Vancouver.	12	255	Large, smooth and uniform.
Long Red Surrey	A. E. McKenzie Seed Co., Brandon	11	1,275	Smooth, large and even, difficult to harvest.
Danish Champion	Central Experimental Farm, Ottawa.	11	1,030	Fairly smooth and uniform, medium in size.
White Belgian	Steele, Briggs Seed Co., Winnipeg.	10	580	Medium size, fairly uniform.
Long Orange Belgian	Wm. Rennie Seed Co., Vancouver.	8	1,150	Very rooty and most difficult to harvest.
Cooper's Yellow Intermediate	A. E. McKenzie Seed Co., Brandon.	6	1,720	Fairly smooth and uniform.
Average		13	1,892	

IRRIGATION

Rate of application in acre-inches

June	July	Total
13·0	16·0	29·0

CARROT SEED

Selected roots of White Intermediate carrots were grown this year and a fair crop of seed was harvested. Selection for yield and quality of root is being continued. In the root crop, carrots come next to mangels in yield, and, on light soil, take first place in tonnage.

Five varieties have been grown for two years, 1916-17. The following are the average yields:—

Variety	Average yield per acre for two years, 1916-1917	
	tons	lbs.
Mammoth White Intermediate	18	300
White Belgian	18	100
Ontario Champion	17	1,425
Improved Short White	17	800
Giant White Bosges	13	1,825
Average	17	90

Three varieties have been grown for two years. The following are the average yields:—

Variety	Average yield per acre for two years, 1921–1922	
	tons	lbs.
White Intermediate S.D.	24	1,747
Danish Champion	19	1,000
White Belgian	8	30
Average	17	1,126

SWEDE TURNIPS—TEST OF VARIETIES

Eight varieties of Swede turnips were tested in duplicate one-seventy-sixth acre plots on late spring ploughed gravelly loam soil which had been in alfalfa for several years. The varieties were sown on May 4, in rows thirty-six inches apart. The plants were thinned to ten inches apart. All were harvested on October 30 and the following yields obtained:—

Variety	Source of Seed	Average yield per acre, 1922		Remarks
		tons	lbs.	
Swede Imperial	A. E. McKenzie Seed Co., Brandon.	7	1,200	Large, fairly smooth but variable in type.
Bangholm	" "	7	1,200	Large, rooty but uniform.
Swede Superlative	" "	7	364	Large, rooty and uneven.
Good Luck	St. Anne	7	212	Small, rooty but uniform.
Bangholm Purple Top	Steele, Briggs Seed Co., Winnipeg.	5	1,856	Fairly smooth, slightly rooty and uneven.
Purple Top Canadian Gem	Wm. Rennie Seed Co., Vancouver.	5	640	Rough, rooty and variable in type.
Magnum Bonum	" "	5	412	Rooty, rough and much variation.
Bangholm	Charlottetown	5	184	Very rough and uneven.
Average		6	758	

IRRIGATION

Rate of application in acre inches

June	July	Total
12·88	9·08	21·96

NOTE.—Owing to yearly infestations of aphis, the turnip crop for this district is not recommended.

COMPARATIVE TESTS OF WESTERN RYE GRASS

Nine varieties of Western rye grass for comparative tests were seeded on April 6, in uniform duplicate plots of one-fifty-fifth of an acre. Germination and development were very good. On July 28 all varieties were harvested and the following results obtained.

Source of Seed	Average length of spike	Colour of grass	Weight per measured bushel after cleaning	Average yield per acre, 1922	
				Hay—Dry	Seed
	inch.		lb.	tons lb.	lb.
No. 4 Central Experimental Farm, Ottawa	8	Bluish	17	1 722	462
No. 5 " " "	8	"	18	1 777	517
No. 6 " " "	8	Green	17	1 477	490
No. 10 " " "	8	Bluish	17	1 751	544
No. 11 " " "	8	Bright green	15	1 532	653
Dominion Experimental Station, Morden	7	"	18	1 532	626
Dominion Experimental Station, Summerland.	7	"	18	1 586	544
Steele, Briggs Seed Co., Winnipeg	8	"	16	1 124	490
Wm. Rennie Seed Co., Vancouver	8	"	18	1 178	571
Average				1 520	544

IRRIGATION

Rate of application in acre inches

June	July	Total
0·56	2·77	3·33

COMPARISON OF CORN AND SUNFLOWERS FOR ENSILAGE

The season of 1922 again demonstrated that corn is more able to withstand drought than sunflowers. During the water shortage in mid-summer, sunflowers wilted very much. However, if wilting was not too prolonged, the plants recovered quickly with irrigation. Both corn and sunflowers were planted in hills two feet apart and three feet between rows. With the exception of dry areas on gravelly loam soils, germination and early development were good. This year's average shows sunflowers to yield over half as much again as corn. In the three-year average, however, there is not much difference. The extra cost of harvesting sunflowers as compared with corn would probably be fifty per cent. Therefore, if the extra cost of harvesting, quality of feed and drought resistant powers of sunflowers are taken into consideration, it becomes doubtful whether it excels corn for ensilage purposes, particularly where the latter crop can be economically grown. Sunflowers will grow at a lower temperature than corn. Consequently, where the season is short and corn is likely to freeze, sunflowers will be of value. The results are as follows:—

COMPARISON OF CORN AND SUNFLOWERS FOR ENSILAGE ON DIFFERENT TYPES OF SOIL

Variety	Type of soil	Date of planting	Date of cutting	Average height	Stage of maturity	Average yield per acre, 1922	Irrigation			
							Rate of application in acre inches			
				feet		tons lbs.	June	July	Aug.	Total
Russian Mammoth	Medium, heavy loam.	June 30	Oct. 2	12	75% in head	33 0	2·0	3·0	2·5	7·5
Northwest Dent	Medium, heavy loam.	" 27	Sept. 22	9	Soft milk	19 100	2·0	3·0	2·5	7·5
Russian Mammoth	Gravelly loam	May 30	" 28	8	25% in head	23 31	6·0	4·0	3·0	13·0
Northwest Dent	"	" 30	" 19	5	Soft dough	8 153	6·0	4·0	3·0	13·0
RussianMammoth*	"	" 18	Aug. 31	8	50% in head	17 1,698	7·1	3·1	4·0	14·2
Longfellow	Light loam	" 20	Sept. 21	6	Firm dough	14 348	12·0	6·0	2·2	20·2
Russian Mammoth	Low bottom land	June 1	" 23	9	½ % in head	8 1,910	No irrigation.			
Northwest Dent	"	" 1	" 23	5	Firm dough	4 440	"	"	"	
Average for Northwest Dent Corn						10 898				
Average for Sunflower (*not included in average)						21 1,314				

CORN AND SUNFLOWERS—THREE-YEAR AVERAGES

North West Dent corn and Russian Mammoth sunflowers have been grown for three years. The following average yields have been obtained during that time:—

CORN AND SUNFLOWERS—COMPARATIVE TESTS FOR ENSILAGE, THREE-YEAR AVERAGES

Year	Average Yield per Acre, 1920–1922			
	Corn—North West Dent		Sunflowers—Russian Mammoth	
	tons	lb.	tons	lb.
1920	10	0	12	1,000
1921	16	740	11	0
1922	10	864	20	1,407
Average	12	535	14	1,469

The average over the three years does not show a very marked difference between sunflowers and corn.

FERTILIZERS

In continuation of experiments with Wizard Dried Manure (which comes under the distinctive process names of "Shredded", "Pulverized" and "Phosphated") tests were made this year with corn and sunflowers in duplicate plots each one-eighth of an acre. The fertilizers were disced into the soil just before ploughing. Both sunflowers and corn were planted two feet apart in the row and three feet between the rows on May 30, on gravelly loam soil which had grown corn the previous year. The sunflowers were cut on September 25 when five per cent of the plants were in bloom and ten feet high. The corn was harvested on September 15 when in the firm dough stage with a height of seven feet. Timely and thorough irrigations were not possible and germination and early development were very irregular. It is very probable that variations in soil and moisture account more than the fertilizers for differences in yield. Consequently, one year's results do not indicate the value of the different fertilizers under test. The results were as follows:—

CORN AND SUNFLOWERS—FERTILIZER TEST

Fertilizer Used	Rate of application per acre		Average Yield per Acre, 1922			
			Corn		Sunflowers	
	tons	lbs.	tons.	lb.	tons	lb.
Check	0	0	13	664	18	1,560
Manure, barnyard	10	0	15	1,040	22	600
Shredded (Dehydrated manures)	..	600	13	1,472	23	1,680
Phosphate (Dehydrated manures)	..	300	12	1,282	21	1,400
Pulverized (Dehydrated manures)	..	300	13	240	18	1,000

IRRIGATION

Approximate rate of application in acre inches

June	July	Aug.	Total for season
9·19	7·30	5·96	22·45

CORN AND SUNFLOWERS—FERTILIZER TEST

A fertilizer experiment with corn and sunflowers was started this year in duplicate test rows one hundred and sixty-four feet long by six feet between rows on light, gravelly loam soil which had grown potatoes the previous year. The fertilizers were disced into the soil just before planting. The crops were planted on June 10 and harvested on September 28. Practically enough water was available for this test, although not always timely, and germination and development were good. The sunflowers show above the average yield for this crop and this was caused by growing sunflowers in single rows. Plots would have given more average results. Like the previous fertilizer tests the probable variations in soil and moisture may account for more than the fertilizers in difference of yield. The results for one year were as follows:—

CORN AND SUNFLOWERS—FERTILIZER TEST

Fertilizer Used	Rate of application per acre	Average Yield per Acre, 1922			
		Corn		Sunflowers	
	lb.	tons	lb.	tons	lb.
Shredded, Pulverized, Phosphate } Dried Manures	1,200	7	960	43	240
	1,200	7	520	45	640
	600	10	328	44	1,056
Blood	350	8	1,600	44	880
Nitrate	200	13	1,720	43	1,120
Potash	150	12	1,080	42	1,536
Phosphate	300	9	1,800	47	1,920
Mixture (150 nitrate, 100 potash, 250 phosphate)	500	8	1,600	45	1,960
Check		9	40	43	1,120

IRRIGATION

Rate of irrigation in acre inches

June	July	Aug.	Total
6·05	4·00	3·05	13·00

SUNFLOWERS—VARIETY TEST

Variety	Sources of Seed	Date of planting	Date of cutting	Average height	Average diameter heads	Stage of Maturity				Yield per acre 1922	
						Per cent bloom	Seeds ripe	Seeds white	Seeds soft		
				ft.	inch.					tons	lb.
Mammoth Russian	Steele Briggs	April 29	Sept. 5	10	4	50	.....	25	25	23	400
Mammoth Russian	Dakota Impr. Seed Co., Ottawa.	" 29	" 5	10	4	75	.....	25	50	20	1,500
Mammoth Russian	McDonald, Ottawa	" 29	" 5	10	4	50	.....	25	25	18	400
Manteca	Rosthern Experimental Station.	" 29	" 5	7	7	100	100	.....	.....	15	840
Mammoth Russian	Early Ottawa, Ottawa	" 29	" 5	8	5	100	50	50	.....	14	320
Mammoth Russian	Summerland	" 29	" 5	10	4	50	.....	25	25	13	1,200
Brooks Dwarf	Rosthern Experimental Station.	" 29	" 5	7	7	100	100	.....	.....	10	1,440
Early Ottawa 76	Ottawa	" 29	" 5	7	5	100	90	10	.....	9	1,760
Mixed Mennonite	Rosthern Experimental Station.	" 29	" 5	7	5	100	100	.....	.....	6	1,200
Prolific White	Rosthern Experimental Station.	" 29	" 5	7	8	100	25	75 hard white	.....	6	320
Average				8·3	5·3	82·5	46·5	23·5	12·5	13	1,738

IRRIGATION

Rate of application in acre inches

June	July	Total
24·82	14·00	38·82

With the exception of Menteca the Mammoth Russian varieties out yielded all others. They are very hardy and their lateness in maturing may be considerably overcome by much earlier seeding in the spring. The Dwarf varieties show practically one hundred per cent maturity but very low yields. As yield is of more importance than earliness where the crop is to be used for ensilage, the Mammoth Russian varieties are recommended.

NATIVE BUNCH GRASS (*Agropyron spicatum*).

An experiment was begun in 1921 with Native Bunch grass with the object of developing constant varieties suitable for improving the natural dry grazing lands throughout the southern interior of British Columbia. Selections were made from which two thousand three hundred plants were set out in the field in early autumn. Soon after this, many plants perished through soil drifting. This season no work was done with this grass except to establish the plot thoroughly for next year. Much has been learned from a cultural standpoint. Both autumn and spring seedings have been entirely successful. Of the two thousand three hundred plants set out in 1921, there are six hundred and ninety-eight alive. These thrived well without irrigation and the majority of the plants set seed. Observations would seem to indicate that this grass is cross fertilized; however, to date no definite statement can be given on this point.

BERMUDA GRASS

Object of this experiment is to test this grass for range purposes. A few plants of this grass were planted in 1920 on a light, gravelly soil with a very exposed aspect. During the first season of planting, the plants lived without irrigation. In the spring of 1921, the grass was so slow in starting growth that it was thought to be dead. A very weak growth was made during the season, which failed to survive the following winter.

CLOVER

Ottawa Perennial has been developed from Common Red and from several years' test at Ottawa has shown a strong tendency to perennialism. A plot of one-fiftieth of an acre was seeded to Ottawa Perennial on April 26, 1922. Germination and development were very good and the following results were obtained.

OTTAWA PERENNIAL CLOVER

Variety	Yield per Acre, 1922				
	First Cutting		Second Cutting		Total yield
	Date	Yield	Date	Yield	
		tons lb.		tons lb.	tons lb.
Clover, Ottawa Perennial	July 28	4 1,000	Oct. 30	4 500	8 1,500

IRRIGATION

Rate of application in acre inches

June	July	Total
0·56	2·77	3·33

ALFALFA

Five varieties of alfalfa were seeded in plots of one-hundredth of an acre. Germination and early development were good. Later in the season all varieties suffered from untimely and insufficient irrigation. The results obtained are as follows:—

ALFALFA—TEST OF VARIETIES

Variety	Date of planting	Date of cutting	Yield per acre, 1922
			tons lb.
Grimm, Lyman	April 26, 1922	July 31	1 1,000
Turkestan	" 26, 1922	" 31	1 600
Grimm, Cap Rouge	" 26, 1922	" 31	.. 1,800
New Zero	" 26, 1922	" 31	.. 1,100
Siberian	" 26, 1922	" 31	.. 400
Average			.. 1,780

Grimm, Lyman and Turkestan were in duplicate plots.

SOY BEANS AND COW PEAS

Soy beans and cow peas were grown in continuation of the nodule experiment begun in 1920. This year, both the cow peas and soy beans were planted in soil which had never grown these crops before. They were planted on medium, heavy loam soil on May 29, made good growth, and were harvested on October 2. The cow peas produced seed at the rate of seventy-five pounds per acre and the soy beans seven hundred and seventy pounds. No nodules were found on either the soy beans or cow peas.

Soy beans were seeded on another plot which had grown soy beans for the two previous years. They were planted on light gravelly loam soil on May 23 and harvested on October 2. They yielded seed at the rate of six hundred and sixty pounds per acre and produced an abundance of nodules. When compared with the previous plot this would indicate that soil inoculation is essential for the production of nodules that are so valued for the up-building of the soil.

POULTRY

THE PLANT

The poultry plant at this Station is situated on several acres of rough bottom land immediately to the south of Trout Creek. The situation is sheltered, being surrounded on three sides by hills from sixty to one hundred and fifty feet high, but is not too much closed in to exclude the sun. The land is stoney and gravelly but on one patch which has been fenced in, we have succeeded in getting an excellent catch of alfalfa to be grown as green feed for the flock. The location has proved quite satisfactory.

THE BUILDINGS

Near the entrance of the plant is situated the administration building for office, incubator cellar, feed rooms, etc. There are three permanent poultry houses to accommodate one hundred layers each, with runs facing south and a number of movable colony houses placed over the range. The types of houses, both permanent and movable, have proved quite satisfactory. A bulletin giving plans and specifications of these houses can be obtained free of charge by application to the Superintendent of this Station.

STOCK

The poultry work is carried on with one breed—the White Wyandotte. At the end of December, 1922, the flock consisted of the following:—38 two-year old hens; 175 yearling hens; 250 laying pullets; 8 yearling males; 50 selected cockerels for spring use and sale; 115 chickens for marketing, making a total of 636 birds. Culling at this season is being done from trap-nest records mainly, the weak individuals and those laying poor-shaped or poor-sized eggs having already been eliminated from the flock. The 1922 season has produced a finer type of male than any former year, some compensation for careful selection along other lines than for production only. A large number of yearling hens (with trap-nest records from 150 to 200 eggs in their pullet year) and pedigreed males have been placed in the district, the reports of their breeding being quite satisfactory.

GROWTH OF THE PLANT

Since the establishment of the poultry work on this Station, good progress has been made towards the development of a high-laying strain of Wyandottes, as is borne out by the figures below. Due credit must be given to pedigree breeding, which has enabled the use of only the best all-round birds each season. Whilst the records do not show phenomenal layers—289 eggs in the pullet year being the best to date—the average has been high.

Season	Pullets No.	Number laying 200 eggs or better	Per cent of 200-egg birds
1918–19	66	5	7·5
1919–20	84	7	8·3
1920–21	324	66	20·3
1921–22	344	119	34·6

Egg Production

HENS VERSUS PULLETS BY MONTHS

Date	Hens			Pullets		
	No.	Eggs	Average	No.	Eggs	Average
1921						
November	137	809	5·90	252	3,468	13·76
December	133	566	4·26	370	5,708	15·42
1922						
January	123	688	5·59	360	6,264	17·40
February	117	893	7·63	348	5,808	16·69
March	105	1,616	15·39	445	6,836	19·81
April	87	1,560	17·93	341	5,914	17·34
May	60	999	16·65	330	5,516	16·71
June	56	732	13·07	318	4,689	14·74
July	48	541	11·27	291	4,102	14·09
August	44	600	11·27	270	4,198	15·55
September	44	539	12·25	253	3,859	15·02
October	43	308	7·20	240	2,642	11·01
Average per bird per year			128·41			187·54
Average per bird per month			10·73			15·63

BREEDING

Every chick hatched this year was pedigreed, so that the records in this department are complete for the first time. So much valuable information has been gained from this, that it will be continued in the future. Below are the records, by groups, of the breeding hens being carrying through for use during the spring of 1923:—

—	176–199 eggs	200–225 eggs	226–250 eggs	Over 250
Two-year olds	18	11	7	2
Yearlings	55	67	36	8

During the breeding season of 1922, 94 hens, 75 pullets and 13 cockerels were used, two of the latter having been imported from Indian Head Experimental Farm and one from the University of British Columbia. Only mature pullets, which had been laying prior to November 15, 1921, were used in the pens. As usual, three methods of using the males were followed, viz:—

(1) Single matings, where the one cockerel was left throughout the season.

(2) Large pens in which four males were used, two being alternated daily; that is, two males in the pen to-day, out to-morrow and two others in.

(3) Medium-sized pens, with two males each day about. The table below gives the results for the 1922 season:—

FERTILITY AND HATCHABILITY OF 1922 PENS

Number of pens	Number of females	Age of females	Pullet year laying record	Number of males	Treatment of males	Number of eggs set	Per cent fertility	Chicks hatched	Per cent hatched
		years							
4	29	1	188–245	2	Alternate single	441	66·4	228	51·7
5	33	1	187–263	4	Alternate pairs	516	85·8	358	69·3
	14	2	176–191			155	79·3	87	56·1
7	41	2	183–210	4	"	388	73·2	200	51·5
8	13	1	181–273	1	Single mating	266	75·2	155	58·2
9	13	2	214–256	1	"	145	73·1	65	44·8
10	13	2	216–262	1	"	170	77·0	102	60·0
11	13	2	202–289	1	"	114	57·9	37	32·5

Remarks.—Pen 11 gave the poorest results, no doubt owing to the fact that the original male was the victim of crop trouble and had to be changed for another. There was little to choose between the remainder, the results being slightly in favour of "alternate pairs". Following is a summary for the past three years of the three methods of treating males.

SUMMARY OF THREE-YEARS TREATMENT OF MALES

Treatment of birds	Number of females	Number of eggs set	Per cent fertility	Chicks hatched	Per cent hatched
Alternate singles	107	1,364	75·3	717	52·4
Alternate pairs	280	3,071	77·7	1,775	57·8
Single matings	112	1,900	74·7	1,046	55·0

Remarks.—From the above table the following conclusions may be drawn. There are fewer wasted eggs from pens mated under the "alternate pair" system, and fertility is 2·4 per cent better than the apparent next best treatment.

Where exact pedigrees of chicks through the male line are required single matings are necessary, but for the average poultry keeper the other methods of mating appear to be just as good, besides saving housing and fencing of separate runs.

The group pens are mated with brothers as far as possible so that one is able to tell better through which line we are getting our blood.

The results last year showing that heavy winter production does not affect hatching the following spring, have been almost duplicated this season. 1922 tables follow:—

EFFECT OF WINTER PRODUCTION UPON FERTILITY AND HATCHABILITY

Number of eggs to March 1	Number of birds in groups	Total eggs set	Per cent fertile	Per cent total eggs hatched	Per cent fertile eggs hatched	Total eggs required for one chick hatched
Over 100	17	327	76·4	55·9	73·2	1·78
76-100	40	602	79·1	64·1	81·1	1·56
50-76	16	268	72·0	59·7	82·9	1·67

INCUBATION AND PRODUCTION

To gain further knowledge regarding the ideal period to incubate under local conditions for future winter production a March hatch was introduced into the experiment this year. The figures obtained are here given:—

Number of birds	Date hatched	First egg	Number of eggs to end of February 1922	Average per bird for winter
53	Mar. 17	Sept. 3	3,791	71·5
144	April 3	Sept. 6	10,008	69·5
109	April 26	Oct. 23	5,902	54·1
3	May 4	Dec. 3	125	41·6

Remarks.—Not only were more winter eggs obtained from the two earliest hatches but the birds were generally of a larger type, although coming from the same breeding stock. The month between the middle of March and middle of April would appear to be the best time to take off large hatches from the heavier breeds.

INCUBATION

In answer to an enquiry regarding the loss in weight of eggs during artificial incubation we carried out a short experiment along these lines. The eggs were weighed before being put in to the machine and on the 3rd, 7th and 15th days. The loss in weight between the 1st and 15th days, taking an average of the eggs that hatched, was 12·7 per cent. Weights in ounces per dozen.

SET MARCH 11, 1922—MOISTURE PANS USED

Egg Mark	Before incubation	After 48 hours	Seventh day	Fifteenth day	Remarks
41	26·9	26·3	25·5	23·8	Hatched.
13	27·1	26·8	25·9	23·8	"
13a	27·8	27·0	25·8	24·1	"
197	27·7	27·0	.....	.....	Infertile.
178	27·2	26·7	26·0	23·7	Hatched.
187	27·7	27·5	26·1	23·9	"

The table below shows in detail the returns over cost of feed of all pullets put into the laying sheds from 1921 hatches. The birds were culled throughout the test and allowing for this the average profit per bird for the year was $3.81.

EGG AND FEED RECORD AND PROFIT AND LOSS ACCOUNT

	Number of birds	Total eggs laid	Average per bird	Average price	Total value	Weight of feed in pounds	Weight of feed per bird	Weight of feed per dozen eggs	Total cost of feed	Cost of feed per bird	Cost of feed per dozen eggs	Total		Per Bird	
												Profit	Loss	Profit	Loss
				cts.	$ cts.				cts.	cts.	cts.	$ cts.		cts.	
1921															
November	252	3,468	13·76	60·0	173 40	2,123	8·4	7·3	60 53	24·0	20·9	112 87	.....	44·7	
December	370	5,708	15·42	53·0	252 10	3,139	8·4	6·6	88 67	23·9	18·6	163 43	.....	44·1	
1922															
January	360	6,264	17·40	43·0	224 46	3,453	9·6	6·6	96 09	27·4	18·4	128 37	.....	35·7	
February	348	5,808	16·69	39·0	188 76	2,990	8·6	6·1	81 75	23·5	16·8	107 01	.....	30·7	
March	345	6,836	19·81	33·0	187 99	3,105	9·0	5·4	89 21	25·8	15·6	98·78	.....	28·6	
April	341	5,914	17·34	30·0	147 85	2,540	7·4	5·1	69 52	20·4	14·1	78 33	.....	22·9	
May	330	5,516	16·71	30·0	138 90	2,552	7·7	5·5	51 16	15·5	11·1	86 74	.....	26·3	
June	318	4,689	14·74	30·0	117 22	2,199	6·9	5·6	45 14	11·0	11·5	72 08	.....	22·6	
July	291	4,102	14·09	35·0	112 80	1,779	6·1	5·2	36 02	12·3	10·5	76 78	.....	26·4	
August	270	4,198	15·55	35·0	122 44	2,065	7·6	5·9	42 35	15·7	12·1	80 09	.....	30·0	
September	253	3,859	15·02	42·0	135 06	1,851	6·9	5·7	32 27	12·3	10·0	102 79	.....	40·6	
October	240	2,642	11·01	48·0	105 68	1,784	7·4	8·1	36 69	15·3	16·6	68 99	.....	28·7	
Averages or totals	309·9	59,004	187·54	39·8	1,906 66	29,580	94 lb.	6·1	729 40	$2 27$\frac{1}{10}$	14·7	1,176 26	.....	$3 81$\frac{3}{10}$	

FERTILITY AND HATCHABILITY

Below is given a table of 33 "E" year birds (all those of which we have records for two consecutive years) with their fertility and hatching figures:—

Bird Number	First year record eggs	Percentage fertile		Percentage hatched	
		First year	Second year	First year	Second year
E 5	259	100·0	95·8	94·3	87·5
8	242	95·0	100·0	85·0	60·0
10	256	65·6	Nil	40·6	Nil
12	289	88·4	Nil	67·4	Nil
15	194	66·7	92·5	58·3	75·0
19	230	86·2	70·0	51·7	70·0
20	214	74·3	63·7	68·6	54·5
21	262	94·4	Nil	55·6	Nil
24	254	93·7	Nil	62·5	Nil
27	188	100·0	84·6	33·3	69·2
30	202	96·9	92·3	78·8	84·6
32	226	75·0	100·0	75·0	91·3
43	224	94·4	100·0	88·9	55·6
52	215	78·9	75·0	68·4	50·0
53	237	100·0	57·1	77·8	41·8
55	231	44·4	28·5	44·4	28·5
63	216	96·7	91·3	86·7	61·9
66	240	38·9	Nil	11·1	Nil
70	252	89·5	50·0	57·9	30·0
87	198	89·5	100·0	84·2	70·0
102	235	90·3	95·2	67·7	4·8
114	230	96·9	100·0	90·9	80·9
119	191	62·5	100·0	Nil	80·0
161	192	90·9	87·5	77·8	75·0
167	186	74·6	100·0	61·5	100·0
190	176	72·2	85·7	66·7	85·7
216	250	95·2	88·0	85·7	72·0
249	217	92·9	75·0	64·3	25·0
259	224	93·7	63·7	68·7	54·5
265	180	100·0	81·2	100·0	68·7
267	196	97·3	77·8	86·5	55·6
275	187	91·7	78·6	70·8	78·6
134	194	35·7	100·0	28·6	90·0

Remarks.—From the above the following conclusions may be drawn:—

(1) That there appear to be certain individuals which will give no fertility in their second year after heavy laying in their first, possibly owing to internal breakdown.

(2) That—excluding the five birds giving no fertility in the second year—hens which give good records the first year will usually continue to do so the second year.

The table below summarizes this:—

Number of birds	Percentage fertile		Percentage hatched	
	First year	Second year	First year	Second year
28	83·6	83·3	77·0	67·3

PRESERVATION OF EGGS

In June, 1921, an equal number of eggs were packed for preservation in each of the following different methods:—

(1) Commercial preservative (grease) packed in cartons.

(2) Water glass.

(3) Dry dairy salt.

These were all tested out during March, 1922 with these results:—
(1) Eggs showed evaporation, yolks dropped but were quite edible.
(2) Eggs in splendid condition compared with other treatment.
(3) Evaporation had rendered eggs unfit for use.

BREEDING

In the spring of 1922, 18 birds which had failed to produce a fertile egg the previous season, were divided among the various pens to ascertain to what extent individuals are consistent in non-fertility from year to year. Altogether 111 eggs were set at different times throughout the incubation season, or an average amongst the 14 birds giving further non-fertility of 5 eggs each.

Fourteen birds showed no change, whilst the records of the other four are given below:—

Bird No.	Eggs set	Per cent fertile
E 165	5	100·0
E 171	16	93·7
E 73	13	92·3
E 51	7	28·6

NOTES.—There is no doubt that the use of the trap-nest during the incubation season helps in no small measure toward cutting down infertility to a minimum.

It seems that, to a large extent, infertility is confined to a certain number of individual birds; if these, still persisting in giving poor records early in the season, are eliminated from the pens—incidentally giving the other hens and males a better chance to prove their work, the number of wasted eggs will be considerably less and incubator space conserved for hatchable eggs.

BEES

In the fall of 1921, four colonies of bees were prepared for the winter, two being left in the Kootenay cases and two packed in the four-colony wintering case. The winter was long and steady, perhaps the steadiest cold that has been experienced in the Okanagan, but all colonies came through in good condition. This year there was no apparent advantage in one method of wintering over the other, but up to date the Kootenay hive has given excellent satisfaction and is strongly recommended for local conditions.

Very early in the spring, too early to open the hives up for a thorough examination, small cakes of candy were placed under the quilt immediately above the bees. This was made by dissolving over a slow fire, 6 pounds of sugar in 1⅛ pints of hot water and boiling it to 238 degrees F. over a hot fire, with ¼ teaspoonful of cream of tartar, for a few minutes. This was poured into dishes, to form cakes about an inch thick. When the first thorough examination was made on April 6th, each colony had plenty of food and brood was found in all stages. The number of frames covered by bees was 9 in each colony wintered in Kootenay cases and 7 and 4 (this a jumbo hive) in those wintered in the 4-colony wintering case. The number of frames covered when the bees were packed away in the fall was 8, 7, 5 and 5.

In most districts throughout British Columbia, the year 1922 will be remembered by bee-keepers as one of the best on record and the Okanagan was no exception to this rule. As stated above, the winter had been long, the cold steady, and the spring was cold and late. The apples were in full bloom about

May 27th and quite a surplus of nectar was stored from this source. The hive on the scale between May 20th and May 29th showed an increase of 25 pounds, the greatest increase at this time in the 24 hours being 8 pounds, on May 25-26. All colonies were in excellent condition to take care of the principal honey flow which occurred at the end of June and early in July. The hive on the scales showed the greatest daily increase early in July. For the 24 hours ending p.m. July 4th increase 9 pounds, July 5th, 6 pounds, July 6th, 17 pounds, July 7th, (rain) 1 pound, July 8th, 6 pounds. The second great flow occurred during the last few days of July and early August. The principal sources of nectar were white Dutch and alsike clovers, alfalfa, sweet clover, and numerous minor plants which bloomed individually for a short period only, but collectively covered a greater part of the summer.

Our treatment of the colonies in the spring and early summer was as follows: About the middle of April the stronger colonies had a large amount of brood in the brood chamber and at this time a super was given them with ten frames of drawn-out comb. No queen excluder was used at this time, the queen being allowed the run of both chambers. Thus there is very little tendency to early swarming. In using this method it is important to have a good idea as to when the first main honey flow will commence. On June 23rd most of the brood was placed in the upper chamber and frames of drawn-out comb placed in lower chamber. The queen was put below and a queen excluder placed over the brood chamber. There was no swarming from any of the colonies, but further precautionary measures must be taken, i.e., the brood chamber must be gone through about every eighth day to cut out queen cells and provide extra space and ventilation as necessary.

Artificial increase works in excellently with the above system. When placing the queen below on June 23rd from each of two of the colonies three good frames of brood with the adhering bees were taken and placed in a separate hive. Unfortunately at that time we could not find a single queen cell, therefore we had to give a small quantity of unsealed brood and allow the nucleus to rear a queen for itself. On June 27th it was noticed queen cells were built; on July 3rd all were destroyed except one and the new queen was laying on July 18th.

It is interesting to compare this method of increase with 2 pound packages obtained from the south. On May 21st two such packages arrived and were placed in hives Nos. 5 and 6. The nuclei were Nos. 7 and 8.

—	Number of frames cover with bees		Amount of honey stored
	Aug. 1	Oct. 18	
			lbs.
Hive No. 5 (Jumbo)	5	6	60
Hive No. 6	6	6	50
Hive No. 7	5	5	10
Hive No. 8	5	5	10

It would make a much fairer comparison if ripe queen cells were obtainable when making the nuclei.

The average weight of extracted honey produced per colony, spring count, was 165 pounds, the greatest yield from one colony being 240 pounds.

FIBRE PLANTS

HEMP SEED—FOR FIBRE PRODUCTION

For several years hemp seed production has been under test at this Station. The objective is to determine whether hemp will mature seed in this district in order to supply Canadian grown seed to the Prairie provinces. There the season is too short for the production of hemp seed for fibre purposes. Experiments to date in hemp seed production have given small results. Last year, only one of several varieties under test set and matured seed. This year, big plants were produced. These plants set much seed, but only a very small amount matured. It would seem, that like the prairie Provinces, the season here is too short for seed production. With this in mind, careful selections were made in 1921 with plants possessing early and heavy seeding capacity. Seed from these selected plants was tested out against unselected home grown seed. The results of this test gave practically no difference in earlier maturity or heavier seeding between selected and unselected seed. In the early spring of 1922, healthy, self-seeded, hemp plants were observed. The seed had fallen in the soil late the previous autumn. Judging by the size of the plants, growth must have started very early in the spring, at least several weeks before planting time. The location of these autumn seeded plants made necessary their eradication early in the season, consequently observation as to seed production was not possible to test this idea of gaining time in the spring with its probable resultant earlier maturity and heavier seed production, a portion of the field to be seeded next year was sown in late autumn.

The crop was again grown on deep sandy soil in hills four feet apart each way and thinned to five stalks per hill. The plants commenced to bloom on July 25. After fertilization, all male plants were cut out.

The results for 1922 and the average yield for two years are as follows:—

HEMP SEED FOR FIBRE PRODUCTION

Variety	Date of planting	Date of cutting	Weight per measured bushel	Yield per Acre, 1922		Average yield per acre, 1921
				Selected seed	Unselected seed	
			lbs.	lbs.	lbs.	lbs.
From Kentucky	April 27	Nov. 1	37	24	18	24
Unknown	.....	.....	.....	.....	.....	

There is a difference of six pounds of seed in favour of selected seed.

FLAX—FOR FIBRE

Area of plot, quarter acre. Soil, light gravelly loam

Variety	Date of sowing	Date of pulling	Number of days maturing for fibre purposes	Yield per acre stems for fibre	Irrigation	
					Rate of application in acre inch	
				tons lbs.	July	Total
Longstem	May 16	Aug. 5	82	1 276	11·20	11·20

Not being able to obtain Blue Dutch which is one of the best fibre varieties, Longstem was produced this year. Seed was sown at the rate of one and a-half bushels per acre. When the lower half of the stems were beginning to turn a yellow shade and the leaves starting to fall, the crop was pulled. The stalks were tied in bundles, shocked and allowed to dry for several days, afterwards they were forwarded to Ottawa to be tested for fibre purposes.

GENERAL NOTES

FAIRS AND MEETINGS

This year it was decided that the Summerland station should take charge of the Experimental Farms' exhibit at Vancouver and New Westminster and we attended these fairs with educational exhibits on August 19-26 (Vancouver) and Septemer 11-16 (New Westminster). We also attended Armstrong, September 20-21; Grand Forks September 28-29; Creston October 1, and Summerland November 1-2.

The following meetings were attended by the superintendent during the course of the year: Meeting of British Columbia Agronomists at Agassiz, Kamloops Bull Sale and Annual Meeting of Wool Growers Association, Irrigation Convention at Maple Creek; made trips through the Okanagan from south to north, investigating horticultural conditions at different times of the year and addressing meetings at various places; addressed Farmers' Institute and United Farmers' meetings at different centres; gave irrigation demonstration at Creston, etc.

VISITORS

There was a marked increase in the number of visitors to the station this year. As stated above several picnics were held here and the conveniences provided were much appreciated. The horticultural students from the neighbouring high schools paid us periodical visits and were conducted over the farm and the work explained to them.

OTTAWA: Printed by F. A. ACLAND, printer to the King's Most Excellent Majesty, 1923.