DOMINION OF CANADA

DEPARTMENT OF AGRICULTURE

DOMINION EXPERIMENTAL FARMS

EXPERIMENTAL STATION

SUMMERLAND, B.C.

REPORT OF THE SUPERINTENDENT

W. T. HUNTER

FOR THE YEAR 1926

AN OKANAGAN VALLEY TOBACCO FIELD

Showing some of the varieties under test on bench land under irrigation at the Summerland Experimental Station in 1926. Average yield per acre of cured leaves, 2,314 pounds.

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OTTAWA
F. A. ACLAND
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1927

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DOMINION EXPERIMENTAL STATION,

SUMMERLAND, B.C.

REPORT OF THE SUPERINTENDENT, W. T. HUNTER, B.S.A.

THE SEASON

The winter of 1925-6 was very mild with light snowfall. On November 14 the temperature dropped to 20 degrees Fahrenheit, this being the lowest temperature recorded during the winter. On October 28 five inches of snow fell which was exceptionally early for this district. This all went during the following day. Light falls of snow were experienced during November and December, but it was not until early January that any snow remained on the ground. From January 5 to February 4 there was a light covering, but this finally went about the latter date. General work on the land was started on February 24.

Spring was upwards of two weeks earlier than usual. Soil moisture conditions were fairly satisfactory and early seeding got away with a very good start. Precipitation during the spring months was slightly above the average, but so also were the temperatures, a maximum of 84 degrees Fahrenheit being reached on April 28, the mean for that month being 52.59 degrees as compared with an average of 47.51 degrees over a period of eleven years. Irrigation water throughout the district was very short. Creeks reached their maximum much earlier than usual and storage in the hills was depleted. We were more fortunate on this Station as we had our own storage supply which carried us over the worst part of the summer, but even so, we were compelled to concentrate on the permanent and more important crops, with the result that other crops suffered. The total precipitation for the year was 8.48, the average for eleven years ending 1926 being 9.63. A severe frost was recorded on September 24 the temperature dropping to 25 degrees Fahrenheit. This did a great deal of damage throughout the whole district. After that date ideal fall weather prevailed and it was not until October 30 that frost was again recorded. November and December were very fine with only one low dip about the middle of the latter month, 1 degree above zero being recorded on the 14th.

The accompanying table gives a summary of the meteorological data for the year 1926, also the average mean temperatures and precipitations over a period of eleven years and average sunshine for ten years.

TABLE 1—METEOROLOGICAL RECORDS, 1926

—	Temperature (F)						Precipitation (inches)				Sunshine (hours)		Evaporation
	Mean		Maximum		Minimum				Total Precipitation				
	1926	Average 11 years	Highest	Mean Maximum	Lowest	Mean Minimum	Rain	Snow	1926	Average 11 years	1926	Average 10 years	inches
January	29·74	25·52	42·0	33·13	23·0	26·35	0·09	6·0	0·68	0·95	23·0	52·3	.....
February	38·75	28·80	54·0	44·71	27·0	32·79	0·51	2·1	0·72	0·56	75·4	90·4	.....
March	44·28	38·44	64·0	54·23	25·0	34·33	0·62	0·0	0·62	0·53	100·1	138·1	.....
April	52·59	47·51	84·0	63·60	28·0	41·57	0·48	3·5	0·83	0·76	220·1	189·8	1·05 (8 days)
May	55·69	56·05	81·0	66·90	36·0	44·48	0·98	0·0	0·98	0·68	226·7	254·9	4·39
June	62·51	63·26	96·0	78·93	43·0	51·10	0·69	0·0	0·69	1·03	281·8	258·1	5·83
July	73·92	70·51	102·5	87·08	50·0	60·77	0·16	0·0	0·16	0·61	303·6	328·1	7·08
August	67·85	68·47	88·0	78·00	47·0	57·71	0·83	0·0	0·83	0·73	213·2	265·8	5·07
September	54·03	53·91	80·0	63·87	25·0	44·30	0·55	0·0	0·55	0·73	203·4	209·3	2·63 (20 days)
October	49·34	48·07	69·0	57·52	30·0	41·16	0·73	0·0	0·73	0·78	142·0	149·9	.....
November	39·61	36·61	58·0	44·90	22·0	34·33	0·42	3·0	0·72	0·89	44·5	60·1	.....
December	29·30	27·81	51·0	35·35	1·0	23·26	0·62	3·5	0·97	1·32	47·6	41·9	.....
Totals	.....	.....	.....	.....	.....	.....	6·67	18·1	8·48	9·63	1,886·4	2,038·7	.....

HORTICULTURE

Tree Fruits

The investigation of problems encountered in the production of tree fruits is one of the primary objects for which this Station was established. A large number of experiments have been instituted for the purpose of throwing light on questions which are of vital importance to the industry but which it is difficult or impossible for the grower to solve for himself. The field of inquiry covers all phases of orchard practice, but special attention is being devoted to problems dealing with cultural methods, irrigation, harvesting, storage and the introduction of improved varieties.

It is impossible to set forth, in a report of this kind, the complete annual results of all the tree fruit projects which are being carried on. Accordingly it is proposed to omit a great deal of the detail, and to present only a summary of the results secured from the various experiments during the year. In addition it is planned to include each year, a more or less complete statement of the progress made towards the solution of a particular problem investigated over a period of several years. By this procedure it is hoped to keep all growers in the territory served by this Station constantly in touch with the more important developments and also eventually to make the full results of each project readily available to those specially interested. In accordance with this plan brief mention is made of a large number of the projects under way, but only two experiments dealing with thinning are discussed at length in this report.

BREAKDOWN OF APPLES

The fact that western-grown apples sometimes develop a condition of decay commonly called "breakdown" is only too well known to fruit-growers and distributors. The losses from this disease in 1922 were sufficiently serious to warrant thorough inquiry into possible causes and means of preventing the trouble. The investigation begun at that time has been continued and extended each year. For the first three years efforts were concentrated on the study of breakdown in Jonathan, but during the past season it has been possible to devote some attention to the disease in several other important commercial varieties. It is proposed to defer publication of the details of the various projects until they have been carried on for a five-year period. But in order that the industry might benefit from the work while it was still in progress a summary of the results secured during the first three years was published in the annual report of this Station for 1925. The material presented below is supplementary to that published in the report for 1925 and deals with breakdown in the Delicious, Rome Beauty, Wagener, Stayman, and Grimes Golden varieties.

The 1926 season was not particularly favourable for investigation of this problem as the severe freezing weather experienced in the latter half of September caused winter varieties to drop from the trees much earlier than usual, with the result that it was difficult to secure fruit which had reached an advanced stage of maturity on the trees. Nevertheless over 300 boxes of apples were gathered from various commercial orchards in the Winfield, Kelowna, Summerland, Penticton, and Keremeos districts. This fruit furnished the data which is summarized under the project headings which follow.

INFLUENCE OF GROWING CONDITIONS ON BREAKDOWN—PROJECT H. 416A

Losses from breakdown in Delicious, Rome Beauty, Wagener, and Stayman have usually been less serious than those experienced with the Jonathan. One reason for this may well lie in the fact that these varieties normally attain a larger size than the Jonathan so that there is less incentive for the grower to attempt to increase their size by over-stimulation in the form of very heavy

pruning, thinning and manuring. It has been found, with all of these varieties, that the fruit from trees carrying a light crop of over-large fruit is particularly susceptible to the disease. Soil conditions also enter into the problem, for breakdown was found to be more serious in Rome Beauty and Delicious grown on heavy clay and in Wagener grown on light sandy soil than in these same varieties from orchards where soil conditions were more favourable. Likewise seasonal weather conditions play their part, for breakdown has been quite serious in a wide range of varieties some seasons, and of negligible importance in any variety in other years. The grower has no control over seasonal weather conditions but he can apparently do much to reduce the losses from breakdown by practising cultural methods calculated to result in the production of regular crops of moderate-sized fruit.

INFLUENCE OF CONDITION OF FRUIT AT PICKING TIME ON BREAKDOWN—PROJECT H. 416B

With all varieties tested the tendency to develop breakdown appears to be increased if the fruit is left on the trees until it reaches an advanced stage of maturity. Similarly fruit which is over-large for the variety commonly shows greater susceptibility to the disease than do the medium and smaller sizes. Watercore has also been found to be a predisposing factor, though the correlation between breakdown and watercore is much less pronounced in some varieties than in others. Thus Wagener and Delicious which showed quite serious watercore at picking time failed to develop breakdown in storage, while in the Jonathan, Stayman, and Rome Beauty extensive watercore was almost invariably followed by breakdown.

Further work with these varieties is necessary but the results secured to date suggest that with most varieties the development of watercore is an indication that the fruit should be picked without further delay. It is also apparent that over-large fruit should receive special attention. The colour-chart maturity test devised for use with the Jonathan promises to prove a practical means of reducing the losses from breakdown in other varieties.

INFLUENCE OF STORAGE CONDITIONS ON BREAKDOWN—PROJECT H. 416C

Temperature is the only storage condition which has been found to exert a significant influence on the development of breakdown in Delicious, Wagener, Stayman, Rome Beauty and Grimes Golden. By placing the first four of these varieties in cold storage where a temperature of 32° Fahrenheit was maintained the development of breakdown has been very materially delayed, though not prevented.

The Grimes Golden presents a special problem in that when the above procedure was carried out with this variety it was rendered susceptible to a particular type of breakdown which did not develop in comparable specimens stored at a higher temperature. Apparently the flesh of the Grimes Golden, as grown under British Columbia Dry Belt conditions, is not capable of withstanding a continuous temperature of 32° F. Accordingly it is inadvisable to place this variety in storage at this temperature.

The rate of development of typical breakdown as it occurs in the Jonathan has not been the same in all the varieties studied. Very few Jonathans have been found to develop breakdown after being held in common storage for a period of two months, whereas with Rome Beauty and Wagener additional specimens have continued to develop the trouble over a much longer period. The fact that common storage temperatures are usually a good deal higher when Jonathans are picked than when Romes and Wageners are harvested probably accounts at least in part, for this difference in rate of development.

The results suggest that precooling may be of material assistance in getting fruit into consumption before breakdown has time to develop. They indicate,

however, that low temperatures are merely a means of delaying breakdown, and that prevention is possible only through proper attention to cultural conditions and methods of harvesting. The extended period over which breakdown continues to occur in many varieties suggests the advisability of packing susceptible fruit only as orders are received.

BREEDING OF TREE FRUITS

Progress in the fruit industry is largely dependent upon the development of improved varieties. The commercial varieties of to-day have been selected as the best of countless seedlings, but not one of them is perfect and each has its own particular climatic requirements. Further improvement is possible and most desirable, but the day of the seedling orchard is past, with the result that very few seedling trees are now being grown by private individuals. If the fruit industry in this province is to keep pace with that in other parts of the world the growing of seedlings must be continued in order that there may be a source from which to select improved varieties.

The most rapid progress is to be expected where actual breeding work is conducted. Within recent years much has been learned regarding the laws which govern the inheritance of plant characters. The application of this knowledge has already resulted in a " speeding up " of plant improvement. It is now possible, by making carefully controlled crosses and raising seedlings of known parentage, to produce a variety possessing certain desired characteristics in much shorter time than was formerly required. Nevertheless the production of improved varieties of tree fruits is still such a slow process that few growers can afford the time, labour and land necessary to carry it on. With these facts in mind breeding of tree fruits was started at this Station in 1924.

APPLE BREEDING—PROJECT H. 22

The most important deficiency in the commercial apple plantings of this province is the shortage of desirable winter varieties. The Winesap and Newtown have been planted to some extent, but the area in which these varieties thrive to good advantage is comparatively limited and at best their quality is inferior to that of such varieties as the McIntosh and Delicious. There is urgent need for attractive high-quality winter apples sufficiently hardy and productive to be grown profitably under the climatic conditions which prevail in the various apple districts of British Columbia.

It was with the object of satisfying these requirements that this project was started in 1924. Each year since that time controlled crosses have been made, using such varieties as McIntosh, Delicious, Newtown, Winesap and Rome Beauty as parents. Each of these varieties has many desirable characteristics but some weaknesses. By judicious crossing it is hoped to recombine the desirable characters in such a way as to produce new varieties which will prove more satisfactory to the consumer and more profitable to the grower than any of the parents. To achieve this result it will likely be necessary to raise thousands of seedlings. Good progress has been made, in that there are now several hundred seedlings of known parentage growing at the Station and thousands of seeds from controlled crosses were planted in the autumn of 1926.

In the course of this breeding work it has been found that, under local conditions, very little pollen is produced by the McIntosh and practically none by the Winesap. Delicious, Newtown and Rome Beauty on the other hand are excellent pollen-producers. This information suggests the advisability of mixed plantings to insure proper pollination.

APRICOT BREEDING—PROJECT H. 574

The Okanagan valley and a small district in the Arrow lake country are the only areas in Canada where the apricot can be produced commercially. The

varieties grown leave much to be desired both from the standpoint of grower and consumer. Since this Station is located in the southern Okanagan valley it is logical that some attention should be given to the improvement of this fruit. Crosses were made in the spring of 1926 and the resulting seed planted in the fall of that year.

PEAR BREEDING—PROJECT H. 43

There are as yet no varieties of the pear which combine immunity to Fire Blight with desirable market qualifications. There is need also for a variety embodying the bearing capacity of the Bartlett and the keeping quality of the Anjou. Similarly a pear with the hardiness of the Flemish Beauty and the dessert quality of the Bosc would be a great boon to the pear-grower. It is in the hope that some of these desirable combinations may be realized that this project has been undertaken. Breeding material has been collected and crossing begun.

CULTURAL METHODS FOR TREE FRUITS

From the standpoint of production the prosperity of the orchardist depends primarily on the maintenance of a high state of soil fertility at the lowest possible cost. In the territory served by this Station the problem is complicated by a wide variation in soil type, natural precipitation and amount of irrigation water available. The soil ranges from very heavy clay to coarse gravel, the only similarity in many cases being the common deficiency in both humus and nitrogen. The precipitation in some districts is less than half what it is in others and is very variable from year to year. Similarly irrigation water is plentiful in some districts, unobtainable in others and subject to seasonal fluctuations everywhere. To meet these diverse conditions the following methods of orchard culture have been devised and tested at this Station.

ALFALFA COVER-CROP—PROJECT H. 404

Alfalfa is being grown as a cover-crop in five acres of apple and three acres of stone fruit orchard on the Station. Practically all of this area is underlaid with gravel, but there is great variation in the depth of the top soil. Many of the trees have suffered from time to time from shortage of water, particularly in those locations where the soil is shallow. This has resulted in the death of a number of trees in the stone fruit orchard, and has apparently rendered the apple trees susceptible to collar rot. Nevertheless the general health of most of the trees is excellent as is evidenced by vigorous growth and luxuriant foliage.

A serious disadvantage of alfalfa is the high water requirement. During an acute water shortage in the summer of 1926 an attempt was made to reduce this moisture requirement by frequent disking during the growing season. This procedure did not give very encouraging results. The alfalfa continued to send up new growth, and the labour involved in disking and re-marking the irrigation furrows was quite an item of expense. On shallow soils and where the moisture supply is likely to run short it is undoubtedly much safer to grow some other cover-crop such as hairy vetch.

ANNUAL COVER-CROPS—PROJECT H. 580

In districts where there is insufficient moisture to permit the growing of continuous cover-crops there is need of some plant which will make a rapid growth during the cool months of autumn and early spring. To determine the relative value of various plants for this purpose, plots of rape, buckwheat, tangier peas, field peas, barley, fall rye, fall wheat, spring vetch and hairy vetch were sown in a ten-year-old apple orchard on August 1 and September 1 in 1925, and again on the same dates in 1926. The soil was in good tilth and the seeding was done with a grain-drill.

The rape made a good growth when sown on August 1 but suffered somewhat from drought. The September sowing made fair growth in the long open fall of 1925 but did not produce a satisfactory cover in 1926. This crop sometimes kills out during the winter even in the southern Okanagan so that it cannot be relied upon to produce additional growth in the spring. The seed is cheap and gave a good stand when sown at the rate of 4 pounds to the acre.

Buckwheat made a very rapid growth but did not stand as much frost as rape. In 1926 it was killed out by the 12 degrees of frost experienced in the latter half of September. About a bushel of seed to the acre is required.

Tangier peas and field peas both made good growth when sown on August 1, but did not produce as good a cover as the vetches. About 2 bushels of seed to the acre is required, which makes the cost of seed quite an item of expense, especially as these crops seldom survive the winter.

Barley made the most rapid growth of all the crops tested, and promises to prove valuable where moisture conditions are such that seeding must be delayed until late in August. The plant is usually killed out during the winter, but the growth produced in the fall mats down and makes a good protective covering. A bushel and a half of seed to the acre gave good results. Where non-legumes such as barley are grown as cover-crops it is usually advisable to make an application of some nitrogenous fertilizer in the late fall or early spring.

Fall rye and fall wheat produced a satisfactory cover even when sown as late as September 1, and furthermore resumed growth very early in the spring. It may be well to mention that these crops should not be allowed to make too tall a growth before being ploughed under in the spring. When properly handled they supply a large quantity of humus at low cost and in a comparatively short time. Like barley, they may well be supplemented by some fertilizer high in nitrogen.

Spring vetch made a fairly good cover when sown on August 1, but cannot be relied upon to live through the winter.

Hairy vetch is undoubtedly the most satisfactory legume for use as an annual cover crop in the Okanagan valley. It grows at a low temperature and seldom suffers materially from winter injury. Sown at the rate of 25 pounds to the acre the first week in August it can usually be counted on to produce a good covering before winter sets in. However, where moisture conditions are not favourable to planting until near the end of August it seems safer to use one of the cereals already mentioned. Hairy vetch resumes growth very early in the spring and where it can be left undisturbed until May supplies a valuable quantity of both humus and nitrogen. When left until this time the crop is frequently too tangled to permit ploughing, but can be readily incorporated with the soil by thorough disking.

CLEAN CULTIVATION—PROJECT H. 403

The trees in the two-acre apple orchard which had been carried on under a system of continuous cultivation for ten years were so badly injured by the abrupt drop in temperature in December 1925 that it was decided to remove them. The experience with these trees proved beyond question the inadvisability of attempting to grow fruit in the Okanagan valley under a system of clean cultivation with no provision for returning humus and nitrogen to the soil. But the question as to whether, in a clean-cultivated orchard, these elements of soil fertility can be economically supplied through the medium of barnyard manure and chemical fertilizers merits further investigation. A three-acre orchard of stone fruits planted in 1923 is being used to secure information in this connection.

FARM ROTATION—PROJECT H. 408

Such crops as mangels, oats and corn have been grown from time to time in the young orchards at the Station. The results secured indicate that this practice can be followed with advantage provided the fertility of the soil is maintained by applying manure or ploughing in a cover crop at frequent intervals. It is doubtful whether inter-cropping of this kind is advisable in orchards over eight years of age as even when the trees have been planted 30 feet apart they should by that time be large enough to make good use of all the space.

HAIRY VETCH COVER-CROP—PROJECT H. 405

Hairy vetch has been used to good advantage as a continuous cover-crop in both apple and stone fruit orchards since 1920. The usual procedure has been to disk the crop thoroughly late in July or early in August when a fair proportion of the seed is ripe. This disking serves the double purpose of reseeding the vetch and incorporating the organic matter with the soil. In bearing orchards it is often necessary to modify this plan as the weight of fruit bends the branches down and makes disking inadvisable at this time of year. Where the vetch has been established for several years good results have followed disking several times during June and early July. This procedure has the added advantage of reducing the water requirement of the cover-crop, and there is frequently sufficient seed in the soil to ensure a new crop without further seeding. Another plan which has proved its worth is to leave the crop undisked until late fall or very early spring. This ensures the ripening of a maximum of seed, but the growth of vetch and weeds which results is sometimes sufficiently rank to interfere somewhat with picking operations.

The suitability of hairy vetch for use as an annual cover-crop has already been mentioned. This adaptability to various methods of handling makes it one of the safest and most satisfactory cover-crops for use in the territory served by this Station.

SWEET CLOVER COVER-CROP—PROJECT H. 578

Sweet clover promises to prove valuable as an orchard cover-crop particularly on heavy clay soils. In order to secure first-hand information as to the best methods of handling this crop a two-acre pear orchard was seeded down to it in the spring of 1926. The land was prepared by ploughing in the fall and disking in the spring. A firm seed-bed was secured by the use of the float and packer. The very early spring made it possible to sow the seed on March 10.

Seed-drill was used, the seed being mixed with half its volume of shorts and sown through the grain spouts with the openings cut down as fine as possible without crushing the seed. By this procedure a very uniform stand was secured with fifteen pounds of seed to the acre. The crop was clipped once early in June to help control weeds, and again in late August to assist in conserving moisture as the clover had by that time attained a height of over 4 feet. It is planned to mow again about the time the crop is coming into bloom in 1927. By this procedure it is hoped to prevent the clover from becoming so tall and woody as to interfere with harvesting operations, for it has been found that cutting at this stage encourages the plant to send out a second growth which is spreading in habit. This second growth can usually be relied upon to set sufficient seed to insure reseeding, which may be effected by thorough disking early the following spring.

VEGETABLE INTERCROPS—PROJECT H. 407

The practice of growing vegetable crops such as potatoes, tomatoes and cantaloupes between the trees has been given a thorough trial. The results

secured indicate that this is a satisfactory method of securing cash returns during the years which must necessarily elapse before the trees come into bearing. Care should be taken, however, to maintain the fertility and physical condition of the soil by applying barnyard manure or turning in cover-crops at frequent intervals.

FERTILIZERS FOR ORCHARDS

Does it pay to apply chemical fertilizers to orchards? If so what kind should be used and when should it be applied? Many experiments have been carried out elsewhere with a view to furnishing the answers to these questions. The results secured, however, have been somewhat inconsistent due probably to differences in soil fertility and the nutritional conditions existing within the trees at the time the fertilizers were applied. Local experiments are undoubtedly necessary to determine the economy of applying various fertilizers to orchards in the territory served by this station. Accordingly there is ample justification for carrying on the following projects in which over 7 acres of orchard are being used.

MAINTAINING FERTILITY IN ORCHARDS—PROJECT H. 579

This project is designed to secure information regarding the relative economy and efficiency of chemicals, manure and cover-crops as a means of maintaining soil fertility in Okanagan orchards. Nitrogen is undoubtedly the only chemical element in which most orchard soils are seriously deficient. When this is supplied in chemical form care should be taken to supply organic matter in some other way, as humus is the other element of fertility in which Dry Belt soils are commonly lacking. Barnyard manure never fails to give satisfactory results where it can be secured at reasonable cost. Legume cover-crops are a most economical source of both nitrogen and humus, and should be used wherever sufficient moisture is available to grow them to advantage.

PROMOTION OF ANNUAL BEARING IN APPLES—PROJECT H. 531

The purpose of this project is to find out whether fertilizers can be used to advantage in promoting annual bearing. The habit of producing a very heavy crop one year and a very light one the next is much more pronounced with some varieties than with others. Varieties such as the Wagener and Northern Spy which tend to produce spurs of uniform length seem to be particularly prone to biennial bearing. On the other hand varieties like the Rome Beauty and Jonathan which commonly produce fruit-spurs of varying length are normally consistent annual bearers. These facts suggested that it might be possible, through the use of fertilizer, to set up in the Wagener and Spy similar nutritional conditions to those which give rise to varying spur length and annual bearing in the Rome and Jonathan.

Accordingly, in the spring of 1924 a number of biennial bearing Wagener trees which had borne a heavy crop in 1923 were selected. Early in March nine of these trees were given an application of 10 pounds of nitrate of soda per tree, nine received a 5 pound application of the same fertilizer and nine were left untreated. None of the trees bore more than a few pounds of fruit in 1924 but all produced a good crop in 1925, and in 1926 three of those which had received the 10 pounds of nitrogen, and one of each of the other lots gave a fair crop. While these results are far from conclusive they suggest that a heavy application of nitrogen in the spring of the "off" year may sometimes assist in bringing a biennial bearing tree back into annual bearing.

Experiments conducted elsewhere indicate that, in old trees carrying a large quantity of weak wood, spur-pruning in the spring of the "off" year is sometimes even more effective in attaining the same end.

Nevertheless it is well to bear in mind that, once established, the biennial bearing habit is very difficult to overcome, especially in varieties which are particularly susceptible. It is certainly easier to prevent it by planting varieties which are naturally regular bearers, and by adopting cultural methods calculated to keep the trees making moderately strong new growth.

SECURING SIZE IN WINESAPS—PROJECT H. 412

In districts north of Penticton the Winesap seldom attains full size except in particularly favourable locations. This project was undertaken to determine whether the fruit could be encouraged to grow larger by the use of fertilizers. To date the results have not been very encouraging. The essentials for securing size in this variety appear to be a relatively long growing season, a deep fertile soil, and proper attention to irrigation, pruning and thinning. A nitrogenous fertilizer may well be used to assist in maintaining vigour in the trees, but there is no experimental evidence which would indicate that potash or phosphoric acid exert any significant influence on the size or quality of apples grown in the British Columbia Dry Belt.

FILLERS FOR TREE FRUIT ORCHARDS

The most profitable distance apart to plant trees is influenced by many factors such as soil fertility, moisture supply and the variety of fruit. A well-grown apple tree thirty years of age needs a large area of soil to draw from if it is to function to advantage. In the early years, however, it does not require quite so much space and the question arises as to the economy of planting trees 30 feet or more apart unless some use is made of the intervening space while the trees are small. One means of utilizing this space is to plant extra trees called "fillers", which it is planned to remove as soon as the permanent trees are large enough to require the extra room. The following projects are being carried on to secure data regarding the advisability of using "fillers".

APPLE FILLERS—PROJECT H. 530

In 1916 twelve acres of apple orchard were laid out in such a way as to provide opportunity for a study of this problem. The results to date suggest that the advantages of using fillers are more apparent than real. Even though early fruiting varieties were used as fillers they failed to produce sufficient fruit to pay for their upkeep during the first seven years, after which time they commenced to crowd the permanent trees. The growing of vegetable intercrops or dairy feeds during the early years of an apple orchard appears to offer greater prospect of satisfactory financial returns than the planting of filler trees.

APRICOT AND PEACH FILLERS—PROJECTS H. 533 AND 534

Three acres of peach and apricot orchard set out in 1924 are being used to furnish data as to the most profitable distance apart to plant these fruits when various methods of pruning and orchard culture are followed.

PEAR FILLERS—PROJECT H. 355

The use of pears as fillers has many advocates. It is claimed that close-growing varieties such as the Bartlett do not interfere with the permanent trees for a long time and come into bearing relatively early. In order to secure information as to the yield which may be expected from pear fillers and the length of time which they may be left in the orchard without interfering with the permanent trees, the two-acre pear orchard set out in the spring of 1925 was planted with the permanent trees 30 feet apart each way and a filler in the centre of each square.

GRAFTING OF TREE FRUITS

The fact that it is possible to unite parts of closely related plants by means of grafting has been known for centuries. Various ways of effecting a union between stock and scion have been devised with the result that grafting is now in common use in orchards and nurseries. Nevertheless, there are still a number of practical problems for the solution of which both growers and nurserymen look to the Experimental Stations. That the following projects are receiving very careful attention is evidence that this confidence is not misplaced.

TOP GRAFTING—PROJECT H. 532A

There is a growing opinion that a determined effort should be made to eliminate the less popular varieties of apples from our commercial orchards. Top grafting has been frequently suggested as an economical means of securing this result. There is little information available, however, concerning the best method of grafting and most satisfactory materials to use. The economy of grafting trees of various ages and the affinity between different varieties when used as stock and scion also merit investigation. It was with a view to securing reliable data on these points that this project was undertaken.

Four methods of grafting, the cleft, bark, notch, and whip graft have been tried out. Good results have been secured with each of these methods. Whip grafting may be practised to advantage where the stock is half an inch or less in diameter. The cleft graft is well adapted for use on apples where the stub of the stock is not larger than two inches in diameter. When this method is used the grafting should be done early in the spring before there is much movement of sap in the stock. The bark graft may be used on larger stubs as it permits the use of more scions to a stub than is possible with the cleft method. The notch graft is in reality a modification of the bark method. As it has given particularly gratifying results it is described at some length and illustrated in this report.

In notch grafting, as with the other methods mentioned, the scion wood should preferably be secured in the autumn and buried in a sheltered spot or placed in damp sawdust in a root-cellar to keep it dormant, though good results have sometimes followed the practice of cutting it from the trees as required. Well matured one-year-old wood with good plump buds should be used.

The stock is prepared by sawing off limbs so as to leave stubs which, for best results, should be less than two and a half inches in diameter. Where care is taken in the selection of branches to be worked over it is usually possible to do all the grafting in one year. It is advisable, however, to leave some branches to act as "feeders" during the first season while the grafts are becoming established. These feeders may well be comparatively small branches so placed that they do not interfere with the development of the grafts. The operation of putting in the grafts is best performed after the sap has begun to flow freely in the spring. Starting from the end of the stub and cutting downward, a small section of bark about an inch and a half long and the same width as the scion is removed so as to leave a notch which tapers slightly towards the base. A scion carrying two or three buds is made with a slanting cut across its butt, the cut surface being the same width and length as the notch into which it is pressed. To hold the scion in place and ensure contact of the cambium or growing layers a small shoe tack is driven through the scion into the stock. The union is then protected from drying out by coating it with wax. It is a good plan to place several grafts in each stub according to the diameter, but all but one of these should be headed back severely after the first year's growth, and when the stub is completely healed over only one graft should be allowed to remain. This may be pruned in much the same manner as a young tree. Water sprouts should not be permitted to rob the young grafts, but it is often

of advantage to allow a few to grow, especially near large cuts, as they help to prevent so called "sour sap" or "die back" which sometimes causes serious losses in top-grafted trees. Should sour sap set in it can sometimes be checked by removing the diseased bark with a sharp knife, being careful to cut well back into healthy tissue.

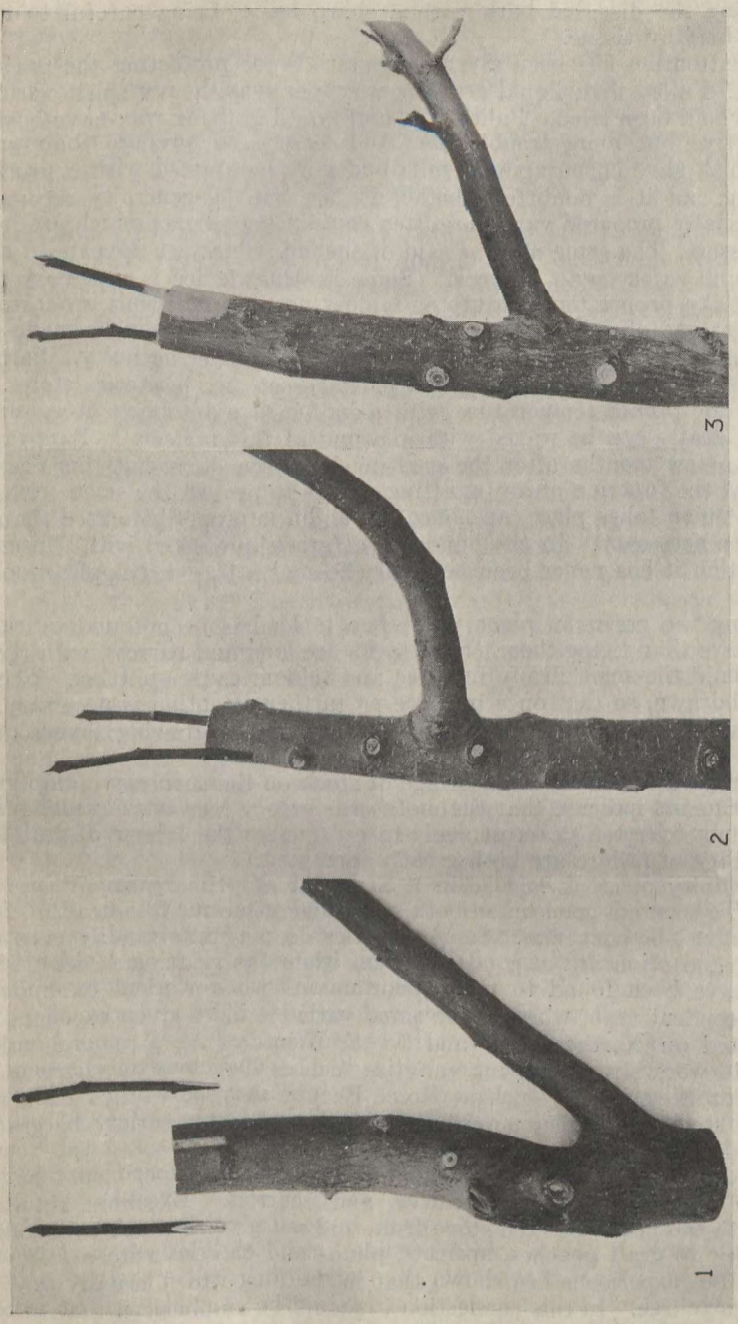
Some attention has been given to materials for protecting the grafts from drying out. Pulled wax, liquid grafting wax, parawax, heavy spirit varnish and shellac have all been tried. Pulled wax and liquid grafting wax have been found quite effective but more troublesome and costly to prepare than parawax. Spirit varnish gave encouraging results and may be applied with a brush without heating, but it is doubtful whether its use can be generally recommended as commercially prepared varnishes often contain ingredients which are injurious to plant tissue. The same may be said of shellac. Parawax appears to combine efficiency and safety with low cost. Some heating device is necessary to keep the wax at the proper temperature as it does not spread evenly when too cold, and tends to run off when too hot. A satisfactory heater can be made from a coal-oil can, a kitchen lamp, some hay wire and a little ingenuity. Parawax is cheap and can be purchased in pound packages at any hardware store. When applied at the proper temperature with a half-inch paint brush it is surprising how many grafts can be waxed with a pound of this material. Parawax often cracks off a few months after the grafting has been done, but this need cause no alarm as the function of any grafting wav is to protect the scion from drying out before union takes place, and once the union is properly formed the coating is no longer necessary. In the hundreds of grafts protected with this material at this station it has never been necessary to make a second application of the wax.

Tacking the grafts in place with shoe tacks has been found quicker and more effective than tieing them. Shoe tacks are long and narrow, with the result that they hold the scion firmly in place and seldom cause splitting. They need not be withdrawn, so that once in place no further attention is necessary. Furthermore their use ensures very close contact of the growing layers of stock and scion.

With regard to the influence of age of stock on the economy of top grafting, these experiments indicate that the most satisfactory results are usually secured with trees not over ten years of age. In older trees the labour of grafting and the possibility of failure are both greatly increased.

The affinity of stock and scion is a matter of primary importance in top grafting. To secure a good union both stock and scion must be healthy, furthermore they must be congenial. Some varieties do not unite readily even though both stock and scion are in good condition when the grafting is done. Several varieties have been found to make poor unions when worked on Spitzenberg and Transcendent crab, whereas the same varieties have given excellent results when grafted on Northern Spy and Scott's Winter. As a general rule it is advisable to work strong growing varieties such as Delicious on vigorous stocks. A smaller growing variety such as Rome Beauty may be worked on a slightly less robust stock, but under no circumstances should any variety be grafted on a stock which is not in the best of condition.

In addition to the work with apples top grafting experiments have been carried on with pears, plums, peaches and cherries. Excellent results were secured with the pears, but the stone fruits did not give so much encouragement. It is possible to graft peaches, apricots, plums and cherries with a fair measure of success, but experience has shown that in the long run it usually pays better to plant a new tree. In this connection it should be emphasized that to be commercially profitable top grafting must produce trees which compare favourably as to vigour, fruitfulness and longevity with new trees planted at the time the grafting was done.



Three Stages in Making the Notch Graft.—1. Stock and scions prepared for grafting. 2. The scions tacked in place. 3. The waxing completed. Note the comparatively small subsidiary branch left to act as "feeder."

BRIDGE GRAFTING—PROJECT 532B

Bridge grafting is sometimes recommended as a means of saving trees which have been girdled by rodents or by collar rot. A good deal of labour is involved, however, and the operation is not always successful. These facts have suggested the necessity for experiments to determine the cheapest and most effective methods of bridge grafting. To secure information in this connection several trees were artificially girdled and bridge-grafted in 1924. Ten trees which had been partially girdled by collar rot were grafted in the fall of 1925, and ten additional specimens injured by the same disease were bridged in the spring of 1926. A record was kept of the labour required and materials used. The "notch" method of grafting was employed in all cases and the unions were protected with parawax applied hot with a brush.

A very high percentage of successful unions was secured with the work done in early spring but only a few of the grafts made in the autumn survived. For best results it seems particularly important that the scions be dormant and the sap beginning to move in the stock when the grafting is done. Given these simple requirements there is apparently no reason for failure in bridge-grafting trees which have been girdled by rodents. The percentage of successful unions is likely to be lower with trees girdled by collar rot, especially where the disease has progressed sufficiently to entirely girdle the tree. In such cases the vitality of the tissue above and below the girdle is often very low, with the result that it is difficult to effect a satisfactory union. Unless the tissue above and below the girdle is healthy it is very doubtful whether it is worth while to go to the expense and trouble of bridge grafting. Trees which are only partially girdled by collar rot, however, may often be saved by prompt bridging.

In preparing a girdled tree for grafting care should be taken to cut well back to healthy tissue, removing all diseased bark from both root and trunk. Well-matured scions of some hardy variety such as McIntosh should be used. The work is greatly facilitated by adopting the "notch" method of grafting which ensures perfect contact of the growing layers. Parawax has proved quite effective when properly applied. Bridge grafted trees should be carefully protected from injury by mice as the young grafts are very attractive to these rodents. It is a good plan to clear away all debris from the base of the tree leaving a clear space of eighteen inches or so on all sides of the trunk, but for complete protection it is necessary to kill the mice. This can be most economically accomplished by the use of poisoned bait. The following formula developed by the United States Biological Survey, has given very satisfactory results:—

"Mix together, dry, one-eighth ounce of powdered strychnine and one-eighth ounce of baking soda. Sift the strychnine-soda mixture over one quart of rolled oats, stirring constantly to ensure an even distribution of the poison through the grain. Thoroughly warm the poisoned rolled oats in an oven and sprinkle over them six tablespoonfuls of a mixture of three parts of melted beef fat and one part of melted paraffin, mixing until the oats are evenly coated." It is very important that the beef-fat-paraffin mixture be hot and the poisoned rolled oats thoroughly warm, otherwise it will not be possible to obtain an even coating.

Teaspoonful quantities of this bait should be placed in small "poison stations" where it is available to the mice but protected from the weather and out of reach of birds. Such a station can be easily and cheaply made from three peach-box ends. One of the ends should be ripped down the centre to make two cleats. The four pieces of wood may then be nailed together to form a tunnel. Through the open ends, which measure about an inch and a half square, the bait may be placed on the floor-board halfway along the tunnel.

In orchards where mice are abundant it is advisable to place one poison station at the base of each tree. The station should be placed in a dry location

where there is good circulation of air. Under such conditions bait prepared as above has been found to keep fresh for a long time. Inspection of the stations at regular intervals is necessary to make sure that there is always a supply of appetizing bait waiting for any hungry mouse that may chance to pass that way.

HARVESTING OF TREE FRUITS

The commercialization of the fruit industry has brought with it many new problems. One of these is the development of maturity tests which will enable the producer to pick his fruit at such a stage of ripeness that it can be delivered in prime eating condition to a consumer who lives thousands of miles away. With a view to assisting British Columbia growers to solve this problem, harvesting experiments have been conducted with apples for the past five years. In 1926 it was possible to make a beginning with pears and in the near future it is hoped to be able to extend the scope of the work so as to include a study of maturity tests for stone fruits.

MATURITY TESTS FOR APPLES—PROJECT H 414A

The results secured from this project in 1926 corroborate the statements published in previous reports. From the standpoint of maturity tests the most important changes which take place in an apple as it ripens on the tree are increase in size, yellowing of the skin on the unblushed side of the fruit, softening of the flesh, loosening of the bonds which hold the fruit to the tree and the development of watercore. The comparative value of these changes as indications of picking maturity has been found to differ somewhat with the variety.

Increase in size is probably the most important factor in determining the best picking time for early varieties such as Yellow Transparent, Duchess, and Wealthy, which are used largely for culinary purposes. Duchess and Transparent may well be picked as soon as they have attained sufficient size to be saleable, though their quality is improved if picking be delayed until some yellowing of the skin can be discerned. The improvement in quality consequent upon delayed picking is even more pronounced with the Wealthy, but it has often proved more profitable to harvest this variety in a comparatively immature condition, for there is commonly a keen demand for good cooking apples early in the season, and late-picked Wealthies have frequently suffered from competition with the more popular McIntosh.

The gradual change in colour of the skin on the unblushed side of an apple from leaf-green to clear yellow has been found to be a most valuable index to the ripening processes going on in the fruit. The change from green to yellow appears to lag somewhat when weather conditions during the ripening period are unusually warm. Nevertheless these changes provide one of the most consistent and reliable tests for determining the most desirable stage of maturity at which to harvest such varieties as Jonathan, Delicious and Wagener. It is most important that these varieties be picked at the proper time, for premature harvesting results in poor quality in Jonathan and Delicious, and renders the Wagener very susceptible to scald, while failure to pick the fruit before it reaches an advanced stage of maturity renders all three varieties susceptible to breakdown. Through the courtesy of Dr. J. R. Magness of the U. S. Bureau of Plant Industry it has been possible to prepare a colour chart which shows the stage of maturity at which these varieties should be picked, and also the stages when they are too green and too ripe for best results. Copies of this chart are available for distribution to interested growers.

The invention, by Dr. J. R. Magness, of a comparatively cheap, accurate and convenient instrument for measuring the hardness of apples, has made it possible to use softening of the flesh as a test for picking maturity. By means

of this instrument it has been ascertained that apples do soften appreciably as they approach maturity, but with most varieties the rate of softening is rather slow. The pressure tester has proved particularly valuable as a guide to picking time for the yellow Newtown which is commonly ready to harvest when still quite green in colour.

Loosening of the bonds which attach the fruit to the tree is often the determining factor in establishing the stage of maturity at which picking should be done. The unusual cold weather experienced in the latter half of September, 1926, caused many varieties, which frequently hang well until late October, to drop from the trees early in the month. This was particularly true of Winesap, Stayman, Wagener and Rome Beauty, and necessitated harvesting these varieties earlier than usual in order to prevent serious loss from windfalls. Losses of this nature are also likely to occur with McIntosh and Grimes Golden which separate very easily from the spur after they have reached an advanced stage of maturity. In this connection it may be well to mention, however, that a few boxes of apples under a tree does not necessarily indicate a reduction in yield, for under favourable growing conditions the fruits remaining on the tree have been found to increase more than a sixteenth of an inch in diameter in a week's time. It is obviously advisable to pick the fruit as soon as it comes off so easily that there is danger of serious loss from dropping, but the practice of picking apples in an immature condition for fear of loss from wind is likely to result in fruit of small size and inferior quality.

The development of watercore may be made to serve as a maturity test. In several varieties, such as Jonathan, Delicious and Winesap, watercore usually appears first as small water-soaked spots arranged in a circle about the core area. These spots can be readily seen when the apple is cut across with a knife, and their presence may be taken as a sign that the fruit should be picked without delay. A small amount of watercore of this kind often disappears from the apples in storage, but when the fruit is left on the tree until watercore has progressed to the stage where it has commenced to form a continuous band of watery tissue round the core trouble may be expected in the form of rapid development of mealiness and breakdown. The after effects of watercore seem to be less serious with Wagener and Yellow Newtown, but even with these varieties picking should be carried out before extensive development of watercore has taken place.

MATURITY TESTS FOR PEARS—PROJECT H. 414B

Inasmuch as most varieties of pears must be picked while they are still distinctly green if they are to develop the best quality this fruit presents special harvesting difficulties. When left too long on the tree some varieties become susceptible to core rot, while others fail to develop that melting flesh and delicacy of flavour which make a properly ripened pear one of the most appetising of fruits. On the other hand care must be taken to avoid picking too early as this procedure materially reduces the yield and often results in a shrivelled product deficient in quality.

This project was undertaken with the purpose of determining whether there are maturity tests for pears which are reliable and yet simple enough for the grower to use in the orchard. In 1926 the fruit from two trees of each of the varieties Bartlett, Flemish Beauty, Howell, Bosc and Anjou was used in the experiments. A peach box of pears was picked from each tree every three days for a period extending well over the customary picking season for the variety. The "ground colour" or colour of the skin on the unblushed side of the fruit was recorded at picking time, as was also the seed colour and the ease with which the pears could be removed from the tree. The hardness of the fruit was determined at each picking by means of a pressure tester. The increase in yield was cal-

culated from caliper measurements made on each of ten pears on each tree at each picking. The loss from dropping was arrived at by noting the number of marked pears which had fallen at each picking. The fruit was stored unwrapped in a common storage cellar, and examined at frequent intervals, notes being made with regard to condition, quality and the development of storage diseases. This procedure has made it possible to secure information as to the influence of maturity at picking time on yield as well as on the quality and storage life of the fruit.

While it will be necessary to repeat this work for several years before definite recommendations can be made it may be said that the colour chart and pressure tester promise to prove of real value. Used in conjunction with the time-honoured test of the ease with which the fruit leaves the spur they should make it possible to very materially improve the quality of pears shipped from the Dry Belt of British Columbia.

IRRIGATION OF ORCHARDS

In irrigated districts no phase of orcharding is more deserving of investigation than the distribution of irrigation water. The only means of offsetting the high cost of operation involved in the artificial application of water lies in the production of large yields of high-grade produce. To achieve this end knowledge must be secured regarding the best methods of applying water, the most advantageous time to apply it, and the most desirable amount to apply. It is also imperative that there be information available concerning the practicability of attempting to grow fruit where the water supply is limited. This station has availed itself of the opportunity to be of service in this connection by carrying on the following projects.

IRRIGATION OF APPLE ORCHARDS—PROJECT H. 411A

During the past ten years this project has brought to light a great deal of information, much of which was presented in the Annual Report of this Station for 1925. The results secured in 1926 support the statements made in the 1925 report. They serve to affirm the contention that the fruit-grower in an irrigated area cannot employ his time and energy to better advantage than in providing for uniform distribution of moisture in his soil. A few weeks' neglect of this all-important matter in a critical period can do irreparable damage. The practical difficulties of the irrigator are legion, but ways and means of overcoming many of them have been devised and this information is available to any grower who wishes to take advantage of it.

IRRIGATION OF PEAR ORCHARDS—PROJECT H. 411B

The fact that certain irrigation practices are considered to render pear trees susceptible to blight has made it imperative that an investigation be undertaken to determine the most satisfactory method of irrigating this fruit. Accordingly the water applied to the pear orchards set out in 1925 is being measured and the amount applied, time of application, etc., are being varied with a view to finding out the influence of such factors on the fire blight problem.

IRRIGATION OF STONE FRUIT ORCHARDS—PROJECT H. 411C

This project has for its object accumulation of data on the irrigation requirements of apricots, peaches, cherries, and plums. Detailed records are kept of the dates of application, amounts of water applied and time required to apply it. The influence of soil type and methods of culture on such factors as length of run and distance apart of furrows is receiving careful study, and various kinds of distributing flumes are being compared from the standpoint of efficiency and economy.

PRUNING OF FRUIT TREES

In the past there has undoubtedly been greater diversity of opinion among fruit-growers with regard to methods of pruning than in connection with any other horticultural practice. While the extensive experiments carried out during recent years have done much to bring about a better understanding of the principles which underlie the response of trees to pruning, there is still much to be learned regarding the application of these principles to the solution of the practical problems of the fruit grower. It is for the purpose of securing information along these lines that attention has been given to the following projects, in which over 500 trees are being used.

APPLE, TYPE OF PRUNING—PROJECT H. 32A

Pruning has long been the means adopted to produce trees of certain desired shape and conformation. In the commercial apple orchards of Western America practically all the trees are pruned to what, in England, would be termed "half standards". In the production of trees of this type far less pruning is required than is necessary with the more elaborate and less natural forms which are still in vogue in many European countries. Nevertheless, pruning is looked upon as a necessary operation by most progressive orchardists in this country and full advantage is taken of the opportunity it provides for modifying the character of fruit trees.

Of the several types of apple trees developed in the station orchards the "modified leader" promises to prove most satisfactory from the standpoint of economy of orchard operation and yield of high grade fruit produced. Good examples of this type of tree have been developed by the following procedure. One-year-old whips have been headed at 30 inches at planting time. By winter these have usually produced several vigorous shoots from which a leader and two scaffold branches may be selected, care being taken that the scaffolds leave the trunk at a good wide angle and that the lowest one is about 2 feet from the ground. These scaffolds are tipped to preserve balance and to encourage branching, the leader being headed about 6 inches longer than the laterals. It should be emphasized that the scaffolds should be left at least 18 inches long, as more severe heading usually results in the formation of too many side branches close to the trunk, necessitating the removal of much wood later on. The second and third prunings are similar to that done the first winter. By the fourth winter a frame-work of five or six limbs has been developed along the main leader between two and six feet from the ground. At this time the leader is encouraged to assume the role of a main branch. In a well-built modified-leader tree the scaffold limbs are uniform in size, evenly distributed about the trunk and 6 or 8 inches apart vertically. In trees of this type little pruning other than thinning out of superfluous growth has been necessary from the fifth to the tenth year. Subsequently some heading back to laterals may be advisable to keep the tree within bounds, and help to maintain the fruiting wood in a vigorous thrifty condition. It should be more generally realized, however, that it is usually more profitable to maintain vigour by feeding the tree at the roots than by reducing the top.

APPLE, DEGREE OF PRUNING—PROJECT H. 32B

Experiments carried out at this Station, in conformity with many others conducted elsewhere, indicate that pruning exerts a dwarfing effect on the tree. These results suggest that pruning should be no more severe than necessary to produce the type of tree desired. In all pruning it should be constantly borne in mind that the aim in view is to produce a tree with a large area of healthy bearing surface within convenient reach of the sun and the orchardist alike,

so that each may do his part in perfecting a bountiful crop of high-grade fruit. The most efficient pruner is the man who achieves this desired result with the fewest cuts.

APRICOT PRUNING—PROJECT H. 533

As with apples so with the apricot pruning has been found of great value in the production of trees which conform to the shape desired in commercial orchards. With this fruit it has been found of advantage to cut back the young trees to a height of about 2 feet at planting time. A rather short head of three or four main branches may then be developed, the dormant pruning during the first few years being mainly thinning out. With favourable soil conditions and irrigation the young trees make a very vigorous growth, and it has been found that the removal of excess shoots early in June reduces the severity of the pruning necessary during the dormant season, thus hastening the bearing period. After the trees come into full bearing more heading back may be found necessary, but good cultural methods will do much to stimulate new growth and so reduce the severity of pruning required.

PEACH PRUNING—PROJECT H. 534

With the peach there is apparently good reason to look upon pruning as a necessary means of promoting vigour in the fruiting wood. The growth of the young tree branches freely, however, so that a good framework can be developed with very little heading back during the first few years. It is when the trees come into full bearing that an annual system of heading back to laterals may become advisable.

PEAR PRUNING—PROJECT H. 355

The purpose of this project is to determine the efficiency and economy of pruning as contrasted with tieing down as a means of bringing Bartlett pears into profitable bearing at an early age. The results secured indicate that with young strongly growing trees of this variety fruiting may be hastened by tieing down some of the branches to a position approaching the horizontal.

PRUNE PRUNING—PROJECT H. 577

It is sometimes very difficult to maintain vigorous growth in Italian prune trees which have come into full bearing. It frequently happens that an over-abundance of weak spur growth is developed. By pruning or breaking off some of this weak wood larger fruit has been secured on the remaining spurs and the trees have been stimulated to make strong new growth. This practice is cheaper and apparently more effective than thinning the fruit and is worthy of trial by growers who own devitalized prune trees. It may be well to mention that in this experiment the pruning was accompanied by good cultural methods and an ample supply of moisture.

STOCKS FOR TREE FRUITS

The importance of the root-stock problem is not yet fully appreciated by most fruit-growers. Investigations carried on in recent years indicate clearly that greater attention should be paid to the portion of the tree which grows below ground, for it has been found that the hardiness, productivity and longevity of fruit trees is materially influenced by the root system. It seems probable that the practice of budding or grafting fruit trees on seedlings of unknown origin is likely to be replaced by a system of propagation wherein greater emphasis is placed on the production of trees on root systems of uniform vigour and hardiness. The possibilities of double working as a means of increasing hardiness and disease resistance also merit investigation. In order that these matters may receive due attention the following projects, involving the use of seven acres of land, have been undertaken.

STOCKS FOR APPLES—PROJECT H. 360

The problem of securing apple trees on roots of known character is complicated by the fact that it is very difficult to propagate this fruit by means of cuttings. Several methods of securing trees on their own roots have been devised, but so far they are all slower and more expensive than the old plan of working the desired variety on a seedling root. Consequently they are not popular with nurserymen. It has been found, however, that a good measure of uniformity and hardiness can be secured by using seedlings of known hardy parentage for propagating material. In order to test the practicability of this method under commercial conditions a quantity of seed was secured in the fall of 1926 from an orchard in Vernon where only Hyslop crab and McIntosh are grown. Samples of this seed were distributed to nurserymen for trial and it is hoped that the results will be such as to encourage the extensive use of such seed.

STOCKS FOR PEARS—PROJECT H. 529

The comprehensive investigations carried on by Dr. F. C. Reimer at the Southern Oregon Experiment Station have called attention to the fact that pear species and varieties vary greatly in their susceptibility to fire blight. The results of Dr. Reimer's experiments suggest that the losses from fire blight may be reduced by working our commercial varieties on frameworks and root stocks which are highly resistant or immune to blight. It has been found that a fairly high percentage of the seedlings of the Chinese species *P. Calleryana* and *P. ussuriensis* are immune to blight, but unfortunately these seedlings cannot be relied upon to make good framework branches. The best of our commercial varieties have all proved highly susceptible to blight. There are, however, several European varieties of rather poor quality which show marked resistance to blight. One of these, the Old Home, is an extremely vigorous grower and makes an excellent framework. By double working it is possible to combine these three, the immune root stock, the resistant framework and the high quality commercial variety. The obvious advantage of such a procedure is that a tree is produced, the roots and framework of which are not susceptible to blight and the bearing surface of which produces high quality fruit. Should fire blight start in the fruiting wood it is probable that its spread will be checked when it reaches the resistant framework and thus the main body of the tree will remain unaffected.

Nevertheless, before the commercial possibilities of double working in fire blight control can be determined, an answer must be forthcoming to such questions as: "What is the cost involved in double working?" "What influence has double working on the productivity of the tree and on the quality of the fruit produced?" "What sort of unions will our commercial varieties make with the resistant stock?" "How efficient is double working in preventing loss from fire blight during a severe outbreak?" "How hardy are the blight-resistant stocks under British Columbia conditions?" It is hoped that this project will furnish answers to these questions.

STORAGE OF TREE FRUITS

The fact that this province now produces more fruit than can be marketed to advantage directly it is picked makes it imperative that a portion of the crop be placed in storage. This procedure brings with it many new problems and it is to assist growers and shippers in the solution of these that over five hundred boxes of apples have been used every year since 1922 in the projects which follow. To date the investigation has been confined to a study of storage conditions for the apple, but it is hoped that in the near future it will be possible to extend the scope of the work to include pears and stone fruits.

INFLUENCE OF CULTURAL CONDITIONS ON THE STORAGE LIFE OF APPLES—PROJECT H. 29A.

The wealth of data which have now been collected in connection with this project provide ample evidence that the storage life of an apple is greatly influenced by the conditions under which it is grown. In general it may be said that conditions which tend to produce fruit which is over-large for the variety tend also to render it susceptible to early decay. On the other hand the very small sizes are not popular in most markets and furthermore they are very costly to handle both in the orchard and in the packing house. There is a reason why the discriminating buyer specifies fruit of the medium sizes and it will doubtless be increasingly unprofitable for the grower to produce fruit which does not meet this demand. The ideal system of culture is undoubtedly that which will result in the production of the greatest quantity of high-grade apples of the medium sizes at the minimum of cost. Some of the requisites for the attainment of this end are deep fertile soil, uniform distribution of irrigation water, legume cover crops, intelligent pruning, judicious thinning and timely spraying. The proper inter-relation of these factors so as to secure the most satisfactory results is a task worthy of the fruit-grower's best thought. Even under the most careful management, factors over which the grower has no control will often result in the production of some over-large and unduly small apples. In the light of the informatoin provided by this project, however, it seems clear that no effort should be spared to reduce the production of such fruit to as small a percentage of the total crop as possible. Only the medium sizes can be expected to return a profit to the grower after storage charges and shrinkage have been deducted.

INFLUENCE OF TEMPERATURE ON THE STORAGE LIFE OF APPLES—PROJECT H. 29 B*

This experiment has now been carried on for two years and has furnished a great deal of evidence regarding the important influence which temperature exerts on the storage life of apples. The softening of apples in storage has been found to be a reliable index to the advance of the ripening processes. This fact has made it possible to use the rate of softening as a means of measuring the effect of temperature on the storage life of the fruit. By the use of a pressure tester the average softness of several important commercial varieties at various stages in their ripening period has been ascertained. This information promises to prove of value to storage house operators as a means of determining when the fruit under their care is nearing the end of its storage life. The importance of this knowledge lies in the fact that the whole purpose of storage is to facilitate the delivery of the fruit to the consumer in first-class condition. To achieve this the fruit must be removed from storage and placed on the market some time before the end of its storage life is reached.

While it is proposed to defer a complete report on this project until it has been conducted over a three-year period the following brief remarks relative to the results secured to date with several important commercial varieties are presented at this time in the hope that they may prove of interest to growers and storage-house operators.

McIntosh.—McIntosh apples having an average hardness of 14 pounds when placed in cold storage at 32° F. took five months to reach a softness of 9 pounds. Similar fruit placed in common storage where the temperature during the autumn months ranged between 40° and 50° F. reached a softness of 9 pounds in two months. By the time the apples had reached a softness of 8½

* Thanks are due to the Associated Growers of British Columbia, to Mr. B. Hoy of the Provincial Department of Agriculture and to Mr. T. H. Jones of the Fruit Branch, through whose co-operation this project has been made possible.

pounds their market value had become seriously impaired by shrivelling and by discoloration of the flesh and the development of undesirable flavour. These results suggest that it is not advisable to hold the McIntosh in storage after the ripening processes have reached a stage such that the fruit has a hardness of about 10 pounds as measured by the pressure-tester. The rapidity with which the fruit softens after removal from storage depends largely on the temperatures to which it is subjected, but unless temperatures of well over 40° F. are encountered and over a month is taken to get the apples into consumption this procedure may be expected to insure delivery of the fruit to the consumer in good condition. In this connection it may be well to mention that there appears to be room for education of the consumer as to how apples should be treated after they come into his hands. Every housewife should know that apples retain crispness and flavour to best advantage when kept under conditions of comparatively low temperature and high humidity. A week or two in a warm furnace room or under the kitchen table will seriously impair the appearance and quality of the best apples. Ideal conditions are provided by a cool, damp cellar from which the apples may be withdrawn as required. The realization of this fact by the housewife should do much to increase the sale of apples by the box.

JONATHAN.—The Jonathan variety, when picked at the proper stage of maturity, maintains its crispness and flavour over a surprisingly long period even under common storage conditions. Its life can be materially prolonged, however, by placing it in cold storage immediately after picking. Specimens testing 16 pounds in hardness when placed in cold storage took five months to reach a softness of 11 pounds, whereas this condition was reached in two months at common storage temperatures averaging 45° F. Diseases which commonly shorten the storage life of the Jonathan are breakdown, shrivelling and Jonathan spot. Breakdown is delayed by storage at lower temperatures, but prevention can only be accomplished by proper treatment during the growing season and at harvest time. Susceptibility to shrivelling is increased by picking in an immature condition and by storage in a dry atmosphere, but occurs eventually even in fruit which receives ideal treatment. Jonathan spot is intimately associated with the conditions under which the fruit is grown but can be materially reduced by storage at low temperatures. It does not injure the flavour of the fruit but makes it much less attractive in appearance and therefore materially lowers the sale value. Breakdown and Jonathan spot have done much to ruin the reputation of one of our finest dessert and culinary apples, but a better understanding of the means of preventing these troubles promises to restore to this variety the popularity which it so richly deserves.

DELICIOUS.—The Delicious, the acme of perfection in dessert apples, has one serious weakness. When kept at high temperatures it softens very rapidly and soon loses the crispness and delicacy of flavour which have endeared it to the public. When stored at temperatures close to freezing, however, this variety has been kept in perfect condition until March. The skin of the Delicious is remarkably resistant to superficial diseases such as Jonathan spot and scald. It is tough enough to protect the flesh against bruising and waxy enough to minimize shrivelling. These facts have undoubtedly contributed largely to its favour with distributors. In order that the Delicious may continue to delight the palate of an increasingly large number of admirers over as long a period as possible, the temperature requirements of this variety should be widely known. At picking time the Delicious commonly offers a resistance of 16 pounds to the pressure tester, but at high temperatures this rapidly drops to 9 pounds and is accompanied by the development of mealiness and undesirable flavour. At temperatures below 40° F. this variety remains in perfect condition for a long time even after it has reached a stage of maturity such that it tests only 12 pounds.

GRIMES GOLDEN.—Grimes Golden, as grown under British Columbia Dry Belt conditions, is peculiar in its response to low temperatures. When placed in storage at 32° F. immediately after picking it is often rendered susceptible to a particular type of internal breakdown which makes it quite unfit for human consumption. Low temperatures also prevent the development of that rich golden-yellow colour which makes a properly ripened Grimes a delight to the eye. When allowed to mature at temperatures of from 36° to 40° F. this variety develops a flavour and texture which are considered by many to be unsurpassed in any other variety. In the past the storage life of Grimes has all too frequently been shortened by the development of scald, which completely ruins the appearance of the fruit. Fortunately it has recently been discovered that this disease can be almost entirely prevented by wrapping the apples in oiled paper within a month of the time that they are picked. The same tenderness of skin which renders the Grimes particularly susceptible to surface disfigurement serves to commend this variety to the connoiseur who knows that the full flavour of an apple cannot be appreciated unless it is eaten without being peeled. The knowledge which is now available concerning the storage conditions necessary to ensure the delivery of Grimes Golden to the consumer in prime eating condition should do much to restore this most excellent variety to favour with distributors and the consuming public.

ROME BEAUTY.—The Rome Beauty has proved almost as responsive to temperature as the Delicious. Apples testing 18 pounds when picked have softened so rapidly at temperatures of between 40° and 50° F. that they offered a resistance of only 11 pounds at the end of two months' time. Similar specimens held at 32° F. took five months to reach this stage of maturity. Mealiness commonly develops in the Rome soon after a softness of 11 pounds is reached. Since this variety is used almost entirely for culinary purposes this condition is not quite such a serious defect as it is in the Delicious. Nevertheless it is an indication that the fruit is near the end of its storage period. Scald and surface spotting also frequently shorten the life of this variety. Oil wraps are of assistance in the control of scald and low temperatures materially retard the development of surface spotting.

NEWTOWN.—Since the Newtown matures slowly even at comparatively high temperatures this variety is well adapted for common storage holding. Nevertheless its life can be prolonged by storage at 32° F. Specimens averaging 20 pounds in hardness when picked had matured sufficiently to test 13 pounds after four months in common storage, whereas similar fruit held continuously at a temperature of 32° F. still retained a hardiness of 15 pounds. The Newtown is ripe enough to eat raw when its flesh offers a resistance of 13 pounds to the pressure tester. After this stage of maturity is reached its sale value is likely to be impaired by the development of scald. Unfortunately the oiled wrap has not proved entirely satisfactory as a means of preventing scald on the Newtown grown under British Columbia conditions. The disease has been observed to develop to a serious extent even on fruit which has been wrapped in oiled paper soon after picking. This has been particularly true in the case of the large yellow fruits which trees of this variety sometimes produce when they are carrying a light crop. These observations suggest the desirability of disposing of the large sizes early in the season and storing the bulk of the crop unwrapped under conditions of free ventilation.

From this discussion it is apparent that by reducing the temperature of apples to 32° F. soon after they are picked a greatly extended storage life may be attained with several of our most important commercial varieties. The advantage of cold over common storage lies largely in the fact that it provides low temperatures during October and November, whereas common storage temperatures during that period are frequently close to 50° F. The results

secured indicate, however, that cold storage should not be regarded as a cure-all. Even at a temperature of 30° F. the life processes of the apple continue to progress, though at a reduced rate. This results in delayed development of mealiness, scald, and breakdown, but does not prevent the final occurrence of these diseases. To be most effective, low storage temperatures must be accompanied by other factors, such as efficient harvesting methods, high humidity, proper ventilation and the use of oil wraps, which all play a part in ensuring the delivery of a perfect product to the consumer.

INFLUENCE OF VENTILATION ON THE STORAGE LIFE OF APPLES—PROJECT H. 29C

The results secured from this project in 1926 substantiate the statements made in previous reports. Ventilation is of value in that it carries away the odorous products, which, if allowed to remain in contact with the skin of certain varieties of apples, result in the characteristic discolouration known as scald. Ventilation is also of assistance in the control of temperature and humidity.

INFLUENCE OF WRAPPERS ON THE STORAGE LIFE OF APPLES

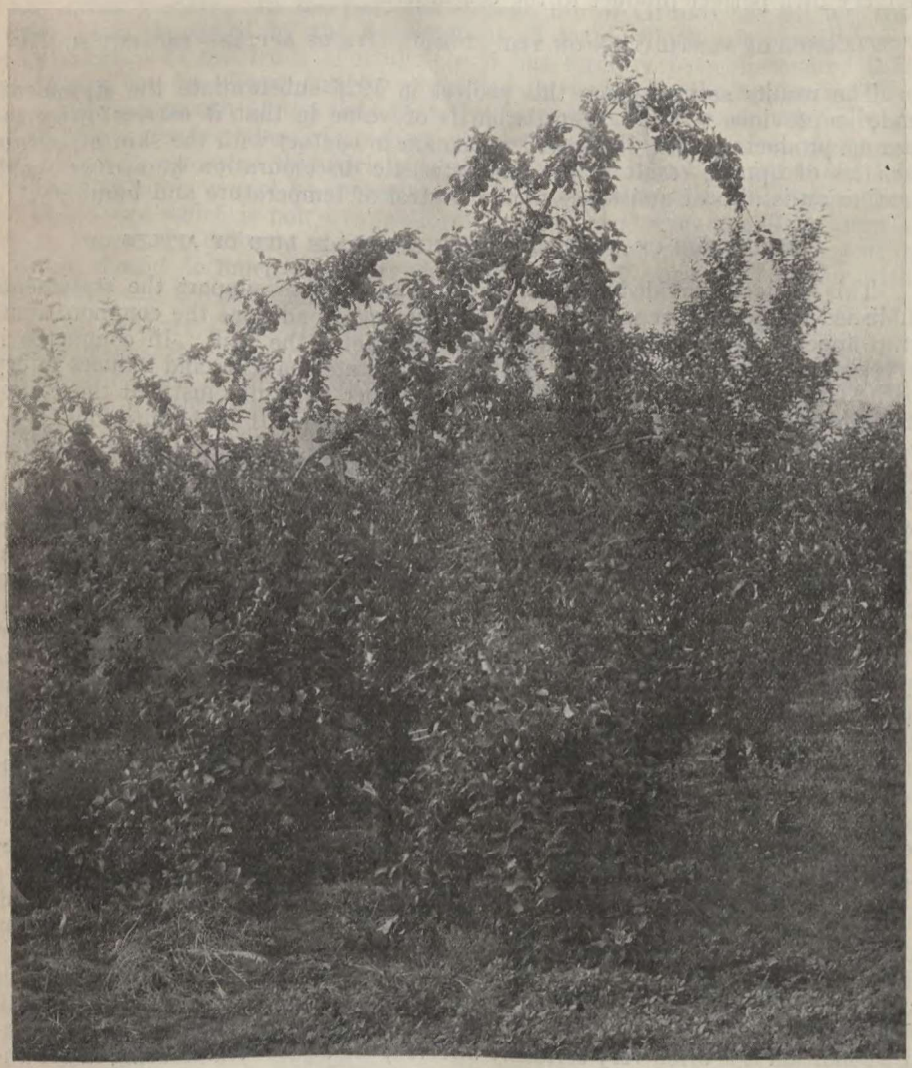
This project provided further evidence in 1926 to support the statements published in the 1925 report. Under good storage conditions the common tissue wrap appears to exert little influence on the life of the fruit. In commerce it serves a useful purpose, however, in that it facilitates packing and reduces injury to the fruit during transport. The oiled wrapper has fully justified the claims of the originators, Messrs. Brooks, Cooley and Fisher. It has limitations, however, and the realization of these by fruit-shippers will save much needless expense. The oiled wrap is of no benefit in connection with such diseases as bitter pit, breakdown and Jonathan spot. Its influence on the rate of ripening is very slight, but it does retard shrivelling to an appreciable extent. Furthermore, apples wrapped in oiled paper have been observed to come out of storage noticeably brighter in appearance than those wrapped in common paper or stored loose. It is in connection with the control of scald, however, that the oiled wrap is most valuable. Varieties very susceptible to this disease are Grimes Golden, Wagener, Yellow Newtown, Stayman, Arkansas, Ben Davis, Gano and York Imperial. The disease has been found to occur also on Rome Beauty, Jonathan, Winter Banana and Winesap, but these varieties have seldom been affected until late in the storage season and then only to a slight extent. Delicious and McIntosh have proved practically immune to scald. The oiled wrap has given satisfactory commercial control of scald on all varieties tested, with the exception of Yellow Newtown. This variety appears to present a special problem and until further evidence is secured in this connection it seems advisable to store it unwrapped under conditions of good ventilation.

To be effective the oiled wrap should be applied soon after the fruit is picked. This applies especially to early maturing varieties such as the Grimes Golden. It is also important that the wrapper contain at least 15 per cent of oil. Susceptibility to scald is greatly influenced by the stage of maturity at which the fruit is picked. This is particularly true of the Wagener. When left on the tree until well coloured this variety is quite resistant to scald, but when picked in an immature condition it is often very seriously affected, the disease culminating in browning and softening of the flesh which can scarcely be distinguished from breakdown. For this reason it is the low-grade fruit rather than the Extra Fancy which is most in need of the protection afforded by wrapping in oiled paper.

The results of this project leave no doubt as to the wisdom of using oiled wraps on such varieties as Grimes Golden and Wagener, but it seems questionable whether the additional expense involved is justified with varieties which are less susceptible to scald.

THINNING OF TREE FRUITS

Thinning, or the removal of a portion of the crop in the early stages of growth, is an orchard operation which calls for the exercise of sound judgment. In order that the grower's judgment may be sound it must be based on accurate evidence. Much evidence of value can be accumulated by the grower in his own orchard; in fact it will always be necessary for him to modify his practice to



Unthinned tree of McIntosh Red, showing breakage due to overloading.

conform with local conditions. Few growers, however, have the time or inclination to carry on detailed thinning experiments over a series of years. Experience has shown that it is practically impossible to persuade commercial growers to leave a sufficient number of " check " or untreated trees, from the performance of which the effect of various thinning practices on experimental plots may be

accurately ascertained. The natural tendency is for the grower to adopt over his whole orchard that practice which, after the first season's work, seems to promise greatest financial returns. It is only at an experimental institution where experimental data is accorded first place and financial returns are considered of secondary importance that it is possible to conduct a systematic series of thinning experiments over a long period of time. With these facts in mind the original orchards planted at this Station in 1916 were laid out to serve as an extensive test of various thinning practices. As the trees have been producing commercial crops for several years it is now possible to present detailed results which it is hoped may prove of interest and value to a large number of growers.

APPLE, DEGREE OF THINNING—PROJECT H. 413A

A wide difference of opinion exists regarding the most economical distance apart to which to thin apples. There are those who advocate no thinning whatever, while others are strongly in favour of removing a large portion of the crop. This project was planned to secure information regarding the factors which have a bearing on the distance apart to which apples should be thinned in order to secure greatest financial returns. Special attention has been devoted to a study of the influence of various degrees of thinning on the size and yield of fruit produced and on the bearing habit of the trees.

There were originally over six hundred trees included in the experiment, but owing to the removal of fillers this number has now been reduced to four hundred trees of the following varieties: McIntosh, Grimes Golden, Delicious, Rome Beauty, Yellow Newtown, Yellow Transparent, Duchess, Jonathan, Wagener and Cox Orange. Ever since they began to bear fruit an equal number of trees of each of these varieties has been thinned heavily, moderately and lightly, while "check" trees of all varieties except Wagener and Cox Orange have been left unthinned. In heavy thinning the apples are spaced one to every eight or ten inches of bearing wood. On moderately thinned trees the apples are thinned to about six inches and on lightly thinned trees they are spaced about four inches apart.

At harvest time the marketable fruit from each individual tree is sorted into three sizes according to transverse diameter. In all varieties except Rome Beauty these sizes are: over 3 inches, under $2\frac{1}{2}$ inches, and a size including all apples of and between $2\frac{1}{2}$ and 3 inches in diameter. The latter size includes roughly all the apples which pack 113, 163 and intermediate counts to the standard box. These are popular counts, though some markets prefer a larger apple, particularly of the Delicious variety. Since Rome Beauty is used almost entirely for culinary purposes, sizes smaller than 138 apples to the box are undesirable. Accordingly this variety is sorted into sizes $\frac{1}{4}$ inch larger than the dessert varieties. Apples rendered unmarketable through insect or mechanical injury are recorded as culls. Windfalls and apples less than $2\frac{1}{4}$ inches in diameter are placed in the same category.

TABLE 2—INFLUENCE OF THINNING ON THE SIZE AND YIELD OF APPLES (TREES PLANTED 1916)

Variety	Diameter in inches	Average Yield in Pounds per Tree 1926				Variety	Diameter in inches	Average Yield in Pounds per Tree 1926			
		Heavy	Medium	Light	Unthinned			Heavy	Medium	Light	Unthinned
McIntosh.....	Over 3....	334·3	274·3	373·1	50·0	Transparent.....	Over 3....	51·0	57·0	29·0	.....
	2½ to 3....	58·7	61·8	170·6	450·0		2½ to 3....	33·6	92·0	53·4	7·5
	Under 2½	1·2	1·8	6·8	86·6		Under 2½	1·0	13·0	7·0	77·5
	Culls.....	24·3	21·2	31·2	101·6		Culls.....	7·6	11·8	10·2	25·0
	Total.....	418·5	359·1	581·7	688·2		Total.....	93·2	173·8	99·6	110·0
Grimes Golden..	Over 3....	120·0	76·4	48·5	21·7	Duchess.....	Over 3....	69·3	65·0	65·0	5·0
	2½ to 3....	120·7	115·7	188·5	308·3		2½ to 3....	12·5	35·0	53·1	46·2
	Under 2½	0·7	1·5	7·8	58·3		Under 2½	0·6	6·8	10·0	120·0
	Culls.....	47·1	38·5	32·4	48·3		Culls.....	15·0	12·5	13·7	28·7
	Total.....	288·5	232·1	277·2	436·6		Total.....	97·4	119·3	141·8	199·9
Delicious.....	Over 3....	112·5	77·0	74·5	90·0	Jonathan.....	Over 3....	21·2	18·1	13·7	3·1
	2½ to 3....	38·5	44·0	126·0	238·3		2½ to 3....	55·0	126·2	111·2	113·7
	Under 2½	.....	0·5	8·5	41·6		Under 2½	3·1	10·8	17·5	36·1
	Culls.....	46·0	43·5	51·5	138·3		Culls.....	19·3	19·3	16·8	25·0
	Total.....	197·0	165·0	260·5	508·2		Total.....	98·6	174·4	159·2	178·1
Rome Beuty....	Over 3½...	132·5	80·6	73·7	70·0	Wagener.....	Over 3....	50·0	48·0	37·0	.....
	2½ to 3½...	28·1	44·3	48·5	175·0		2½ to 3....	11·0	13·0	43·6	.....
	Under 2½.	.....	1·7	1·0	10·6		Under 2½.	3·5	2·6	4·6	.....
	Culls.....	2·7	2·8	2·1	4·0		Culls.....	9·6	7·8	10·4	.....
	Total.....	163·3	129·4	125·3	259·6		Total.....	74·1	71·4	95·6	.....
Newtown—	Over 3....	65·0	98·7	96·8	30·0	Cox Orange.....	Over 3....	21·2	6·4	17·5	.....
	2½ to 3....	25·6	53·3	58·1	215·0		2½ to 3....	62·6	52·0	69·0	.....
	Under 2½.	0·7	1·6	5·0	77·5		Under 2½.	4·0	7·6	10·2	.....
	Culls.....	10·3	13·7	18·7	37·5		Culls.....	27·0	19·0	24·0	.....
	Total.....	101·6	167·3	178·6	36·0		Total.....	114·8	85·0	120·7	.....

Before presenting the results of this experiment it may be well to mention that the trees have been well cared for since planting. Soil conditions are not of the best as the land is underlaid with gravel which rises close to the surface in some parts of the orchard. In an endeavour to compensate for this original handicap, special attention has been paid to building up the soil by means of legume cover-crops. A determined effort has also been made to secure adequate and uniform distribution of irrigation water. The orchard has been systematically pruned and sprayed each year. The trees were planted 30 feet one way by 15 feet the other, but most of the fillers were removed eight years after planting. This system of orchard management has resulted in healthy, vigorous trees which are large for their age. In many cases they made an annual growth of three feet in their early years, and the average increase in length of the terminal shoots during the past three seasons has been about twelve inches. The distribution of the trees receiving each degree of thinning has been such as to overcome, to as great an extent as possible, any error due to soil variation and differences in the amount of irrigation water received.

From the data presented in table 2 it is apparent that in 1926 heavy and moderate thinning had the general effect of increasing the percentage of large-sized fruit at the expense of a marked reduction in total yield. This is in conformity with the results recorded in previous years. With varieties used primarily for dessert purposes, such as McIntosh, Jonathan, and Cox's Orange this increase in size is not altogether to be desired as the medium sizes are most in demand. Furthermore, breakdown in Jonathan and bitter pit in Cox's Orange are commonly more prevalent in over-large fruit.

Unthinned trees in most cases gave the highest total yield, but this was accompanied by an increase in the percentage of culls and small-sized fruit. The reduction in size of the fruit on unthinned trees was especially pronounced

with Yellow Transparent and Duchess, two varieties in which good size is very desirable. It should also be mentioned that many of the unthinned trees have been broken and dwarfed due to over-loading.

In most cases light thinning has produced fruit of satisfactory size and comparatively few culls, but it seems doubtful whether the expense involved has been justified except in the case of trees carrying a fairly heavy crop.

The fact that thinning has so far exerted no significant influence on the bearing habit of the tree is indicated by the data presented in table 3, which shows the yield of fruit produced in each of the years 1923, 1924, 1925 and 1926. It will be noted that several varieties have developed a tendency to bear alternating heavy and light crops, but this does not seem to be correlated with degree of thinning. Thus McIntosh produced light crops in 1923 and 1925 and heavy crops in 1924 and 1926 regardless of the severity of thinning practiced. Similarly the yield from the Newtown has shown an increase each year on light and unthinned trees as well as on those which received heavy and medium thinning.

TABLE 3.—INFLUENCE OF THINNING ON THE BEARING HABIT OF APPLES. (TREES PLANTED 1916)

Variety	Year	Average Yield in Pounds per Tree				Variety	Year	Average Yield in Pounds per Tree			
		Heavy	Medium	Light	Unthinned			Heavy	Medium	Light	Unthinned
McIntosh Red	1923	114·0	94·0	149·0	258·7	Transparent	1923	92·2	71·5	62·6	195·8
	1924	264·0	297·5	311·9	354·9		1924	61·4	101·6	26·6	37·2
	1925	132·0	144·6	178·0	233·7		1925	79·9	68·7	69·3	201·2
	1926	418·5	359·1	581·7	688·2		1926	93·2	173·8	99·6	110·0
	Total	928·5	895·2	1220·6	1535·5		Total	326·7	415·6	258·1	544·2
Grimes Golden	1923	175·0	141·6	173·3	319·7	Duchess	1923	120·1	110·8	139·2	159·8
	1924	172·4	184·2	229·4	326·0		1924	146·1	140·1	184·3	210·0
	1925	239·2	266·0	239·5	428·7		1925	86·1	83·1	92·8	77·0
	1926	288·5	232·1	277·2	436·6		1926	97·4	119·3	141·8	199·0
	Total	875·1	823·9	919·4	1511·0		Total	449·7	453·3	558·1	647·7
Delicious	1923	118·2	70·8	132·2	46·0	Jonathan	1923	155·6	155·1	190·4	220·1
	1924	66·2	40·1	58·6	60·2		1924	114·2	99·2	96·7	118·2
	1925	175·5	141·2	214·2	245·0		1925	80·3	91·8	94·7	116·7
	1926	197·0	165·0	260·5	508·2		1926	98·6	174·4	159·2	178·1
	Total	556·9	417·1	665·5	859·4		Total	448·7	520·5	541·0	633·1
Rome Beauty	1923	105·0	84·5	92·1	113·7	Wagener	1923	83·0	82·7	129·5	.....
	1924	148·2	146·0	153·2	126·0		1924	43·2	88·6	52·6	.....
	1925	129·0	127·5	89·2	109·0		1925	151·6	149·1	208·3	.....
	1926	163·3	129·4	125·3	259·6		1926	74·1	71·4	95·6	.....
	Total	545·5	487·4	459·8	609·2		Total	351·9	391·8	486·0	.....
Newtown	1923	30·0	33·0	34·8	30·5	Cox Orange	1923	52·6	17·2	33·6	.....
	1924	78·2	66·1	91·8	39·0		1924	65·6	88·4	69·8	.....
	1925	79·5	94·3	111·7	96·6		1925	39·5	19·7	17·0	.....
	1926	101·6	167·3	178·6	360·0		1926	114·8	85·0	120·7	.....
	Total	289·3	360·7	416·9	526·1		Total	272·5	210·3	241·1	.....

From these results it seems possible to draw the general conclusion that with young vigorous apple trees heavy thinning is not justified. Light thinning, however, seems to be desirable wherever there is danger of overloading. As the trees get older more severe thinning will doubtless be required, but it should be emphasized that thinning is only one of many orchard practices which influence the size of fruit. Proper attention to such factors as soil fertility and irrigation will do much to increase the yield and at the same time reduce the amount of thinning necessary to secure fruit of the desired size.

APPLE, TIME OF THINNING—PROJECT H. 413B

There is great need of accurate experimental data concerning the economy of thinning apples at various stages of growth. It is most important that the grower should know when thinning should be done in order to secure the greatest effect. He should also know when the operation can be performed with the least expenditure of time and effort. It was to provide the grower with such information that this project was undertaken in 1924.

The procedure followed has been to select trees carrying a good crop and thin one main branch of each tree every two weeks, making the first thinning in the blossom stage and the last in August. Moderate thinning is practised, the apples being spaced one to approximately every 6 inches of bearing wood. Ten apples on each branch are labelled with tinfoil tags. These apples are measured at thinning time and again when the crop is harvested. At each thinning date careful observations are made concerning the ease with which the fruit can be removed. Notes are also taken relative to the progress of the "June drop". One or more branches on each tree are left unthinned for purposes of comparison. The possibility of experimental error is greatly reduced by having all dates of thinning on the same tree. To further lessen the chances of error and provide information concerning the influence of time of thinning on a large number of varieties the experiment is being carried on with two trees each of Yellow Transparent, Duchess, Wealthy, McIntosh, Jonathan, Rome Beauty, Cox Orange, Newtown, Wagener, Delicious, and Grimes Golden.

In order to ensure a correct interpretation of the results secured it may be well to point out that the trees used in this experiment were planted in 1916 and have received good cultural treatment since that time, with the result that they are healthy and vigorous, making a foot or so of new growth each year.

The results secured in 1924 and 1925 were summarized in previous reports of this Station. As they are substantially in agreement with those recorded in 1926 the latter only are presented in detail at this time. In 1926 Duchess, Wealthy, McIntosh, Jonathan, Rome Beauty, Cox Orange and Newtown were included in the experiment. Table 4 shows the size of the apples on these trees at the time the thinning was done. The fruits were not measured at the first two thinnings as they were then only in the blossom and calyx stages.

TABLE 4—RELATION OF DATE OF THINNING TO DIAMETER OF FRUIT AT THINNING TIME

Variety	Average Diameter of Fruit in Inches							
	April 26	May 10	May 25	June 7	June 21	July 5	July 19	Aug. 2
Transparent	Blossom stage	Calyx stage	0·88	1·07	1·44	1·74	2·18	.....
Duchess	"	"	1·09	1·41	1·70	2·13	2·33	.....
Wealthy	"	"	1·00	1·34	1·72	1·94	2·21	2·60
McIntosh	"	"	0·84	1·06	1·49	1·96	1·97	2·43
Jonathan	"	"	0·70	0·98	1·46	1·60	1·91	2·27
Rome Beauty	"	"	0·65	1·09	1·56	1·95	2·18	2·52
Cox Orange	"	"	0·63	0·94	1·43	1·76	2·09	2·32
Newtown	"	"	0·83	1·13	1·56	1·77	1·97	2·16

The data presented in table 5 is of special interest in connection with the observations on ease of thinning and progress of the "June drop". Thinning was most expeditiously performed when the fruit was from an inch to an inch and a half in diameter. At that stage the apples could be rapidly removed with the fingers with the minimum of injury to the spur system of the tree. In many varieties the fruits were quite difficult to remove until they had attained a diameter of an inch; likewise apples two inches and over in size were found to be much harder to thin than those having a diameter of about an inch and a half.

TABLE 5—INFLUENCE OF DATE OF THINNING ON DIAMETER OF FRUIT AT PICKING TIME

Variety	Average Diameter of Fruit in Inches							
	April 26	May 10	May 25	June 7	June 21	July 5	July 19	Aug. 2
Transparent	2·61	2·73	2·54	2·52	2·43	2·12	2·06	.....
Duchess	2·78	2·96	3·02	3·04	2·77	2·02	2·66	.....
Wealthy	3·17	2·91	3·01	3·15	2·89	2·92	2·88	2·96
McIntosh	3·15	3·12	3·07	3·03	2·96	2·94	2·76	2·81
Jonathan	2·92	3·01	2·93	2·97	2·85	2·78	2·86	2·92
Rome Beauty	3·28	3·39	3·26	3·15	3·14	2·91	2·96	2·93
Cox Orange	3·07	3·06	2·85	2·68	2·53	2·49	2·52	2·45
Newtown	2·90	2·98	2·94	2·98	2·93	2·83	2·83	2·65

Thinning before the apples were an inch across involved a great deal of unnecessary labour as the "June drop" had not yet taken place. Furthermore, it was found that thinning in the blossom and calyx stages did not altogether prevent the "June drop", with the result that, in some cases, too few apples were left to give a full crop. By the time the apples had attained a diameter of an inch and a half the "June drop" was over.

The influence of date of thinning on the size of fruit at picking time is indicated by the data presented in table 5. From a careful study of this data it is apparent that, at harvest time, there was comparatively little difference in the average size of the fruit thinned on various dates up to June 7. In most cases the fruit thinned on June 21 was slightly smaller at picking time than that thinned earlier, and with several varieties this decrease in size was still more pronounced in the fruit which was left unthinned until July and August. It will be noted that the final thinning of Transparent and Duchess was made on July 19, these varieties being harvested on July 23 and 29 respectively. In all varieties the average diameter of the apples on the unthinned branches was less than that of the thinned fruit. It was noted, however, that in many instances the unthinned branches produced a good percentage of apples which were as large as those on the branches which were thinned in July and August.

From a comparison of the data set forth in tables 4 and 5, it is clear that, from the standpoint of size of fruit at harvest time, best results were secured when the thinning was done at the time the fruit was an inch and a half or less in diameter.

These results suggest the general conclusion that it is good practice to thin apples when they have attained a diameter of an inch and a half. With varieties such as Transparent, Duchess and Wealthy, which tend to set fruit in clusters, thinning may well be done when the apples are about an inch across. Varieties such as McIntosh, Grimes Golden and Delicious, which the "June drop" frequently thins to one fruit to a spur, can be thinned to good advantage when the fruits are about an inch and a half in diameter.

THINNING OF STONE FRUITS—PROJECT H. 410

The great quantity of very small apricots, peaches, plums and prunes produced in the commercial orchards of this province in 1926 leaves no doubt as to the necessity for increasing the size of these fruits. This project has been planned with a view to determining whether this can be economically done by thinning, and if so how severe the thinning need be to secure the desired result. A large number of trees in the cultural and variety orchards have been used in the investigation during the past five years.

It has been found that with some varieties of stone fruits a certain amount of thinning is not only desirable but absolutely necessary in order to produce fruit of satisfactory market size in profitable quantities. The degree of thinning required depends on such factors as the vitality of the trees, the fertility of the

soil and the moisture supply. As a general rule it may be said that good results follow the practice of thinning the fruit sufficiently so that when it has reached full size no two fruits will be touching. With apricots, plums and prunes this means from two to three inches. Peaches may often be thinned to six inches apart without materially reducing the total crop of first class marketable fruit.

It should be stated that there are many varieties, such as the Moorpark apricot, Tennant prune, Wickson plum and Crawford peach which seldom require to be thinned. On the other hand, heavily loaded trees of Royal apricot, Silver prune, Burbank plum and Triumph peach must be properly thinned or very inferior fruit is almost sure to result.

VARIETY TESTS OF TREE FRUITS

The importance of this project lies in the fact that progress in fruit production depends to a great extent on the introduction of improved varieties. Commercialization of the fruit industry has tended to narrow down the list of varieties which it is profitable for the orchardist to grow. He cannot afford to experiment with new and untried varieties. Nevertheless it is extremely important that no novelty of promise should be discarded before it has been thoroughly tested, for it may prove to be a valuable addition to the list of commercial varieties. For the benefit of the grower and originator alike it is important that there be some trial ground where these new introductions may serve a term of probation and where their good qualities and also their weaknesses may be faithfully and impartially recorded. It is to fill this need that the following projects have been undertaken.

APPLE, VARIETY TEST—PROJECT H. 33

Of the large number of seedling varieties which have so far come into full bearing at this Station only one, the Melba, promises to prove of commercial value in the British Columbia Dry Belt. Grown under the climatic conditions experienced at this Station, Melba is a summer apple which remains in prime eating condition for a comparatively short time, but it is superior in both dessert and culinary properties to any other variety of the same season so far tested. Unlike many other early apples it ripens the crop practically all at the same time. Melba is a seedling of McIntosh and inherits some of the flavour and aroma which have gained for that variety the proud position of premier dessert apple in the Empire. Unfortunately, Melba is not quite so attractive in appearance as its illustrious parent. Furthermore the flesh is rather soft in texture which makes the fruit bruise easily unless it is carefully handled.

From the results secured at other Experimental Stations in Canada, Melba appears to be quite hardy, which suggests that it may well replace Duchess in the list of varieties recommended for the colder sections of this province. The tree is quite similar in habit to the McIntosh, carrying a load of fruit well distributed over a large bearing surface. Time alone will tell whether Melba is destined to become a popular commercial variety, but it is at least deserving of extensive trial where a high-quality apple of the Duchess season is desired. Trees of Melba can now be secured from commercial nurserymen in British Columbia.

APRICOT, VARIETY TEST—PROJECT H. 334.

A number of recent introductions are under observation but until these have been tested over a longer period growers are advised to continue planting the standard commercial varieties Moorpark, Blenheim, and Tilton.

CHERRY, VARIETY TEST—PROJECT H. 35.

With cherries, efforts have been directed towards securing varieties of the same type as the Bing and Lambert, but earlier and later in ripening season. Several varieties which are claimed by their originators to meet this require-

ment are being tested. Until further information is available concerning the performance of these new varieties commercial plantings should undoubtedly consist mainly of Bing and Lambert with about 10 per cent of Black Tartarian or Black Republican as pollenizers.

FILBERT, VARIETY TEST—PROJECT H. 338.

There seems no reason why fruit growers in the British Columbia Dry Belt should not grow at least enough filberts for their own use. The Barcelona is the filbert of commerce. This variety is self-sterile, so that some other variety such as Du Chilly should be planted with it.

NECTARINE, VARIETY TEST—PROJECT H. 333.

The nectarine is a fruit which deserves to be better known. In the opinion of its most ardent admirers it ranks higher than the peach as a dessert fruit. Accordingly there is good reason for carrying on a test to determine the varieties best adapted to the soil and climatic conditions of the southern Okanagan. Comparatively few varieties are grown commercially in America. Specimens of the most popular kinds have been secured, and new varieties are being compared with these standard sorts.

PEACH, VARIETY TEST—PROJECT H. 332

The growing population of Vancouver and the mining towns of southern British Columbia, not to mention the Prairie cities, offers great opportunities for the development of the fresh peach industry in this province. The standard shipping peach at the present time is the Elberta. This variety has proved productive under a wide range of climatic and soil conditions. When delivered to the consumer in prime condition it has fair dessert quality, but its season is comparatively short. In order that the fresh peach industry may be developed to full capacity some way must be found for supplying the consumer with a first-class product over an extended season. A series of varieties of the Elberta type, as good or better in quality and ripening one after the other, would make this possible. Progress is being made towards the attainment of this objective. The Rochester, a yellow-fleshed dessert peach of the St. John season has been fruited at the Station for six years. It has proved a heavier yielder than the Yellow St. John and its equal in dessert and shipping quality. Trees of the South Haven, a high-class dessert peach recently originated in Michigan, have been secured. This variety is reported to have a ripening season eighteen days earlier than Elberta, which would bring it on the market just after Rochester. Vedette, an Elberta seedling originated at the Vineland Experimental Station, Ontario, fruited at this Station for the first time in 1926. It matured fully two weeks ahead of Elberta, and in quality it is, if anything, superior to the parent. Valiant, another seedling of the same origin as Vedette also ripened a crop at this Station in 1926. It matures several days later than Vedette, and is equal to it in quality. J. H. Hale, which has attained great popularity during the past few years, begins to ripen a few days previous to Elberta. These six varieties, Rochester, South Haven, Vedette, Valiant, J. H. Hale and Elberta promise to make it possible to deliver freestone yellow-fleshed dessert peaches to the consumer in prime condition over a long period. Propagating material of Rochester has already been supplied to nurserymen and the same procedure will be followed with South Haven, Vedette, and Valiant, if no serious weakness is discovered in these varieties during the next few years.

Some attention has also been devoted to a test of clingstone peaches for canning purposes. Five varieties of the California "rubber" flesh clings were included in the original variety orchard set out in 1916, and trees of six additional varieties were planted in 1923. None of the varieties planted in 1916 have proved satisfactory from the grower's standpoint, being either too late in matur-

ing or insufficiently productive. However, two of the more recent introductions, Peak and Paloro, seem worthy of trial in the Oliver district. In California these varieties ripen about ten days later than the Elberta and have proved satisfactory to both growers and canners.

PEAR, VARIETY TEST—PROJECT H. 44

As yet no new varieties of outstanding merit have been raised to bearing age. Accordingly growers are advised to continue planting such well-known varieties as Bartlett and Anjou.

PLUM AND PRUNE VARIETY TEST—PROJECT H. 48

A large number of recent introductions are included in this project, but the work has not yet reached the stage where definite recommendations can be made as to whether any of the new varieties are worthy of being included with those of proven value such as Italian prune and Green Gage plum.

QUINCE, VARIETY TEST—PROJECT H. 335

The quince is at present little grown in the territory served by this Station. However, there are those who consider it a delicacy and it is grown in commercial quantities in other parts of the British Empire. A few of the best-known varieties are being tested to determine their adaptability to local soil and climatic conditions.

WALNUT, VARIETY TEST—PROJECT H. 351

A large number of walnut trees of seedling origin are included in this project. The great variability in the quality of nuts produced by these trees indicates the wisdom of planting grafted varieties such as Franquette.

Small Fruits

A comparatively small area of the territory served by this Station is adapted to the extensive commercial production of small fruits. Nevertheless there seems no reason why growers in the tree fruit sections should not produce enough berries to supply the local demand. Accordingly the following projects are being carried on in order to ascertain the varieties best adapted to the soil and climatic conditions prevalent in the interior valleys of this province.

BLACKBERRY, VARIETY TEST—PROJECT H. 2

This project has demonstrated that, with a little care, even the tender trailing berries such as the Leucretia dewberry and the Loganberry can be grown in southern Okanagan. The vines require to be laid on the ground and protected from winter injury by covering with straw or other loose material, but to those who appreciate the luscious quality of a fully ripened dewberry this is labour well expended.

CURRANT, VARIETY TEST—PROJECT H. 4

The hardiness of the currant makes it possible to grow this fruit under adverse climatic conditions, but the bushes are very responsive to good cultural treatment. Owing to the prevalence of the currant-borer it is important to encourage new canes to sprout from below the surface of the ground. This can be done by practising a heavy thinning out type of pruning. As the fruit of the black currant is borne on one-year-old wood all old canes should be removed at pruning time. The bearing habits of the red and white varieties are such that pruning may well be less severe, but even with these it is a good plan to remove all canes over two years of age. A few well-cared for bushes of Boskoop Giant (black), Perfection (red) and White Grape will furnish the orchardist with a year's supply of delicious currant jelly, while those who prefer this fruit in the form of wine will be well repaid for their labours.

GOOSEBERRY, VARIETY TEST—PROJECT H. 6

The commercial possibilities of the gooseberry are limited, but a few bushes of Oregon Champion will provide the housewife with material for the production of a variety of pie which is deservedly popular. The English varieties such as Industry and Lancashire Lad lose their acidity and develop a most delectable flavour when permitted to mature on the bush. Where these are grown, however, special precautions are necessary to guard against mildew. A good measure of protection from mildew is afforded by the application of lime-sulphur spray, dormant strength, before the gooseberries come into leaf. Two recent introductions, Poorman and Clark, which are claimed to combine the productivity, ease of propagation and resistance to mildew of the American varieties with the large size and high quality of the English sorts, are being tested.

GRAPE, VARIETY TEST—PROJECT H. 40

The comparatively cool summer nights which make the climate of British Columbia so attractive to human beings are not conducive to successful grape culture on a commercial scale. Nevertheless, many excellent varieties can be brought to maturity in favourable sections of this province. In the districts where peaches can be grown a few properly tended vines of Campbell Early (black), Niagara (white) and Vergennes (red) can be relied upon to reward the grower with an abundance of delicious fruit which may be consumed in the fresh state, made into jelly, or converted into wine.

RASPBERRY, VARIETY TEST—PROJECT H. 11

In this project several new introductions such as the Viking, Newman and Latham are being compared with the standard varieties Herbert and Cuthbert. Viking in particular seems worthy of a place in every orchardist's berry patch as it is a vigorous grower and produces an abundance of fruit of excellent quality. Like the older varieties, however, it is susceptible to mosaic, and for this reason care should be taken to remove and destroy any canes which show yellow mottling on the young leaves.

STRAWBERRY, VARIETY TEST—PROJECT H. 21

The drying winds and bright sunshine of the southern Okanagan are not favourable to production of those varieties of the strawberry which are grown commercially at the coast. Van Sant seems well adapted to Dry Belt conditions as it produces an abundance of foliage and bears the fruit closer into the crown than does the Magoon. At this Station, however, Van Sant has produced berries which are rather small for commercial purposes. The search for a berry of desirable type particularly suited to this section is being continued.

Vegetable Gardening

While the early frost in September caused heavy damage to truck crops in the Okanagan valley and had a marked influence on some experiments yet the year has shown considerable progress in many lines of vegetable investigations. Considerable attention was given to revising and reorganizing variety tests. In order to reduce the possible experimental error the triplicate system of tests has been generally used. A review of variety testing at this station shows that while certain varieties consistently do well there may be great variation within the strains of that variety. When seed is obtained from commercial seedhouses a strain may prove very good one year and be recommended but by the time this information can be printed and distributed the seed being supplied by the same seedhouse may be greatly inferior to the sample tested and the reports would therefore be misleading.

Recognizing the importance of securing good foundation seed in all lines of vegetables this Station is working in conjunction with the Canadian Seed Growers' Association to produce élite stock seed of as many lines as possible. Work has already commenced with tomatoes, beans, onions and radishes and foundation blocks will be started next season with several more varieties of vegetables.

ASPARAGUS FERTILIZER EXPERIMENT—PROJECT H. 604

This is a long-term project and will require several years' work before any results are available. Twelve plots each 1/20 of an acre were set out with Mary Washington asparagus. The following fertilizers will be used, the first applications to be made in 1927.

Plot 1—Barnyard manure alone.
Plot 2—Barnyard manure and nitrate of soda at 150 pounds per acre.
Plot 3—Barnyard manure and superphosphate at 500 pounds per acre.
Plot 4—Barnyard manure and muriate of potash at 150 pounds per acre.
Plot 5—Barnyard manure and complete fertilizer.
Plot 6—Barnyard manure and green manure.
Plot 7—Green manure alone.
Plot 8—Green manure and nitrate of soda 150 pounds per acre.
Plot 9—Green manure and superphosphate at 500 pounds per acre.
Plot 10—Green manure and muriate of potash at 150 pounds per acre.
Plot 11—Green manure and complete fertilizer.
Plot 12—No fertilizer, no manure, no green manure.

The complete fertilizer on plots 5 and 11 consist of nitrate of soda 100 pounds, superphosphate 200 pounds, potash 100 pounds per acre. The green-manure crop will consist of rye 60 pounds, spring vetch 40 pounds per acre.

BEANS VARIETY TEST—PROJECT H. 61

Keeneys Rustless Golden Wax and Refugee or 1000 to 1 were the heaviest yielders. The latter matures very unevenly, however. Princes of Artois O 9388 is very early, being ready to use in sixty-two days. It is a light cropper and the quality is not very high.

BEETS VARIETY TEST—PROJECT H. 68

Twenty-one strains were tested in triplicate in 15-foot rows with the following yields:—

TABLE 6—VARIETY TEST OF BEETS

Variety	Source	Yield
		Lb.
Bastion Half Long Blood	Dreer	23
Extra Early Egyptian	Madsen	22
Crosby Egyptian	Stokes	18
Crimson Globe	Madsen	17¾
Detroit Dark Red	Manitoba Agricultural College	17¾
Crosby Egyptian	Manitoba Agricultural College	17
Detroit Dark Red	Moore	16
Crosby Egyptian	Madsen	16
Early Wonder	Dreer	15¾
Detroit Dark Red	Madsen	15
Early Wonder	Lethbridge Experimental Station	14¾
Early Model	Manitoba Agricultural College	14¾
Flat Egyptian	Moore	14¾
New Half Long	Burpee	14¾
Detroit Dark Red	Graham	14
Cardinal Globe	Rennie	13¾
Early Model	Graham	13¾
Early Wonder	Graham	12
Early Model	Bruce	11
Black Red Ball	O-6894	9
Detroit Dark Red	O-8935	6½

The half long varieties were very rough. The quality of the Manitoba Agricultural College strains was excellent.

CABBAGE VARIETY EXPERIMENT—PROJECT H. 77

Cabbage is seldom a successful crop in the southern Okanagan and this year's tests proved no exception. The plants got off to a good start but about the middle of June were attacked by insects and the leaves completely skeletonized in two days. Arsenate of lead controlled the insects but the cabbage plants made only a partial recovery and comparative yields are impossible. The cauliflower and Brussels sprouts plants were destroyed in the same way.

CANTALOUPE VARIETY TEST—PROJECT H. 122

Fifty-four strains were tested in triplicate. The earliest maturing cantaloupe tested was Golden Champlain, ready thirteen days before any other variety. This variety lacks uniformity, is not well netted and has not the quality and flavour of the later varieties. Hales Best or H. B. is early, well netted, of splendid quality and flavour, an excellent shipper and long keeper. It throws a number of "jumbos" or oversized fruits, but is worthy of a fair trial. Superperfecto was tried out for the first time and is very promising. It is good in size, shape, netting, and flavour, and has a very small seed cavity. Gold Standard and Hearts of Gold also are good and are satisfactory varieties for the commercial grower.

CANTALOUPE PROTECTION AGAINST FROST—PROJECT H. 607

It is generally recognized that the earliest cantaloupes to be marketed bring the highest price. Growers are giving considerable attention to the use of plant protectors and a trial was made of two commercial types of these. A row consisting of six hills of the Hales Best variety of cantaloupe was seeded on April 22 and given no protection. A similar row was seeded the same day and each hill covered with individual waxed papers. A third row was protected with a tarred paper preparation 18 inches wide and the length of the row. On the same date, seed was planted in the greenhouse to supply material for six rows to be transplanted later. At intervals of one week open seedings were made and also seedings with both types of protectors. On the last date May 29, the greenhouse plants were set out.

The following table shows the results of this experiment:—

TABLE 7—COMPARISON OF DIFFERENT TYPES OF PROTECTION FOR CANTALOUPES

Protection	Date planted	Number of plants lived	Date first ripe	Ripe in August	Ripe in September	Total ripe
No protection	April 22	3	Aug. 21	3	7	10
Waxed paper	" 22	4	" 21	11	29	40
Tarred paper	" 22	4	" 17	23	20	43
Transplanted	May 29	6	Sept. 1	0	45	45
No protection	April 29	2	Aug. 27	7	13	20
Waxed paper	" 29	5	" 21	23	22	45
Tarred paper	" 29	6	" 21	22	24	46
Transplanted	May 29	6	" 21	5	37	42
No protection	May 6	6	Aug. 21	27	23	50
Waxed paper	" 6	6	" 21	34	14	48
Tarred paper	" 6	6	" 21	1	42	43
Transplanted	" 29	6	" 25	2	37	39
No protection	May 13	5	Aug. 25	1	37	38
Waxed paper	" 13	6	" 21	9	37	46
Tarred paper	" 13	6	" 30	4	28	32
Transplanted	" 29	6	" 25	6	25	31
No protection	May 20	5	Aug. 30	4	40	44
Waxed paper	" 20	6	" 30	8	28	36
Tarred paper	" 20	6	Sept. 4	0	21	21
Transplanted	" 29	6	Aug. 30	3	36	39
No protection	May 29	6	Aug. 30	6	50	56
Waxed paper	" 29	6	Sept. 4	0	45	45
Tarred paper	" 29	6	" 4	0	27	27
Transplanted	" 29	6	Aug. 30	1	40	41

TABLE 7A—SUMMARY OF SIX TRIALS OF EACH TYPE OF PROTECTION FOR CANTALOUPES

—	No protection	Waxed paper	Tarred paper	Trans-planted
Number of plants	27	33	34	36
Total yield	218	260	212	237
Yield in August	48	85	50	17

Difficulty was experienced in securing germination beneath the tarred paper. Sufficient soil moisture remained in the soil on April 22 and April 29 to germinate the seeds but although irrigated weekly the third, fourth and fifth seedings under the tarred paper did not germinate until soaked by a heavy rain on May 23. No frost was recorded during the experiment. The following low temperatures were noted: 35 degrees on May 8, 36 degrees on April 25 and May 5, 37 degrees on May 9, 10, and 25. Further tests are being planned for 1927.

CORN VARIETY TEST—PROJECT H. 102

Thirty-three strains were tested in duplicate. The following table gives the average yield of 12 hills together with average length of cob and stalk and time of maturity. The corn ear-worm caused considerable damage to corn trials this year.

TABLE 8—VARIETY TEST OF CORN

Variety	Source	Days to mature	Average length of cob	Average length of stalk	Average yield of 12 hills
			ins.	ins.	
Black Mexican	Morse	64	9	80	45
Black Mexican	Burpee	64	9	80	38
Sweet Squaw	O 6623	67	5	60	46
Banting	O 6654	67	6½	48	43
Picaninny	O 6579	67	6	41	40
Alpha	Bruce	70	6	54	53
Mammoth White Cory	Bruce	79	9	60	43
Mammoth White Cory	Dreer	79	8	72	39
Alpha	Harris	79	6	58	48
Bantam Evergreen	Bruce	79	9	84	45
Bantam Evergreen	Livingston	79	9	86	46
Golden Bantam	Morse	79	6	60	50
Golden Bantam	Burpee	79	6	60	46
Golden Bantam	Stokes	79	6	65	44
Early Malcolm	Dupuy & Ferguson	79	8	60	39
Early Malcolm	Stokes	79	8	60	40
Early Malcolm	O 8205	79	8½	60	42
Bolearly	Bolgiano	79	6	60	58
Stowell Evergreen	Morse	86	8	84	43
Stowell Evergreen	Burpee	86	8	84	46
Early Sugar Independence	Dreer	86	7	72	43
Groff Golden	Groff	86	7	60	39
Almeda Sweet 257	Morse	93	8	72	38
Buttercup	Harris	93	9	70	42
Howling Mob	Burpee	93	8	84	49
Early Crosby	Vaughan	93	6½	72	44
Whipple Early	Bruce	97	8	72	48
Whipple Early	Livingston	97	8	72	45
Carmel Golden	Morse	97	7	68	38
New Jumbo Gold	Stark	97	8½	84	37
Howling Mob	Dreer	97	8	84	48
County Gentleman	Vaughan	97	9	76	44
The Vanguard	Stokes	101	9	65	45

CUCUMBER VARIETY TEST—PROJECT H. 106

Seventeen strains of cucumbers were tested in duplicate with the following average yield of 5 plants. These were seeded May 22 and all strains were ready to use July 29.

TABLE 9—VARIETY TEST OF CUCUMBERS

Variety	Source	Length	Count
		ins.	
Early Russian	Dreer	5	257
Snow Pickling	Morse	6	244
Snow Pickling	Stokes	6½	241
Early White Spine	Bruce	8	218
Early Fortune	Dreer	8½	205
Early White Spine	Burpee	8	202
Early Russian	Burpee	5	200
Early Fortune	Landreth	8½	191
Crystal Spring	Bolgiano	7½	189*
Davis Perfect	Bolgiano	9	180
Early Fortune	Burpee	9	166
Always Green	Landreth	7½	146
Windermoor Wonder	Stokes	12	110
Improved Long Green	Gregory	8½	109
Deltus	Burrell	10	106
Improved Long Green	Stokes	11	91
Harris Perfection	Harris	10	86

*4 plants.

EGG PLANT VARIETY TEST—PROJECT H. 107

Black Beauty and New York Improved Large Purple were both good. A disease new to this district was discovered in the egg plants which reduced the yield materially. This disease is being studied in the Summerland Field Laboratory of Plant Pathology and has been isolated but not yet identified.

ONIONS, VARIETY TEST—PROJECT H. 138

Twenty-six strains of onions were tested in triplicate. The conditions which produced a shortage of onion seed in 1925 no doubt affected the quality of commercial seed and the slight variations in yields obtained may be attributed to this cause rather than to varietal differences. Red Wethersfield again proved the heaviest yielder.

PEAS, VARIETY EXPERIMENT—PROJECT H. 154

Invermere No. 6, Director, and Bruce all obtained from the Dominion Experimental Station at Invermere, were outstanding leaders in this test. Gradus X American Wonder (O 3584) showed up well also. Climatic conditions are not suitable for peas, and vine diseases are prevalent.

PEPPER, VARIETY TEST—PROJECT H. 157

Peppers were started in the greenhouse and planted out on June 14 in triplicate rows each 15 feet long and containing 11 plants. The following average yields were obtained.

TABLE 10—VARIETY TEST OF PEPPERS

Variety	Source	Yield
		Lb.
Chinese Giant	Dreer	33
Giant Crimson	Harris	32
Early Giant	Harris	31
Chinese Giant	Gregory	30
Large Bell Bullnose	Harris	29
Ruby King	Burpee	27
Chinese Giant	Burpee	28½
Schells Quality	Stokes	28
World Beater	Stokes	28
Sunnybrook	Burpee	27
Large Bell Bullnose	Dreer	25
Pimento	Dreer	24
Sweetmeat Glory	Burpee	23
World Beater	Dreer	22
Anaheim Chili	Landreth	21
Harris Earliest	Harris	21
Rainbow	Dreer	20½
Neapolitan	Dreer	20
Pimento	Gregory	18½
Cayenne	Burpee	15
Neapolitan	Harris	15
Cayenne	Gregory	11½

POTATOES, TEST OF VARIETIES—PROJECT H. 186

The following varieties were grown in single test rows from certified seed.

TABLE 11.—POTATOES, VARIETY TEST

Variety	Source	Marketable per acre		Unmarketable per acre	
		tons	lb.	tons	lb.
Burbank	M. L. 8	14	1,564	2	840
Jersey Royal	U. B. C.	14	1,480	2	400
Gold Coin	M. A. 4	13	1,104	2	1,808
Green Mountain	B. N. 2	13	136	1	1,872
Early St. George	F. 1	12	1,168	2	1,130
Netted Gem	Invermere	12	200	3	292
Gold Coin	U. B. C.	11	1,430	0	1,100
Eureka	U. B. C.	11	1,100	1	860
Early Ohio	S. Y. 4	10	328	1	420
Up to date	U. B. C.	8	1,600	0	1,980
Sir Walter Raleigh	U. B. C.	8	940	0	1,210
Rural Russett	Invermere	6	1,552	2	840

After several years variety tests with potatoes it is evident that source of seed is more important than choice of variety. Diseases are an important factor in determining yields and the potato investigations at this Station will be reorganized with the hope of building up disease-free strains from which more reliable comparisons of varities may be made.

POTATO, HOME-GROWN VS NORTHERN-GROWN SEED—PROJECT H. 174

This experiment was started in 1923 when certified seed was planted in the Okanagan and in the Bulkley valleys. This seed was planted in the same district in 1924. In 1925 seed from the 1924 Bulkley valley crop was brought to Summerland and planted beside seed from the Summerland 1924 crop. Seed was saved from both crops. In 1926 seed from the Bulkley valley 1925 crop was planted beside the same variety which had been grown at Summerland two years and one year respectively and gave the following results.

TABLE 12.—COMPARISON OF HOME-GROWN VS. NORTHERN-GROWN SEED

Variety	Yield per acre	
	tons	lb.
Early St. George, grown Summerland one year	14	750
Early St. George, grown Summerland two years	13	1,685
Early St. George, grown Bulkley valley three years	13	1,298
Green Mountain, grown Summerland one year	13	1,491
Green Mountain, grown Summerland two years	12	587
Green Mountain, grown Bulkley valley three years	8	746

These results are exactly opposite to those obtained from a similar experiment in 1925. So no conclusions may be drawn at this time. The test will be continued.

RADISH, VARIETY EXPERIMENT—PROJECT H. 192

Burpee Red Giant is worthy of mention. This variety is a little later than Scarlet Turnip White Tip and Scarlet Globe but lasts much longer. It is very solid and is free from a pithy centre.

SPINACH, VARIETY EXPERIMENT—PROJECT H. 199

Fifteen strains were seeded on April 6. Viroflay was the earliest and finest in quality. Victoria was early but not so fine. King of Denmark was a week later but excellent in quality. Bloomsdale was also good. New Zealand is a very heavy cropper and will give spinach when the other varieties have gone to seed. This variety was ready the beginning of July. It is coarse in quality.

TOMATO AND CANTALOUPE FERTILIZER EXPERIMENTS—PROJECTS H. 388 AND C. 157

This experiment gave results very similar to those obtained in 1925. Plots treated with barnyard manure gave an average increase of 107 per cent in 1925 and 63 per cent in 1926 over plots having no manure. No appreciable difference was noted in the yield of plots where commercial fertilizers were used compared with similar plots where no fertilizers were used. The barnyard manure by supplying humus increases the water-holding capacity of the soil and this probably explains the increased yields from the use of manure.

TOMATO, VARIETY EXPERIMENT—PROJECT H. 211

Extensive tests were made to ascertain the merits of some of the more popular varieties of tomatoes grown in the Okanagan. At the request of the canning companies, Earliana, Avon Early, Bonny Best, John Baer, and Chalks Early Jewel were tested for earliness and total yield.

A heavy frost occurred on September 23. In determining earliness the yields of the different varieties before this date were tabulated as well as total yield for the season.

Tables 13 and 14 show the relative merits of these five varieties. Yields are for fifteen plants of each strain.

TABLE 13.—COMPARISON OF DIFFERENT VARIETIES OF TOMATO FOR TOTAL YIELD

Variety	Number of strains tested	Average of all strains	Highest strain	Lowest strain
		lb.	lb.	lb.
Earliana	45	313	404	248
Avon Early	22	301	357	259
Bonny Best	12	269	294	237
John Baer	19	246	294	208
Chalks Early Jewel	9	243	260	217

TABLE 14.—COMPARISON OF DIFFERENT VARIETIES OF TOMATO FOR EARLINESS

Variety	Number of strains tested	Average of all strains	Highest strain	Lowest strain
		lb.	lb.	lb.
Earliana	45	193	259	89
Avon Early	22	176	240	119
John Baer	19	96	117	73
Bonny Best	12	89	118	65
Chalks Early Jewel	9	84	106	66

Table 15 gives the complete list of all varieties tested.

TABLE 15—TOMATO VARIETY EXPERIMENT
(Yield of 15 plants)

Variety	Source of Seed	Yield in September	Yield in October	Total	Rank for earliness
		lb.	lb.	lb.	
Alacrity x Earlibell	Ottawa 6570	219·0	185·0	404·0	12
Alacrity x	Ottawa 6560	219·0	182·0	401·0	13
Alacrity x Hipper	Ottawa 5217	213·5	170·0	383·5	19
Alacrity x Hipper	Sd. 80- 2	214·5	153·0	367·5	18
Earliana	Sd. 38-15	205·5	157·0	362·5	25
Alacrity	Ottawa 5465	192·0	168·0	360·0	30
Avon Early	Ferry	217·0	140·0	357·0	14
Earliana	Sd. 40-7	223·5	130·0	353·5	9
Bolgiano	Sd. 15-2	227·5	123·0	350·5	7
Earliana	Sd. 5-3	211·5	135·0	346·5	22
Avon Early	Sd. 89-6	177·5	167·0	344·5	48
Earliana	Sd. 32-2	240·0	103·0	343·0	5
Earliana	Sd. 4-1-6	191·0	151·0	342·0	33
Earliana	Sd. 19-2	251·0	86·0	337·0	2
Earliana	Sd. 35-6	196·5	140·0	336·5	28
Avon Early	Vaughan	240·0	95·0	335·0	4
Special Early 498	Sd. 84- 2	195·0	138·0	333·0	29
Earliana	Sd. 20-13	220·0	113·0	333·0	11
Earliana	Sd. 22- 5	212·5	111·0	323·5	20
Earliana	Sd. 21- 4	246·0	77·0	323·0	3
Earliana	Bolgiano	185·5	137·0	322·5	41
Special Early 498	Morse	186·5	136·0	322·5	38
Earliana	Sd. 27-3	188·0	134·0	322·0	37
Avon Early	Burrell	220·5	101·0	321·5	10
Earliana	Morse	153·0	168·0	321·0	66
Earliana	Livingston	174·0	147·0	321·0	52
Extra Early Sunrise	Landreth	160·5	160·0	320·5	60
Burbank	Livingston	188·5	128·0	316·5	35
Avon Early	Sd. 96-15	216·5	100·0	316·5	15
Avon Early	Sd. 102- 5	192·0	124·0	316·0	30
Earliana	Sd. 26- 3	259·0	55·0	314·0	1
Avon Early	Sd. 99-16	132·0	182·0	314·0	69
Avon Early	Sd. 94- 1	166·5	143·0	309·5	57
Earliana	Sd. 24- 4	191·5	114·0	305·5	32
Earliana	Sd. 4- 4-7	186·5	119·0	305·5	38
Earliana	Sd. 33- 8	201·0	104·0	305·0	26
Earliana	Sd. 28- 3	182·5	119·0	301·5	43
Avon Early	Sd. 91-15	188·5	111·0	299·5	35
Burbank	Gregory	186·0	113·0	299·0	40
Avon Early	Dreer	182·5	116·0	298·5	42
Avon Early	Sd. 25-4	182·5	116·0	298·5	42
Earliana	Gregory	216·0	82·0	298·0	17
Avon Early	Sd. 93-18	206·5	90·0	296·5	24
Avon Early	Sd. 92- 3	146·5	150·0	296·5	67
Earliana	Burrell	155·0	141·0	296·0	64
Avon Early	Sd. 98-4	156·0	140·0	296·0	63
Bonny Best	Vaughan	69·5	225·0	294·5	114
Bolgiano	Bolgiano	224·5	70·0	294·5	8
John Baer	Moore	104·0	190·0	294·0	83
Landreth	Landreth	91·5	202·0	293·5	95
Earliana	Burpee	197·0	96·0	293·0	27
Earliana Canadian	Harris	180·5	111·0	291·5	46
Earliana	Sd. 32-5	216·0	75·0	291·0	16
Earliana	Sd. 30-3	227·5	62·0	289·5	7
Earliana	Dreer	212·5	77·0	289·5	20
Bonny Best	Stokes	114·0	175·0	289·0	75
Avon Early	Sd. 81-2	175·5	113·0	288·5	51
Avon Early	Sd. 90-5	170·0	116·0	286·0	54
Bonny Best	Burrell	110·5	175·0	285·5	77
Earliana	Harris	170·0	115·0	285·0	55
Avon Early	Sd. 100-3	119·5	165·0	284·5	72
Avon Early	Sd. 97-4	158·5	125·0	283·5	61
Bonny Best	Gregory	83·0	200·0	283·0	106
Red Head	Sd. 16-2	165·0	118·0	283·0	58
Norfolk Special	Canners Ltd	121·5	159·0	280·5	71
Earliana	Sd. 19- 7	177·0	103·0	280·0	50
John Baer	Sd. 49-3-9	80·5	199·0	279·5	107
John Baer	Sd. 45-2-6	99·5	179·0	278·5	87
Bonny Best	Stokes	79·5	198·0	277·5	109
Avon Early	Hart & Vick (14)	172·0	105·0	277·0	53

TABLE 15—TOMATO VARIETY EXPERIMENT—*Concluded*

Variety	Source of Seed	Yield in September	Yield in October	Total	Rank for earliness
		lb.	lb.	lb.	lb.
Earliana	Stark	168·5	107·0	275·5	56
Avon Early	Sd. 103–7	125·0	150·0	275·0	70
Earliana	Sd. 34–2	207·0	67·0	274·0	23
Earliana	Hart & Vick	156·5	115·0	271·5	62
Earliana Penn State	Stokes	154·5	116·0	270·5	65
Avon Early	Sd. 101–5	145·5	125·0	270·5	68
Earliana	Sd. 36–6	189·5	80·0	269·5	34
Earliana	Landreth	161·0	108·0	269·0	59
Bonny Best	Hart & Vick	88·5	180·0	268·5	98
Earliana	Vaughan	179·5	88·0	267·5	47
Bonny Best	Dreer	65·0	202·0	267·0	118
Devon Surprise	S.K.O.	47·0	220·0	267·0	123
New Unnamed	Stark	102·0	165·0	267·0	85
Bonny Best	Harris	118·5	148·0	266·5	73
Bonny Best	Moore	80·5	185·0	265·5	107
John Baer	Sd. 47–1–9	103·0	162·0	265·0	84
Bonny Best	Burpee	71·5	190·0	261·5	112
Chalks Early Jewel	Gregory	89·0	171·0	260·0	96
Avon Early	Sd. 11–13	181·5	78·0	259·5	45
Chalks Early Jewel	Bolgiano	69·0	190·0	259·0	115
Redhead	Livingstone	113·5	145·0	258·5	76
Chalks Early Jewel	Morse	96·0	161·0	257·0	91
Earliana	Sd. 20–5	177·0	80·0	257·0	49
John Baer	Sd. 49–2–9	86·0	170·0	256·0	102
John Baer	Vaughan	96·5	159·0	255·5	89
John Baer	Bolgiano	73·5	178·0	251·5	111
Chalks Early Jewel	Harris	66·5	185·0	251·5	116
John Baer	Burrell	88·5	161·0	249·5	98
John Baer	Sd. 48–2–6	94·0	155·0	249·0	93
John Baer	Livingston	88·0	160·0	248·0	100
Clarks Early	Clark	89·0	159·0	248·0	96
John Baer	Dreer	105·0	142·0	247·0	82
John Baer	Sd. 47–1–1	105·5	140·0	245·5	81
Chalks Early Jewel	Burpee	106·5	138·0	244·5	80
Chalks Early Jewel	Vaughan	70·0	173·0	243·0	113
Bonny Best	Livingston	84·0	157·0	241·0	105
Clarks Early	Burrell	85·5	153·0	238·5	103
Bonny Best	Bolgiano	108·0	129·0	237·0	78
John Baer	Gregory	107·5	125·0	232·5	79
John Baer	Landreth	101·5	125·0	226·5	86
John Baer	Sd. 49–2–1	86·5	139·0	225·5	101
John Baer	Burpee	117·5	108·0	225·5	74
John Baer	Harris	96·5	128·0	224·5	90
John Baer	Hart & Vick	93·5	125·0	218·5	94
Pink No. 1	Ottawa 6574	51·0	167·0	218·0	122
Chalks Early Jewel	Livingston	77·5	140·0	217·5	110
Chalks Early Jewel	Hart & Vick	95·0	122·0	217·0	92
Stone	Vaughan	66·5	150·0	216·5	116
Danish Export	Sd. 62–4	85·0	125·0	210·0	104
John Baer	Stark	98·5	110·0	208·5	88
Marglobe	Stark	62·0	145·0	207·0	119
Blight Resister	Stark	54·5	150·0	204·5	121
Pink No. 2	Ottawa 6569	55·5	140·0	195·5	120
Novato	Diener	46·0	138·0	184·0	124
Sonoma	Diener	35·5	146·0	181·5	128
Marglobe	Stokes	44·5	135·0	179·5	125
San Geronimo	Diener	29·0	150·0	179·0	130
Tulare	Diener	33·0	138·0	171·0	129
Petaluma	Diener	36·0	135·0	171·0	127
Ignacio	Diener	37·5	120·0	157·5	126

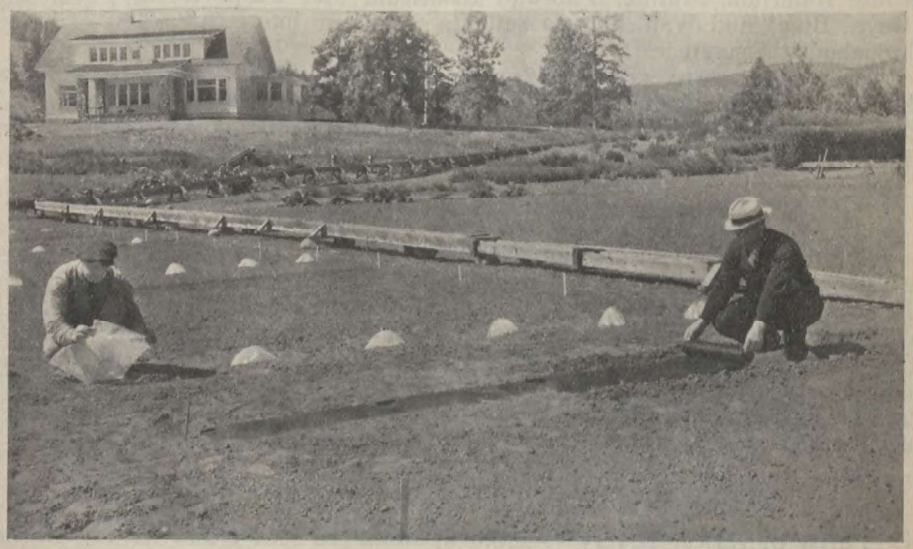
DATES OF SEEDING TESTS WITH VEGETABLES

Owing to the exceptionally mild winter of 1925-1926, all fall seedings of vegetables were a failure except lettuce. This was probably due to early germination followed by weather which although mild was too cold for growth. Normally, fall seedings lie dormant until the ground begins to warm up in early spring when growth commences and continues steadily.

Early spring seedings as usual were most successful except where a succession was desired.

Flowers, Trees and Shrubs

In floriculture, systematic arrangement and organization have been emphasized during the year. Many of the different classes of flowers previously grown in the general borders have been grouped and arranged in test beds where they may readily be compared. Iris, paeony, tulip, narcissus and hyacinth beds are all well started as well as several classes of annuals. Considerable planting of shrubbery and general improvement of grounds has followed the construction of buildings recently erected at this station. Many varieties of trees and shrubs are being grown from seed and when ready for planting will be used in further landscape improvements and in the establishment of the arboretum. Special studies are under way with sweet peas and asters. The flower beds as usual attracted many visitors. Recently organized local horticultural associations made seasonal visits to the gardens of this Station.



Placing Plant Protectors in Position.—After planting the seed in hills a loop of wire is made over the hill. The waxed paper is placed in position and the edges secured by drawing soil over them. The tarred paper is unrolled, the edges are secured by covering with a small garden plough or with a hoe. Slits are cut at proper distances and seed planted through these slits.

ASTER VARIETY EXPERIMENT—PROJECT H. 263

An investigation of the possibilities in aster seed production was commenced this year. Eighty-five strains were started in the greenhouse on April 27 and set out June 14. Seven degrees of frost occurred on September 23 and for two weeks after this date the asters made little if any growth. They later recovered from this frost and eighty of the strains produced some mature seed. For commercial seed-growing purposes in this district the asters may be classed in three groups. The Early Wonder and Queen of Market types may be expected to produce full crops of seed every year. The Astermum, Quilled, Imperial, Mikado, King, Early Branching, Ostrich Feather types and some strains of Crego Giant type in average years should yield good crops of seed. The Perfection, Rochester, Late Branching and American Beauty types may be too late to produce successful seed crops.

Aster seed as often purchased in packets is not pure enough for seed-growing purposes. There is a wide variation in type and colour in many strains. Prospective seed growers should begin in a small way and by selection build up pure strains before starting to produce seed for sale. The market for aster seed is very discriminating and growers must prepare themselves to be able to rogue intelligently to cater to this market.

HERBACEOUS PERENNIALS VARIETY EXPERIMENT—PROJECT H. 274

A rock garden was substituted for a grass slope so steep that it had been difficult to maintain a turf upon it. Aubretia (Mrs. Lloyd Edwards); Arenaria balearica; Arenaria juniperina; Arenaria montana; Androsace laggeri; Androsace lanuginosa; Arabis alpina; Calceolaria polyrhiza; Campanula Isophylla; Campanula muralis; Delphinium nudicaule; Sempervivums; Iberis sempervirens; Saxifrage (Longifolia, Calyciflora, Caespitosa, Muscoides, Aizoon, Decipiens), Sedum (Spurium, Murale, Pilosum, Asiaticum and Purpurescens); Veronica (Royal Blue) and Wahlenbergia caudata gave an interesting show of bloom throughout the summer.

Some other easily grown perennials were tried out and might be added to the list of suitable varieties published in previous reports. Bahia Lanata and Dielytra spectabilis are both suitable for light sandy soils. Cheiranthus Allionii (biennial) bloomed from early spring until late summer.

SWEET PEAS VARIETY TEST—PROJECT H. 287

Twenty-five varieties were planted in flats on February 2 and transplanted to the open on March 30. On this latter date the same varieties were seeded in the open in adjoining rows. The transplanted sweet peas bloomed the last week in May while the same varieties seeded in the open bloomed the middle of June. The earlier blooms were larger, more vigorous and lasted longer than the later blooms. In growing sweet peas for transplanting it is recommended that the flats be kept in a cool place or the plants will grow weak and spindling. They may be kept outside and covered for protection against frost at night.

SWEET PEA CROSSING EXPERIMENT—PROJECT H. 561

Purity of variety is very essential in sweet pea seed grown for sale in discriminating markets. It has been suspected that a slight amount of natural crossing takes place in sweet peas although fertilization normally takes place before the blooms open. British scientists have worked out the order of Mendelian dominance of colour in sweet peas as follows: purple bicolour, purple, blue, red, pink, tinted white, white and cream. From this it is evident that if any crossing takes place in cream varieties the progeny will show the more dominant colours in the first generation. Applying this principle, cream varieties were planted in 1925 in close proximity to maroon and purple varieties. The seed produced by these creams was planted out in 1926 and in every case produced true creams. This would indicate that the probability of crossing taking place is very slight under Okanagan conditions.

A bloom of the variety Kenneth (a rose pink) was tagged on Vancouver island in 1924. Seed from this bloom was planted at Summerland in 1925 and gave one plant with purple blooms. Seed from this plant was planted in 1926 and the progeny broke up along Mendelian lines in the proportion of three purples and one rose pink with two additional plants of a tinted white. This suggests that crossing had actually taken place and while rare it must be regarded as a possibility in fields of sweet peas being grown for seed.

PROPAGATION OF TREES AND SHRUBS FROM SEED—PROJECT H. 606

This experiment was started in 1925 and continued in 1926. Many of the seeds germinate slowly; others have to be stratified over winter. In the majority of cases considerable time must elapse before results are obtained. The following trees and shrubs planted in 1925 have been grown successfully from seed:—

Acer pseudoplatanus
Acer platanoides
Aralia spinosa
Berberis vulgaris
Berberis vulgaris purpurae
Betula paprifera
Buddleia wariabilis weitchiana
Buddleia wariabilis magnifica
Calycanthus floridus
Cedrus deodora
Cedrus libani
Cedrus atlantica
Celastrus orbiculatus
Cornus florida
Crataegus pyracantha
Cupressus lawsoniana
Euonymous bungeana
Gingko biloba
Hemiptelia davidii
Juniperus virginiana
Liquidambar styraciflua
Morus alba
Picea pungens
Pinus strobus
Pinus banksiana
Pinus mughus
Pinus sylvestris
Platanus orientalis
Pyrus arbutifolia
Quercus rubra
Quercus robur

FORAGE CROPS

In the following forage crop tables, yields in green, dry and air-dried matter per acre are recorded. The method of determining the green and dry matter per acre was as follows: Each plot after cutting was immediately weighed, which gave the yield in green matter per acre. From each plot a representative sample weighing approximately 50 pounds was taken and passed through an ensilage cutter and thoroughly mixed. Duplicate samples each weighing 2 pounds were taken for the determination of the absolute dry matter. These samples were air-dried in the sun and the drying process continued until no further shrinkage was observed. The samples were then placed in an electric oven and dried to constant weight. The air-dried yields represent yields of field-cured hay.

ENSILAGE CROPS

INDIAN CORN—PROJECT AG. 1

Twenty varieties of Indian corn were tested in triplicate 1/220-acre plots on sandy loam soil which had grown alfalfa the previous year. In the autumn of 1925, manure was applied at the rate of 15 tons per acre and the land ploughed. The following spring the land was irrigated and prepared for seeding. All varieties were seeded May 25, in rows 3 feet apart and later thinned to 8 inches apart in the row. All varieties were harvested when in the early glazed stage. Irrigation: rate of application in acre-inches, July 13, August 17, total of 30 acre-inches. The results obtained in 1926 and the average results over a number of years are given in tables 16, 17, and 18.

Crompton's Early of seed obtained from J. O. Duke continues to give the highest yields over a number of years. This variety recorded highest yield green and dry matter in the three-year average of twelve varieties (1923-25); second highest yield in green matter; and fourth highest yield in dry matter of twenty-three varieties under test in 1925; the highest average yield green weight

of six varieties for five years (1921-25); highest yield in green and dry matter of twenty varieties under test in 1926 and highest yield in green and dry matter of ten varieties for four years (1923-26).

A comparison of results for the years 1923-1926 show considerable variations in yields of corn sold under the same variety name but obtained from different sources. Thus, North Western Dent may vary as much as twenty days in time of maturity and 2,933 pounds in yield of dry matter per acre depending on the source from which it is secured. Several other varieties tested show the same tendency and indicate that source of seed is a very important factor for growers to consider when purchasing seed corn.

Under adequate soil-moisture conditions, practically all varieties of corn mature in the southern Okanagan valley. Under field conditions at this Station the following varieties have matured for ensilage purpose: North Western Dent, Leaming, Golden Glow, Wisconsin No. 7 and Longfellow. In districts with a higher altitude than 1,500 feet and in the northern districts of the southern interior of British Columbia (districts where the season is shorter than at this Station and where frosts occasionally occur during the growing season for corn) early maturing varieties such as Quebec No. 28 and North Western Dent should be considered and planting should be done immediately after danger of late spring frosts. Each farmer producing corn should aim to grow the highest-yielding variety or strain that will mature under his particular soil and season, and throughout the districts of the southern interior of British Columbia considerable variable soil and season exist.

The corn ear-worm (*Heliothis obsoleta* Fab.) was observed for the first time in large numbers in the ears of practically all varieties under test this year at the Station. However, this is but a minor pest compared with the European corn-borer, which is doing such tremendous damage in eastern corn-growing sections.

TABLE 16—INDIAN CORN—VARIETY TEST FOR ENSILAGE, 1926

Name	Source of seed	Number of days to			Height in inches			Number		Percentage dry matter	Yield of fodder per acre 1926	
		Emerge	Tassel	Silk	Plant	Upper Ear	Lower Ear	Ears	Suckers		Green weight	Dry matter
											tons lb.	tons lb.
Compton's Early	J. O. Duke	10	59	72	114	48	.....	1	2	21·30	28 320	5 1,996
90 Day White Dent	Dakota Imp. Seed Co	10	59	67	114	50	39	2	1–2	22·67	21 1,340	4 1,925
Burr Leaming	G. S. Carter	9	66	77	126	52	.....	1	2	20·93	23 200	4 1,670
North Western Dent	Dakota Imp. Seed Co	8	52	64	108	30	.....	1	1–2	19·45	24 400	4 1,414
North Western Dent	Nebraska (grown)	8	66	74	108	42	.....	1	1	19·04	24 1,280	4 1,383
North Dakota	Steele Briggs Seed Co	10	54	66	102	48	39	2	4	21·58	21 460	4 1,163
Longfellow	Dakota Imp. Seed Co	9	61	72	114	42	37	2	1–2	21·11	21 1,340	4 1,149
North Western Dent	Dom. Exp. Farm, Brandon, Man.	8	48	52	90	18	.....	1	1–3	23·21	19 940	4 1,038
Golden Glow	Kelowna, B.C. (grown)	9	59	66	108	48	.....	1	1	19·92	22 880	4 940
Yellow Dent	A. J. Wimple	9	61	70	114	52	49	2	1–2	20·70	21 680	4 835
Twitchells Pride	Dom. Exp. Station, Fredericton, N.B.	9	51	58	90	30	24	2	5	20·30	20 1,800	4 485
North Western Dent	Kelowna, B.C. (grown)	8	50	54	72	36	30	2	1–2	21·09	19 940	4 212
North Western Dent	Dakota (grown)	8	49	52	90	27	.....	1	1–4	22·61	18 300	4 207
Longfellow	J. O. Duke	10	61	73	114	48	.....	1	2–3	20·01	19 1,600	3 1,924
Leaming	J. O. Duke	11	70	80	123	62	.....	1	2	20·20	18 300	3 1,333
Yellow Pride Dent	Dakota Imp. Seed Co	9	53	58	102	37	.....	1	2	20·83	17 540	3 1,195
Wisconsin 7	J. O. Duke	10	68	77	132	72	.....	1	1–2	18·73	18 1,840	3 1,087
Golden Glow	J. O. Duke	10	58	66	114	41	.....	1	1–2	21·02	16 1,440	3 1,029
White Cap Yellow Dent	Steele Briggs Seed Co	11	56	71	114	49	39	2	1–2	20·98	14 600	3 0
Quebec 28	J. L. Todd	11	41	53	90	30	21	2	1–4	20·51	11 880	2 693

TABLE 17—INDIAN CORN—VARIETY TEST FOR ENSILAGE—FOUR YEAR AVERAGE 1923-1926

Name	Source of Seed	Number of Days			Height in Inches			Number		Percentage Dry Matter	Yield of Fodder per acre —Four Year Average 1923–1926	
		Emerge	Tassel	Silk	Plant	Upper Ear	Lower Ear	Ears	Suckers		Green Weight	Dry Matter
											tons lb.	tons lb.
Compton's Early	J. O. Duke	9	63	73	102	47	42	1–2	0–2	26·42	17 1,956	4 696
North Western Dent	Dakota Imp. Seed Co	9	57	66	100	40	37	1–2	1–2	28·07	14 1,880	3 1,665
Longfellow	Dakota Imp. Seed Co	9	60	73	114	51	40	2	0–2	25·83	14 1,145	3 1,391
90 Day White Dent	Dakota Imp. Seed Co	13	65	70	74	28	.....	1	2	26·22	14 965	3 1,258
North Dakota	Steele Briggs Seed Co	10	56	71	98	45	39	1–2	2–4	25·07	13 1,366	3 785
Golden Glow	J. O. Duke	9	63	69	103	47	.....	1	0–2	25·68	13 362	3 657
Leaming	J. O. Duke	10	67	75	106	56	.....	1	0–2	26·23	12 1,636	3 450
Wisconsin 7	J. O. Duke	9	63	71	112	55	.....	1	0–2	25·70	12 1,613	3 320
Longfellow	J. O. Duke	9	60	69	102	43	37	1–2	0–3	25·32	12 471	2 1,951
Twitchel's Pride	Fredericton, N.B	9	57	58	94	32	24	1–2	1–5	24·30	10 560	2 1,879

TABLE 18—INDIAN CORN—VARIETY TEST FOR ENSILAGE—TWO YEARS AVERAGE 1925-1926

Name	Source of Seed	Number of Days			Height of Inches			Number		Percentage Dry Matter	Yield of Fodder per acre —Two-Year Average 1925-1926	
		Emerge	Tassel	Silk	Plant	Upper Ear	Lower Ear	Ears	Suckers		Green Weight	Dry Matter
											tons lb.	tons lb.
North Western Dent	Nebraska (grown)	8	64	75	114	60	.....	1	1	23·62	20 52	4 1,033
North Western Dent	Dom. Exp. Farm Brandon	8	54	59	85	25	.....	1	1–3	33·01	14 882	4 549
Burr Leaming	G. S. Cartier	9	65	80	106	61	.....	1	0–2	24·87	17 1,587	4 434
Golden Glow	Kelowna, B.C. (grown)	8	61	70	108	57	.....	1	0–1	26·14	16 1,840	4 160
Yellow Dent	A. J. Wimple	10	63	71	105	48	42	1–2	1–2	27·61	16 65	4 119
North Western Dent	Dakota (grown)	8	51	55	93	35	.....	1	0–4	29·92	13 437	3 1,910
White Cap Yellow Dent	Steele Briggs Seed Co	10	57	71	114	51	40	2	1–2	27·84	12 987	3 709
Quebec 28	J. L. Todd	9	47	56	96	33	21	1–2	0–4	30·20	9 340	2 1,099

SUNFLOWERS, VARIETY TESTS FOR YIELD AND PURITY—PROJECT AG. 76

Five varieties of sunflowers were tested under the same cultural conditions as the variety test with corn. The Mammoth Russian and Russian Giant varieties were cut when in the full blossom stage. The Manchurian, Ottawa 76 and Mennonite varieties were cut when the heads were in the dough to ripe stage. A comparison of the varieties under test show a considerable variation in the number of days to blossom. Thus, the variety Mennonite blossoms twenty-five days earlier than Mammoth Russian.

On non-irrigated lands in the northern districts served by this Station, early maturing varieties of sunflowers are recommended. In the southern districts under irrigation, the later maturing and heavier yielding varieties are recommended.

A comparison of tables 16, 17, 18, and 19 shows that under irrigation, corn yields considerably more in both green and dry matter per acre than sunflowers. In comparing sunflowers with corn for ensilage, sunflowers are more resistant to cold weather during the spring and therefore may be seeded to advantage earlier than corn, an important factor in districts where the season is short and where corn is not likely to thrive or mature. Where corn can be economically grown, it is without a peer as an ensilage crop. As compared with sunflowers, corn is more palatable, more nutritious, more drought-resistant, more economical to harvest and yields more green and dry matter per acre. However, the sunflower crop for ensilage has a place in Canadian agriculture and that place is in those districts where corn or other more desirable ensilage crops cannot be economically grown.

TABLE 19—SUNFLOWERS—TEST OF VARIETIES, 1926 AND AVERAGE FOR THREE YEARS, 1924-1926

Name	Source of Seed	1926		
		Percentage dry matter	Yield per acre	
			Green weight	Dry matter
			tons lb.	tons
Mammoth Russian	K. McDonald & Son	15·76	20 260	3 345
Russian Giant	Dakota Improved Seed Co	15·12	22 1,100	3 819
Manchurian	A. E. McKenzie	16·57	23 1,373	3 1,850
Ottawa No. 76	C.E.F., Ottawa	16·93	22 1,500	3 1,703
Mennonite	Rosthern Experimental Station	19·09	22 1,393	4 665

Name	Source of Seed	Three Years' Average—1924-1926					
		Number of days to		Height of plant in inches	Percentage dry matter	Yield per acre	
		Emerge	Blossom			Green weight	Dry matter
						tons lb.	tons lb.
Mammoth Russian	K. McDonald & Son	7	80	107	25·41	13 1,693	3 122
Russian Giant	Dakota Improved Seed Co	7	83	90	24·79	14 937	2 1,306
Manchurian	A. E. McKenzie	8	65	75	26·76	12 816	2 1,266
Ottawa No. 76	C.E.F., Ottawa	9	61	66	26·75	12 206	2 1,215
Mennonite	Rosthern Experimental Station	9	55	57	23·64	10 1,087	2 1,108

ANNUAL HAY CROPS

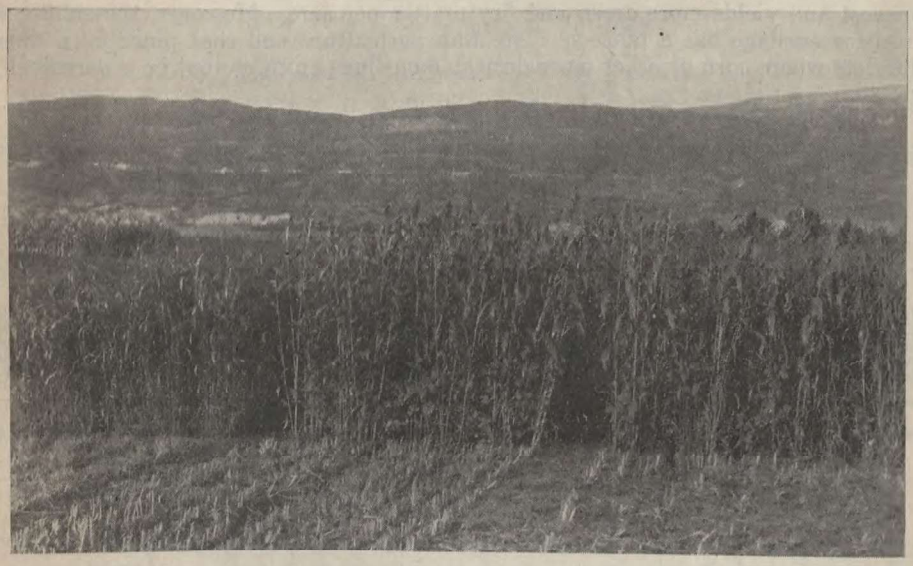
PROJECTS AG. 251, 247, 248, AND 249

A number of legumes, grasses and mixtures for annual hay crops were tested in duplicate 1/100-acre plots on sandy loam soil which had grown mangels the previous year. The land was fall-ploughed in 1925 and the following spring irrigated and prepared for seeding. The plots were seeded June 10. The dates

and total rate of application of irrigation water in acre-inches was as follows: June 6; July 5; August 4; total 15 acre-inches. The annual hay crops sown, the rate of seeding and the yields per acre are given in table 20.

The oat varieties tested required from sixty to sixty-five days to reach the early dough stage—the stage of maturity when they were harvested. The results obtained indicate that medium-late varieties yield more than early varieties of oats. Accordingly, it would seem that a late oat would be suitable for seeding during the early part of the season and an early oat for seeding as an emergency crop in mid or late summer, and also for seeding in the early part of the season in districts where the seasons are very short.

Eight varieties of millets were tested this year for general suitability for hay. Over a period of several years, three of these varieties have given higher yields than the three highest-yielding varieties of oats. For a very early maturing variety, Early Fortune is especially suitable when the crop is required to mature in from 40-45 days. Golden millet continues to be one of the best varieties under test. It is very leafy and of excellent quality. The variety Japanese continues to be the least desirable of the millets under test. Millets like a warm growing season and respond to a plentiful supply of irrigation and require about 60 days to mature for hay.



Test Plots of Annual Hays

Sorghum and Sudan Grass Sorghum and Soy Bean Sorghum, Sudan Grass, Cow Pea and Soy Bean

All seeded June 9, 1926: Seventy-five days after seeding. The three-foot paths will assist the reader in estimating the relative height of the standing crop.

Ten varieties of soy beans were tested for suitability for hay and gave much promise, especially for use in mixtures. The varieties under test required about 85 days to reach the early pod stage. They require less moisture than millets.

Various mixtures or combinations of sorghum, Sudan grass, cow peas and soy beans gave exceptional promise and high yields. Early varieties of sorghum, soy bean and cow pea that mature about the same time as Sudan grass should be used in such mixtures.

Hubam clover and White sweet clover and spring rye are not suitable mixtures. The clovers grow so slowly that they are only a few inches high when the rye is in early blossom and ready to cut.

Teff grass was seeded at the rate of 2 pounds less per acre this year and gave a much stronger stand. This annual grass gives promise for hay under very moderate moisture conditions.

Spring rye, except for its earliness, is not of much value for hay. Peas are not suitable for hay in a hot, dry climate, even under irrigation. Spring and winter vetches are only suitable for hay when used in mixtures.

Some desirable characteristics of an annual hay crop are: wide range of adaptability to soil and climatic conditions; ability to grow fast and to compete with weeds, especially in the early stages of growth; ease of harvesting and curing aides to produce economical yields of palatable and nutritious fodder.

TABLE 20—ANNUAL HAY CROPS

Name	Seeding rate per acre	1926			Average		
		Percentage dry matter	Yield per acre		Percentage dry matter	Yield per acre	
			Green weight	Dry matter		Green weight	Dry matter
	lb.		tons lb.	tons lb.		tons lb.	tons lb.
Oat Varieties—					(2-year	average	1925-26)
Gold Rain	100	34·42	6 1,500	2 647	33·25	4 450	1 1,369
Alaska	100	38·60	4 1,900	1 1,721	42·54	3 450	1 558
Leader A	100	31·64	6 600	1 1,987	33·27	3 1,500	1 412
Laurel	100	30·37	8 1,200	2 1,224			
Longfellow	100	30·98	7 800	2 585			
Columbian	100	29·49	7 700	2 335			
Leader B	100	29·88	6 1,400	2 4			
Millett Varieties—					(3-year	average	1924-26)
Hog	30	25·58	10 1,900	2 1,602	24·73	7 250	2 1,225
Siberian	30	29·59	10 1,600	3 391	31·64	7 567	2 434
Golden	30	22·46	13 1,900	3 266	25·11	9 217	2 353
Common	30	31·79	7 1,900	2 1,055	29·88	6 683	1 1,805
Hungarian	30	29·03	9 0	2 225	30·58	6 783	1 1,404
Early Fortune	30	21·09	9 1,000	2 7	23·06	7 250	1 1,356
Japanese	30	21·38	9 400	1 1,934	27·25	6 867	1 1,013
Hursk	30	27·10	8 500	2 471			
Soy Bean Varieties—					(2-year	average	1925-26)
Summerland	90	29·20	7 1,000	2 380	29·40	4 600	0 1,515
Ita San	90	24·05	11 1,000	2 1,531			
Early Yellow	90	30·21	8 900	2 1,105			
Harbora	90	23·85	10 1,400	2 1,104			
Quebec	90	27·41	9 100	2 961			
Early Brown	90	30·08	7 400	2 331			
China No. 1221	90	28·03	7 1,400	2 317			
Pea Varieties—							
Invermere	90	27·61	7 1,600	2 307			
Bruce	90	28·00	7 900	2 172			
Manchurian	90	27·98	5 100	0 1,826			
Mixtures—					(3-year	average	1924-26)
Sorghum	20						
Sudan grass	12	21·21	19 800	4 229	21·94	10 1,400	2 627
Sorghum	20						
Cow peas, Summerland	45	15·42	22 300	3 835	17·85	11 617	1 1,814
Peas	15						
Oats	68	30·27	4 1,000	1 724	29·66	3 400	0 1,914
Vetches, spring	45						
					(2-year	average	1925-26)
Sorghum	10						
Sudan grass	6						
Cow peas, Summerland	22	23·29	19 600	4 990	26·04	12 400	2 1,963
Soy bean, Summerland	22						
Sorghum	20						
Soy bean, Summerland	45	18·53	24 1,800	4 1,228	20·77	15 600	2 1,925
Sudan grass	12						
Soy bean, Summerland	45	28·32	13 1,900	3 1,901	29·70	8 1,150	2 945

TABLE 20—ANNUAL HAY CROPS—*Concluded*

Name	Seeding rate per acre	1926			Average		
		Percentage dry matter	Yield per acre		Percentage dry matter	Yield per acre	
			Green weight	Dry matter		Green weight	Dry matter
	lb.		tons lb.	tons lb.		tons lb.	tons lb.
Sudan grass	12						
Cow peas, Summerland	45	25·58	13 400	3 753	27·22	7 1,600	2 69
Huban clover	15						
Siberian millet	20	25·51	11 1,100	2 1,892			
White Sweet Clover	15						
Siberian millet	20	23·39	10 200	2 725			
Hubam	15						
Banner oat	80	24·51	6 1,900	1 1,407			
White Sweet clover	15						
Banner oat	80	27·29	6 200	1 1,329			
White sweet clover	15						
Spring rye	80	27·68	4 500	1 353			
Hubam clover	15						
Spring rye	80	30·81	2 1,700	0 1,756			
Miscellaneous Crops—					(3-year average 1924-26)		
Sudan grass, commercial	25	25·71	17 600	4 895	29·35	7 433	1 1,868
Spring rye	90	31·96	4 1,600	1 1,068	39·11	2 1,400	1 414
Barley, feeder	100	38·35	4 400	1 1,221	40·38	2 1,711	1 258
Hubam clover	20	27·76	7 1,300	2 24	29·12	1 1,882	1 154
White sweet clover	20	24·31	7 200	1 1,45	26·15	3 950	0 1,776
					(2-year average 1925-26)		
Sorghum	40	16·84	26 1,100	4 942	21·19	16 500	2 1,990
Cow pea	90	26·98	13 500	3 1,150	22·57	7 1,300	1 1,947
Teff grass	5	27·68	7 400	1 1,986	34·34	4 450	1 505
Sudan grass, China	25	27·80	14 1,600	4 229			
Teosinte	25	17·38	21 0	3 1,300			
Winter Vetch	30	33·32	8 600	2 1,531			
Early Amber sugar cane	25	16·45	16 1,000	2 1,428			
Teterita	25	20·43	13 100	2 1,332			
Milo Maize	25	18·52	13 100	2 834			
Kaffir corn	25	16·65	13 300	2 379			
Spring vetch	50	32·83	6 700	2 169			
Chancellor pea	60	24·73	7 900	1 1,685			
Serradella	8	23·63	4 300	0 1,951			
Tangier pea	60	21·53	1 700	.. 581			

ALFALFAS, CLOVERS, GRASSES AND HAY AND PASTURE MIXTURES OTHER THAN ANNUALS

During a period of five years, from 1922 to 1926, eight hundred plots of biennial and perennial grasses and legumes were seeded singly and in various combinations to determine what single plant or combination of plants gives the maximum yield of both hay and pasture when grown under average conditions. These tests were conducted on gravelly and sandy loam soils and under irrigation and under very unfavourable cultural conditions. Each year, many of the plots under test did not produce sufficient stands to harvest. Accordingly, it has been impossible to record average yields over a period of years of a considerable number of these fodder crops which have been under test. However, much information has been obtained on the growth and yield of many grasses and legumes when seeded singly and in various combinations under irrigation at Summerland.

ALFALFA, VARIETY TESTS FOR HARDINESS, YIELD AND SUITABILITY—PROJECT Ag. 126

Varieties of alfalfa obtained from different sources were tested on gravelly loam and sandy loam soils under irrigation. All varieties were seeded broadcast at the rate of 12 pounds of seed per acre and without a nurse-crop. The varieties tested and the yields obtained in green and dry matter per acre are given in tables 21, 22, and 23.

During the three-year test, 1924 to 1926, no variety of alfalfa shows a market superiority in yield of dry matter per acre. The results would indicate that common Turkestan alfalfa—source of seed unknown—is the most suitable variety to seed, especially when the difference in price of seed is compared between Turkestan and Grimm. However, in view of the fact that alfalfa fields are often weakened by the ravages of insects, inadequate irrigation, overpasturing (especially in late autumn), and also that many farmers fail to secure profitable stands of alfalfa, and that winter-killing occasionally occurs in these districts, it is recommended that farmers use good quality alfalfa seed of a hardy variety, which has been grown in a northern climate and is from a known source. Considering the variable soil, moisture and season prevailing throughout the southern interior of British Columbia, farmers would do well to give Western Canadian-grown Grimm a trial.

TABLE 21—ALFALFA VARIETIES—SOWN 1922

Name	Source	1926					Average yield per acre 1923-1926 Field cured hay
		First cut June 1	Second cut July 8	Third cut Aug. 5	Fourth cut Sept. 11	Total yield per acre	
		lb.	lb.	lb.	lb.	tons lb.	tons lb.
Grimm	A. B. Lyman	5,488	3,794	3,780	1,260	7 322	6 637
Grimm	Summerland	4,200	3,822	2,520	1,484	6 26	5 1,152
Turkestan	Commercial	4,004	3,192	3,052	1,386	5 1,634	4 1,873

TABLE 22—ALFALFA VARIETIES SOWN 1923

Name	Source	1926							Three-year Average 1924-1926				
		Yield per acre, green weight					Per cent dry matter	Dry matter per acre	Total of all cuttings				
		First cut June 7	Second cut July 19	Third cut Sept. 3	Total three cuttings				Yield per acre, green weight		Per cent dry matter	Dry matter per acre	
		lb.	lb.	lb.	tons	lb.		tons lb.	tons	lb.		tons	lb.
Turkestan	Commercial	12,000	17,900	13,500	21	1,400	34·73	7 1,073	20	1,217	27·92	5	1,591
Grimm	Cap Rouge	16,300	18,100	15,500	24	1,900	29·12	7 531	22	1,283	25·27	5	1,564
Grimm	Brooks, Alberta	16,800	16,200	14,500	23	1,500	29·20	6 1,870	20	783	25·29	5	1,210
Variegated	Steele Briggs	11,500	18,600	13,400	21	1,500	32·07	6 1,950	16	933	27·78	5	924
Cossack	Hansenstock	11,800	16,300	11,900	20	0	33·31	6 1,324	18	633	28·60	5	584
Grimm	A. B. Lyman	10,700	18,600	13,200	21	500	33·86	7 390	17	1,333	22·74	5	503
Alfalfa	McCannus, Ida, Ont	11,200	20,000	13,600	22	800	31·23	6 1,991	17	1,493	28·58	5	411
Cossack	D.I.S.C.	10,400	17,600	12,400	20	400	32·12	6 976	17	1,283	28·49	5	154
Siberian	Rife, Alberta	14,900	16,700	10,200	20	1,800	26·88	5 1,236	17	650	26·41	4	1,189
Siberian	Nelson, B.C.	8,200	11,500	9,000	14	700	37·64	5 803	14	1,733	30·49	4	868
Medicago falcata	Rife, Alberta	10,600	10,900	5,600	13	1,100	32·73	4 870	12	1,650	29·12	3	1,493

TABLE 23—ALFALFA VARIETIES—SOWN 1925

Name	Source	1926						
		Yield per acre green weight				Per cent dry matter	Dry matter per acre	
		First cut June 4	Second cut July 20	Third cut Sept. 4	Total three cuttings			
		lb.	lb.	lb.	tons lb.		tons	lb.
Marlborough	New Zealand	27,500	22,400	19,700	34 1,600	23·16	8	119
Alfalfa	Lytton, B.C.	10,100	15,900	16,800	21 800	35·49	7	1,190
Cossack	Rife, Alberta	12,300	19,300	12,100	21 1,700	34·52	7	1,085
Turkestan	Commercial	9,400	21,400	14,000	22 800	32·20	7	426
Grimm	Brooks	13,500	21,000	12,300	23 800	30·75	7	391
Grimm	Lyman	10,200	18,900	10,300	19 1,400	36·37	7	330
Siberian	Rife, Alberta	13,600	20,500	8,600	21 700	30·95	6	1,216
Cossack		14,800	21,000	11,800	23 1,600	26·45	6	590
Broadleaf	Victoria, Australia	13,600	12,500	13,500	19 1,600	30·05	5	1,900
Grimm	Summerland	5,500	7,800	6,200	9 1,500	49·70	4	1,691
Broadleaf	Queensland, Australia	5,600	7,700	5,900	9 1,200	38·96	3	1,480

WHITE DUTCH CLOVER, VARIETY TEST FOR YIELD AND SUITABILITY—PROJECT Ag. 231

GRASSES, TEST OF VARIETIES—PROJECT Ag. 255

HAY AND PASTURE MIXTURES—PROJECT Ag. 258

HAY AND PASTURE MIXTURES, WITH ALFALFA, WHITE SWEET CLOVER AND RED CLOVER AS BASES—PROJECTS Ag. 258B, 258C, 258D

Only a brief summary of the results, to date, of these experiments in a form that may be of service to the farmer is presented at this time.

Hay and pasture mixtures were started in 1922 to determine what grasses can be economically grown in a mixture with alfalfa as the base. In 1924 the experiment was enlarged and included hay and pasture mixtures with alfalfa, white sweet clover and red clover as the bases. During 1925-1926, forty hay and pasture mixtures were tested.

Red clover as a base in hay and pasture mixtures has not given satisfactory yields, that is, when compared with alfalfa or white sweet clover. The results of this experiment indicate that red clover is not suitable for seeding on light gravelly soil, silt loam or sandy loam—even under irrigation. White sweet clover used as a base in hay and pasture mixtures has given good yields of fodder and also the promise of being suitable for soil conditions that are slightly too light and dry for alfalfa. Mixtures with alfalfa as the base have given higher yields than white sweet clover mixtures. Legumes, grasses and mixtures of grasses have not given as high yields as mixtures which contain a legume. *The problem then for each farmer who desires to establish hay and pasture mixtures is to determine what legume does best under his particular soil and season and then to include this legume as the base in the mixture.* From observations taken in the fields of these various hay and pasture mixtures and also from the yields obtained, the following mixtures may be taken as a guide for seeding on gravelly loam, silt loam, and sandy loam soils under irrigation. The figures given represent pounds of seed to be seeded per acre:—

For hay only: alfalfa 6, meadow fescue 6, tall oat grass 6, Italian rye grass 2.

For pasture only: alfalfa 6, tall oat grass 3, meadow fescue 4, orchard grass 2, Italian rye grass 2, western rye grass 2, and a small amount of Timothy and Canadian blue grass.

For hay and pasture: alfalfa 6, meadow fescue 6, tall oat grass 6, Italian rye grass 2, timothy 2 and brome grass 2.

In mixtures with sweet clover as the base, use 10 pounds of white sweet clover in place of 6 pounds of alfalfa and the same number of pounds of grasses as is given in the alfalfa mixtures.

The number of pounds of seed given in these mixtures may be varied to suit the needs of the farmer without the yield being influenced to any appreciable extent.

FIELD ROOTS

MANGELS, VARIETY TESTS FOR YIELD AND PURITY—PROJECT A. 21

Twelve varieties of mangels were tested this year in triplicate 1/220-acre plots on gravelly loam soil which had grown a crop of hay the previous year. All varieties were seeded on May 27 and harvested during the first week in October.

The rate of application of irrigation water in acre-inches was as follows: April 14; May 13; June and July 7; total, 34 acre-inches.

Several years' tests with mangels indicate the importance of seeding with the best quality seed obtainable—seed that is pure and true to type and of a variety which is suitable for the soil and season of the district.

The yields for 1926 and the average yields of a number of varieties which have been tested for several years are given in tables 24 and 25.

TABLE 24—MANGELS—TEST OF VARIETIES—FOUR-YEAR AVERAGE 1923-1926

Name	Source of seed	1926			Four-year Average 1923-1926		
		Percentage dry matter	Yield per acre		Percentage dry matter	Yield per acre	
			Green weight	Dry matter		Green weight	Dry matter
			tons lb.	tons lb.		tons lb.	tons lb.
Yellow Intermediate	C.E.F., Ottawa	16·22	17 1,827	2 1,811	15·68	23 1,854	3 1,736
Long Red Mammoth	Wm. Ewing	14·75	13 1,280	2 24	14·99	21 1,441	3 421
Yellow Globe	Steele Briggs	12·23	16 583	1 1,985	12·18	20 173	2 835
Giant Yellow Globe	Wm. Ewing	11·91	15 1,167	1 1,712	11·31	21 983	2 835
Giant Yellow Intermediate	Wm. Ewing	14·18	14 1,113	2 128	12·46	19 405	2 708
Half Sugar White	Steele Briggs	13·28	16 707	2 343	.....	.....	.....

TABLE 25—MANGELS—TEST OF VARIETIES—THREE-YEAR AVERAGE 1924-1926

Name	Source of Seed	1926			Three-year Average 1924-1926		
		Percentage dry matter	Yield per acre		Percentage dry matter	Yield per acre	
			Green weight	Dry matter		Green weight	Dry matter
			tons lb.	tons lb.		tons lb.	tons lb.
Elevetham Mammoth	Hartmann	16·06	14 160	2 522	15·51	21 652	3 619
Half Sugar Red	Hartmann	15·79	15 140	2 759	15·41	19 1,084	3 28
Barres Oval	General Swedish	12·50	16 1,660	2 207	13·01	20 945	2 1,365
Eckendorfer Red	Hartmann	12·35	18 1,767	2 664	12·65	20 1,920	2 1,300
Taaroje Barres	Hartmann	12·28	15 1,900	1 1,917	12·69	19 1,859	2 1,130
Eckendorfer Yellow	General Swedish	12·81	18 1,107	2 753	12·92	18 1,557	2 906

CARROTS, VARIETY TESTS FOR YIELD AND PURITY—PROJECT Ag. 36

Twenty varieties of carrots were tested for purity and yield of green and dry matter per acre under the same cultural conditions as the mangels. The yields for 1926 and the average yields for four years, 1923-1926, are given in table 26.

Field carrots grown on irrigated gravelly loam and sandy loam soils have not given as much green or dry matter per acre as mangels. They are more costly to harvest than mangels and are not recommended except as a relish for horses.

TABLE 26—FIELD CARROTS—TEST OF VARIETIES

Name	Source	1926					Four-year Average 1923-1926				
		Percentage dry matter	Yield per acre				Percentage dry matter	Yield per acre			
			Green weight		Dry matter			Green weight		Dry matter	
			tons	lb.	tons	lb.		tons	lb.	tons	lb.
White Belgian	Wm. Ewing	17·48	8	133	1	820	15·44	16	81	2	696
White Intermediate	Summerland	19·65	11	1,613	2	640	16·00	15	1,012	2	696
Imp. Intermediate White	Wm. Ewing	20·11	7	1,253	1	1,067	15·47	17	247	2	606
White Belgian	Halifax Seed Co.	16·55	6	1,273	1	197	14·85	15	1,035	2	322
Long Orange Belgian	John A. Bruce	13·60	7	520	0	1,975	14·69	27	1,600	2	313
Imp. Short White	Steele Briggs	16·82	8	1,087	1	874	14·41	15	1,596	2	278
Long Red Surry	Steele Briggs	12·91	9	1,800	1	556	16·50	13	534	2	275
Yellow Belgian	Wm. Ewing	18·60	6	764	1	374	15·90	12	105	1	1,938
Danish Champion	C.E.F., Ottawa	12·77	7	667	0	1,873	15·50	12	1,147	1	1,933
White Belgian	John A. Bruce	14·33	6	320	0	1,765	14·84	12	744	1	1,605
Long Orange	John A. Bruce	16·55	7	80	1	330	18·24	10	601	1	1,587
New Yellow Intermediate	Wm. Ewing	17·23	6	1,787	1	375	14·84	12	1,218	1	1,440
Yellow Intermediate	Halifax Seed Co.	20·26	5	1,733	1	377	19·27	10	418	1	1,317
Imp. Intermediate White	Dupuy & Ferguson	16·52	6	687	1	96	13·13	14	247	1	1,309
Mam. Intermediate White	John A. Bruce	17·65	7	740	1	602	14·52	12	264	1	1,236
*White Belgian	Hartmann	20·09	10	827	2	184	16·51	14	526	2	484
*Champion	Hartmann	16·57	8	1,087	1	831	15·51	9	1,928	1	1,061
*White Half Long	General Swedish	16·43	5	340	0	1,699	14·92	10	798	1	947
White Belgian	Trifolium	20·43	8	133	1	1,296	.....	.....		.....	
Champion	General Swedish	12·30	7	1,327	0	1,885	.....	.....		.....	

*Average 2 years, 1925-1926.

ANIMAL HUSBANDRY

DAIRY CATTLE

The Jersey herd which is maintained at this Station consisted at the end of 1926 of twenty head, of which sixteen were females, nine being of milking age. Two heifers were culled from the herd during the year and disposed of as grades. One bull calf was sold to head a grade herd and one bull calf was exchanged for a mature bull. This animal, a proven breeder, is being placed on property adjoining the Station and will stand for service in the community.

The herd successfully passed the annual test for accreditation in February.

Five cows obtained R.O.P. certificates during the year as shown in table 27. Probably the most outstanding individual record this year was that of Farleigh St. Mawes Retta—21677—which again broke further Canadian and world records this year in the 305-day class for senior two-year-olds.

Going on test at the age of 2 years, 341 days, by producing, in 305 days under the regulations governing the Canadian Record of Performance, a total of 11,606 pounds of milk, yielding 648.78 pounds of butterfat, Retta has excelled the performance of the former holder of the so-called world's record for production in this particular class, namely, Blue Fox's Eminent Queen—649691A—owned by F. H. Young of South Carolina, which produced 11,348 pounds of milk and 642.16 pounds of butterfat under the regulations of the American Record of Merit for Jersey cattle.

It may be recalled to mind that Farleigh St. Mawes Retta a year ago as a senior yearling at 1 year 347 days of age, broke the 305-day class record which was at that time acclaimed as the world's record for yearling Jerseys, by the production of 9,013 pounds of milk and 524 pounds of butterfat. This record of hers was later exceeded by the present holder of the title, Graymere Alice —585853A—owned and tested by M. N. Tibbles of Oregon.

Retta completed her lactation period in November, and is due to freshen about February 10 next, well within the time prescribed under the calving limit qualifying in the 305-day class. She carried calf for 206 days during the period of her test.

Farleigh St. Mawes Retta was bred by E. W. Paitson at Duncan, B.C., and acquired as a yearling by the Dominion Experimental Station, shortly after her dam, St. Mawes Landseer 3rd Daughter, was purchased as a foundation cow for the Station Jersey herd when it was established early in 1924.

Perhaps to the dairyman the most interesting phase of the production of this cow lies in the excellent margin of profit which she shows. Like all her stable-mates she has all her food weighed to her at each feeding and accurate production costs are therefore available. Her total feed bill for the ten months, even including allowance for pasture, was $105.30. Her feed bill for the corresponding period of her first test was $106.21. While it was actually lower this year, this is accounted for by the fact that her grain ration was lower in cost per ton than during the previous test, but the average consumed for the entire period of both tests was about the same, being 3,004 pounds in 1925 and 3,078 pounds in 1926. However, her consumption of roughages, such as silage, roots and alfalfa hay, was much higher during the last test than the previous. Her daily ration of grain did not exceed 12 pounds per day at any time, and this amount was only fed for a few days as she was dropped to 10 pounds per day when it was found that she did not respond. The grain mixture fed consisted of oat chop, bran and oil meal in the approximate ratio of 2:2:1. This ration was varied in season but the ingredients were not changed. Only meagre pasture was available for the summer months but liberal soiling crops were provided The cost per pound butterfat was exceptionally low, being 16⅓ cents per pound, even though all feeds were charged against this cow at full market prices.

This heifer is of strong, rugged constitution, of fair Jersey type and extreme dairy conformation and temperament. She is intensely bred for production, being of straight St. Mawes and Rosaries Olga Lad breeding. Her sire is St. Mawes Retta 3rd's Son—14879—186382A. Her dam is St. Mawes Landseer 3rd's Daughter—15228—471336A, in the herd of the Dominion Experimental Station at Summerland. Both sire and dam were imported by E. W. Paitson, formerly of Duncan, from E. Cary of Oregon. The sire and dam were both by Susy Anna's St. Mawes 131371A who was by Poppy's St. Mawes 115434A, a straight St. Mawes-Rosaries Olga Lad bull. Susy Anna's St. Mawes' dam was also a St. Mawes-Rosaries Olga Lad bred cow. On the maternal side both the sire and dam of Retta were straight St. Mawes and Rosaries Olga Lad. Inasmuch as these blood lines mean production to Jersey breeders it can easily be seen that Retta comes by her production quite honestly. At no time in her life has she been forced. She has made her two phenomenal records on ordinary farm care and farm-grown feeds with the exception of the oil-meal. She has always been milked three times a day and had the privilege of a loose-box.

Her yearling son, who is by a grandson of St. Mawes Lad, is being used in the Experimental Station herd at present.

	Pounds Milk	Pounds Fat
January 1926	179.7	10.70
February	1,205.8	70.99
March	1,388.8	77.87
April	1,361.0	75.31
May	1,345.8	74.00
June	1,246.2	61.69
July	1,290.0	63.31
August	1,199.0	58.85
September	980.6	58.26
October	846.2	57.27
November	563.0	40.53
	11,606.1	648.78

TABLE 27—LACTATION ON RECORD OF PERFORMANCE COMPLETED DURING YEAR

Name of cow	Reg. No.	Age at commencement of test	Date test commenced	Date calving following test	R.O.P. number of record	No. of days on test	Milk	Butter fat	Average per cent fat
		yrs. days					lb.	lb.	
Leonette of Avelreagh	11873	6 –	May 16, 1925	May 7, 1926	677A	305	10,041	495	4·93
Calgarth Starlight	17479	4 144	July 15, 1925	Sept. 17, 1926	2033	365	9,794	581	5·93
Violet's Melia Ann	11599	6 –	Aug. 31, 1925	Aug. 22, 1926	707A	305	10,016	574	5·73
Daisy of N.I.	4786	11 –	July 21, 1925	Aug. 5, 1926	708A	305	11,782	546	4·63
Farleigh St. Mawes Retta	21677	2 341	Jan. 24, 1926	Feb. —, 1927	.....	305	11,606	649	5·59
Average	.....	.....	.....	.....	.....	.....	10,647·8	569	5·34

Table 28 gives the cost of production records for the cows in the herd which were in milk throughout the greater part of the year. These figures are for the entire year, January 1 to December 31 inclusive, and show the individual and the average production of milk and butterfat, the amount and cost of all feed consumed, also the cost of production per hundred pounds of milk and per pound of butterfat; also the individual and average profit per cow over cost of feeds. These figures are interesting and directly portray the influence of the individuality in the different cows. The herd averages are fairly high for the year, being 9,919.6 pounds of milk, 554.88 pounds of butterfat, and 5.6 per cent test. On the average the cows consumed 2,890 pounds of meal, 10,837 pounds of roots ensilage and apples, 4,170 pounds of alfalfa hay, and 1,079 pounds of green feed, such as corn and oats and peas, etc. Only very limited pasture was available, and the cows had to be fed hay and soiling crops during the entire summer. The average total cost of all feeds, including pasturage, was $113.43; the average cost per hundred of milk was $1.144, and the cost per pound butterfat, 20.4 cents.

The grain mixture which was used consisted of bran, ground oats and oil-meal. The ratio used was two parts by weight of bran, two of oats and one of oil-meal, but this was varied slightly from season to season, and with different individuals

TABLE 28—PRODUCTION AND COSTS—JERSEY HERD

Name and age of cow	Total days in milk during year	Pounds of milk for year	Average daily production	Average per cent fat	Butter-fat for year	Value of butter-fat at 40c. per lb.	Value of skim milk at 20c. per 100	Total value of product	Amount and value of meal consumed in year	Amount and value of roots, apples and ensilage consumed	Amount and value of hay consumed	Amount and value of green feed consumed	Total value of all food for year including pasture	Cost of feed to produce 100 lbs. of milk	Cost of feed per pound butter-fat produced	Profit per lb. butter-fat, skim milk neglected	Profit on cow, for year, labour, calf and manure neglected
		lb.	lb.		lb.	$	$	$	lb.	lb.	lb.	lb.	$	$	$	$	$
Leonette of Avelreagh..... 8 yrs.	326	10,053·9	30·8	4·9	498·87	199·55	19·10	218·65	2,953 $56·93	11,192 $29·41	4,110 $24·77	1,178 $2·35	116·39	1·146	·233	·167	102·26
St. Mawes Landseer 3rd's Daughter..... 6 yrs.	317	7,599·3	23·9	6·3	478·75	191·50	14·25	205·75	2,038 $37·95	10,066 $25·91	4,095 $24·68	1,250 $2·50	93·97	1·230	·196	·204	111·77
Foxhall's Viola of S. C..... 9 yrs.	304	9,749·8	32·07	5·9	577·47	230·99	18·35	249·34	2,361 $45·32	10,749 $28·01	4,095 $24·68	1,323 $2·64	103·58	1·062	·180	·220	145·76
Calgarth Starlight..... 4 yrs.	316	8,552·2	27·06	6·3	539·21	215·68	17·10	232·78	2,731 $51·89	10,867 $27·89	4,040 $24·24	786 $1·57	108·52	1·270	·201	·199	124·26
Violet's Melia Ann..... 7 yrs.	311	9,731·7	31·3	5·94	578·84	231·54	18·30	249·84	3,346 $63·56	11,094 $28·51	4,260 $25·67	620 $1·24	121·91	1·252	·210	·190	127·93
Farleigh St. Mawes Retta..... 2 yrs.	305	11,606·1	37·7	5·59	648·78	259·51	21·90	281·41	3,366 $64·65	10,172 $26·24	4,331 $25·93	1,288 $2·57	122·32	1·054	·188	·212	159·09
Daisy of N. I.....12 yrs.	323	12,142·1	37·6	4·6	562·25	224·90	23·15	248·05	3,433 $66·23	11,718 $30·31	4,260 $25·67	1,106 2·21	127·35	1·048	·226	·174	120·70
Totals.....	2,202	69,435·1	.....	.....	3,884·17	1,553·66	132·15	1,685·81	20,228 $386·53	75,858 $196·28	29,191 $175·64	7,551 $15·08	794·04	.....	.....	.....	$,917·70
Average production costs and profits.....	314·5	9,919·3	31·49	5·6	554·88	221·96	18·88	240·83	2,890 $55·22	10,837 $28·04	4,170 $25·09	1,079 $·215	113·43	1·144	·204	·196	127·39

Figures used as the basis of this computation were as follows:—
Pasture was charged at the rate of $2.93 per head for the season.
Meal consisting of varying proportions of bran $29 to $31; ground oats, $34.50 to $37.50; oilcake meal, $61 to $62 per ton.
Alfalfa Hay, $12; silage, $6; roots, $4; apples, $10; green feed, $4 per ton.

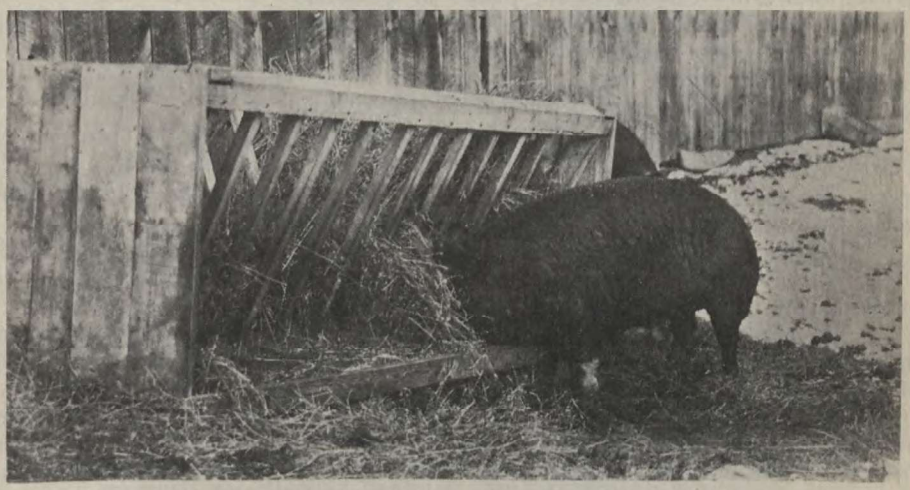
SHEEP

The pure-bred flock of Cheviot sheep which is maintained at the Station was this past summer included in a range band which summered at an altitude of around 6,000 to 7,000 feet. They came down in September in excellent condition. From reports which were received from the herder in charge, the Cheviots ranged exceptionally well and bunched well with the main flock. This information, together with that which was received from those sheep-men who are using Cheviot rams on their range flocks to the effect that extremely pleasing results had been obtained both as to hardiness and to the seasonal market weights of the cross-bred lambs, would tend to show that the use of Cheviot rams is to be commended. New-born Cheviot grade lambs are extremly hardy and in districts where the weather at lambing season is apt to be rough this is a very desirable characteristic.

The Station flock at the end of the year numbered thirty-nine head in all. A number of ram lambs were again sold for range breeding work. However, owing to the limited pasture accommodation which is available at this Station for work with sheep, the flock will be permanently disposed of before another summer.

SWINE

The swine herd numbered forty-five head at the close of the year, all of which were pure-bred Berkshires. No feeding hogs were on hand, owing to heavy demands which have been made on the herd for breeding stock, and to reduction which had been made in the size of the sow herd. Fifty-eight head of gilts and boars were distributed for breeding purposes during the year, the great majority of which were registered.



Racks for Feeding Alfalfa Hay to Brood Sows.—The wastage from feeding fine-quality alfalfa hay in properly constructed racks is not as great as appearances would indicate.

The work with swine during the year has been confined exclusively to breeding operations. No experimental feeding was done, owing both to the shortage of feeding hogs in the herd, and also to lack of proper accommodation and feeding facilities.

Several mature females were eliminated during the year and were replaced by younger matrons of better bacon type and more characteristic refinement.

The general quality throughout in the herd is at present very high.

TOBACCO

CURED LEAF QUALITIES OF VARIETIES OF TOBACCO GROWN IN 1925

These experiments were begun in 1925 to determine the varieties and types of tobacco best suited to the Okanagan valley. Eleven varieties were tested on sandy loam bench soil at Summerland. At Kelowna, seven varieties were tested on eight blocks of land several miles apart and located in various directions within a fifteen-mile radius of Kelowna. The lands included bench and low land, flat and rolling land, virgin land which the year before had been cleared of sage brush and pine trees, and land which had been cropped for many years; land with all aspects and under different methods of irrigation.

The soils of the various blocks of land were classed as clay, loam, sandy loam, fine sandy loam, fine sand and very fine sand. The growing of tobacco under such variable soil and irrigation conditions gave much valuable cultural information and results promise that good crops of tobacco can be grown on a wide variety of soils typical of the Okanagan valley. The varieties tested made, in most instances, a vigorous growth in the field and gave a heavy yield of cured leaf. All lots were air-cured and then shipped to the Tobacco Division of the Central Experimental Farm, Ottawa, for further curing and testing of cured leaf qualities. With regard to the quality of these varieties of tobacco tested in 1925, the Tobacco Division at Ottawa reports as follows:—

"In average cured leaf quality, the White Burley lots were of outstanding excellence, judging from the appearance when graded, with large, thin, uniformly bright-coloured leaves. The thinness of leaf was criticized by manufacturers, who use Burley largely in plug and pipe-smoking mixtures, and desire a heavier-bodied leaf. It may be possible, however, to remedy this condition by wider spacing and lower topping of the plants in the field.

"The cigar-binder lots* were of good quality except where grown on virgin soil. One objection might be that the leaf carries too much body for a prime binder, but this defect may be obviated by closer spacing in the field, and harvesting before the leaves become thick and overripe.

"The quality of the Green River lots was disappointing. A tremendous growth was obtained in the field, but the cured leaf was much too thin for this type. By wider spacing, lower topping and leaving the crop a longer time in the field, it may be possible to improve the leaf body.

"The flue-cured types† were air-cured, as no flue-curing barns were available. The field growth was very heavy, and the leaves cured fairly well, with qualities like the Green River but with better body.

"The cured-leaf qualities of the Cuban and Canelle types were poor, and the yield low. On the basis of 1925 results, these sorts showed the least promise of any tested for the Okanagan valley.

"In summing up our 1925 results, it should be pointed out that excepting the cigar varieties, none of these types had ever previously been grown in British Columbia. Much remains to be done in the way of ascertaining the best methods of culture and handling to improve the quality of the product. But the results secured are promising and indicate that the Okanagan valley may well be regarded by manufacturers as a possible source of supply of leaf tobacco."

A detailed report of the field experiments with tobacco conducted at the Summerland Experimental Station and at Kelowna, B.C., for the year 1925 is given in the Report of the Tobacco Division for the year 1925.

* Cigar Binder type—Connecticut Havana No. 38

† Flue-cured types—Hickory Pryor and Warne.

FIELD EXPERIMENTS AT KELOWNA, 1926

TOBACCO, VARIETY TESTS.—In the Kelowna district eight varieties of tobacco were tested on bench or semi-bench land under irrigation and on low land without irrigation.

TOBACCO, COST OF PRODUCTION STUDIES.—The economic feasibility of the culture of tobacco in comparison with other crops grown in the district is of considerable importance at this early stage of the tobacco industry in the Okanagan valley especially to prospective tobacco-growers who are operating on high-priced land under irrigation. An experiment was, therefore, started this year in the Kelowna district to determine the cost per pound to produce cigar leaf and other types of tobacco.

Owing to the lateness of planting and the slow curing of the experimental tobacco grown in the Kelowna district this year, the results of the variety tests and cost of production studies are not available for publication in this report.

FIELD TESTS AT SUMMERLAND EXPERIMENTAL STATION, 1926

Varietal tests with tobacco under Project T. 47 were continued this year. The Cuban and Canelle types which were grown in 1925 and which gave very poor cured-leaf qualities and low yields were not included in this year's tests. The White Burley grown last year was of such excellence that four additional White Burley varieties were included in this year's test. Four lots of Turkish tobacco were tested this year and harvested by the priming method. These tobaccos gave an average yield of 947 pounds of cured leaves per acre.

The seed was sown* in cheesecloth-covered semi-hot beds on April 17, and the seedlings transplanted into the field on June 15. Previous to transplanting, precautionary measures were taken to combat cutworms by two applications of poisoned bran mash. Attacks by wireworms, however, necessitated extensive daily replantings for two weeks. Throughout the season the crop was given two cultivations, three hoeings, and three irrigations at the rate of approximately 4 acre-inches per irrigation. The sand or lower leaves were removed in late July. Hornworms, more commonly known by the growers in this district as tomato-worms, were numerous, but by keeping a sharp watch for them when working on the plots, they were easily kept under control.

Tobacco leaf drop, an injury to tobacco plants in the form of the lower prime leaves dropping off the stems, the cause of which is not known and which was observed last year at this Station on a number of plants, was not observed on the tobacco plants grown this year at Summerland.

Frenching, also an injury to tobacco plants, the cause of which is not known but thought to be due at least to a certain extent to the influence of too much irrigation water, was observed again this season. Last year this injury could only be seen on the two or three uppermost leaves. This year, however, this injury was more prevalent and could be seen on the uppermost leaves and also on the leaves extending down the stem to about the centre of the plant.

Physiological Leaf Spot and Frenching were very prevalent in a part of the field where it was thought that too much irrigation water was applied to the crop. The low yields of cured leaves recorded in the spacing and harvesting experiments as compared with yields obtained from the variety tests, were in a very large measure due to Frenching and Leaf Spot.

A disease called Curly Dwarf, a leaf malformation, the cause of which is not known, was observed for the first time on a few plants at this Station.

It is interesting to note that each of the nine varieties under test yielded at the rate of over a ton of cured leaves per acre. The total average yield of the

* The dates of seeding and transplanting were approximately twenty days too late for best results.

nine varieties was 2,314 pounds of cured leaves per acre. A comparison of the cured-leaf qualities of these varieties will not be available in time to be published in the report. Growth data recorded are the averages of duplicate plots and are presented in table 29.

A detailed report on Tobacco Leaf Drop, Fusarium Leaf Spot, and Curly Dwarf, entitled "New and Unusual Diseases and Injuries of Tobacco" by C. M. Slagg, Chief, Tobacco Division, Central Experimental Farm, Ottawa, Ontario, was published in Scientific Agriculture for February, 1926.

TABLE 29—Tobacco—Variety Test—Conducted at the Dominion Experimental Station, Summerland, B.C.

Variety	Number of days				Twenty-five Plants										Yield per acre, cured leaves	
	To topping		To harvesting		Average height of plants at topping		At harvest time				At stripping time					
							Average length of longest leaves		Green weight		Weight					
											Stalks		Cured leaves			
	1926	Average 1925-26	1926	Average 1925-26	1926	Average 1925-26	1926	Average 1925-26	1926	Average 1925-26	1926	Average 1925-26	1926	Average 1925-26	1926	Average 1925-26
					inch.	inch.	inch.	inch.	lb.	lb. oz.	lb. oz.	lb. oz.	lb. oz.	lb. oz.	lb.	lb.
Connecticut Havana No. 38	52	53	75	77	24	34	27	26	83	71	12 11	9 15	7 15	.. ..	2,994	2,528
Greenwood	61	64	75	81	48	54	30	28	92	96	10 9	9 0	9 11	9 5	2,265	2,241
Hickory Pryor	57	59	75	81	46	56	28	27	77	79	10 12	12 0	7 12	8 0	2,607	2,234
Station Standup White Burley	61	61	88	83	46	51	30	31	69	73	8 5	7 0	9 0	9 0	2,094	2,064
Warne	57	59	75	81	55	61	29	28	80	77	10 10	9 0	8 6	9 0	2,029	2,063
**Halley's White Burley	61	.....	87	.....	39	.....	31	.....	104	.....	12 14	.....	12 14	.....	3,219	.....
*Judy's Pride White Burley	61	.....	88	.....	46	.....	27	.....	78	.....	9 7	.....	9 10	.....	2,351	.....
*Broadleaf White Burley	61	.....	88	.....	35	.....	28	.....	67	.....	8 4	.....	9 5	.....	2,094	.....
*Standup Resistant White Burley	61	.....	88	.....	50	.....	28	.....	63	.....	8 12	.....	7 2	.....	2,082	.....

*Tested one year only—1926.

**Yield per acre of cured leaves was calculated on the basis of 25 plants. Some plants were widely spaced in the plot, this would have an influence on the high yield recorded.

TOBACCO—FIELD SPACING AND TIME OF HARVESTING—PROJECTS T. 12 AND 81

With further reference to the cured-leaf qualities of varieties of tobacco which were grown in the Okanagan valley in 1925, the Chief of the Tobacco Division at Ottawa reports as follows:

"With certain varieties of tobacco grown in the Okanagan valley in 1925, the quality did not measure up to the requirements of the manufacturers. In some cases the leaf carried too much body and in others not enough, judging by the standards for each variety as required by the trade at present. This resolves itself into a problem of securing cigar binder tobacco with less body and more elasticity, a thinner and stretchier leaf, and in the case of the Green River and Burley varieties to obtain a thicker and heavier leaf, at the same time maintaining the proper colour and other desirable characteristics in the varieties." For these reasons, therefore, field spacing and harvesting experiments were begun at the Summerland Experimental Station in 1926.

The different varieties under test show that the larger the space between the plants in the row, the smaller the yield of cured leaves; also that the larger the number of days from topping to harvesting, the larger the yield of cured leaves. The tobacco grown in these tests is not sufficiently cured to ascertain the effect on the quality of this year's cured leaf as derived from the different spacings between plants in the row and of the number of days from topping to harvesting the crop. However, from observations made in the curing-shed, it would seem that with the variety Connecticut Havana No. 38, as the number of days as outlined in the experiment was increased from topping to harvesting, there was a marked decrease in the quality of the leaf.

The space between the plants in the row and the number of days from topping to harvesting and the results obtained, with the exception of quality, which is the object of these experiments, are given in tables 30 and 31.

TABLE 30—TOBACCO—SPACING BETWEEN PLANTS IN THE ROW

Variety	Space between plants in the row*	Number of days		Twenty-five Plants					Yield per acre, cured leaves, 1926
				Average height of plants at topping	At harvest time		Atetripping time		
		To topping	To harvesting		Average length of longest leaves	Green weight	Weight		
							Stalks	Cured leaves	
	inch			inch	inch	lb.	lb. oz.	lb. oz.	lb.
Station Standup White Burley	24	61	91	40	28	60	6 9	7 15	2,039
Station Standup White Burley	30	61	91	44	28	66	8 5	8 12	1,851
Station Standup White Burley	36	61	91	43	31	74	10 8	10 0	1,752
Greenwood	24	66	75	50	24	78	11 11	8 3	1,906
Greenwood	30	61	75	48	23	81	16 9	9 10	1,535
Greenwood	36	61	75	51	24	87	13 15	9 3	1,498
Connecticut Havana No. 38	18	61	75	48	26	81	12 12	6 14	1,993
Connecticut Havana No. 38	22	61	75	46	25	75	10 8	5 13	1,644
Connecticut Havana No. 38	26	61	75	48	25	79	11 10	6 0	1,639

*Space between rows, 36 inches.

TABLE 31—TOBACCO—HARVEST EXPERIMENT—NUMBER OF DAYS FROM TOPPING TO HARVESTING THE CROP

Variety	Number of Days			Twenty-five Plants			Yield per acre, cured leaves, 1926
	From topping to harvesting	From planting to topping	From planting to harvesting	Green weight at harvest	At stripping time		
					Weight		
					Stalks	Cured leaves	
				lb.	lb. ozs.	lb. oz.	lb.
Station Standup White Burley	21	64	85	44	4 7	6 2	1,612
Station Standup White Burley	28	64	91	49	6 0	7 0	1,938
Station Standup White Burley	35	64	98	57	10 7	13 2	2,527
Greenwood	20	61	80	65	13 3	8 2	2,047
Greenwood	30	61	81	70	11 8	10 13	2,631
Greenwood	40	61	98	78	12 0	12 14	2,645
Connecticut Havana No. 38	15	57	75	74	11 12	6 9	1,793
Connecticut Havana No. 38	20	57	80	66	10 9	6 1	1,490
Connecticut Havana No. 38	25	57	83	51	8 8	6 0	1,866

BRIEF CULTURAL RECOMMENDATIONS THAT PARTICULARLY APPLY TO OKANAGAN VALLEY CONDITIONS

SEED-BEDS.—When cold frames or semi-hotbeds are used, seed should be sown the last week in March. Plants raised in the greenhouse may be started later than March. Tobacco seed should be sown at such a time as will provide sturdy plants from 4 to 6 inches high for transplanting to the field when the soil is warm and when there is no danger from late spring frosts. Under normal conditions, the last week in May should be an opportune time for transplanting tobacco plants to the field.

SOILS.—Light gravelly soils, even under irrigation, are not suitable for the culture of tobacco.

IRRIGATED LANDS.—Tobacco fields under irrigation must be thoroughly levelled and graded to ensure prompt and uniform distribution of water.

IRRIGATION.—To produce a large crop of high-quality leaf tobacco in seventy to ninety days in the field, it is essential to maintain through judicious irrigation and cultivation a continuous available supply of moisture in the soil. *At the same time, it should be borne in mind that the tobacco plant will readily suffer from a very small amount of excess irrigation.* On fertile soils in good tilth, the tobacco plant does not require large amounts of water. The amount of irrigation and frequency of application will depend in a large measure on the class of soil and the fertility and tilth of the soil and also on the slope or grade of the land. Each grower should endeavour to ascertain the amount and frequency of irrigation that is best suited to his particular soil conditions.

The judicious irrigation of tobacco under Okanagan valley conditions is a very exacting cultural operation and should be given very careful supervision. Care should be exercised not to over-irrigate.

HOEING.—After transplanting, hoeing should be prompt and thorough, especially when a machine planter which gives about a quart of water to each plant has been used. On many soils, this method of watering at transplanting time causes the soil around each plant to bake. Under such soil conditions the young plants make practically no growth until the soil has been thoroughly hoed. A prolonged check in growth at this time will take a heavy toll in yield and quality of leaf.

HARVESTING.—Under Okanagan valley weather conditions it is possible within an hour from cutting to piling to burn the leaves that are directly exposed to the sun. Accordingly, during very hot weather, the tobacco crop should not be cut and piled during the heat of mid-day.

HAULING.—The practice of piling flat on a truck from one to three tons of leaf tobacco when hauling tobacco from the field to the curing barn should be discontinued if growers desire to attain the best possible quality of cured leaf. Properly constructed racks should be used.* Under Okanagan valley conditions the aim should be to have the crop harvested during the latter part of August to take advantage of the hot days during early autumn and have the crop thoroughly cured for stripping during mild and damp weather in late October or November.

PUBLICATIONS ON TOBACCO CULTURE

The following publications of the Dominion Department of Agriculture relating to tobacco culture are available on application to the Publications Branch, Department of Agriculture, Ottawa, or to the Dominion Experimental Station, Summerland, B.C.

Tobacco-Growing in Canada—Bulletin 25.
Tobacco Seed-Beds—Bulletin 21.
Tobacco, Summary of Three Years' Experiments at Harrow—Bulletin 41.
Flue-Cured Tobacco in Canada—Bulletin 38.
Heating-appliances for Flue-Curing Tobacco—Pamp. 51.
White Burley Tobacco in Canada—Bulletin 66.
Tobacco-Growing in Southwestern Ontario—Bulletin 76.
Annual Report of the Tobacco Division, Central Experimental Farm, Otttawa.

POULTRY

White Wyandottes are maintained exclusively at this Station, and at the end of the year the stock consisted of 115 hens, 277 pullets and 12 males, a total of 404 birds.

Egg production has been well up to the standard of previous years; in fact, the 248 pullets which were trap-nested during the season 1925-26, laid better than any former flock bred on this Station. Of these, 102 birds, or 41.1 per cent of the whole, laid 200 eggs or more.

Much work has been done on egg size, and only birds laying good average eggs were used in the breeding pens except where records on breeding up egg size are desired. Registration, as practised in connection with the Dominion Egg-Laying Contests, has done more than anything else to make the poultry-breeder recognize egg size as probably the most important factor when mating up breeding pens.

It takes at least three years to breed out the bad results of using a male bird that is the progeny of a female laying small eggs.

The pullets, some of which have been in their winter quarters since September of this year (1926), have come along in laying just as well as in any former season, and should produce well up to the previous standard. A pen was this fall entered in the Agassiz Egg-laying Contest.

No expansion in the investigational work on the plant is contemplated until a new site has been obtained where the soil can be kept clean and sweet.

BEES

The 1926 season was another favourable one for the bees in this locality, especially with regard to the colonies on this Station. The winter 1925-26 was particularly short and mild, with even temperatures throughout, so that all colonies survived, although one was found to be queenless and had to be united later.

*Pictures of tobacco racks for hauling tobacco from the field to the barn are given in the following bulletins on the culture of tobacco.
Tobacco-Growing in Canada—Bulletin No. 25.
White Burley Tobacco in Canada—Bulletin No. 66.

As usual alfalfa was the chief source of nectar supply, with varying flows from vetch, sweet, alsike and Dutch clovers, etc.

The total crop produced from the eleven hives (spring count) was 2,100 pounds, an average of 191 pounds per hive. The greatest yield from one hive was 268 pounds. Only 100 pounds of sugar was required for feeding this fall, sufficient honey having been retained in each hive to make up the deficiency. This honey was not calculated in the total yield of 2,100 pounds.

WINTERING BEES IN FOUR-COLONY CASE—PROJECT AP. 8

All colonies wintered very well under this method. On April 27 when the first spring examination was made, the average number of combs covered by bees was 9.7, whilst the brood was 7.7, and weight of stores 37.5 pounds, per hive.

WINTERING BEES IN SINGLE-COLONY CASE—PROJECT AP. 10

All but one of the eight colonies under this method of wintering came through in good shape; the exception was minus a queen, which necessitated its union with another colony.

At the time of spring examination (April 27) an average of 9.8 combs were covered by bees in each hive. Brood was in an average of 7.7 frames, and weight of stores 40 pounds per hive.

COMPARISON OF DIFFERENT SIZES OF HIVES—PROJECT AP. 21

Two sizes of hives come under this experiment at this Station, the Langstroth 10-frame, and the Jumbo 10-frame. Production records follow:—

TABLE 32—SIZE OF HIVE

Make of Hive	Number of hives	Total honey yield	Average per colony
		pounds	pounds
Langstroth	5	983	196·6
Jumbo	2	446	223·0

PROTECTED VERSUS UNPROTECTED HIVES DURING SUMMER—PROJECT AP. 42

This experiment was started in 1925, the primary object being to determine whether protecting cases, either partial protection or full, has any influence on the amount of honey produced. In past years it was usual to adopt one of the two best known methods, either no protection whatever or full Kootenay cases, with lifts added to conform with the number of supers. As this latter method entailed much more work, especially when going through the colonies every ten days during swarming season, and also necessitated having a large number of lifts to add to the hives as the season progressed, it was thought that the work, etc., could be curtailed, without any loss in production, if just the brood-chamber were protected. The results of 1926 are given in table 33.

TABLE 33—PROTECTION FOR HIVES

Method followed	Number of hives	Total yield	Average per colony
		pounds	pounds
Full protection	4	859	214·75
Brood-chamber protection	3	570	190·0
No protection	4	671	167·75