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Canada

DOMINION OF CANADA

DEPARTMENT OF AGRICULTURE

DOMINION EXPERIMENTAL FARMS

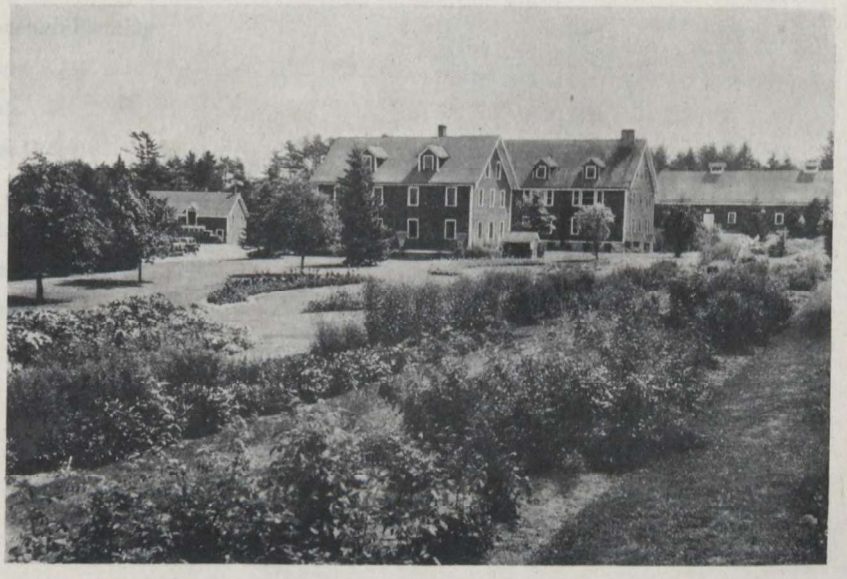
Dominion Experimental Station

Kentville, N.S.

RESULTS OF EXPERIMENTS

1931-1936 INCLUSIVE

W. S. BLAIR, D.Sc.
Superintendent



Part of the flower garden and main buildings. Left to right: Implement shed, office, laboratory, and fruit warehouse.

Published by Authority of the Hon. James G. Gardiner, Minister of Agriculture,
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DOMINION EXPERIMENTAL STATION

KENTVILLE, N.S.

PROGRESS REPORT, 1931-1936

INTRODUCTION

The purpose of this report is to acquaint the fruitgrowers and farmers of the Annapolis Valley and western Nova Scotia with the results of some of the major lines of work being carried on at this station. No attempt is made to outline the methods of investigation or the detailed data on which recommendations are based. It is hoped that information of practical value will thus be presented, and that those especially interested in any subject will feel free to write the station for detailed information.

The weather records which have been kept at this station for 23 years show in a general way the climatic conditions of this part of Nova Scotia and, in particular, of the Annapolis Valley. Extremes of temperature are rare. The highest temperature recorded was 99° F., and in only eight summers of the 23 did the temperature go over 90 degrees. The lowest temperature recorded was 22 below zero, and this occurred twice in the 23 years. In a mild winter the temperature may go below zero only seven or eight times, with a minimum of 5° or 6° below for the season.

The average yearly precipitation is a little over 40 inches, fairly regularly distributed throughout the year, with an occasional dry period of three or four weeks in summer, and nearly always a wet October. The snowfall included in the above precipitation (10 inches being equal to one inch of rain) has averaged 81 inches yearly (the equivalent of 8·1 inches of rain), ranging from 18 to 22 inches for each of the winter months. The snowfalls are usually followed by mild weather resulting in rapid settling and often ice formation on the surface soil.

The bright sunshine varies from an average of about 220 hours in July and August to about 58 in December, with a yearly total of about 1,760 hours.

In the period 1931 to 1936, inclusive, the outstanding departure from normal weather was the very cold, early winter of 1933-34. Because of the wet, open fall and the sudden onset of severe weather much earlier than usual, many apple trees still in a succulent, growing condition were badly injured, some being killed outright. This loss has been computed to be approximately five per cent of the mature and young trees.

Another set-back to orchardists was the two heavy windstorms in September, 1932, when approximately half of the crop was shaken off the trees. An early severe frost (11 degrees) on October 11, 1936, also seriously damaged late varieties of apples still unpicked.

TREE FRUITS

Apples

The major experimental work at this station is with apples. The total area planted is 61 acres, of which 16 acres are not yet fruiting. Seven acres are devoted to tests of varieties. All the areas are devoted to tests of some kind, either cultural, fertilizing, or spraying. The young orchard is made up principally of varieties developed on different kinds of rootstock, which have not yet fruited.

The land on which the most of the orchard is situated was in forest when the station was started in 1912, and was cleared from 1912 to 1915. The soil is a sandy loam with fair natural surface and subsoil drainage. The soil would not be considered of high fertility, but so far as surface appearance indicated, was uniform and the average of similar soils on which apples were being produced profitably.

The standard orchard varieties, such as Gravenstein, Wealthy, Blenheim, Ribston, Cox Orange, King, Wellington, Rhode Island Greening, Wolf River, Yellow Bellflower, McIntosh, Fameuse, Northern Spy, Stark, Ben Davis, Gano, Rome Beauty, Baldwin, and Golden Russet, were most extensively planted, and interplanting was made on the entire area with Wagener. The latter was considered a good variety for pollination purposes. The bulk of the planting was of Gravenstein, McIntosh, and Wagener.

The standard sorts were planted 40 feet apart and the Wagener between the standard trees in the row, the rows thus being 40 feet apart and the trees 20 feet apart in the row. This made 54 trees per acre.

Orchard area. Gravenstein and Wagener alternating. Planted in 1913. Covered branches and cheesecloth tents used for breeding work.

One of the reasons for spacing the rows 40 feet apart was to permit the growing of field crops between the rows for the longest time possible, thus using the land to advantage when the trees were being developed. It was thought also that a spacing of this distance, when the trees were matured, would permit of better use of spraying equipment, allow the free movement of implements necessary to cultivate the trees properly and provide for adequate handling of the crop. At such time as the intermediate trees (Wagener) interfered with the development of the standard trees they were to be removed and the orchard trees left, 40 by 40 feet apart, or 27 trees per acre.

Records have been secured as to the value of the crops produced on the land not occupied by the roots of the growing trees. The area utilized by the young trees at the start was limited. The trees were cultivated and kept free from weeds or other growth during the first ten to twelve years, and after this a grass strip was allowed to develop under the trees, thus doing away with cultivation close to the tree and thereby avoiding root injury, which so often results from deep ploughing and cultivating close to the tree.

Fertilizer Experiments

Several different areas have been used for tests with fertilizers. The earliest, and the one covering the longest period, was started in 1913, and consisted of 51 plots which have been fertilized and cultivated according to plan since that date. The varieties were Gravenstein, McIntosh, and Wagener. The plots were each 100 by 40 feet and included five trees, but the end or fifth tree of each plot, which served as a guard tree between the plots and received on opposite sides the treatments given the adjacent plots, was not used in the tabulation of the records. The yields were from two Gravenstein or McIntosh trees, and two Wagener, on each plot. The yields were recorded in pecks but the production during the first seven years in the records here given is not included, as up to that time the production from apple trees is exceedingly light. The yields here recorded are for the 16 years, 1920 to 1935 inclusive.

Fertilizers Applied.—When the experiment was started it was the opinion that 150 pounds per acre of nitrate of soda was sufficient to supply the nitrogen required. This at the present time is considered to be quite inadequate, and many orchardists are using even up to 600 pounds per acre. Superphosphate was supplied at 350 pounds per acre and basic slag, when used, at 500 pounds per acre. Muriate of potash was used at 150 pounds per acre. Some plots were fertilized with one of these fertilizing materials only, others had two, and others were given a complete fertilizer made up of the three at the rates stated. When the three were used together the amount given per acre was 650 pounds, containing approximately 3½ per cent of nitrogen, 8½ per cent of phosphoric acid, and 11½ per cent of potash, and supplying approximately 22½ pounds of nitrogen, 55 pounds of phosphoric acid, and 75 pounds of potash per acre per year.

Stable manure was used at the rate of 5 tons per acre per year on some plots. On certain plots 2 tons of ground limestone was used once in three years. This was used to permit of a better development of clover. The lime supplied to these plots, 14 tons since the trees were planted, was apparently in excess of the requirements of the trees, and, in fact, produced malformation in fruits and die-back on the branches, due evidently to the lime inhibiting the intake of boron, an element considered to be of minor importance but which must be present if certain physiological disorders are to be avoided. This was particularly in evidence in the McIntosh trees where lime was used.

Production.—The records from the individual trees show a considerable range in yield between the two trees of a variety on each plot. The highest-producing Gravenstein trees averaged on all plots 334·9, and the lowest, 268·2 pecks; the highest McIntosh, 322·4, and the lowest, 232·7 pecks; and the highest Wagener, 176·4, and the lowest, 139·6 pecks of total product during the 16 years. This is a difference per year between highest and lowest trees of 4·1 pecks for Gravenstein, 5·6 pecks for McIntosh, and 2·3 pecks for Wagener, per tree. It is evident that over a period of years some trees have consistently produced lower yields than trees of the same variety 40 feet away fertilized similarly. This difference is due to some influence other than the fertilizer and cultural treatments, as all plots have been treated alike.

Trees Not Fertilized.—There were nine plots in this experiment not fertilized, of which six were Gravenstein (and Wagener) and three McIntosh (and Wagener). The highest-yielding Gravenstein plot averaged 351·9 pecks (total production) and the lowest, 151·7; the highest McIntosh, 284·3 and the lowest, 236·1; the highest Wagener, 144·7 and the lowest, 57·8 pecks, per tree, during the 16 years. This difference is evidently due to variability in the depth of the surface A_1 layer. The soil profiles in this field show an undulating A_2 horizon and a consequent greater depth of surface soil in some sections than in others. The annual crops grown on these areas did not indicate such variability. There was no indication that the difference in yield was due to any variation in the rootstock used.

Complete Fertilizer.—Two plots of Gravenstein and McIntosh have been supplied yearly with 650 pounds per acre of the complete fertilizer already referred to. The total yields averaged for Gravenstein, 358·3 pecks; for McIntosh, 349·1 pecks; and for Wagener, 181·9 pecks per tree.

Different Amounts of Potash.—In some of the plots supplied with the three elements of plant food, the rate of application of potash has been varied, 30, 60, 100, and 150 pounds per acre being used, the other elements being supplied alike to all plots. The respective yields were: Gravenstein, 324·3, 354·7, 369·7, 358·3 pecks; Wagener, 111·9, 163·6, 183·8, and 224·9 pecks. The yields from plots given one element only were: Gravenstein, potash only, 264·6 pecks; nitrogen only, 283·3; superphosphate only, 264·6 pecks. Wagener, potash only, 108·8; nitrogen only, 142·3; superphosphate only, 67·8 pecks. The results show that single elements are not effective in giving best production and that if a fertilizer containing one element only is used a nitrogenous fertilizer is likely to be the best.

Different Rates per Acre.—A complete fertilizer of the combination already mentioned (3½ per cent nitrogen, 8½ per cent phosphoric acid and 11½ per cent potash) was applied to separate plots at 400, 600, and 800 pounds per acre. The respective yields were: Gravenstein, 232·5, 278·4, and 337·9 pecks; Wagener, 218·5, 138, and 175·2 pecks, per tree in 16 years. The yield in Wagener has not shown a consistent increase from the larger applications. No reason can be given. The plot receiving the largest rate per acre has the best-appearing trees at the present time, and the trees with the medium application are better than the ones where the 400-pound application has been used. This latter plot, however, has been the most productive, although the trees are now lacking in vegetative vigour.

Nitrate of Soda with Superphosphate, or Basic Slag, and Potash.—Nitrate of soda with basic slag gave for Gravenstein in 389·5, and for Wagener 235·1 pecks per tree. Nitrate of soda with superphosphate gave for Gravenstein 284·7, and for Wagener 125·8 pecks per tree. Nitrate of soda with potash gave for Gravenstein 401·1, and for Wagener 257·5 pecks per tree. The superphosphate and nitrate of soda plot shows a shallower top-soil layer than that of the one where nitrate of soda and slag were used, and has consistently been one of the best plots in the orchard.

Manure.—Where manure was used, 5 tons per acre per year, the yield of Gravenstein was 277·6, and of Wagener, 193·3 pecks; manure with superphosphate gave, for Gravenstein 305·1, and for Wagener, 202·4 pecks; manure and slag gave, Gravenstein 300·8 and Wagener 219·1 pecks, per tree in 16 years. This indicates a gain from using superphosphate or slag in addition to the manure.

Soil Survey of This Area.—Because of the data secured, a soil survey was made of certain plots by the Division of Chemistry, Central Experimental Farm, Ottawa. The results indicate that even in limited areas the depth of surface soil ranges from 8 to 15 inches. It is evident that the depth of the surface-soil layer is of importance and may be accountable for the range in production of the trees on certain plots. The natural soil in Nova Scotia in its unbroken state has a very uneven surface and during the working of the land to make it level the top surface of the cradle-hills or mounds is worked into the depressions, resulting in a good depth of surface soil where the depressions were and a shallower surface soil on the cut-down mounds. If such shallow surface soils are evident it is advisable when planting apple trees to remove the subsoil to a depth of one foot and from four to five feet in diameter, replacing this soil with surface soil and thus making possible the development of good, deep main roots. It is thought that in this way much of the variable production in orchards may be overcome.

Results from This Test.—The growth at present indicates that the trees on most of the unfertilized plots and those receiving no nitrogen are lacking in productive vigour and that a higher nitrogen feeding will be required to maintain the vegetative vigour necessary for wood growth and production. It is apparent that the single elements alone—nitrogen, phosphoric acid or potash—will not on this land develop good trees after the natural fertility has, in part at least, been exhausted. It does seem that nitrogen is more important than any other single element, but that on such soils a complete fertilizer is advisable. There seems to be no reason why 500 pounds per acre of 9-5-7 fertilizer, as at present advised, supplying 45 pounds of nitrogen, 25 pounds of phosphoric acid and 35 pounds of potash per acre, should not fully meet the requirements for good growth and production on any orchard area. This is particularly the case in cultivated orchards. If the orchard is cultivated between the trees and a vetch cover crop used it is quite possible that a 6-5-7 mixture will supply sufficient nitrogen to meet all requirements. It is evident that excessive amounts of nitrogen may give more vegetative growth than is necessary, resulting in more pruning than should be required, and producing a fruit not keeping so well in storage as one from a tree receiving a balanced supply of the three elements.

OTHER ORCHARD FERTILIZER EXPERIMENTS

Other tests were made on uniform areas, using trees that had been grown under the same conditions. These were as follows:—

Source of Nitrogen.—Nitrate of soda, sulphate of ammonia, cyanamid, and nitrate of lime were compared. Nitrate of soda (15 per cent) at the rate of 5 pounds per tree supplies nitrogen equivalent to that in sulphate of ammonia (20 per cent) applied at the rate of 3¾ pounds per tree, and in cyanamid (22 per cent) at 3½ pounds per tree. The amounts of the different materials applied per acre varied, but in each case the same amount of nitrogen was supplied. Mineral fertilizers consisting of two pounds of superphosphate and one pound of muriate of potash were supplied in addition to all trees in the test. The yields in barrels per acre are the average of a nine-year test with King, Baldwin, and Wagener and were: nitrate of soda, 112·3; sulphate of ammonia, 106·8; nitrate of lime, 106·8; cyanamid, 102·8; not fertilized with nitrogen, 94·3.

Nitrate of Soda Applied at Different Rates.—It has been thought that in some cases more nitrogen is applied than is necessary to get good production and that this may lessen colour in the fruit by checking early maturity, and produce fruit that will break down in storage or during shipment. In a test covering a period of 12 years with the variety Gravenstein the rates of application and results from the nitrogen were as follows:—

NITRATE OF SODA APPLIED AT DIFFERENT RATES PER ACRE

Rate applied per acre	Yield per acre per year	Colour rating	Storage breakdown January 1st
	bbl.	%	%
0 lb.	80·84	60·00	4·00
200 lb.	90·36	56·25	4·00
400 lb.	97·15	51·25	12·75
600 lb.	97·56	43·75	17·75

The colour ratings and storage records are the average for this period. It is evident that the colour was best, and that the fruit in storage kept better, where the lighter applications of nitrate of soda were made. All plots received uniform basal applications of superphosphate and muriate of potash.

Cultural Tests and Date of Application.—The same mixture of fertilizer was used in each case on a clean-cultivated area, an area in sod, and one under sod-strip culture—a strip ten feet wide under the tree allowed to remain in grass, and the area between these strips cultivated until the end of June and then seeded with a cover-crop of common vetch. The sod-strip itself was not cultivated. The grass growth was clipped on both the sod and sod-strip areas when six to eight inches tall and left as a mulch. The average yield in barrels per acre over a period of 12 years was, for clean cultivation, 57·72; for sod-strip and cultivation, 104·84; and for sod with mulch grass, 74·50.

Fertilizer was applied to plots on these areas April 25, May 17, and June 8 each year, with one series of plots left unfertilized. The average yields of these plots were 71·84, 79·83, 87·21, and 66·45 barrels per acre, respectively. This test was with McIntosh.

MAIN ORCHARD FERTILIZATION

The orchard area not under fertilizer tests was fertilized with a mixture made up of 200 pounds of nitrate of soda, 200 pounds of sulphate of ammonia, 300 pounds of superphosphate, and 100 pounds of muriate of potash. This approximates a mixture containing 8·7 per cent of nitrogen, 6 per cent of phosphoric acid, and 6·2 per cent of potash. The amount applied ranged from three pounds per tree at the start to eight pounds per tree as the orchard matured. There were 54 trees per acre and the rate at eight pounds per tree would be 432 pounds per acre, or four pounds of nitrogen, three pounds of phosphoric acid, and one pound of muriate of potash, per tree per year. This application seems to be sufficient to maintain the orchard in vigour and production. The trees are grown under the sod-strip method and common vetch is seeded to the cultivated areas between the grass strips.

The series of plots dealing with the use of the principal fertilizing materials —nitrate of soda, sulphate of ammonia, and cyanamid supplying nitrogen; superphosphate and slag supplying phosphoric acid; and muriate of potash supplying potash—indicate in general that on land newly cleared and similar to that used, the amount of plant food present may meet the requirements of the growing tree and give reasonable production for a number of years even if no fertilizers are used at all. The areas with a fairly deep surface soil show much greater vigour, and variable surface soil may be a greater factor in growth and production than the differences in fertilizers used.

It is quite evident, however, that there is no way whereby a sturdy, productive tree can be secured except by using a well-balanced fertilizer. It does appear

that nitrogen alone cannot be used to advantage, that superphosphate and potash in moderate amounts are necessary, and that lime may on many soils be required to make up the shortage of calcium.

While the plots not fertilized have been productive, in most cases the trees show a stunted, thin leaf and weak fruit-buds, and, as time goes on, it would seem that, because of the depletion in natural fertility, this condition will be accentuated and the trees will prove to be unprofitable.

The 9-5-7 fertilizer has been used extensively of late years by growers. On light, poor soils this combination has given good results. It is apparent, however, that a modification of this formula is necessary on soils high in nitrogen, and with varieties such as Stark and Gravenstein. These varieties if fed a fertilizer high in nitrogen tend to make excessive vegetative growth, resulting in a suppression of fruit-bud formation and greatly increasing the cost of pruning.

It does seem that a 9-5-7 fertilizer at the rate of 450 pounds per acre is satisfactory on good soils, and that double this may be used to advantage on some sandy soils. It seems doubtful if more than this amount is necessary. The yearly growth, and condition of the fruit-buds formed, must be relied upon by the grower in determining the rate of application of fertilizers in his orchard.

The tests with the different forms of nitrogenous fertilizers, mentioned previously, show that, per unit of nitrogen, there is little difference as to their suitability for orchard work.

East Malling Rootstocks

Propagation of apple stocks by the stool method was started in 1923, using several types from the East Malling Research Station, England. Those grown in 1926 were planted in nursery rows in 1927 and budded. The varieties Cox Orange, Red Spy, Red Stark, and Gravenstein were used. These were planted permanently in 1930. The growth and production indicate type XII to be the most vigorous, followed in order by types XIII (almost as vigorous), XVI, I, and V. Type II is a semi-dwarfing rootstock. Type XI is very dwarfing. The results seem to show that while type XII is the most vigorous, type XIII and type I are the most productive to date. Type II has not fruited as early as anticipated but has developed excellent semi-dwarf trees. Type XI is considered to be of little value as a rootstock for commercial orchard plantings.

Trees propagated on the French crab rootstock and planted at the same time are as vigorous as any of the trees on the other stocks used and were in fruiting as early.

The Girdling of Seedling Apple Trees to Induce Fruiting

The seedling trees grown in connection with the apple-breeding work are planted in rows four to six feet apart and four feet apart in the row. An attempt has been made to promote earlier fruiting by girdling of the trunks when four years of age. Several methods have been followed and the one found to be the most satisfactory is that known as the double spiral system, or the removal of a band of bark three-eighths of an inch wide in a spiral twice around the trunk, starting about one and one-half foot from the ground. The spiral cut is ranged two inches apart and the upper and lower ends are four inches apart. The space opened is filled with grafting wax.

The first work was done in 1934 and while the 849 trees not treated show 46 trees with fruit buds, or 5·4 per cent, the 35 trees spirally girdled show 31 trees with fruit buds, or 88·6 per cent. This work is being continued on the later-planted seedlings.

Varieties of Tree Fruits

APPLES

The leading sorts from different apple-growing districts have been planted, nearly 300 varieties having been tested. Many have been eliminated as not being of particular value and the trees grafted out after records of production and worth have been established.

Among those retained Red Winter Reinette (Reinette Rouge Étoilée), a red, firm-fleshed winter sort resistant to apple scab, has been used extensively in breeding work and seedlings are now coming into fruiting.

Bramley, so extensively grown in England as a cooking apple, is vigorous and productive but because of its heavy planting in England and Ireland has not been encouraged here for extensive planting. The fruit, however, seems to be equal to that produced in England. All the English sorts tested produce fruit that is fully equal to the same kinds grown in England. Cox Orange, Blenheim, and Ribston are the outstanding examples.

Cox Orange, one of the most prized of the English dessert apples, grows to perfection and, because of the ready market for the fruit, has been extensively planted. With the large plantings made within recent years in England the prospects are that the returns from this variety will decline.

Ribston is particularly suitable for growing here and although its sale is limited chiefly to the London market, it is the general opinion that this has been one of the most profitable varieties grown for export.

Since Bramley takes the place of Blenheim to a great extent, there will likely be no further planting of Blenheim in the Valley.

The variety most extensively planted has been Gravenstein. The market for this variety is declining because of the production of varieties in England available for market at the same time. The first marketing is done a few days before the middle of September. An attempt has been made to hold this market by changing from the original to strains of higher colour, developed as mutations from the original. The Crimson Gravenstein has been planted of late years and many orchards have been grafted to get this earlier and better colour. How far this will go toward holding the market for this excellent apple it is impossible to say.

Red King, a bud mutation from the King of Tompkins, is being used, giving better colour than the original variety. This late fall variety following the Gravenstein has been a profitable sort and will likely continue to be one of the leading fall sorts.

McIntosh has not been extensively grown. The difficulty on some soils is to get the high colour so desirable for this variety, which is primarily a box apple. The shipments made in barrels have returned good prices.

Cortland is firmer in flesh than McIntosh and is being planted because it stands shipment in barrels better and does not drop so readily before full maturity.

Wagener is being continued as a satisfactory early winter sort. It requires a full season for maturity as it is the last of the varieties harvested. It is a biennial producer, which is an objection.

Golden Russet is one of the most extensively grown varieties at the present time. The quality of the fruit seems to meet the requirements of the English consumer and invariably it brings good prices.

The original Northern Spy is being replaced by a bud sport of higher colour, and the later plantings or grafting are confined to this sport.

The Baldwin is not being planted. The Red Rome Beauty is being planted, and this variety, which does well, returns good prices, being a desirable late variety of good colour.

The original Delicious, except in certain sections, has not been entirely satisfactory. The red sports of this, however, give considerable promise and of these Richared and Starking seem to be the best. Under good culture and proper thinning there seems to be no reason why these improved strains of this apple should not be produced profitably.

Stark has been a largely planted sort. It seems, however, that it does not meet present-day requirements and many of the orchards are being grafted into Cox Orange, Russet, Red Rome Beauty, and highly coloured Delicious. Rhode Island Greening, which has also been exported to advantage, is gradually being eliminated by Bramley.

Ben Davis, and Red Ben Davis or Gano, while making up a large volume of the late export apples, are not being increased, and varieties of the firm texture of these kinds but with better quality are looked for.

PEARS

The Bartlett pear is the principal one grown. The export of this variety, when handled under cold storage during shipment, has returned favourable prices. The early marketing of immature fruit is not profitable.

Clapp Favourite is well suited to conditions here but because of its short season is unsatisfactory for export, except for quick marketing under refrigeration. As a canning pear it makes a product equal to Bartlett, but carrying it in cold storage to continue its season for canning purposes is not entirely satisfactory. However, the season may be extended two weeks by this means. The fruit will keep but the product after two weeks in low temperature takes on a yellow cast when canned, which is not suitable to the trade.

Beurré Clairgeau is a late fall sort, very vigorous and productive, suitable for export and for canning. Beurré d'Anjou is better in quality than Clairgeau but less vigorous and not so productive.

It is very difficult to get good maturity in the Kieffer pear and the fruit of this variety has not been satisfactory for shipping or canning purposes.

PLUMS

Many sorts of plums have been tested. Burbank is the most productive and satisfactory of the Japanese sorts. It is necessary to thin this variety heavily in certain years of heavy set, as otherwise the fruit is likely to be small in size for the variety. Shiro, a yellow plum, is one of the earliest and of fair quality. This also usually sets heavily and must be thinned to get good-sized fruit. Washington is one of the best of the early European plums, of good size and medium production, and satisfactory to the trade for canning purposes. Imperial Gage is of high quality and two weeks earlier than Bavay (Bavay's Green Gage or Reine Claude de Bavay). This is medium in size but of excellent quality. Yellow Egg (Yellow Magnum Bonum) is one of the best of the large, late yellow plums for shipping or canning purposes. Bradshaw, a purplish red, and Quackenboss, a blue mid-season plum, are both recommended. Monarch, Diamond, and Grand Duke are the leading late, purple sorts.

In prune plums the Italian Prune (Fellenberg), blue, is one of the best. Giant Prune, red, is a large prune plum of higher quality but of less vigorous growth.

Shropshire Damson is the only really satisfactory plum of this class and should be more generally grown for canning or household use.

CHERRIES

Montmorency is the best of all the sour cherries grown. English Morello is a late variety with dark juice, which is prized for home canning. The tree is rather dwarf but is productive and the fruit is excellent.

The Wood (Governor Wood), yellow with a blushed cheek, is one of the earliest of all sweet cherries. Napoleon (Royal Anne), yellow with a red cheek, is much later, has much firmer flesh and is more suitable for shipment. Bing, Lambert, and Black Tartarian are the best of the black sweet cherries. Windsor is the hardiest of the firm-fleshed sweet cherries, but the fruit is not so large and attractive as the above-named. May Duke is the most satisfactory of the Duke class (hybrids between sweet and sour varieties).

SMALL FRUITS

STRAWBERRIES

The Dunlap (Senator Dunlap) has been more extensively grown and seems to be more satisfactory over a wide range of conditions than any other sort. It is vigorous and hardy but because of being an abundant plant maker should be restricted in runner-plant development and attention given to spacing of the plants before rooting, to avoid excessive crowding. The plants should average six inches apart.

Premier has been found to be slightly earlier, the season of fruiting is longer, and the tendency to form fewer runners results in better-fruiting plants. The planting of this variety is being extended. Blakemore has been grown but seems, under certain conditions, to show more weak-fruiting plants with a tendency toward lack of vigour in the plant. This variety sets abundant runner plants and crowding of the plants may in part cause this weakness. Dorsett and Fairfax are quite similar, and probably are the best of the midseason varieties so far tested.

Heat and shortage of rainfall may result in depletion of yields, and when varieties to supply good early, midseason, and late crops are grown there are usually low yields from the late sorts, so that they often are unprofitable. Dunlap and Premier seem to be the favourite varieties and are likely to prove as profitable as any so far tested.

Tests of the varieties originated at the Central Experimental Farm, Ottawa, show that many have promise, and their propagation will be extended.

RASPBERRIES

Tests indicate that Viking is one of the best sorts. It is hardy, vigorous and produces good yields of fruit that ships well. Herbert is still considered to be a leading variety and some prefer it to Viking. The latter has been more satisfactory at this station. The plantation includes most of the newer varieties, and none seem better than those mentioned.

GOOSEBERRIES

Downing is the favourite green commercial variety. It is vigorous and productive. Red Jacket is one of the best of the coloured sorts, suitable for use ripe. Whinhams Industry is the best general variety of the true English gooseberries. It is not so large as some others but is more resistant to mildew, which renders the large-fruited European sorts practically worthless in this climate. Houghton is no longer grown because of the small size of fruit produced.

CURRANTS

A small planting is made to supply local requirements but the outlook for the sale of this fruit is limited. Of the red sorts, Perfection and Fays Prolific are the leading kinds. White Grape is one of the best whites. Black Victoria and Boskoop Giant have been the best black sorts.

BREEDING OF FRUITS

APPLES

The work in apple breeding was started in 1928. The first seedlings grown were from the fruit of trees employed in connection with the pollination studies conducted from 1928 to 1932 at this station. Systematic breeding was undertaken from 1929 to 1934, using many sorts not employed in the pollination investigations. The seeds from fruit of various crosses of known parents were seeded and later planted as yearling trees in rows mostly six feet apart and four feet apart in the rows. These trees occupy 15 acres.

Included in the many varieties of apples used for crossing is the Red Winter Reinette (Reinette Rouge Étoilée) a firm, late, red apple showing resistance to apple scab in foliage and fruit. Some of these seedlings show considerable resistance in the foliage to this disease. It is hoped that from this cross varieties of value may be obtained.

CHERRIES

One of the parents used in this work has been the so-called "Bear River" cherry, planted here in 1913. This variety appears as seedlings throughout the Bear River section of Digby and Annapolis counties and is undoubtedly *Prunus avium* (Mazzard) and probably originally found its way to this district from plantings, by the early Acadian settlers, of seed brought from France. The tree is strong-growing, without trunk injury, and with strong branches resistant to splitting.

Bear River cherry used for breeding work. Cheesecloth covering where blossoms have been pollinated.

The fruit is black and of fair quality when fully ripe, soft, with a very tough skin, and too small to be of much commercial value.

The varieties crossed with the Bear River were principally the firm-fleshed sweet cherries Napoleon (Royal Anne), Bing, Windsor, and Black Tartarian.

A number of seedlings from open-pollinated crosses are growing in addition to the crosses of known parentage, and many of these will be used for fruiting and for propagation work.

BLUEBERRIES

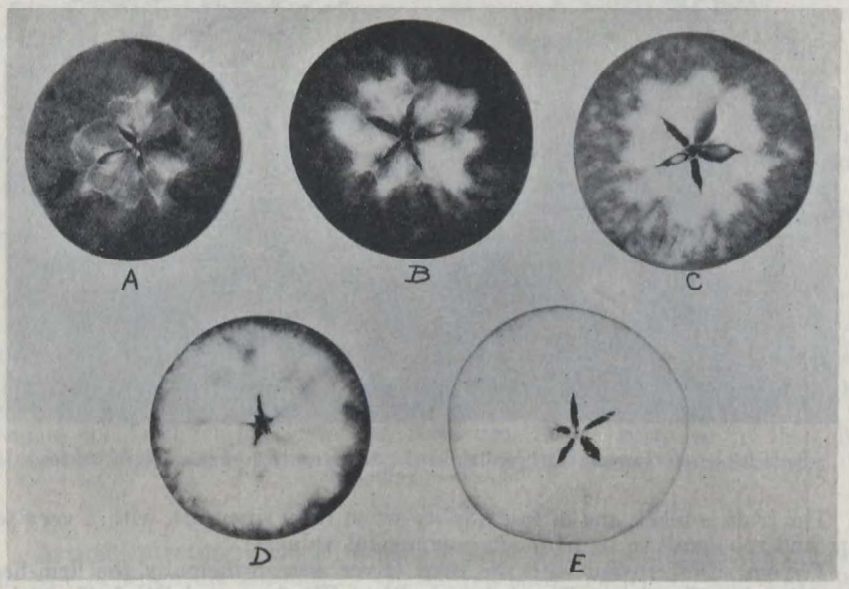
The first planting of blueberries was made in 1926 and consisted of a number of plants of named high-bush varieties from Whitesbog, Inc., Whitesbog, N.J. There were also planted in 1927 some low-bush seedlings grown at the Experimental Farm, Ottawa, from low-bush fruit secured on the open market. The planting was increased in 1931 by some 1,900 plants grown at the Experimental Farm, Ottawa, from fruit of open-pollinated and hand-crossed high-bush varieties.

The low-bush plants have not shown much promise but from the high-bush seedlings selections have been made and several have been propagated. Seedlings of the native Nova Scotian high-bush blueberry from Digby county have been started and it is thought that from these additional progress may be made. The land devoted to this planting is not entirely satisfactory, due to its drying out too much in some seasons.

STORAGE AND TRANSPORTATION INVESTIGATIONS

The need for more information with regard to the keeping qualities of fruits has come to the fore within recent years, with the result that an experimental cold storage plant was built at this station in 1931. This has made it possible to test fruits under controlled temperature conditions.

It has been shown that temperatures below 37° F. are unsuitable for the storage of such varieties as Wagener, Cox Orange, Ribston, King and McIntosh, due to the development of internal disorders. On the other hand late winter varieties such as Golden Russet, Baldwin, Rhode Island Greening and Northern Spy keep best at temperatures between 32° F. and 36° F.



Starch-iodine test of apples to indicate maturity.

Keeping quality of fruits is largely dependent upon the stage of maturity at which they are picked and for this reason picking-date tests with different varieties have been undertaken. The two methods used for this purpose were the starch-iodine test and the change in ground colour of the apple. Accordingly the following table indicates the most desirable picking stage for four varieties as determined by the starch-iodine test. The amount of starch in the apple is indicated by the development of blue colour in the tissue on the exposed surface of a cut apple when dipped in the iodine solution. The letter A in the table denotes starch throughout or immaturity, as shown by a deep colour throughout the tissue, whereas E denotes full maturity with no colour development.

APPROXIMATE PICKING DATES FOR FOUR APPLE VARIETIES AS BASED ON THE STARCH-IODINE TEST

Variety	Starch test	Date
Gravenstein	B - C	Sept. 14—Sept. 21
Cox Orange	B - C	Sept. 20—Sept. 27
Ribston	B - C	Sept. 20—Sept. 27
McIntosh	C - D	Sept. 26—Oct. 5

Similar studies are now in progress with pears, a temperature of 32° F. being found most satisfactory for this fruit.

An investigation of the influence of orchard fertilizers upon the keeping quality of apples has shown that a complete fertilizer containing nitrogen, phosphoric acid and potash is preferable to applications of only two of these elements, or of one, as for example nitrogen alone. The continued use of lime on certain plots has been associated with the disorder " corky core", seen in both Gravenstein and McIntosh apples. Efforts to eliminate this condition are now in progress. Storage pit has been found to be more prevalent in early picked fruit and develops at relatively high temperatures, 40° F. and above. Scald, which appears as a surface browning on Wagener apples in storage, has been successfully controlled by means of oiled shredded paper scattered through the barrel (one and one-half pounds per barrel). Furthermore, scald develops to a more marked extent on early picked green fruit than on more mature well-coloured apples.

GAS STORAGE

Preliminary trials have been in progress in order to ascertain the value of gas storage for both apples and pears. Results to date indicate that a carbon dioxide concentration of five per cent both at 38° and in common cellar storage improves the keeping quality of McIntosh apples, and that a ten per cent concentration of the same gas prevents the shrinkage and maintains the original flavour of Golden Russet apples. Similar results have been noted with Bartlett and Clapp Favourite pears but the problem of ripening these fruits after storage is still under consideration. Exposing the fruit to atmospheres containing high concentrations of carbon dioxide and to pure nitrogen for short periods immediately after picking gives promise as a method of lengthening the storage life.

Attention has been directed toward improving and expanding the present cold storage facilities in the fruit-growing area, and a detailed survey was made in this connection. The necessity of removing the initial heat from the freshly picked early fruit has been stressed. It was shown in an investigation, in collaboration with the officials of the Halifax Cold Storage, that a consignment of 700 barrels of apples could be reduced from a temperature of 65° F. to 40° F.

within 24 hours when subjected to a temperature of 20° F. in moving air. This, together with other tests, has shown the value of the pre-cooling method for barrelled apples before export.

WAREHOUSE MANAGEMENT STUDIES

The problems of warehouse management have received continuous attention. Thermographs (through the courtesy of the Fruit Branch) have been distributed and valuable data collected concerning the value of good ventilation, including the size and placement of ducts and windows, the use of fans and the maintenance of proper humidity conditions. It has been demonstrated that roof insulation assists greatly in providing minimum temperatures in the warehouse during the fall months. Mimeographed sheets of notes on warehouse management were recently made available. Assistance was also rendered in the reconstruction of a number of warehouses.

Finally, much time was devoted to the temperature aspects of the project in connection with the handling and transportation of apples to the British market, the results of which have recently appeared in bulletin form. In order to follow up these studies a controlled-temperature room has now been completed at this station, which will be used to approximate conditions which obtain in ships' holds.

DEHYDRATION OF APPLES

Considerable work has been done on the dehydration of apples, which as dried fruit are exported in large volume from Nova Scotia. The drying in tunnels, placing the fruit in shallow layers on trays arranged one above another on trucks, and forcing the heated air through the trays by means of a fan, is now largely employed to replace the older method of drying on slatted floors where the fruit is placed four inches deep over heat from stoves below. Much valuable information covering this work is available.

CANNING

The canning of fruits, and also of some vegetables, has been given attention. This work has involved the securing of data as to the canning of certain varieties of apples separately, the handling of the different varieties to avoid waste, and the sizes that may be profitably employed to develop a product suitable to the trade.

Work has been done to determine whether the canning season of Clapps Favourite pear may be extended by carrying the fruit in storage. This is possible but carrying more than two weeks results in a product with a yellow flesh not liked by the trade. Bartlett does not show this trouble.

The suitability of many different varieties of vegetables for canning has been ascertained.

VEGETABLES

The principal work with vegetables has been to carry out comparative tests of vegetable varieties in order to encourage more general use of the most satisfactory kinds. These trials have been so complete that the varieties recommended are believed to be at least equal to, and in most cases superior to the many other kinds so generally offered by the seed trade.

It is necessary to compare the many new sorts being constantly developed with those that are considered to be the best, and because of this to carry a limited number of test plots from year to year.

Because of the large development in vegetable canning and the difference in varieties when so processed, considerable attention has been given to the production and value of the crops used for this purpose. The volume so handled is not great but sufficient has been done to enable a fair determination to be made as to the ones most desirable for this purpose.

The aim has been to supply growers with directions as to the culture of the various crops, and experimental work to aid in this particular has been a part of the activities.

The land is a sandy loam well drained. The fertility is not high and stable manure at the average yearly rate of 15 tons per acre has been used, supplemented with a broadcast application of 800 pounds of 5-10-7 fertilizer per acre. This supplies the following plant food, in addition to the manure: 40 pounds of nitrogen, 80 pounds of phosphoric acid, and 56 pounds of potash. This fertilization seems to be ample under soil conditions here, although much less than that used in general vegetable culture. The land is used continuously from year to year and a system of rotation is followed to avoid the planting of the same crop on a specific area from year to year. This practice can be easily followed, and is advised for the home vegetable garden.

The advantage of a sandy loam is that it provides for a free movement of soil water, allows the early planting which is so desirable for many crops, and permits of ease in working. If the land is devoid of humus the annual application of manure prevents excessive drying out and aids in maintaining a uniform moisture supply.

While some vegetable crops can be developed satisfactorily without lime, the practice has been to lime the area uniformly. This is done by applying one ton of lime per acre every four years, which, it seems, meets the requirements of the crops. It has been the experience that a moderate application of lime is essential for nearly all vegetable crops if the most satisfactory returns are to be obtained.

Except for onions and the vine crops, planting is made in rows 30 inches apart. This distance permits of horse cultivation. The planting is done entirely on the level without the running-up of rows, which is often necessary, particularly on areas not naturally well drained.

The securing of good seed is highly important, and such kinds as can be ripened and carried from year to year should be retained if the variety or strain proves to be satisfactory. This is particularly the case with peas and beans, and more care should be taken to carry seed of these from year to year.

It is necessary to have a hotbed to start certain vegetables such as tomatoes, and to get certain sorts earlier by growing the plants and transplanting in early May. However, cabbage, cauliflower and celery can be seeded in the field as early in April as the ground can be worked, and will provide plenty of plants for later transplanting. The importance of the early seeding if onions are to be matured is especially to be noted. To get early peas, lettuce, and beets, early seeding is practised, as these crops start under a low soil temperature.

Frequent cultivation to keep the soil free from weeds is necessary and if done in season the garden weeding does not involve much labour.

ASPARAGUS

The culture of this crop has been confined largely to the Mary Washington variety, which has in trials proved to be the best. The essential in asparagus growing is to give the bed a chance to develop without cutting until the third year, and to keep all weed growth and grass under control. The plant is hardy and can be grown very satisfactorily with proper culture.

PEAS

The Alaska pea has been the standard early-maturing sort and has provided the bulk of the peas for canning. The Fenland Wonder is equally as early, and is much sweeter, and is considered to be the best of all the early sorts. Unfortunately the seed is difficult to get as it has not been extensively grown. Gradus and Thomas Laxton are the standard main-crop sorts of high quality. The variety Stratagem for late use is one of the best, as is also the Tall Telephone. The Dwarf Telephone or Daisy is preferred by some because of its dwarf growth. Seed of these varieties that is superior to that usually available can be carried from year to year by harvesting and storing as soon as ripened.

ONIONS

Of the many varieties of onions tested none for early maturity can surpass the Extra Early Flat Red and the Yellow Globe Danvers. Seeding the last of April or early in May can be depended upon to give a good crop of well-matured bulbs toward the middle of September. For very early use, the Mammoth Flat White, and for pickling, the White Barletta are advised. For starting under glass or in a hotbed and transplanting to the open early in May, the Prizetaker is one of the best. The plants should be started eight weeks before setting to the open.

CABBAGE AND CAULIFLOWER

As already indicated, seed can be sown in the open in April as soon as the surface of the soil can be prepared, and plants will be available for transplanting toward the end of May or early in June. They may be started in the hotbed six weeks before they are wanted, and plants thus secured for setting during the middle of May. The Golden Acre and Copenhagen Market are the best early sorts of cabbage. The Danish Ballhead is the best of the varieties for winter storage. There are intermediate sorts of cabbage of which Glory of Enkhuizen is one of the best.

The variety Erfurt is the best cauliflower. Cauliflower is more sensitive to transplanting than is cabbage and for early maturity of good heads it should not be set to the open until the middle of May, when the higher soil temperature permits unchecked growth and prevents the premature development of small unmarketable heads. The plants should be treated twice with corrosive sublimate solution to control the root maggot that may attack them before and after planting.

LETTUCE

The variety Grand Rapids is the best of the loose-leaf sorts and the New York or Wonderful is one of the best of the cabbage-head sorts grown. Lettuce is rarely given the space necessary to grow fully; the cabbage-head sorts should be spaced 10 inches apart by early thinning after the plants have started. The early, thin seeding of the cabbage-head sorts directly to the row where they are to mature is advised.

BEETS

The Detroit Dark Red is the best of all the beets tested for bunching or for canning. The Improved Crosby Egyptian is somewhat earlier and flatter in form. Early seeding in late April, and later in early June, is advised, the latter seeding being much more satisfactory for winter use and of better quality although not so large.

CARROTS

April seeding of carrots for early bunching or use is advised, and spraying the plants with corrosive sublimate solution two or three times is necessary to control the carrot rust-fly maggot which renders early carrots unmarketable. Seedings made the last week in May or early June usually escape this pest. Chantenay and Danvers Half-Long are the most desirable sorts for bunching or for canning.

SPINACH

The Bloomsdale has been the most satisfactory of all the varieties grown. King of Denmark is a reliable sort. Spinach to be satisfactory must be seeded early, for as the early dry warm weather approaches good quality is not possible and seed stalks often develop before the plants mature.

HERBS

The important herbs are summer savoury, sweet marjoram and thyme. These are seeded directly in the ground early in May. This also holds true of parsley, of which Moss Curled is the best variety.

RUTABAGA AND EARLY TURNIPS

The early turnips are suitable for use earlier than the regular swede turnips, and the Golden Ball is one of the favourites. Extra Early Milan is one of the best extra early sorts. Of the swede garden turnips the Canadian Gem or Purple Top is one of the best. Seeding in April or early in May is advised for early use.

CELERY

The usual practice is to start celery for early use under glass two months before setting to the open about the middle of May. Seeding to the open in late April or very early in May will give good plants for setting in mid-June. The variety Golden Self-Blanching or Paris Golden Yellow has been the most satisfactory. Giant Pascal is the favourite for late winter storage. Frequent dusting every two weeks, starting in the seedbed, using copper hydrate (Bordeaux dust) is necessary to control the leaf rust; or Bordeau mixture, 4-6-40, may be used as a spray.

The tendency is to force growth by the use of large applications of manure. This is important, but liberal feeding in addition with available phosphoric acid (using superphosphate) and muriate of potash to supply the mineral elements so often lacking in manure, is necessary if a good firm celery is to be secured. The rates vary on different soils, but on the average three ounces of superphosphate and two ounces of muriate of potash to the square yard of soil surface, well worked into the soil, is advised to furnish the best-balanced food supply.

VINE CROPS

Cucumbers.—The Improved White Spine and Improved Long Green are the leading sorts. Snows Pickling is a fine small sort for this purpose.

Squash.—The Golden Hubbard and the Green Hubbard are two of the best. The Kitchenette is a fine medium-sized kind. The bush and trailing vegetable marrows are the best of the marrow group.

Pumpkins.—The Small Sugar is the most satisfactory.

Melons.—Because of the cool spring and the late fall it is very difficult to mature either the muskmelon or watermelon satisfactorily. The Golden Champlain and Early Hackensack are the best muskmelons of those tested.

TOMATOES

For early use Alacrity, Bestal, and Abel are good. The Earliana is a more abundant cropper. The best of the smooth, round early sorts are Bonny Best, Chalks Early Jewel, and John Baer, and these three are the most satisfactory for canning. Where land is scarce and very early high-quality fruit is wanted, the plants may be set a foot apart in rows three feet apart, and staked, training them to one or two stems, cutting out the lateral branches as they appear and heading the plants back after four or five trusses are formed.

CORN

For very early use Banting, Dorinny and Golden Gem are satisfactory. The main-crop varieties are Golden Sunshine and Golden Bantam. The latter two are the most satisfactory for canning. Bantam Evergreen is a satisfactory late sort. The Hybrid sweet corns are being tested.

BEANS

Extensive tests with this crop indicate that the Round Pod Kidney Wax is one of the best snap beans for home use or canning. The Stringless Green Pod is one of the best of the green-podded sorts. The Princess of Artois is a good, very early green-pod, if used early. The Kentucky Wonder Wax is a good yellow-podded pole bean.

ORNAMENTAL PLANTING

DECIDUOUS TREES

Trees of different kinds were planted in 1913 and during the years have afforded an opportunity of determining the kinds most suitable for general planting. The sugar maple (*Acer saccharum*) has been the most satisfactory. It is not so vigorous in growth as the more spreading Norway maple (*Acer platanoides)* but is more suitable where areas are limited. The purple-leaved form of this is preferred by many. The American elm (*Ulmus americana*) follows the sugar maple in popularity and probably should be more generally planted than it now is. The red oak (*Quercus borealis*) is the favourite oak and is the most satisfactory of this genus. The Babylon golden-bark willow (*Salix babylonica*) is the most useful willow. The white, paper, or canoe birch (*Betula papyrifera*) is the best of the different birches grown. The Japanese walnut (*Juglans Sieboldiana*) is the best of the large nut trees.

In small trees the rowan or mountain ash (*Sorbus Aucuparia*), double-flowered English hawthorn (*Crataegus oxyacantha fl. pl.*), purple-leaved Japanese crab apple (*Pyrus Niedzwetzkyana*), bronze-barked golden willow (*Salix alba britzensis)*, and Japanese tree lilac *(Syringa japonica)* are considered to be the best of the smaller trees grown.

EVERGREEN TREES

In evergreens the white or silver fir (*Abies concolor*) is the best. The Norway spruce (*Picea Abies*) is probably the best of the green spruces. The Colorado blue spruce (*Picea pungens glauca*) is preferred by many, particularly Koster's variety, the finest of the silvery-blue forms. The Swiss stone pine (*Pinus Cembra*) is perhaps the best of all the pines grown. Of the larger-growing pines the Austrian pine (*Pinus nigra var. austriaca*) is the best. The dwarf mugho pine *(Pinus mugo mughus)* is highly satisfactory. The Douglas fir *(Pseudotsuga taxifolia)* does exceptionally well on the grounds here and makes a fine specimen tree.

DECIDUOUS SHRUBS

It is difficult, because of the number of fine shrubs offered, to suggest varieties likely to be the most satisfactory, and within some groups many not specified will probably be considered better under certain conditions. Of those ranging in height to about eight feet the bush honeysuckle (*Lonicera tatarica speciosa)* is one of the best. The Siberian Pea Tree *(Caragana frutex)* is good. The sweet mock-orange syringa (*Philadelphus coronarius*) Virginal is most desirable. The Rouen lilac *(Syringa* x *chinensis)*, the common purple and white lilacs (*Syringa vulgaris*) in many fine varieties, Hungarian lilac (*Syringa Josikaea*), a late desirable sort, and the *Syringa villosa,* a late, even more desirable form, are all good. The Amur privet (*Ligustrum amurense*) is the best of all the taller-growing privets for hedge purposes. The common snowball *(Viburnum Opulus roseum (sterile))* is attractive in season. The golden bell (*Forsythia intermedia*) is the hardiest and best of this very early-blooming genus.

Among the somewhat lower-growing shrubs is Van Houtte's spiraea *(Spiraea Vanhouttei)*, often spoken of as the bridal-wreath spiraea. The garland spiraea (*Spiraea arguta*) is lower-growing than the above and about one week earlier. The Anthony Waterer spiraea (*Spiraea bumalda* Anthony Waterer) is a dwarf, late, crimson-flowered, very desirable sort. The Japanese rose *(Rosa rugosa)*, red and white in many forms, is a desirable hardy form for shrubbery planting. The Japanese hydrangea (*Hydrangea paniculata grandiflora*) is hardy and desirable for very late bloom. The hills-of-snow hydrangea (*Hydrangea arborescens grandiflora*) is fine, and early-blooming. The Japanese barberry (*Berberis Thunbergii*) is a very desirable low-growing shrub, three to four feet, with abundant fruit. It is one of the best for a low-growing hedge. The purple-leaved Japanese barberry *(Berberis Thunbergii atropurpurea)* is much liked by some because of its purple leaves.

EVERGREENS, MEDIUM AND DWARF

The best two of the taller-growing arbor-vitaes or white cedars are the pyramidal arbor-vitae (*Thuja occidentalis pyramidalis*) and the Siberian arbor-vitae *(Thuja occidentalis Wareana).* The best of the dwarf kinds is the globe-shaped arbor-vitae (*Thuja occidentalis globosa*). In the group of the Sawara cypresses or retinosporas the thread-like form (*Chamaecyparis pisifera filifera*) and the plume-like form (*Chamaecyparis pisifera plumosa*) are the best. Of the dwarf junipers the Savin juniper *(Juniperus Sabina)* is the best. The reason for the use of the scientific name is to enable one to identify specimens, many of which are difficult to place from the common name only.

HERBACEOUS PERENNIAL FLOWERING PLANTS

Tests of many perennial garden plants have been made, and included in the following are those found most useful. They are arranged approximately in the order of blooming. The use of the scientific name seems to be necessary in order to identify readily some of the species. Many of these are best increased by division of the established plants. The columbine, Iceland poppy, foxglove, Canterbury bell and some others are best maintained by seeding annually.

Iceland poppy *(Papaver nudicaule)*, rock cress *(Arabis alpina)*, English daisy *(Bellis perennis)*, goldentuft *(Alyssum saxatile)*, columbine *(Aquilegia)* in many kinds, moss or ground pink *(Phlox subulata)*, forget-me-not *(Myosotis)*, lily-of-the-valley *(Convallaria majalis)*, leopard's bane *(Doronicum caucasicum* and *D. plantagineum)*, golden marguerite *(Anthemis tinctoria)*, clove or grass pink *(Dianthus plumarius)*, bleeding heart *(Dicentra spectabilis)* perennial flax *(Linum perenne)*, double-flowered buttercup *(Ranunculus repens flore-pleno)*,

purple rock cress *(Aubrietia deltoides)*, snow-in-summer *(Cerastium tomentosum)* sweet rocket *(Hesperis matronalis)*, pyrethrum or painted daisy *(Chrysanthemum coccineum)*, bearded iris *(Iris hybrida)* and Japanese iris *(Iris Kaempferi)* in many fine varieties, common peony *(Paeonia officinalis)* and Chinese peony *(Paeonia albiflora)* in great variety, fleabane *(Erigeron speciosus)*, Oriental poppy *(Papaver orientale)*, orange globe flower *(Trollius asiaticus)*, Maltese cross *(Lychnis Haageana)*, foxglove *(Digitalis purpurea)*, shasta daisy *(Chrysanthemum maximum)*, bellflower *(Campanula persicifolia)*, balloon flower *(Platycodon grandiflorum)*, sneezewort *(Achillea Ptarmica)*, goat's beard *(Astilbe astilboides)*, speedwell *(Veronica spicata)*, lilies in great variety, giant-flowered gaillardia or blanket flower *(Gaillardia grandiflora)*, Canterbury bell *(Campanula Medium)*, Hoope's sneezeweed *(Helenium Hoopesii)*, bugloss *(Anchusa italica)*, meadow rue *(Thalictrum)* in several species, Oriental larkspur *(Delphinium formosum)* and hybrid larkspur *(Delphinium hybridum)* in many varieties, large flowered tickseed *(Coreopsis grandiflora)*, gas plant *(Dictamnus albus)*, baby's breath *(Gypsophila paniculata flore-pleno)*, mountain bluet *(Centaurea montana)*, mountain wild thyme *(Thymus Serpyllum)*, scabious or pincushion flower *(Scabiosa caucasica)*, flowering lupin *(Lupinus polyphyllus)*, stonecrop *(Sedum acre)*, sea lavender *(Statice latifolium)*, globe thistle *(Echinops Ritro)*, houseleek *(Sempervivum tectorum)*, European meadow sweet *(Filipendula ulmaria)*, monkshood *(Aconitum Napellus)*, Adam's needle *(Yucca filamentosa)*, hairy sunflower *(Helianthus mollis)*, prairie sunflower *(Helianthus rigidus* var. Miss Mellish), orange false sunflower *(Heliopsis scabra excelsa)*, common sneezeweed *(Helenium autumnale)*, golden glow *(Rudbeckia laciniata flore-pleno)*, daisy-like boltonia *(Boltonia asteroides* and *B. latisquama)*, perennial phlox *(Phlox paniculata* and *P. decussata)* in many varieties, fall aster or Michaelmas daisy in great variety, and Chinese lantern *(Physalis Franchetii)*.

ANNUAL FLOWERING PLANTS

Plantings are made of the different annual flowering plants to gain information as to the relative usefulness of the many offered for general planting. With reasonable care the hardy annuals can be seeded in the open ground during the first week in May, and later thinned to give the plants a space of six to ten inches apart. When seeded to the open it is very necessary to thin the plants, as otherwise they grow too thickly and are unsatisfactory. The greater part of the plantings made here is from plants started early in April in the greenhouse and planted to the open toward the end of May. Some kinds, such as the poppy, do not transplant well and these, along with most of the important hardy ones, are tested by seeding to the open ground, as well as by transplanting. The tender annuals, such as marigold, cannot be planted to the open ground until danger from frost is past.

Some of the best annual flowering plants are: snapdragon *(Antirrhinum)*, pot marigold *(Calendula)*, ageratum, bachelor's button or cornflower *(Centaurea Cyanus)*, *Coreopsis Drummondii*, cosmos, blanket flower *(Gaillardia)*, baby's breath *(Gypsophila elegans)*, Chinese pink *(Dianthus)*, annual sunflower *(Helianthus)*, California poppy *(Eschscholtzia)*, strawflower *(Helichrysum)*; marigold, both African and French *(Tagetes)*; nasturtium, nemesia, annual poppies, petunias, *Phlox Drummondii*, salpiglossis, scabiosa, stocks, schizanthus, sweet alyssum, verbena, zinnia, and the annual stock-flowered larkspur *(Delphinium)*. There are many named varieties of some of these, and both tall and dwarf varieties can often be obtained. There are many new varieties being developed superior to those considered to be the best a few years ago.

APIARY

Bee colonies in the Valley are generally badly poisoned in spring by the arsenical sprays applied at this time to the apple trees. In foraging for food for the larvae or immature bees the workers gather pollen, some of it from the orchards and having appreciable amounts of arsenic adhering to it. The larvae also need water, some of which is taken by the bees from leaves damp with dew or mist, in which the arsenic may be present. Dead bees and brood soon result, and a strong hive is turned into a weak one. There is little spraying of fruit trees during full bloom, as, quite apart from possible injury to the pollinating insects, this practice is considered injurious to a good set of fruit.

Many of the station's colonies of bees are used each year in pollination experiments, the apiary being thereby greatly weakened for beekeeping investigations.

It has been shown by careful experimental work that an adequate transfer of pollen from one variety of fruit to another is necessary in order to secure a good set of fruit. Few of the sorts of fruit grown commercially are self-fertile. The honey bee is not the only insect that transfers this pollen. The wild or solitary bee, which is abundant in the Valley, also does this effectively and is apparently the most important pollinating insect here.

The honey bee population in the Valley is not great, and very few bees are kept for fruit-bloom pollination. On trees enclosed in cheesecloth to exclude all insects the set of fruit is poor, while on those not enclosed, even though few or no honey bees are present, the set is good. It is considered that under adverse conditions and with a scanty or ineffective pollen supply within close proximity, the introduction of the honey bee is profitable. This has resulted in the importation from the Southern States, for use during the blossoming period, of two- and three-pound packages of bees, which are placed in hives, one to the acre, to ensure an adequate transfer of pollen. This, however, has not been a general practice, and the solitary bee seems to be the principal insect accountable for the set of fruit usually obtained

It has been definitely shown that colonies away from the sprayed areas produce much better crops of honey. The production per year from colonies not injured by the sprays has averaged 115 pounds, while those colonies in contact with sprayed trees have averaged only one-third of this amount, the latter being a decidedly unprofitable crop.

About 8 per cent of the honey crop is produced during the fruit-bloom period, 60 per cent during the clover bloom and 32 per cent from the fall bloom.

The ten-frame Langstroth hive seems a little better suited to local conditions than the Jumbo or the Modified Dadant. Colonies left the year round in a Kootenay case gave somewhat better yields than colonies not protected during the active season.

Colonies wintered with a double brood chamber were slightly stronger in spring and produced a little more honey than those wintered with a single brood chamber. Cellar wintering, even at what is considered low temperatures for bees (33° to 38° F.), has been more successful than outside wintering in cases, though many winters pass without any loss of colonies outside.

CEREALS

In addition to the regular field plantings in rotational areas, some dozen varieties each of wheat and oats and 20 of barley are tested in rod rows in the modified block system, for comparison of new with standard varieties.

Huron gave the largest yield of wheat, and seems to suit local conditions, being of good quality, not too late in maturing and practically always giving a

good crop. It takes this variety about 102 days to mature. Garnet is about ten days earlier, but has a somewhat lower yield. Marquis is seldom satisfactory here.

Victory oats has replaced Banner here for the general crop, having given an average increased yield of some seven bushels per acre. This variety averages 97 days to maturity. Alaska and Cartier are a week earlier than Victory. Legacy, an Ottawa variety, has a fairly strong straw, is a good yielder and ripens a few days before Victory. The hull-less variety Laurel is a fairly good cropper and averages 83 days to maturity.

Charlottetown No. 80 has been the highest yielding barley, and has been very satisfactory over a long period. This variety matures in about 93 days. Nobarb, a new variety, yields well, and is one of the smoothest-awned varieties tested.

Kharkov No. 22 M.C. winter wheat.

FORAGE CROPS

ALFALFA AND CLOVERS

Grimm and Ontario Variegated continue to be the standard alfalfa varieties, although Ladak has been tested recently and gives evidence of producing a somewhat higher yield than either of them. Of the white clovers, the mammoth type, Ladino, along with Morso and Stryno have yielded considerably more herbage than the commercial white Dutch. The late or single-cut red clovers, including Mammoth and Altaswede, have proved very satisfactory and have shown greater resistance to winter-killing than the early or two-cut red clover. The white sweet clovers have not wintered satisfactorily on the soils of this station. The alternate freezing and thawing lifts the plants, often working them entirely out of the ground. Excess of winter moisture in the soil and an insufficiency of lateral roots to resist the lifting action are the cause of this loss, rather than the lack of winter-hardiness. Generally speaking the yellow-blossomed varieties, particularly Zouave, have been less liable to this form of injury than the white sweet clovers.

SOYBEANS

The tests with soybeans indicate that a yield of approximately 1½ tons of cured hay per acre is possible. The yield in ripened seed has been light, averaging in three years approximately 12 bushels per acre. In regard to time of maturity the varieties tested range as follows: Manitoba Brown and Wisconsin Black, 114 days; Mandarin, 123 days, and O.A.C. 211, 143 days. Because of early fall frosts the first-named three only are recommended and of these Mandarin is the most productive.

SWEDE TURNIPS

Tests with swede turnips have given the following average yields (bushels per acre): Wilhelmsburger (Hartman), 1006·3; Bangholm Herning (Hartman), 931·7; Purple Top, 896·9; Halls Westbury, 896·3; Ditmars, 877·3; Corning Green Top, 787·3; Bangholm Kentville, 776·7; Bangholm Charlottetown, 713·6, and Bangholm Nappan, 663·0.

MANGELS

The standard varieties of mangels have been grown, with average yields (bushels per acre) as follows: Half Sugar White, 1029·6; Yellow Intermediate, 1015·8; Danish Sludstrup, 998·5; Yellow Tankard, 918·0; Long Red, 854·6, and Yellow Globe, 798·7.

CORN

Corn varieties tested for ensilage during the past five years gave the following average green yields (tons per acre): Burr Leaming, 36·44; Iroquois, 31·57; Longfellow, 30·48; Comptons Early, 29·94; Golden Glow, 28·66; Northwestern Dent, 26·32, and Wisconsin No. 7, 26·10.

FIELD HUSBANDRY

In addition to the fertilizer work with hoed crops, cereals and hay which have been reported, there are embraced under field husbandry, a number of other projects. A considerable area of land is devoted to the testing of various crop rotations; there is a limited amount of work on weed control, chiefly control of wild radish in grain, and there is some work on pasture fertilization.

Work with crop rotations is necessarily of a long-time nature, and very few definite results can as yet be given from experimental work along this line. Comparisons of continuous and rotational cropping indicate at the present time that equally good crops of timothy hay can be grown under both systems, provided sufficient fertilizer is applied. With mangels and potatoes continuous cropping has been unsatisfactory. Mangels seeded under this system are regularly destroyed in the seedling stage by root-rots and the amount of scab in potatoes is always higher than on the rotated area.

In pasture fertilization work top-dressing with various combinations of complete and incomplete fertilizers has been done. The value of superphosphate in helping to get wild white clover established has been demonstrated. The most valuable treatment with a view to getting pasture in condition to withstand the dry summer weather has been spring top-dressing with a nitrogenous fertilizer.

Probably the most serious nuisance in this part of the province is wild radish (*Raphanus Raphanistrum*) in the grain crop. This weed has been successfully controlled by spraying with a three per cent solution of bluestone. The liquid is applied with a potato sprayer when the grain is five or six inches high and the wild radish plants have two or three leaves. The spray does not appear to kill many of the wild radish plants completely but they are injured sufficiently to prevent flowering. Clover seeded with the grain appears to escape injury

BORON IN FIELD CROPS

Work on the effects of various rates of application of boron was started in 1936. While this work is by no means complete it can be stated at present that applications of 20 pounds of borax per acre eliminated the brown-heart disease in turnips and did no injury to other crops. In fact, there is some reason to believe that yields of mangels and oats were stimulated by additions of borax.

EXPERIMENTS WITH FERTILIZERS

POTASH IN A COMPLETE FERTILIZER FOR POTATOES

Potatoes were grown in the first year of a rotation of potatoes, oats, and clover hay. The land received a basal dressing of 666 pounds of nitrate of soda and 1,000 pounds of superphosphate per acre. Muriate of potash was applied at seven different rates: 0, 120, 200, 280, 360, 440, and 520 pounds per acre. Unfertilized check plots were also included in the test.

All plots, as might be expected, showed a considerable response to fertilizer. Increased potash, up to 280 pounds, gave increasing yields of potatoes; applications greater than this gave no further response. Oats showed no response to the potash while clover hay showed a slight response to applications of over 200 pounds.

From the standpoint of profits it would seem advisable to use some potash since the nitrate and superphosphate used returned an increase over no fertilizer of less than $10 per acre above the cost of the fertilizer, while the application of 200 pounds of muriate of potash gave an added return of $30 per acre above the cost of the fertilizer. Applications of over 200 pounds do not appear to be warranted on a cost basis. The mixture on the plots that received 200 pounds of muriate of potash corresponds to one ton of 5-10-5 per acre.

SOURCES OF PHOSPHORIC ACID FOR OATS

This project is an attempt to determine the relative values of slag, superphosphate, triple superphosphate, and nitrophoska as sources of phosphorus for the oat crop. Nitrophoska is a complete fertilizer with a 10-20-20 analysis. The other sources of phosphorus were tried alone and in combination with nitrate of soda, or sulphate of ammonia, and muriate of potash. Slag and superphosphate were applied at the rate of 469 pounds per acre, triple superphosphate at 167 and nitrophoska at 250 pounds per acre. One plot received no fertilizer at all. All plots receiving superphosphate were repeated with limestone at the rate of 469 pounds per acre—this for a check against the lime value of the slag. The experiment should yield, besides information on phosphorus sources, secondary information on the value of nitrogen, potash, and limestone. Yields to date have been taken from six crops of oats, five crops of clover and four crops of timothy.

The source of phosphorus made no difference in the yields of oats, this being some 50 bushels per acre with phosphorus only, which was only five to six bushels per acre more than from the unfertilized plot.

The response to phosphorus alone was rather small. Nitrophoska gave about eight bushels per acre more than the phosphorus fertilizers alone, but when nitrogen as nitrate or sulphate was added to make up for the nitrogen in nitrophoska, the other sources of phosphorus were equally good.

There was no perceptible response to potash on the oats in these tests since any one of the sources of phosphorus together with nitrogen gave just as good yields whether or not potash was used. This fact would tend to make nitrophoska an uneconomical fertilizer to use for oats. The lack of response to potash is in line with work done on a potato-oats-clover rotation, where no increase in oat yield was found from additions of potash fertilizers.

The response of subsequent hay crops to fertilizers other than phosphorus, where the increase over no fertilizer was around one ton per acre, was not large. Additions of nitrogen and potash to phosphorus treatments gave increases varying from one-third to one-half ton per acre. No benefit was derived from adding limestone to superphosphate. In this connection it should be pointed out that this land had all been limed some time previous to starting this experiment.

DIFFERENT RATES OF PHOSPHORIC ACID IN A COMPLETE FERTILIZER FOR POTATOES

This test was to determine the effect of increasing the proportion of phosphoric acid in a complete fertilizer for potatoes. The experiment is operated as a three-year rotation with potatoes, oats, and clover. The fertilizer is applied to the potatoes at the rate of 1,500 pounds per acre. The plots, with the exception of one which gets 5-10-5, receive fertilizers giving four per cent nitrogen and eight per cent potash. The phosphoric acid is increased by increments of two per cent from nothing up to sixteen per cent.

The results from two crops of potatoes and one crop of oats show very clearly the need of phosphoric acid but as far as this test goes, and with the amounts of nitrogen and potash used, there would not seem to be any advantage in increasing the phosphoric acid beyond four or five per cent.

SOURCES OF NITROGEN FOR THE OAT CROP

This project was started in 1931 to determine the relative value of different sources of nitrogen for the oat crop. The fertilizer was applied to the oats in a three-year rotation of oats, clover and timothy.

In addition to nitrogen, each plot received superphosphate, 500 pounds, and muriate of potash, 120 pounds, per acre. The sources of nitrogen were: nitrate of soda (synthetic), 15 per cent; sulphate of ammonia, 20 per cent; cyanamid, 20 per cent; urea, 46 per cent; calcium nitrate, 15 per cent; nitro-chalk, 15 per cent; calurea, 34 per cent; leuna saltpetre, 26 per cent; cal-nitro, 20 per cent, and Chilean nitrate, 15 per cent. The nitrate of soda was applied at 150 pounds per acre and the others at rates to supply an equal amount of nitrogen. Plots receiving no nitrogen were also included.

Information derived from six crops of oats, five crops of clover and four crops of timothy shows that provided nitrogen is used it makes little or no difference from which of these sources it comes. The plots receiving nitrogen yielded from 10 to 13 bushels of oats, and one-half ton of clover and timothy more per acre than the plots receiving no nitrogen.

FERTILIZERS AND GROUND LIMESTONE

This is one of the oldest experiments at the station, having been laid down in 1914. It was designed to test the effect of liming in conjunction with applications of a complete fertilizer. The limed areas received applications of four tons of limestone per acre every three years from 1914 to 1923, inclusive; i.e., a total of sixteen tons per acre. No more limestone has been applied to these areas and no limestone has ever been applied to the unlimed areas.

The crops grown on this land at different times include potatoes, mangels, wheat, oats, and clover. The experiment is operated as a three-year rotation of hoed crop, grain, and clover hay.

Irrespective of what crop has been grown, the limed areas have consistently yielded higher than the unlimed areas. During the first 12 years of the experiment this represented a total gain, at current prices, of $10 per acre. During the latter period this is represented by an average gain of 111 bushels of mangels, 7·12 bushels of wheat, and 0·72 ton of clover hay per acre or, on a percentage basis, a gain in mangels of 49 per cent; wheat, 76 per cent, and clover hay, 122 per cent.

In the early years, 1914-1923, when potatoes were grown as the hoed crop, a great deal of scab developed on the limed areas, and for this reason potatoes were not grown in later years. In this connection it must be kept in mind that the potatoes were grown in the same year that the limestone was applied. Of late years there has been some difficulty in growing satisfactory crops of mangels on the limed area, and there are indications that this may be due to boron not being available in sufficient quantity for the mangels.

Continued applications of sulphate of ammonia to supply nitrogen are not satisfactory unless sufficient lime is used to overcome the acid condition produced in the soil by the sulphate of ammonia. Slag aids in replacing limestone for this purpose, while superphosphate is of no value in counteracting the acidity due to the use of sulphate of ammonia.

With mangels, nitrate of soda has outyielded sulphate of ammonia, whether limestone was used or not, but with the other crops sulphate of ammonia was, when used with lime, equal to nitrate of soda.

ANIMAL HUSBANDRY

CATTLE

The Shorthorn breed is carried at this station. An effort has been made to breed for both milk and beef. The cows have always been carried under the accredited herd regulations and the periodic tests show no reaction, with complete freedom from tuberculosis and Bang's disease being maintained.

The herd is carried under the Record of Performance regulations and during the time covered by this report (5 years) 68 lactation periods have shown an average of 289 milking days, with an average yield of 19·85 pounds of milk per day, and 5,745·1 pounds of milk, testing 4·06 per cent of fat and yielding 233·33 pounds of butterfat per lactation period. The aim has been to have all cows freshen within a year; the period, however, has averaged 385 days. This record includes young as well as mature cows. Of the 68 there were 29 with over 6,000 pounds of milk, and 39 with over 5,000 pounds. Thirty-seven of the R.O.P. records show an average of 6,466 pounds of milk, testing 4·06 per cent, and yielding 262 pounds of butterfat in 301 days.

Beef conformation has been kept in mind along with milk production and a low-set animal of good type, with capacity for milk production, has been the aim. No effort has been made toward the extreme milking type, nor has feeding for other than normal production been practised.

Forty-three bull calves and forty-two females have been sold for breeding purposes during the period of this report. The herd is maintained at an average of thirty-three head.

The grain feed given is based on production and is fed at the rate of one pound of meal mixture to three pounds of milk produced. The pasture facilities for the milking cows are inadequate, and because of this, barn feeding has to be practised in part during almost the entire summer.

The yearly cost of the feed is tabulated monthly. The average cost of feed per 100 pounds of milk during the period of this report was: 32·66 pounds of meal at $1.56 per cwt., $0.51; 64·6 pounds of hay at 40 cents per cwt., $0.26; 196·2 pounds of roots or ensilage at 15 cents per cwt., $0.29, and 2·22 pasture days at 4·69 cents per day, $0.10, a total of $1.16. The feed cost per pound of butterfat was 28·8 cents.

The calves are fed from the pail after the second day with the cow. New milk, 12 pounds per day in three feedings, is given until they are seven weeks old, and then 15 pounds of skim-milk daily until they are eight months old.

The meal ration is made up of 300 pounds of finely ground oats, 100 pounds of ground barley or cornmeal, 100 pounds of wheat bran, 100 pounds of linseed oilmeal, 50 pounds of white fish meal, 10 pounds of edible bone meal and 6 pounds of salt. This is fed with hay and roots or corn ensilage in suitable amount to keep the calf in good growing condition.

The average feed consumed by 25 heifers from birth to two years of age was 604 pounds of whole milk, 3,053 pounds of skim-milk, 1,465 pounds of meal, 3,194 pounds of hay, 8,217 pounds of roots and ensilage, and pasture for 134 days. At the following prices per hundred pounds: whole milk, $1.60; skim-milk, $0.20; meal, $1.68; hay, $0.40; roots or ensilage, $0.15, and pasture at 5 cents per day, the cost was: whole milk, $9.66; skim-milk, $6.11; meal, $24.61; hay, $12.78; roots or ensilage, $12.33; pasture, $6.70, a total of $72.19.

Shorthorn dry cows and heifers on fertilized grazing area.

HORSES

Three teams of horses are kept and the yearly cost of feed has been $118.37 per year, or 32·4 cents per day, for each horse.

SWINE

It was decided to eliminate swine breeding at this station and the Yorkshire herd was disposed of in 1934.

Records from 12 litters show 126 pigs, of which 110 were reared to the weaning age. Sales of Registered Yorkshires from the station totalled 321, half of which were distributed in Kings county.

The feed consumed by four brood sows for a two-year period averaged as follows, per sow per year: 725 pounds of skim-milk at 20 cents per cwt., $1.45; 1,639 pounds of meal at $1.36 per cwt., $22.29; 1,944 pounds of mangels and apples at 15 cents per cwt., $2.92; pasture for 3 months at 50 cents, $1.50; a total of $28.16, or an average cost per sow per day of 7·7 cents.

The average feed of the herd boar per year was 1,016 pounds of meal at $1.36 per cwt., $13.82; 3,879 pounds of mangels and apples at 15 cents per cwt., $5.81; a total of $19.63, or an average cost of 5·4 cents per day.

Feed costs to raise pigs to the weaning age (six weeks) were calculated from the cost of feed for four sows kept over a period of five years, with meal charged at $1.36 per cwt., skim-milk at 20 cents per cwt.; mangels and apples at 15 cents per cwt., and pasture at 50 cents per month. During this period 264 pigs were reared to the weaning age. The pigs reared per sow per year were 13. The average cost to weaning age was $2.17.

A two-year feeding test with pigs, including 30 sold for pork with an average of 192 days from birth to finish, shows the weight at the start of the test to have been 665 pounds, and at the finish, 6,334 pounds, a gain of 5,669 pounds. The average feed cost to produce a gain of one pound was 4·22 cents.

POULTRY

The projects carried on with poultry during the period of this report have been with Barred Plymouth Rocks. Sanitary methods are followed at all times, in order to prevent and control diseases and parasites. Pens are cleaned twice a week, the floors sprayed with disinfectant, and all feed and water dishes kept off the floor on wire frames. A three-year rotation of runs is also practised with the birds not being released from the brooder houses until eight weeks old. The data given are the average of five years' results.

It was found that, as the spring progresses, there is a gradual increase in the percentage of eggs that hatch out into chicks. Those set the middle of March hatched out 42 per cent; those a month later, 58 per cent, and those the last week of April and the first ten days of May, 62 per cent. With the increased hatchability there was also a slight increase in the mortality at three weeks of the chicks hatched, from 2½ per cent March 19 to 7 per cent at the end of April. However, the mortality dropped in May, the early May hatches showing only 4 per cent loss at the end of three weeks.

Eggs weighing 24 ounces to the dozen hatched out 68 per cent, and there was a noticeable decrease in hatchability as the size of the egg increased, with eggs weighing over 26 ounces to the dozen hatching out only 53 per cent.

The flock is bred for egg production, pedigrees of all birds being kept. The flock average shows, during this period, a reduction of 23 days in the time required to reach maturity (from 209 to 186 days), an increase of one-half pound of body weight per bird, and a gradual increase in the production. Records of the shape, texture and colour of the shell, and candling quality of the egg are kept in connection with the breeding work.

Chicks hatched the first half of April laid a few more and a little heavier eggs the first year than those hatched the latter half of April or in early May, and were a few ounces heavier in body weight.

Hens between six and seven pounds in weight laid the largest number of standard-sized eggs; those weighing over seven pounds laid fewer and larger eggs, and those weighing under six pounds laid fewer and smaller eggs. Further, hens coming into production when between 185 and 215 days old laid more standard-sized eggs than hens developing earlier or later, so that it would appear the aim should be to have this breed reach a maturity weight of between six and seven pounds about the end of the sixth month.

The Nova Scotia Southern Egg Laying Contest, conducted here for 12 years, has shown a gradual increase in egg production. There was an increase of 34 eggs per bird (from 165 to 199) during the period of this report. One pen of hens in the 1934-35 contest ranked first in egg production in all the contests held in Canada.

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