DOMINION OF CANADA

DEPARTMENT OF AGRICULTURE

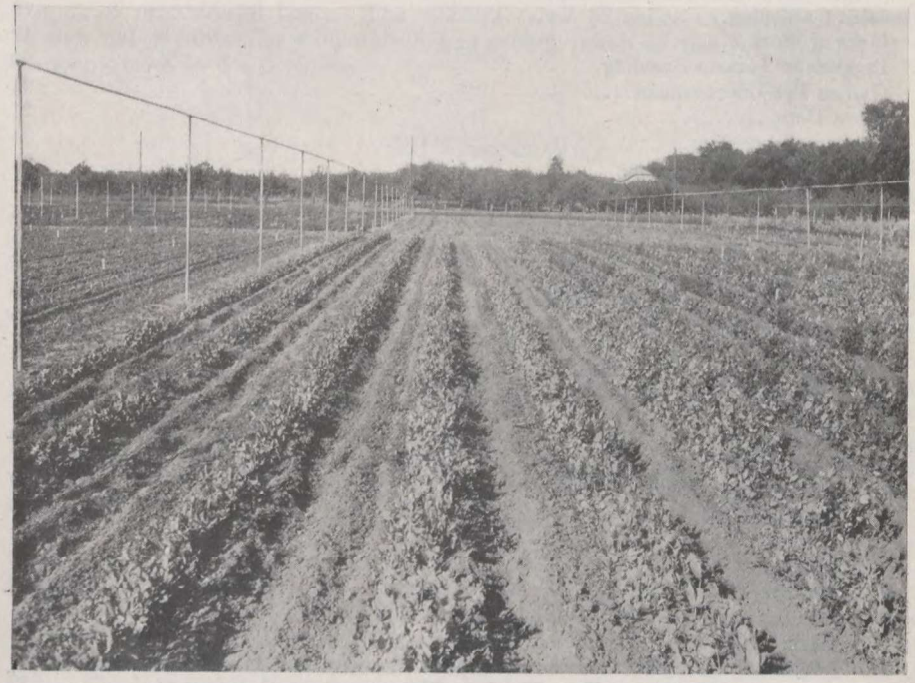
DOMINION EXPERIMENTAL FARMS

DIVISION OF HORTICULTURE

REPORT
OF THE DOMINION HORTICULTURIST

W. T. MACOUN

FOR THE YEAR 1925



GOOD STOCK SEED OF PEAS CAN BE GROWN IN THE OTTAWA DISTRICT

Three rows of Thomas Laxton and three of English Wonder grown for seed at the Central Experimental Farm, Ottawa

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Ottawa, 1926

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REPORT OF THE DIVISION OF HORTICULTURE

W. T. MACOUN, DOMINION HORTICULTURIST

The chief subdivisions of the Division of Horticulture are pomology, or fruit-growing; vegetable-gardening; ornamental gardening; painting of fruits, vegetables, and flowers, and maintenance of a herbarium of horticultural plants; the forcing of plants under glass; and canning and dehydration. In addition to these, are the keeping of the records; the general office work; and much work which has to do with the many horticultural projects at the Experimental Farms and Stations throughout Canada.

The following report, which is the thirty-ninth annual report of the Division of Horticulture, deals with but a few of the many projects being undertaken by the Division, and has been prepared by different members of the staff, Mr. M. B. Davis, B.S.A., Chief Assistant, having contributed the pomological section except the detailed descriptions of apples; Mr. T. F. Ritchie, B.S.A., Assistant in Vegetable Gardening, the section on vegetables; and Miss Isabella Preston, Specialist in Ornamental Gardening, the article on Some Results in Cross-Breeding Ornamental Plants. The Dominion Horticulturist prepared the remainder. Dr. F. T. Shutt, Dominion Chemist, kindly supplied the photographs of ornamental trees. The efficient work of other members of the staff, though not recorded here in detail, has meant much in the carrying on of the many projects in the division.

THE SEASON

The success or failure of crops depends so much on the character of the weather that it seems well to record each year some of the outstanding temperatures or climatic conditions throughout the year.

The month of January, 1925, was an exceptionally cold one, the lowest temperature ever recorded at the Central Experimental Farm occuring on January 28, when it was —34° F. There were nineteen days on which the temperature fell below zero. February, on the other hand, was relatively mild for that month. The lowest temperature was—11° F. on February 3. It was above freezing on thirteen days during the month. March was an exceptionally mild month. The temperature was not below zero at any time during the month, and it rose above freezing on every day during the month. By March 21 fields were nearly bare of snow. The highest temperature of the month was 78° F. on the 25th and it was 76° F. on the 26th and 27th. By April 1 the frost was out of the ground sufficiently to dig, which was ten days earlier than the average date for twenty-eight years, April 11. The orchard land was dry enough for ploughing on April 7. April was, however, a colder month than March in 1925. The temperature fell to below zero three times during the month, the lowest being on the 3rd, when it was —13° F., and on the 16th it fell to —2° F. The highest temperature of the month was 58° F. on the 29th. The last spring frost was on May 24, when it was 28° F. The highest temperature in May was 78° F. on the 20th. The month of June was warm. The temperature was above 80° F. on ten days and above 90° F. on four days. The warmest days of the year were on the 6th and 7th, on both of which it was 93° F. From the 3rd to the 10th was the warmest part of the month. As there was a fair rainfall during the month, growth was rapid. July was only moderately

warm. It was 80° F. and above on nine days, the warmest day being on the 6th, when it was 86° F. August was a warm and rather dry month, there being only one inch of rain. This was the only month of the year when the precipitation was light. It was 80° F. and above on twenty-two days during the month, the warmest day being on the 25th, when it was 91° F. The first autumn frost was on September 23, when the temperature was 31° F. There was also a light frost on the 26th. The month was moderately warm on the whole with the highest temperature, 84° F., on the 10th. October was cool. There was frost on eighteen days, beginning with 28° F. on the 1st, and the lowest temperature on the 30th, when it was 11° F. The highest temperature was 60° F. on the 16th. October was one of the dullest, coolest months on record. By the 26th the leaves were practically all off the ornamental trees. November was comparatively mild up to the last week, when it was —6° F. on the 29th and —11° F. on the 30th, the coldest day in November in the last thirty-six years. Winter may be said to have set in on November 24 with the ground frozen and a few inches of snow. The average date for 28 years is November 25. December was relatively mild for most of the month with the temperature above freezing on nine days. It was below zero on six days. The coldest day of the month was on the 30th, when it was —20° F. At the end of the year there was nearly a foot of snow on the level.

POMOLOGY

The season of 1925 opened with an abnormally early spring which brought most of the fruits into early bloom. Unfortunately this exceptionally early start was followed by cold and inclement weather in the month of May, resulting in very unseasonable conditions for the plums, which, blooming so early, were faced with very poor conditions for pollination. This resulted in rather a poor set of this fruit although the bloom was very abundant.

In apples the orchards of the Division of Horticulture gave the largest crop in their history and although the season was not exactly conducive to the highest colour development, the crop was of high quality and was harvested without mishap, despite the early freeze which caused so much havoc in many of the fruit areas. Small fruits produced abundantly and an excellent crop of strawberries, gooseberries, currants and raspberries was harvested.

EXTERNAL WORK

Arrangements have been completed for orchard cultural work to be conducted in three orchards in the province of Quebec.

The location and type of work being undertaken in these orchards is here described, and it is hoped that in future years some valuable information will be available for dissemination through the medium of this report.

Orchard No. 1 is located at Rougemont, P.Q., on the grounds of Mr. Emile Gadbois. In this orchard cover-crop and fertilizer experiments are being conducted. The area is divided into different ranges for cover-crop work, and cross-divided into series of plots for fertilizer work. As all plots are replicated three times any dfferences due to treatment should be determinable.

Orchard No. 2, located at Châteauguay, on the farm of Jack Bros., is designed to give information on the value of leguminous and non-leguminous cover-crops with and without nitrogen.

In Orchard No. 3, at Abbotsford, on the farm of Mr. Arthur Buzzell the work consists of fertilizer treatment for a sod orchard and a comparison of this with the grass mulch, where the trees are supplied with a sufficient initial mulch of foreign material which is afterwards maintained by the cuttings from the centre and supplemented when necessary by further additions of straw or other available material.

HYBRIDIZATION WITH PEARS

As the commercial varieties of pears have not proved sufficiently hardy for eastern Ontario and Quebec, a large number of hybridizations between such varieties as Clapp Favourite, and Flemish Beauty two of the hardiest of our common commercial sorts, and Kurskaya and Zuckerbirn, two very hardy Russian varieties, were made a number of years ago.

A considerable number (36) of these hybrids have fruited during the past two years and an opportunity has been given to judge of the possibilities of this line of work.

The great majority of the trees have continued to make excellent growth and as they came through our severe winter of 1917-18, they have evidently inherited in a large measure the hardiness of their Russian parents. The value of this hardiness has been further evidenced by the complete loss of a series of one and two-year-old material bred entirely from our commercial sorts, Seckel, Clapp Favourite, and Duchess.

The fruit of this F_1 population shows a considerable variation in appearance, many not being far removed from the Russian parents, while a large number resemble outwardly Flemish Beauty, Duchess, and Clapp, depending upon which of these was the other parent. The increase in hardiness, size, and appearance has been in a large number of cases all that could be desired. When it came to quality, however, very few were able to pass muster. The great majority inherited the coarse flesh, lack of flavour, dryness and poor keeping quality of the Russian varieties. From the entire lot which have so far fruited, six have been selected as being possibly of some value where better sorts cannot be grown. There are still 337 trees to fruit from this collection and possibly something of real merit may yet be obtained.

Further breeding with the best of this group was commenced in 1925, consisting of self fertilization and back crossing with Clapp and Duchess. With everything except quality having been obtained in the F_1, there is every reason for optimism when the further segregations of the F_1 and the back-crossed generations are fruited.

DESCRIPTIONS OF NEW VARIETIES OF APPLES ORIGINATED IN THE HORTICULTURAL DIVISION AND NAMED DURING THE YEAR 1925-26

A continuous effort has been made to originate new and better varieties of apples for Canada since the year 1888 when seed was imported from Riga, Russia. From time to time those which seem most promising are named and trees are sent out for trial to different parts of Canada, and if after these trees fruit a variety is thought worthy of general planting, it is propagated in larger numbers and trees sold to those who desire them, the sale of such being discontinued when nurserymen have a good stock of them.

During the past year the following eighteen varieties, which had been fruiting for some years, were named. The names given suggest, in most cases, the parentage of the varieties.

Antmil (Antonovka x Milwaukee).—Fruit medium to large; form oblate, ribbed, flattened at ends; cavity deep, open, russeted, outspreading; stem short, stout; basin deep, open, wrinkled; calyx open; colour yellow washed on sunny side with bronzy red; predominant colour yellow; seeds below medium size, acute; dots obscure; bloom thin, pinkish; skin moderately thick, tender; flesh yellow and white, firm, moderately juicy; core medium, open; flavour subacid, pleasant; quality above medium to good; season November to March. An attractive-looking apple. Resembles Antonovka somewhat in colour of skin and flesh and Milwaukee in shape.

Beforest (Forest seedling).—Fruit medium to large; form roundish to oblate, slightly ribbed; cavity deep, open, russeted; stem medium length to long, moderately stout to stout; basin open, medium depth, wrinkled; calyx partly open; colour yellow washed and splashed with dull crimson approaching orange-red; predominant colour dull crimson; seeds large, obtuse; dots obscure; skin moderately thick, tender; flesh yellowish, crisp, tender, breaking, moderately juicy; core medium; flavour subacid, pleasant; quality good; season November to February. Resembles Forest somewhat in colour of skin and in flesh and flavour.

Forpear (Forest seedling).—Fruit medium to above medium; form roundish conic, flattened about cavity; cavity deep, open, russeted; stem short, moderately stout; basin open, deep, wrinkled; calyx open or partly open; colour yellow, washed, splashed and streaked with orange-red approaching crimson; predominant colour orange-red; seeds medium size, acute; dots moderately numerous, white, distinct; skin moderately thick, moderately tender; flesh yellow and white tinged with red, firm, crisp, tender, juicy; core medium size, open; flavour subacid, pleasant aromatic; quality good to very good; season late October to January. Resembles Forest somewhat in colour of skin in flesh and flavour.

Ganmore (Gano seedling).—Fruit above medium; form roundish to oblate, regular; cavity open, medium depth, russeted at base; stem medium length, moderately stout; basin open, medium depth to deep, wrinkled; calyx open; colour yellow well washed with crimson; predominant colour crimson; seeds above medium size, acute to acuminate; dots obscure; skin moderately thick, moderately tender; flesh yellowish, rather coarse, juicy; core medium; flavour subacid, pleasant, not high; quality above medium to good; season late December to April. Resembles Gano very much in colour of skin and in flesh. Atractive in appearance.

Keefor (Milwaukee x Forest).—Fruit medium to large; form oblate to roundish, conic, regular; cavity open, deep, sometimes lipped, russeted; stem short, stout; basin open, deep, wrinkled; calyx open or partly open; colour greenish yellow thinly washed with deep carmine; predominant colour deep carmine; seeds medium size, acute; dots obscure; skin thick, tough; flesh yellowish, firm, moderately juicy; core small; flavour subacid, pleasant; quality above medium to good; season late December to March or April. No marked resemblance to either parent, though shape is somewhat like Milwaukee.

Lawmac (Lawver x McIntosh).—Fruit above medium to medium; form roundish, slightly ribbed; cavity narrow to medium, medium depth, wrinkled; stem short, stout; basin shallow to medium depth, medium width to open; calyx open; colour yellow well washed and splashed with crimson; predominant colour crimson; seeds below medium, plump, acute; dots numerous, pale yellow, distinct; skin moderately thick, tender; flesh yellowish, with traces of red, crisp, tender, juicy; core medium size, open; flavour subacid, sprightly, little flavour but pleasant; quality above medium to good; season late December to March or April. Resembles both McIntosh and Lawver in colour of skin. A very good keeper: Attractive in appearance.

Lawseed (Lawver seedling).—Fruit above medium to medium; form roundish; cavity deep, open; stem medium to long, slender; basin deep, open, wrinkled; calyx closed, long lobes; colour yellow well washed and splashed with bright crimson; predominant colour bright crimson; seeds medium size, dark, acute to acuminate; dots moderately numerous, pale yellow, distinct; skin moderately thick, moderately tough; flesh yellowish with traces of red, firm, moderately juicy; core medium; flavour subacid, pleasant; quality above medium to good; season late November to March or later. An attractive-looking apple. No resemblance to Lawver. Resembles Rome Beauty considerably in colour and in flavour.

Lawtosh (Lawver x McIntosh).—Fruit medium to above; form roundish, slightly ribbed; cavity shallow to medium depth, open, russeted; stem medium length, moderately stout to stout; basin medium depth to shallow, narrow to medium width, wrinkled; calyx closed or partly open; colour yellow well washed with deep but lively and attractive crimson; predominant colour deep attractive crimson; seeds medium size, plump, obtuse and acute; dots few, yellow, indistinct; skin moderately thick, moderately tender; flavour very mildly subacid and sweet, pleasant, good; core small, open; flesh yellow, very tender, moderately juicy; quality good to very good; season November to January. A very attractive apple of good quality.

Maclate (McIntosh seedling).—Fruit medium to above; form oblate, slightly ribbed; cavity open, medium depth to deep, russeted at base; stem short to medium length, stout; basin deep, open, smooth; calyx open; colour yellow washed and splashed with attractive crimson; predominant colour crimson; seeds below medium size, roundish, acute; dots few, white, indistinct; skin moderately thick, moderately tender; flesh yellowish, firm crisp, moderately juicy; core small; flavour subacid, pleasant; quality above medium to good; season late December to April. No marked resemblance to McIntosh Red except in colour of skin.

Macross (McIntosh seedling).—Fruit medium to above medium; form roundish to oblong, slightly ribbed; cavity deep, medium width; stem medium length to long, moderately stout; basin deep, open, wrinkled; calyx open or closed; colour yellow thinly but almost entirely washed and splashed with bright attractive crimson; predominant colour bright attractive crimson; bloom thin, bluish; seeds above medium, acuminate, but majority apparently abortive; skin moderately thick, tender; flesh yellowish suffused in places with red, crisp, firm, moderately juicy; flavour briskly subacid, pleasant; core medium; quality good; season late August probably through September. Little if any resemblance to McIntosh except in colour. A handsome apple.

Macver (McIntosh x Lawver).—Fruit medium to above; form oblate to roundish, conic, regular; cavity open, medium depth; stem medium length, moderately stout to stout; basin medium depth and width to open, wrinkled; calyx partly open or closed; colour pale yellow washed and splashed with crimson, green about cavity; predominant colour crimson; seeds above medium to large; obtuse and acute; dots few, white distinct; skin moderately thick, tender; flesh dull white and yellow, crisp, firm, tender, moderately juicy to juicy; core medium size, open; flavour subacid, pleasant; quality above medium to good; season January to March or April. No marked resemblance to either parent, though flesh is considerably like Lawver.

Milfor (Milwaukee x Forest).—Fruit large; form oblate to roundish, slightly ribbed; cavity deep, open, russeted; stem short, stout; basin deep, open, wrinkled; calyx open; colour yellow washed and splashed with carmine approaching orange-red; predominant colour carmine; seeds medium acute; dots obscure; skin moderately thick, tender; flesh dull white or yellowish, very tender, buttery, moderately juicy; core small; flavour subacid, pleasant; quality good; season December to March. Resembles Milwaukee very much in outward appearance and colour of skin and in flesh, but Forest in flavour.

Milmac (Milwaukee x McIntosh).—Fruit above medium to large; form oblate to roundish, ribbed; cavity deep, open, russeted; stem short, stout; basin deep, open, wrinkled; calyx open or partly open; colour yellow washed and splashed with carmine; predominant colour carmine; seeds small or below medium; plump, acute; dots few, white, distinct; bloom thin, bluish; skin moderately thick, tender; flesh yellow and white, crisp, tender, juicy; core small, open; flavour briskly subacid, sprightly, not much flavour; quality above medium; season December to April. Resembles Milwaukee very much in outward appearance and in flesh and flavour. A better keeper than Milwaukee.

Spiana (Northern Spy seedling).—Fruit above medium to large; form roundish to oblate, slightly ribbed; cavity deep, open, russeted; stem short, stout; basin deep, open, slightly wrinkled; calyx open; colour greenish yellow washed and splashed with deep orange-red approaching crimson; predominant colour deep orange-red; seeds below medium to small size, acute; dots moderately numerous, pale yellow, indistinct; skin moderately thick, tender; flesh dull white or yellowish, firm, crisp, tender, juicy; core medium size, open; flavour subacid, sprightly, pleasant, not high; quality good; season December to April. Attractive in appearance. Colour of skin somewhat like Northern Spy. Character of flesh and flavour considerably like Northern Spy.

Spilaw (Lawver seedling).—Fruit medium; form oblate conic; cavity deep, open, russeted; stem medium length to long, stout to moderately stout; basin narrow, medium depth, wrinkled; calyx closed; colour pale yellow washed and splashed with crimson; predominant colour crimson; seeds above medium size, acute; dots few, yellow, distinct; skin moderately thick, tough; flesh dull white tinged with red, crisp, tender, juicy; core medium size; open; flavour subacid, pleasant; quality good; season December to March. No marked resemblance to Lawver. Resembles Northern Spy considerably in colour of skin, flesh, and flavour.

Stonecrop (Stone seedling).—Fruit medium to above; form roundish conical; cavity narrow, shallow; stem medium length to short, moderately stout; basin open, medium depth, wrinkled; calyx open; colour yellow well washed with orange-red; predominant colour orange-red; seeds medium size, acute to acuminate; dots numerous, white or brown, conspicuous; bloom thin, pinkish; skin moderately thick, tender; flesh yellow, firm, buttery, moderately juicy; core medium, open; flavour subacid, spicy, pleasant; quality good; season late December to April. Resembles Stone about cavity, in colour of skin, and in flavour.

Stonehenge (Stone seedling).—Fruit large; form roundish, regular; cavity deep, medium width; stem medium length, moderately stout; basin deep to very deep, open, wrinkled; calyx open; colour yellow well washed with crimson approaching orange red; predominant colour crimson approaching orange red; seeds medium size, acute to acuminate; dots few, pale yellow, indistinct; skin moderately thick, tender; flesh dull white or yellowish, firm, moderately juicy; core medium; flavour subacid, pleasant; quality good; season late December to March. No marked resemblance to Stone. Attractive in appearance.

Toshlaw (McIntosh x Lawver).—Fruit medium to above, form roundish, regular; cavity narrow, very shallow, sometimes closed; stem medium length, stout; basin open, very shallow, wrinkled; calyx closed or partly open; colour pale greenish yellow to yellow washed and splashed with dull crimson; predominant colour dull crimson; seeds medium, plump, acute; dots obscure; bloom thin, pinkish; skin moderately thick, moderately tough; flesh dull white, firm, crisp, juicy; core medium size, open; flavour subacid, pleasant; quality above medium to good; season January to April or May. No marked resemblance to either parent. A combination of both.

Wintlaw (Winter St. Lawrence seedling).—Fruit above medium; form roundish conical, slightly ribbed; cavity deep, medium width; stem medium length, stout; basin open, medium depth to deep, abrupt, wrinkled; calyx open; colour greenish yellow washed with crimson approaching pinkish red; predominant colour crimson; dots few, white, distinct; core medium size; seeds medium size, acute to acuminate; skin thin, tender; flesh dull white, tender, melting, juicy; flavour subacid, pleasant; quality good; season early September to late October. No resemblance to Winter St. Lawrence. A nice dessert apple.

APPLE BREEDING

In the apple breeding section, the great majority of the crosses left by A. J. Logsdail have fruited. As in most cases the parents were not high in quality, the majority have not proved of sufficient merit to warrant further testing. Three of this group, however, are being propagated and their parentage is as follow: 1-Wealthy x McIntosh; 1-McIntosh x Wealthy; 1-Wealthy x Cox Orange.

In addition to these three there have fruited four *P. baccata* and crab hybrids which show considerable merit.

One of these, Duchess X *P. baccata* 6/8, is particularly large sized for a first cross, being 2 inches in diameter. This is the largest first cross from all the work done with *P. baccata* at this station and the only one approaching *Malus sylvestris* in quality and appearance.

From the results of the breeding work of the last three seasons there are now 4,592 hybrids well established in nursery rows. As a great many of these contain blood of Delicious, Jonathan, Grimes, Spitzenberg, and Gravenstein in combination with McIntosh and Wealthy, this is considered the most interesting and valuable group of material originated at this station.

CHERRY BREEDING

Sweet cherries and Dukes not being hardy in either tree or bud for Eastern Ontario and Quebec, and the common sour cherries killing frequently in the fruit bud, our attention for the past five years has been focused on an attempt to effect a successful cross between the sweets, dukes, and sour cherries on the one hand with the bird cherries (*Prunus pennsylvanica*) on the other. Up to the time of writing we have so far been only partially successful. Although there are some 23 seeds in the germinating frames which are the results of much hybridizing there appears to be little if any compatibility between the species referred to. The number of blooms actually pollinated is recorded here together with the number of fruits set; all the sets but two having occurred this past season.

Cross	Number pollinated	Number set
P. pennsylvanica X Sour cherries	278	2
P. pennsylvanica X Dukes and Sweets	251	0
Sour cherries X *P. pennsylvanica*	816	11
Sweets and Dukes X *P. pennsylvanica*	838	10

Percentage of sets = 0.15 per cent.

In addition to the above, some success has attended the crossing of *Prunus tomentosa*, the Japanese cherry, with *Prunus pennsylvanica* and 11 seeds are now in the germinating frames.

PLUM BREEDING

Our breeding work with plums has expanded considerably this last few years.

In the report of this division for 1923, reference was made to the interfertility between Domestica and hybrid plums. During the past two seasons germination results from these crosses have been accumulated and are reported here.

Cross	Germination	
	Number	Per cent
Omaha X Bradshaw	0	0
Omaha X Lombard	0	0
Omaha X Reine Claude	10	9
Omaha X Washington	1	15
Omaha X Shropshire Damson	0	0
Omaha X Yellow Egg	0	0
Waneta X Reine Claude	0	0
Ezaptan X Reine Claude	0	0
Cheney X Reine Claude	0	0

While the results are not entirely satisfactory, yet there still remains the possibility that the gap between *Prunus nigra* and *P. domestica* will at last be bridged in a satisfactory manner. Of the 11 hybrids germinated 6 only are now growing in the nursery, five of the Omaha-Reine Claude hybrids having succumbed.

The combination does not appear to be a very congenial one, as none of the individuals are making the growth that other seedlings in the same nursery are making.

OTHER INTER-SPECIFIC HYBRIDS

Other interesting material which is now in nursery rows consists of the following combinations:—

2—Compass cherry X Emerald plum.
5—Compass cherry X Burbank plum.
1—Zumbra cherry X *P. nigra.*
1—Rocky Mountain Cherry X *P. nigra.*
1—*Prunus spinosa* X Shropshire Damson.
1—*Prunus spinosa* X Bradshaw.

RUBUS BREEDING

In the report of this Division for 1922 attention was called to certain lines of work with Rubus; many of these have fruited since that date and further lines of work have been undertaken.

LOGANBERRY-RASPBERRY COMBINATION

The results from this combination were disappointing as out of 101 hybrids between these two, not one fertile individual appeared. The plants appeared vigorous, grew well, and resembled the Loganberry in plant and foliage characters. The bloom was always similar to that of the Loganberry, but refused under any conditions to set fruit. Only a few nubbins with one or two drupelets would set on each plant. This has so far made it impossible to self or even backcross these hybrids which might give something of value.

The Laxtonberry of England is said to be a result of this cross, so evidently very large numbers of this cross will be necessary to obtain a fertile combination. To date there has not been any information published on the chromosome number of Loganberry, so that it is difficult to determine, except by empirical means, just what Rubus species will combine with it in a satisfactory manner.

RASPBERRY—RED AND PURPLE COMBINATIONS

The combination between the red raspberries and the purple as represented by Royal Purple gave great promise of something of value. The extreme vigour of the hybrids with their stout canes, tall upright growth in many cases, and large firm fruit was very encouraging.

Purple, dark-red, and bright-red fruits were recovered, and in most cases the fruits were very firm and of good size. In firmness they excelled any of the red-by-red combinations. Both suckering and non-suckering individuals were obtained, and several of the non-suckering reds and dark reds were marked for propagation on account of their outstanding vigour, size, and firmness of fruits. Of some eighteen of these only one has propagated by tip layering, the balance refusing to propagate by any means. The best of these have been selfed and again crossed with reds and the later generations are expected to give something of merit.

As just noted, the extreme vigour extant in these hybrids and the firmness of the fruit holds out rather great hopes for these combinations.

RASPBERRY—BLACK AND RED COMBINATIONS

This is not a new combination, as our commercial purples have been originated by this method. The best of these hybrids have, however, been selfed and back-crossed and a very variable group of young plants are now growing which will fruit for the first time in 1927.

GOOSEBERRY BREEDING

As reported in 1922 our work with the thornless gooseberry bush has been prosecuted to several generations, but at that time we had not succeeded in originating a thornless bush with any size of fruit. Since then we have isolated one which is practically thornless and spineless and bears fruit of commercial size. This has been named Spinefree.

To show the development in this project three photos are presented here, which illustrate the development of this line of work. Fig. 1 shows the original thornless specimen, natural size. Fig. 2, natural size, shows one of the F_2 hybrids between the original thornless and Ribes Grossularia, variety Victoria. Fig. 3 shows the present commercial thornless, which is the result of crossing the variety shown in fig. 2 with Mabel.

The individual in fig. 3, the Spinefree, is of commercial size. The fruit is good in quality, rather thick-skinned, bright red in colour when ripe, and entirely free of spines or tomentose. The bush is an upright, vigorous grower, free of mildew and practically resistant to spot. Being free of spines and thorns, picking is rendered a comparatively simple operation.

GOOSEBERRIES—NEW VARIETIES

Since the publication of Bulletin 94, on bush fruits, more information on some of the newer varieties of gooseberries has been obtained and comments on some of these is appended:—

Chautauqua.—While not a new introduction, this variety of European origin has proved exceptionally promising in America, when most of the European sorts are not suitable on account of excessive mildew. The fruit is large size, whitish-green in colour, with smooth skin, and plenty of bloom. The skin is rather thick and tough, but quality is fairly good. Comparatively free of mildew and vigorous. Well worth a trial where large size is desired.

Clark.—This is a new variety originated as a chance seedling in the Burlington district. It appears to have a large amount of English blood and may be a hybrid between some European and American variety. The bush is fairly vigorous and so far has proved hardy at Ottawa. The fruit is very large and thick-skinned, and rather tough, greenish-yellow turning red when ripe, free of mildew, fair in quality.

While it does not appear as productive as either Mabel or Silvia, it is one of the outstanding varieties on account of its very large size and good quality.

Oregon Champion.—This variety has not proved hardy at Ottawa, killing very badly in winter. Very subject to septoria or spot. The fruit is not large, is white, and tomentose, being only medium in quality. There is practically nothing to recommend its continuance.

Poorman.—This variety is of outstanding merit. While not as large as Clark, it is much more productive, handsomer in colour, and better in quality. Its colour is a very lively pink-red, quite distinct from other sorts. It has a fairly tender skin, and good flavour. Apparently all American, and may be recommended for extended trial.

Van Fleet.—This variety is very vigorous and is productive, but otherwise, as grown at Ottawa, is disappointing. The fruit is rather small, dull-red in colour and poor in quality. Free of mildew but subject to spot. Not nearly as promising as Poorman or Clark.

FIG. 1—Spineless gooseberry. Original thornless specimen

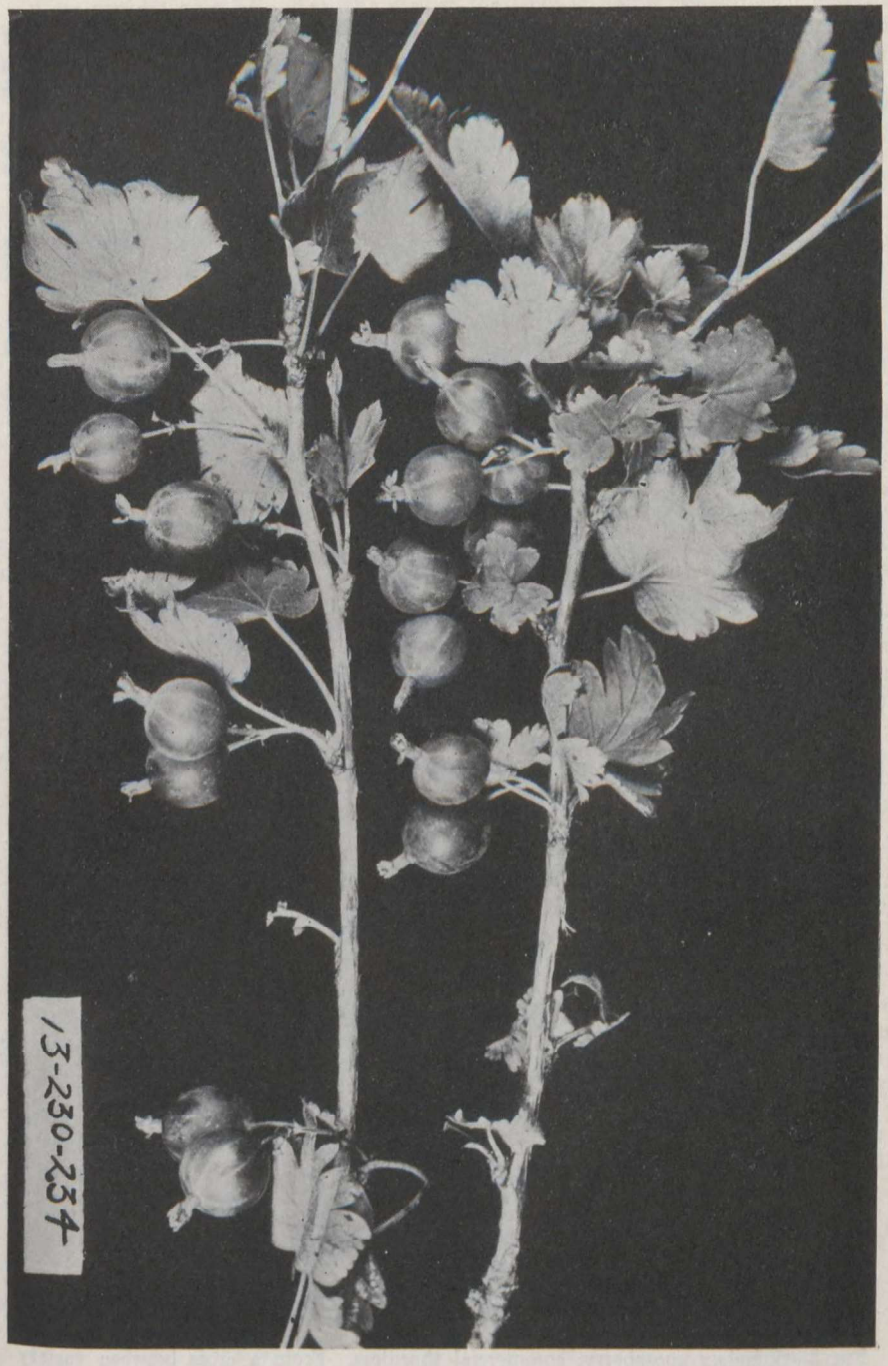

FIG. 2—Spineless gooseberry. Second generation hybrid from a cross between the thornless and variety Victoria

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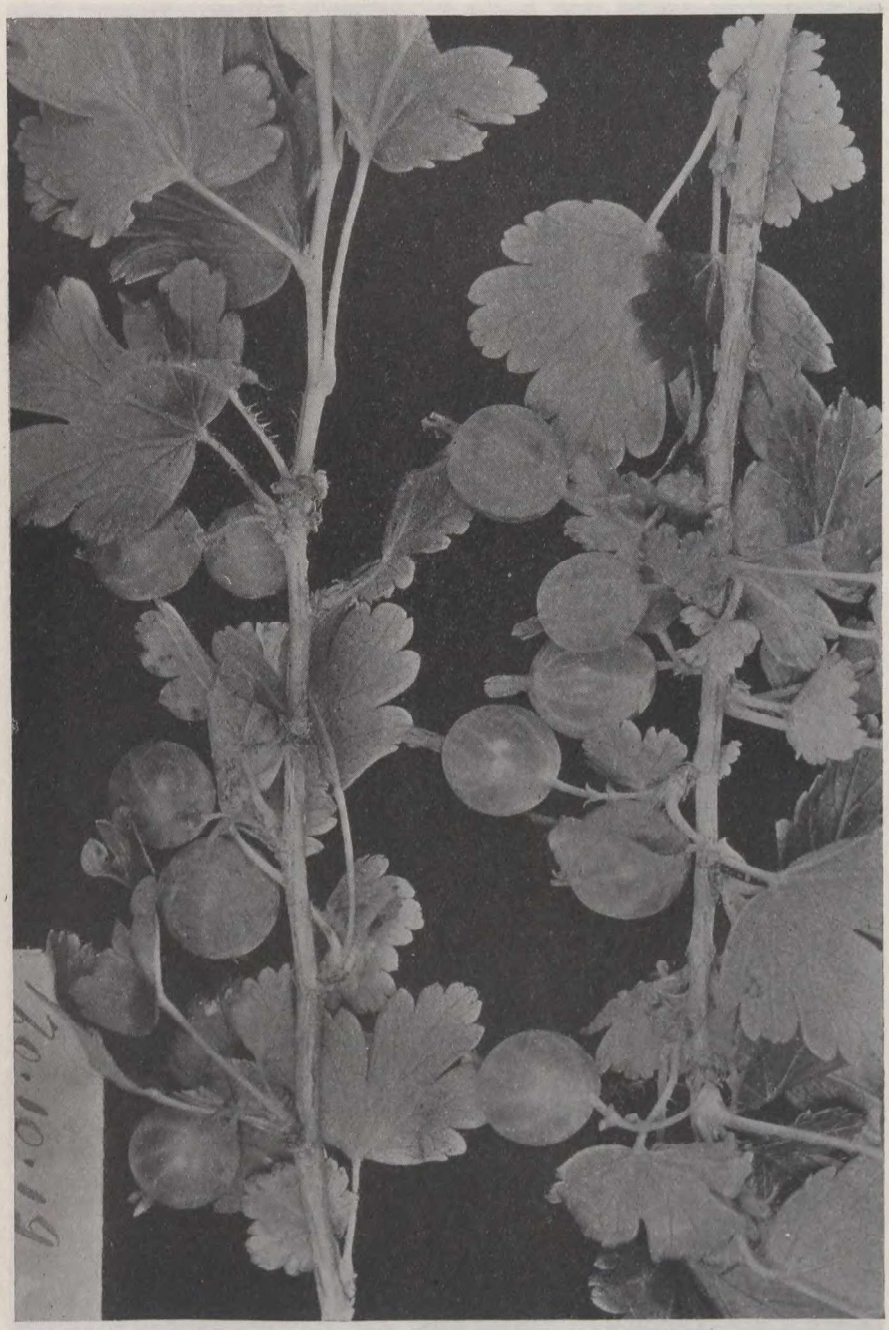

FIG. 3—Spineless gooseberry, commercial thornless. From a cross between variety shown in Fig. 2 and Mabel

STRAWBERRY BREEDING

This project as outlined in the report for 1922 is being continued. From the self fertilization of a number of strains the F_4 generation has been segregated and will fruit in 1927. A certain amount of uniformity in foliage characters is already noticeable. No reduction in the vigour of the plants has been observed, however, although the size of the fruit of the greater number of the F_3 generation was noticeably smaller, with only a very small number of plants producing large-sized fruit.

From the fall bearing hybrids, four varieties have been selected as worthy of extended trial. These are now being propagated as rapidly as possible for distribution to the branch Farms and Sub-stations for final testing before introduction to the trade.

STRAWBERRY FERTILIZER EXPERIMENTS

This experiment was referred to in the 1924 report. This year the yields from the various plots are available and it is possible to give the final results of the effect of nitrogenous fertilizer applications made at different times during the life of the plantation.

As reported in 1924, the soil on which this experiment was conducted was in a high state of fertility, and applications of nitrate of soda failed to give any observable results in vegetation, so that nitrogen was not considered a limiting factor so far as vegetation was concerned. The results from the yields in 1925, were, however, quite marked and the details of the yields from all series are here recorded.

The plots consisted of three fifteen-foot rows, and each treatment or series was replicated three times, so that the yields recorded are from four widely separated plots of the same treatment. The probable error has been calculated by Wood and Stratton's pairing method and is used in deciding the significance of the results.

Series	Treatment	Yield
G	Not nitrated	19·10 lb. ± 0·75
A	Nitrated at planting	20·25 " ± 0·75
B	Nitrated 1 month after planting	22·30 " ± 0·75
C	Nitrated August 15	23·00 " ± 0·75
D	Nitrated September 15 only	23·30 " ± 0·75
E	Nitrated September 15 and before bloom	24·20 " ± 0·75
F	Nitrated September 15 and in full bloom	23·20 " ± 0·75

The highest-yielding series is the one receiving nitrate on September 15 and again just before bloom in the spring. There was, however a noticeable increase due to the September application, and as will be observed by the table, an increase in all the nitrated series, which became progressively more marked as the application approached the fruit bud forming period.

The early spring application, even on soil high in fertility has a tendency to cause increase in size of fruit; which accounts for the slightly greater yield in series E.

Comparing the difference between the check plots and the nitrated series on the probable error basis one is able to gain some idea as to the significance of these results. This comparison is given below:—

Nitrated at planting	20.25 ± .75
Not nitrated	19.10 ± .75
Difference	1.15 lb.

Probable error of the difference $= \sqrt{(.75 + .75)^2} = \sqrt{1.125}$.
The difference = 1.15 lb. ± .34 lb.

Accepting three times the probable error as a safe criterion of a significant difference this can be accepted as being a possible difference due to the treatment.

In the cases of each of the other series the significance is, of course, more marked; for example the difference between the check series and the following treatments:—

Series B Nitrated 1 month after planting	=3.20 lb.
Series C Nitrated August 15	=3.90 lb.
Series D Nitrated September 15	=4.20 lb.
Series E Nitrated September 15 and before bloom	=5.20 lb.
Series F Nitrated September 15 and in full bloom	=4.10 lb.

The differences between the check series and series D, E, F, are quite marked, representing differences that are 12, 15, and 12 times greater than their probable error, which can be accepted as fairly reliable evidence that actual differences existed due to the application of nitrate of soda.

SUMMARY.—Summarizing the results as reported in last year's report and in the foregoing, the following recommendations are made to the strawberry-growers of Canada:—

(1) Nitrate of soda and other soluble salts when applied at planting time may have an injurious effect upon the newly set plants as they are not apparently capable of utilizing increased quantities of soluble nitrogen.

(2) On land in a fairly high state of fertility, applications of nitrate of soda may not cause any marked improvement in vegetative response or early runner formation even when applied as late as two months after planting at which time no injury to the plants is observable.

(3) On poor soils where nitrogen is actually a limiting factor as indicated by the pale colour of the foliage, nitrate of soda applications made not earlier than one month after planting may cause a marked increase in early stolon formation, which will result in increased yields the following year.

(4) Strawberry plants appear in this country to form fruit buds about three weeks after rooting.

(5) Applications of nitrate of soda even on land where nitrogen is not a limiting factor from a vegetable response standpoint, when made about September 15, at which time a large number of plants are forming fruit buds, causes a marked increase in yield the following year.

(6) When manure is used, better results have been obtained by applying in large quantities the year previous to some hoed crop, or when applied at planting time, by ploughing in rather deeply.

BLUEBERRIES IN CULTIVATION

As reported in 1924, the high bush varieties of blueberry, originated in the United States, were planted in various parts of Ontario, Quebec, and Nova Scotia for test purposes on various types of soil.

While there will be little of a definite nature to report, a number of these are apparently doing well on comparatively dry land where soil acidity is close to the considered optimum for this species, viz., P. H. value of about 4.5. Of the varieties under test, Pioneer and Cabot appear so far to be the most suitable for our conditions, but some of the hybrids between the high bush and the low are also making very good progress.

A large number of open pollinated seedlings from these high bush sorts, the native low bush types, and the Nova Scotia native high bush varieties reported on in 1924, are growing at the Central Experimental Farm and will be sent to the various trial grounds in 1927 for permanent planting.

In connection with the above, some results with germinating blueberry seed may prove of interest.

The seed of blueberries is a little difficult to germinate but by following either of two methods good results can be obtained.

Sowing the seed out-of-doors in the fall does not give good results and is practically useless. The seeds do not germinate until late summer, and the young seedlings are unable to withstand the following winter. The following methods of germination were tried. All seed was sown in pure sand, in 6-inch pots, and after being removed to the greenhouse these pots were kept in a saucer of water and a glass placed over the top of the pot to prevent evaporation. No watering from the top was given. While the number of seeds sown was not counted, notes were taken on the first germination and on the general amount of germination obtained, which gives at least some practical evidence of the comparative efficiency of these methods.

GERMINATION OF BLUEBERRY SEED

Series	Treatment	Time to germinate	Amount of germination
24·01	Kept at 40° F. for one month in moist sand, then transferred to greenhouse	84 days	good
24·01 A	Treated with 10 per cent sulphuric acid for 12 hours, then sown in sand and taken to greenhouse	82 days	fair
24·01 B	Kept at 40° F. for one month in moist sand, dried two days and restratified for three weeks	49 days	good
24·01 B.A.	Same as above 24·01 B, but with addition of 10 per cent sulphuric acid for twelve hours after last stratification	56 days	fair
24·01	Kept at 40° F. for three weeks and then transferred to greenhouse	60 days	poor

From these results it may be recommended either an after ripening period of one month at 40° F., or treatment with 10 per cent sulphuric acid for 12 hours will give satisfactory results in the germination of both high and low bush blueberry seed.

The after ripening period of three weeks did not answer as well as one month and where the period was extended to seven weeks the germination was more rapid but no better in the end.

THINNING EXPERIMENT WITH APPLES, VARIETY WEALTHY

In view of the fact that some varieties of apples tend to overcrop during certain seasons, resulting in a large percentage of undersized fruit, an attempt was made to gain some information on the efficiency of thinning the Wealthy variety of apple to different distances.

In order that an estimate could be made of the possible behaviour of the unthinned trees had they been thinned, a count was taken of the fruit removed from the thinned trees during the summer, and also a count of all fruits harvested from both thinned and unthinned trees. Trees as nearly uniform as possible were selected, and the distances of the thinning were as follows:—

(1) thinned 1 to a spur and not closer than 8 inches apart.
(2) thinned 1 to a spur and not closer than 4 inches apart.
(3) thinned 1 to a spur and no attention paid to spacing.

At picking time all fruit was counted and run through a Giffard grader and the percentage of No. 1, No. 2, No. 3, and cull apples calculated. At the time of picking the number of apples, tree-run, required to fill a barrel was recorded. This figure gives in general the comparative size of the fruit. These figures are here recorded:—

Unthinned trees, number apples per bbl. (tree-run) 1,047
Thinned 1 to a spur and spaced 8" apart, number apples per bbl..... 592
Thinned 1 to a spur and spaced 4" apart, number apples per bbl..... 602
Thinned 1 to a spur, not spaced, number apples per bbl..... 861
Trees thinned 8" apart had 54.7 per cent of fruit removed at thinning.
Trees thinned 4" apart had 47.5 per cent of fruit removed.
Trees thinned 1 to a spur had 26.5 per cent of fruit removed.
By removing 54.7 per cent of the fruit, size increased by 76.8 per cent.
By removing 47.5 per cent of the fruit, size increased by 74.0 per cent.
By removing 26.5 per cent of the fruit, size increased by 22.7 per cent.

These figures would suggest that while there was a substantial increase in size and quality, this increase was not sufficient to bring the total net crop up to that of the trees had they not been thinned. For the increase in size to take care of the loss of fruit, the 8-inch thinned where 54.7 per cent of the fruit was removed would be required to increase over the non-thinned by about 109 per cent, the others by 95 per cent and 53 per cent respectively.

These results so far have indicated the possibilities of improving the quality of the product by thinning; whether or not this could be considered an economical practice depends upon the spread in price between high grade and low grade fruit. The results of the pack-out given later indicates more completely the larger number of No. 1 and No. 2 apples on the thinned trees as compared with the unthinned. An attempt has also been made to estimate the actual gain or loss in this instance due to thinning.

At this juncture it should be pointed out that the operation of thinning is one which actually does not cost the grower any more than not thinning. The apples on the tree must be picked at harvest time, and if a certain number of them are picked in early summer and dropped, these do not have to be picked again. It is easy to see that picking and dropping the fruit on the ground is much less expensive than picking in the fall, carefully placing in a basket, hauling to the packing-shed, grading and packing. If a large number of these apples are threes and culls and have to be discarded or sold as cider apples it is easy to see that this expensive handling can come to more than the small price received for such produce. Here in our opinion lies the great advantage of thinning, viz., by reduction of the number of culls the cost of picking and handling may be reduced to the minimum. It is often difficult for growers to appreciate this point and many insist that the cost of removing the fruit in summer must be added to the cost of picking the trees had they not been thinned. If this is done the thinned crop is being asked to bear the cost of picking a percentage of its fruit twice, which does not occur.

In the following estimates no account of picking or thinning costs has been considered. If there is any difference between the thinned and unthinned it is in favour of the thinned trees, gained by elimination of the extra handling of cull fruit which in these plots was simply dropped on the ground in summer.

The prices accorded the different grades were the prevailing prices reported at that time by the market reports. Cull apples have been credited at 25 cents a barrel, the price paid for cider apples. Where cull apples can be sold for a higher figure the difference between the thinned and unthinned plots becomes less, so that the grower can, by using his own returns, estimate with these data whether or not thinning under his conditions is a profitable undertaking or not.

PACK-OUT RETURNS FROM THINNED AND UNTHINNED TREES, IN PER CENT

—	No. 1	No. 2	No. 3	Culls
Not thinned	8·8	15·9	34·9	40·3
Thinned to 8"	32·1	40·3	19·5	7·8
Thinned to 4"	28·5	36·8	25·2	9·5
Thinned 1 to a spur	7·5	26·1	39·0	27·4

On the unthinned trees using four trees as a basis for comparison there was 7.6 barrels harvested, having a total of 7,940 apples, with 1,047 apples per barrel. The pack-out resulted as follows:—

No. 1 apples	8.8 per cent,	= 0.66 bbls. at	$5	= $ 3 30
No. 2 apples	15.9 per cent,	= 1.20 bbls. at	4	= 4 80
No. 3 apples	34.9 per cent,	= 2.65 bbls. at	3	= 7 95
Cull apples	40.3 per cent,	= 3.06 bbls. at	25c	= 76
Total				= $16 81

Taking each set of thinned data in turn these figures would have changed as follows had the trees been thinned.

If thinned to 8 inches, 54.7 per cent of the fruit would have been removed, amounting to 4,343 apples and leaving 3,597 to be harvested, which at the rate of 592 apples per barrel would have given 6.1 barrels of fruit, packing out as follows:—

No. 1 apples	32.1 per cent,	=	1.95 bbls. at	$5	=	$ 9 75
No. 2 apples	40.3 per cent,	=	2.45 bbls. at	4	=	9 80
No. 3 apples	19.5 per cent,	=	1.18 bbls. at	3	=	3 54
Cull apples	7.8 per cent,	=	0.47 bbls. at	25c	=	11
Total					=	$23 20

A net gain of $6.39 for four trees is shown, not taking into consideration reduced cost of handling.

Had these same trees been thinned to 4 inches apart, the returns would have been somewhat as follows. Here 47.5 per cent of the fruit would have been removed amounting to 3,771 apples and leaving 4,169 apples, which at the rate of 602 apples per barrel would have given a total harvested crop of 6.9 barrels, packing out as follows:—

No. 1 apples	28.5 per cent,	=	1.96 bbls. at	$5	=	$ 9 80
No. 2 apples	36.8 per cent,	=	2.54 bbls. at	4	=	10 16
No. 3 apples	25.2 per cent,	=	1.73 bbls. at	3	=	5 19
Cull apples	9.5 per cent,	=	0.65 bbls. at	25c	=	16
Total					=	$25 31

A net gain of $8.50 for the four trees due to thinning.

Had the same four trees been thinned 1 to a spur without any spacing, 26.5 per cent of the fruit would have been removed, viz. 2,104 apples, leaving 5,836 apples to be harvested, which at the rate of 861 apples per barrel would have given 6.8 barrels of fruit packing out as follows:—

No. 1 apples	7.5 per cent,	=	0.63 bbls. at	$5	=	$ 3 15
No. 2 apples	26.1 per cent,	=	1.77 bbls. at	4	=	7 08
No. 3 apples	39.0 per cent,	=	2.65 bbls. at	3	=	7 95
Cull apples	27.4 per cent,	=	1.86 bbls. at	25c	=	46
Total					=	$18 64

Showing net gain of $1.83 for the four trees due to thinning.

SUMMARY.—Briefly the net gain in dollars and cents due to the different degrees of thinning amounted to the following:—

When thinned to 8", a gain of	$1 59 per tree
When thinned to 4", a gain of	2 12 per tree
When thinned 1 to a spur, a gain of	46 per tree

VEGETABLE GARDENING

The spring of 1925 opened fine and warm with every prospect of a good year for all sorts of garden crops, but during the latter part of the spring season a very cold spell retarded the growth of the early planted crops. However, improved weather conditions during the midsummer and early autumn made up for any discrepancies in the growing season of the early spring.

LINES OF WORK

The chief lines of work embraced in this subdivision deal with the hybridizing of such crops as sweet corn, tomatoes, onions, and peas, but by no means is this the limit of the work for there is a great field for improvement in con-

nection with the recognized standard varieties of vegetables which are well known in commerce. The breeding of such crops as beets, cabbage, carrots, onions, parsnip, pumpkin, squash and rhubarb has been carried on with the result that some improvement has been noticed in the progeny. Cultural tests with beans, beets, cabbage, cauliflower, corn, parsnips, peas, potatoes and tomatoes, have been conducted, coupled with a fairly complete variety test of all the commercial varieties of vegetables.

Growing seed of known origin has been undertaken with the result that there is at present under record, strains of beans, carrots, corn, peas, squash and tomatoes that can be traced back for over three generations to one plant. In addition to this the multiplied progeny of this selection work is available for the Experimental Farms and Stations throughout Canada and for seed-growers and seed firms desirous of obtaining such seed in limited quantities.

PROGRESS IN TOMATO BREEDING

The selection and segregation work with hybrid tomatoes for the purpose of securing a high-quality, early maturing variety, that may rank in earliness with Alacrity and possess the high quality of some of the later maturing varieties, such as Bonny Best and Livingston Globe, as well as combining the sweetness of the fruit of the latter sorts, has been continued with comparatively good results.

In the report of 1924 reference was made to a number of crosses in which Alacrity, Bonny Best and Livingston Globe were used in various combinations, and it was found that the segregations from these third generation plants gave promise of fulfilling expectations, in that some segregations showed almost complete uniformity for earliness, with desirable shape and quality of fruit.

Another feature of this work that is of interest is in the fact that where a late maturing variety like Livingston Globe was crossed with Bonny Best a great reduction in the number of days from sowing the seed to ready for use was recorded. From records taken of the performance of Livingston Globe it has been found that it required around 115 days from sowing the seed until the first fruit was fully matured, while on the other hand Bonny Best has been found to require around 106 to 110 days from seed-sowing to ripening of the first fruit. The progeny of a cross between these two varieties in the third generation of plants was found to conform very closely to the time requirements of the Bonny Best or male parent.

By no means is the shortening of the season the only feature accomplished for there has been also an improvement in the quality and flavour of the fruit which can be considerd a great acquisition.

One of the most promising of the early maturing hybrids, is the cross between Alacrity and Bonny Best. This new sort has been found to breed true for type of plant and to possess the earliness of Alacrity or the female parent, while on the other hand it possesses the smoothness and symmetrical rounded shape of Bonny Best. The quality of the fruit is superior to Alacrity, being less acid. There is one drawback with this new origination, which can, however, be overcome by selection, that is the size of the fruit produced by some of the plants. Some of the plants tend to produce fruit of the whole salad type. So that a fair idea of the earliness of this cross may be appreciated, it should be mentioned that under test Alacrity has been found to require around 99 to 104 days from sowing the seed to maturing the first fruit, while some of the hybrids have been found to mature fruit in from 95 to 106 days.

In the accompanying table the yields of a number of individual plants are given. The seed for this crop was sown May 6, pricked out June 1, and planted in the field June 11.

Record No.	No.	—	Date of ripening	Colour of fruit	Total Yield
					lb. oz.
0-9740	1	Alacrity X Bonny Best 02-17010-07063.....	Aug.	9 Red	7— 1
0-9740	5	Alacrity X Bonny Best 02-17010-07063.....	"	15 "	8—10
0-9733	3	Livingston Globe X Bonny Best A1-0-7072-02.....	"	20 "	16— 9
0-9733	2	Livingston Globe X Bonny Best A1-0-7072-02.....	"	20 "	12— 8

GARDEN PEA IMPROVEMENT

The improvement of garden peas by cross-breeding and selection was continued during this season, with the result that some very valuable crosses and selections were obtained.

In the Thomas Laxton x English Wonder crosses there seemed to be a great deal more material of desirable type than in any other crosses made. The chief object of this cross was to obtain a dwarf variety that would combine the good quality of Thomas Laxton peas and retain the size of pod of that sort and to couple with this the prolific pod character of the English Wonder. There are many good dwarf varieties on the market at the present time but few if any possess the quality and sweetness of Thomas Laxton, and few are as prolific as the English Wonder or have even the quality of this sort.

Another feature of this particular cross is the relatively large number of small-sized peas produced by the individual vines. It would seem highly probable that a pea of this type would be desirable for canning purposes, since peas of small size are placed in the higher grades.

In the accompanying tabulation the recorded information is given concerning the progress of one family breeding true for dwarf vines and relatively small peas.

The progeny of other crosses made have been found equally as valuable but have not shown the degree of fixation found in 0-8738.

GARDEN PEA IMPROVEMENT

—	—	Vine Number	Number Pods	Number Peas	Number Peas per oz. dry	Number of twin pods	Length of vine in inches
0-8738	Thomas Laxton X English Wonder.	1	13	58	272	1	8
0-8738	" "	2	14	78	198	2	12
0-8738	" "	3	15	72	198	3	12
0-8738	" "	4	15	84	184	.....	14
0-8738	" "	5	16	59	198	2	14
0-8738	" "	6	16	69	198	3	12
0-8738	" "	7	19	83	198	2	12
0-8738	" "	8	19	99	170	.....	14
0-8738	" "	9	20	116	198	2	14
0-8738	" "	10	28	110	226	8	15

SWEET CORN

The three varieties of sweet corn originated in the Horticultural Division and tested throughout Canada through the initiative of the Horticultural Division still hold their place as the most promising of all known early sorts. They are as follows, Pickaninny, Banting, and Early Malcolm.

Pickaninny is a dwarf hardy variety rarely growing over four feet in height, bearing numerous medium-sized ears close to the ground. When ready for use as green corn the kernels are white with a slight purplish tinge, broad, moderately deep, very tender and extremely sweet. As the corn matures the

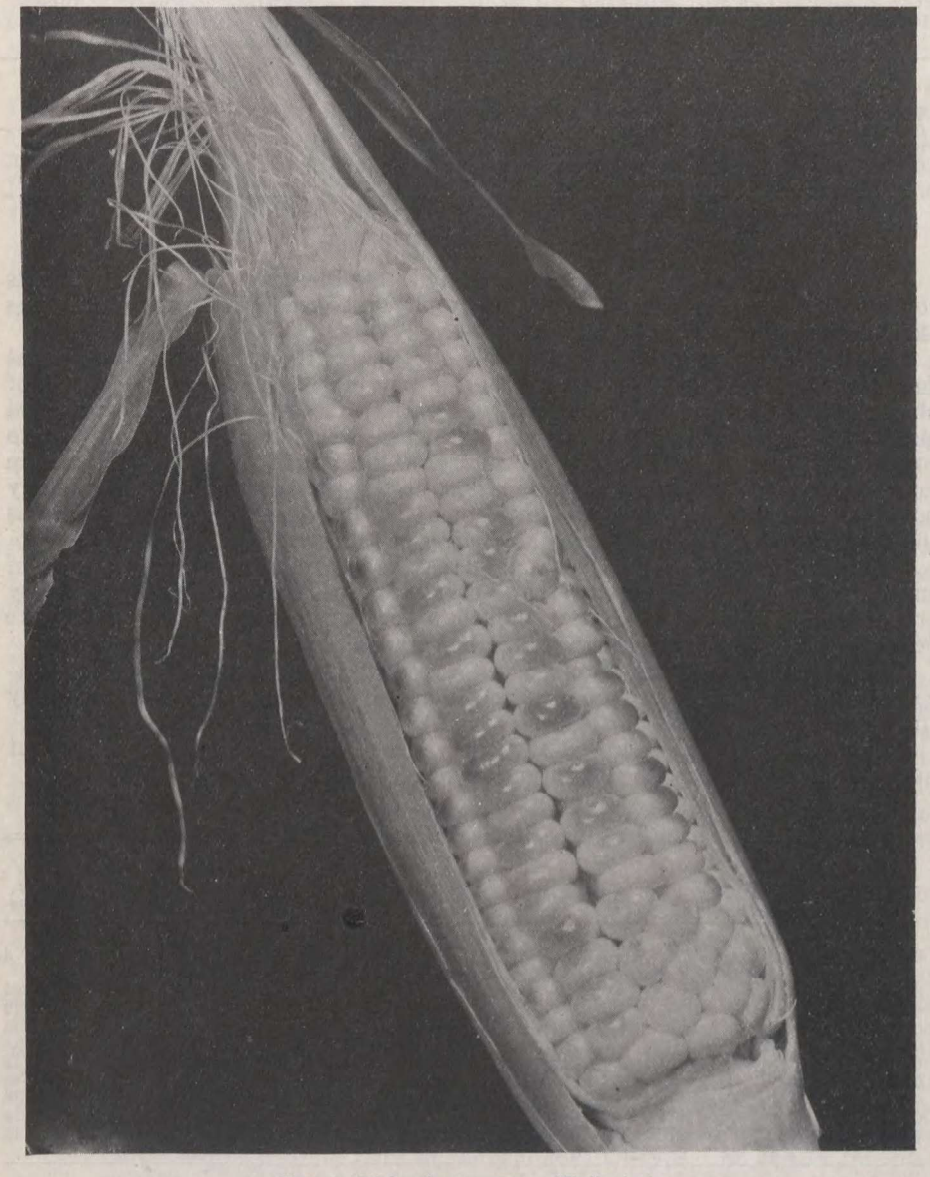

FIG. 4—Pickaninny corn. (Full size)

kernels change to a purplish black, but even at this stage will be found very tender and sweet. The ears range from four and a half to five and a half inches long and are mostly eight-rowed.

Banting, a cross-bred variety of more recent origin, dwarf in habit showing the characters of both parents used in its production, namely, Pickaninny and

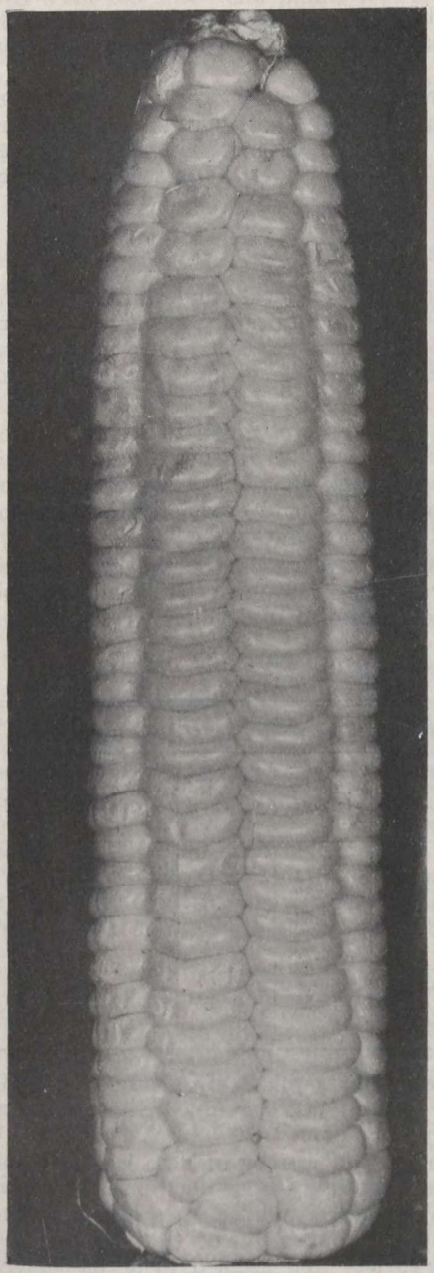

FIG. 5—Banting corn. (Full size)

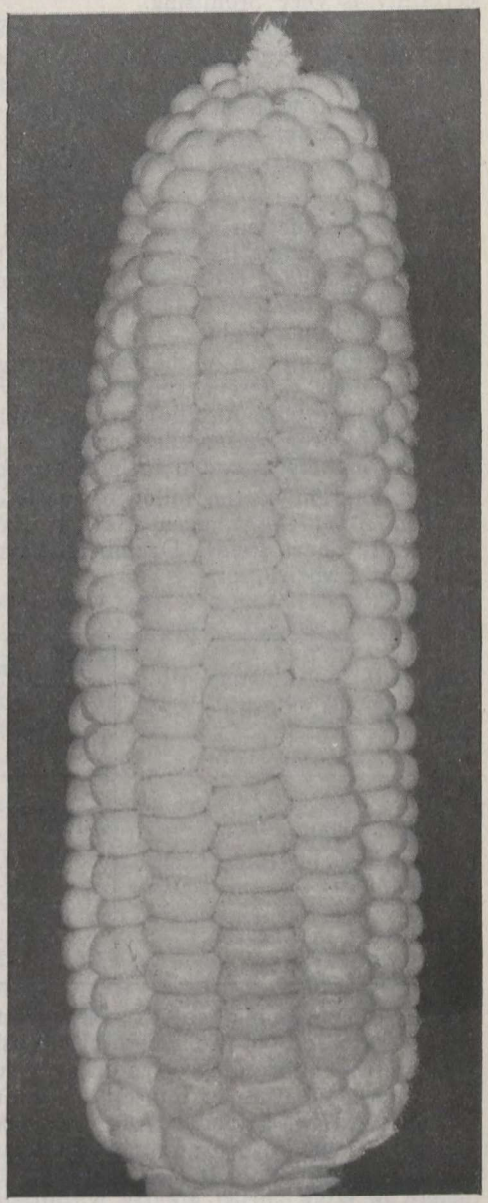

FIG. 6—Early Malcolm corn. (Full size)

Howe's Alberta Flint. This corn rarely grows more than four feet in height bearing numerous medium-sized ears quite close to the ground. When ready for use as green corn the kernels are an attractive golden-yellow colour, broad, moderately deep though somewhat variable at present, quite sweet and very tender. This new corn has not been tested as extensively as Pickaninny but certainly is very promising.

Early Malcolm, a quite strong-growing white sweet corn selected from Russian stock, growing to a height of about five and a half feet, bearing medium to large ears that conform to the following very closely, length six inches, number of rows of kernels twelve, very sweet. This variety is far superior to either Early Mayflower or Cory.

Inbreeding of Cabbage

The production of inbred strains of cabbage was undertaken for the purpose of eliminating as far as possible such undesirable characters as are found in many of the well-known varieties. These characters are as follows: variation in colour of foliage, shape of head, size of head and time of heading as a marketable product.

In many strains of the best varieties, it is quite common to see two, three or even four different types, all of which are quite distinct from the type generally accepted for the variety. When strains of cabbage are found to be variable to even the smallest extent, in shape, type, and especially the time for marketing there is bound to be a decided loss to the grower.

Pollination of the following varieties was undertaken in the greenhouse: Golden Acre, Copenhagen Market, Extra Amager Danish Ballhead, Danish Ballhead (Short stem), Drumhead Savoy, Chester King, Glory of Enkhuizen and Flat Swedish.

Cabbage Inbreeding

Variety	Pollination done with brush			Open pollination		
	Per cent produced, pods and seed	Per cent produced, pods only	Per cent that fell off	Per cent produced, pods and seed	Per cent produced, pods only	Per cent that fell off
Golden Acre	95	.....	5	10	20	70
Copenhagen Market	70	.....	30	.....	.....	.....
Extra Amager Danish Ballhead	50	.....	50	10	85	5
Danish Ballhead (Shortstem)	90	.....	10	20	.....	80
Drumhead Savoy	50	.....	50	2	.....	98
Chester King	50	.....	50	.....	.....	.....
Glory of Enkhuizen	96	.....	4	10	.....	90
Flat Swedish	15	.....	85	10	.....	90

In the foregoing table it will be noticed that a relatively good set of pods with seed was obtained where the brush method was employed and serves to indicate that inbreeding of cabbage is very simple.

Another feature of interest in this connection worthy of note is that some varieties exhibit a tendency to set pods and seed by open fertilization. This feature is one worthy of more than passing notice and led to a study of the flower construction. It was found that the arrangement of the anthers and length of style varied greatly within the variety and seemed to be associated to some extent with the setting of pods and seed production in open pollination.

It was noticed that a flower with a protruding stigma set seed quite freely in open pollination, whereas those with a short style, like in the case of Chester King did not produce pods or seeds, as will be noticed in the foregoing table.

INBREEDING CARROTS

The inbreeding of carrots is being continued with very good results. The seed from the individual plants has produced roots of extremely good type and from present indications considerable improvement has been obtained in the way of uniformity.

TOMATO SEED PRODUCTION

Seed production of the cross-bred tomato and of Alacrity was conducted as usual with the view of maintaining earliness and yield. In this respect careful notes were taken regarding the performance of the individual plants and seed saved from the ten earliest plants of each variety and strain.

As a check on the relative value of these strains and varieties a very extensive comparison test was conducted in which a large number of the outstanding commercial sorts was included. By this means it was possible to find out the rating of the new sorts as to earliness, yield and quality.

A considerable quantity of surplus seed from the best selections of Alacrity and Alacrity x Earlibell was disposed of this year, which indicates that a demand is being created for seed of these two sorts.

PEA SEED PRODUCTION

Good stock seed of peas can be grown in the Ottawa district, and this has been demonstrated very clearly by the results obtained in the variety test. The two commercial varieties being worked with are Thomas Laxton and English Wonder, and should give good results.

BEETS—DIFFERENT DATES OF SEEDING

During the past three seasons Detroit Dark Red beets have been used in a successional sowing test to ascertain the relative value in quality of the beets from the different sowings when harvested for winter storage. In this connection it has been found that the sowings made during the early part of June and as late as June 20 produced very fine quality roots for winter storage. To offset the loss in yield due to late sowing, the growers should bear in mind that the plants should not be thinned too severely. Two to two and a half inches apart in the row should suffice.

The first planting was made May 6, second planting May 16, third planting May 26, and the fourth planting June 5. The beets from the latter sowing were of the right size to store well and possess good quality.

PARSNIP—DIFFERENT DATES OF SEEDING

In the successional sowing test with Hollow Crown parsnips, four plots were sown at intervals of ten days apart. This test has shown quite clearly that for the maximum yield early sowing is essential. Late sowing tends to reduce the yield per acre so greatly below the commercial average for the crop that it is not to be recommended.

CARROTS—DIFFERENT DATES OF SEEDING

The testing of Chantenay carrots in a successional sowing experiment to ascertain the best date at which to sow the seed for carrots for winter storage has shown that if the seed is sown any time between the first to the fifteenth of June that carrots of good quality can be grown. This late sown crop should not be thinned severely but rather the plants left three-quarters to one inch apart in a staggered fashion in the row.

There is, however, another feature which was shown quite clearly and that was the fact that the late sown crops were almost entirely free of carrot rust-fly maggots. This feature has been very noticeable during the past three seasons and growers producing carrots in infested areas should try the late-sowing method of control for this pest.

TOMATOES—TEST OF VARIETIES

An extensive comparison test of the leading sorts of commercial tomatoes as well as the strains of Alacrity, Alacrity x Earlibell, and Alacrity x Hipper was conducted this season. In all ninety-one varieties and strains were tested.

To enable such a test to be made possible under the conditions here, it was necessary to resort to the staking method and to use ten plants of each sort. The plants were trained to one stem and allowed to develop five trusses of fruit, which brought the plants in the stronger growing varieties to the top of the five-foot stakes, at which point the terminal growth was cut off. Of course in the Earliana strains none of the plants developed more than two-thirds the height of the stakes.

The plantation was first of all staked off, with the rows three feet apart and the stakes two feet apart in the row. One inch square, six-foot stakes were used, which were driven one foot into the ground thereby giving good support for the fruiting plants.

The seed for this crop was sown April 18, in the greenhouse, pricked out into flats when large enough and when the plants had made satisfactory growth in the flat, they were then transplanted into strawberry boxes in the hotbeds. Planting was done June 10, at which time they were good stocky plants of the right type for setting. The first ripe fruit was recorded July 27.

In the accompanying table will be found the varieties leading in yield of ripe fruit in the first two weeks and through the month of the tomato season.

TOMATOES—TEST OF VARIETIES

Variety	Number days seed sowing to ready for use	First two weeks				Month			
		Marketable		Unmarketable		Marketable		Unmarketable	
		lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.
Alacrity, O–9822	100	6	9	1	10	24	11	5	2
Earliana, Select Moore, O–9807	101	6	0	1	4	26	15	4	5
John Baer X Earliana O.A.C. No. 224, O–9852	102	5	14	0	11	22	7	2	3 (variable)
Sunnybrook Earliana, O–9809	103	5	4	1	4	18	7	3	4
Alacrity, O–9724	101	4	11	–	13	24	2	1	2
Alacrity, O–9718	101	4	8	1	6	18	14	4	0
Earliana, North Dakota, O–9837	102	4	6	–	–	13	12	0	0
Alacrity X Earlibell, O–9832	101	4	5	–	7	25	11	4	14
Wayahead, Bruce, O–9861	105	3	15	–	2	13	8	0	5
Alacrity X Earlibell, O–9831	101	3	13	0	11	20	1	5	8
Earliest of All, Steele Briggs, O–9790	101	3	8	2	0	20	7	5	3 (Earliana type)
Avon Early, Vaughan, O–9806	102	3	3	0	0	25	12	1	5 (Earliana type)
Burbank, Burbank, O–9873	101	3	2	0	11	16	10	1	1
Alacrity X Hipper, O–9827	103	2	13	0	9	23	5	5	4
John Baer, Carter	106	2	4	0	6	32	2	2	6
Bonny Best, Stokes, O–9803	113	1	6	0	0	34	6	1	5
Chalks Early Jewel, Carter, O–9898	106	1	7	0	6	32	0	2	8

In the table a list of the varieties and strains of tomatoes is given that were found to yield heavily during the early part of the season. Such sorts

as these are well adapted to regions similar to the Ottawa district, and it is believed should be depended upon for the early and main crop under such conditions. Where seasonal conditions are more favourable, many of those included here could be used for the early crop and other varieties of proven worth used for the main crop to meet the particular demand.

At any rate from the tests conducted under Ottawa conditions, over a period of years it has been found that the large growing, large fruited sorts are usually ready for use, when the market is glutted with tomatoes. This is a very unprofitable enterprise and growers should therefore endeavour to have a large portion of the fruit ready early in the season when high prices prevail.

VARIETIES OF VEGETABLES FOR INTRODUCTION

The testing of varieties of recent origin that have been produced by various breeders, seed firms and private individuals has been carried on to some considerable extent, for the purpose of finding if these new sorts compare favourably with the standard sorts as to quality, earliness, yielding ability, and uniformity. Another object of this test is also to keep a check on the introduction of some of the old varieties under new names as this method of increasing sales is considered detrimental to growers and also a detriment to breeders of actual new sorts. Then on the other hand the grower requires protection against flooding the market with worthless types that might look attractive through popular advertising. In short this system of testing to obtain a license to sell under a specific name is a protection to all concerned and will prove its value as time goes on.

In the following tabulation will be found a list of the sorts tested.

VARIETIES OF VEGETABLES SUBMITTED FOR TEST

Asparagus	Martha Washington	D. M. Ferry	Very good, but Mary Washington is the name accepted in the Standard list of varieties.
Bean	Nancy D. Pole	D. M. Ferry	Very good.
	Princess Artois	D. Pingrenon	Very early, good for shell beans.
	Philadelphia Bush Lima	W. A. Burpee	Seasonal conditions against this crop.
	Kentucky Wonder Wax	Wm. Thomas	A very good strain.
	Golden Cluster, Pole	United Seed Growers	Not all true.
	Scarlet Runner	" "	True, very good.
	Jones White	Man. Agr. College	True, very good.
	Runner No. 141	Sutton	True, green pod, fair quality.
	Dwarf No. 301	"	A satisfactory yielder.
Beet	Crimson Globe No. 402	Douglas & Roy	2 per cent true.
	Improved Early Egyptian No. 403	" "	10 per cent true.
	Improved Early Egyptian No. 404	" "	12 per cent true.
	Improved Early Egyptian No. 405	" "	10 per cent true.
	Detroit Dark Red	O. A. C. Guelph	Very uniform.
Cabbage	Golden Acre	Steele Briggs	Distinct from other sorts.
	Copenhagen Market No. 901	Douglas & Roy	45 per cent variation.
	Danish Ballhead No. 902	" "	Good strain, short stem.
	Succession No. 951	" "	Lacked uniformity.
Cauliflower	Danish Giant Dry Weather No. 205	" "	Lacked uniformity.
	Extra Early Snowball No. 206	" "	Lacked uniformity, but good header.
	Extra Early Snowball No. 5207	" "	Very uniform strain.
	Extra Early Erfurt No. 5208	" "	Mixed strains.
Carrots	St. Valery No. 701	" "	Mixed types.
	Scarlet Nantes No. 803	" "	10 per cent off type.
	Early Chantenay No. 804	" "	8 per cent good type.
	Guerande or Oxheart No. 806	" "	Badly mixed.
Celery	Wonderful	Steele Briggs	A good strain of Golden Plume.
	No. 12	Sutton	Resembles Giant Pascal.
Chard	Fordhook	W. A. Burpee	Variable but good.

VARIETIES OF VEGETABLES SUBMITTED FOR TEST—*Concluded*

Chicory	Small Rooted or Radishetta	D. M. Ferry	Quite different from large-rooted sorts.
Corn	Barden Wonder Bantam	Kelly Feed & Seed Co.	A late maturing type of Golden Bantam.
	Delicious	Burpee	A tall growing, late maturing sort, too late for Ottawa season.
	Sunnybrook	" "	" " "
	Sunshine, Yellow sweet	North Dakota	Quite uniform, quite promising.
	Russian Pop	Mrs. Webster	Too variable.
	Golden Bantam	R. R. Moore	Very uniform, good strain.
	" M. Tait, 24	Penticton	Only fair.
	" x Gd. J. 3 C	Penticton	Only fair.
Cucumber	The Vaughan	A. E. McKenzie	A very good strain.
	Woodruff	"	Davis Perfect type.
Musk Melon	Honey Ball	A. E. McKenzie	Quite distinct from all other sorts.
Mustard	Florida Broad Leaf	D. M. Ferry	Very good, distinct.
Onion	Yellow Globe Danvers A	A. McMeans	Very good, round even.
	" " B	"	Very good, flattened.
Peas	1931	Sutton	Germination poor.
	2546	"	" "
	3825	"	" "
Pepper	Kelly Supreme	Kelly Seed & Feed Co.	Similar to Harris Earliest.
Potato	The Robert McCormick	J. E. McCormick	A moderate yielder, distinct.
	The McGainforth	" "	A very good yielder, distinct.
Radish	Twenty Day Leafless	A. E. McKenzie	A small sized sort of French Breakfast type, very good and early.
Squash	White skin	Wm. Thomas	Resembles a Golden Hubbard hybrid.
Tomato	Lowden	E. Lowden	A light cropper of Bonny Best type.
	No. 400	P. Henderson	A very coarse tomato, pink in colour.
	Alacrity	W. D. J. Murray	Not true to type.
	Belvidere	Douglas & Roy	Of wholed salad type, not outstanding.
	Self Pruning	W. A. Burpee	Fruits quite regular but quality only fair, pink coloured.
	Abbotsford Argo	A. H. Horn	A potato-leaved sort.

Reports have been sent to the various parties concerned in connection with the performance of the respective sorts.

It should be pointed out that this test work is being carried out co-operatively with the Seed Branch where the samples are first received, germination tests made and the samples transferred to this Sub-Division for the comparison test. To facilitate this work the samples of seed should be received by this Sub-Division not later than March 1, to enable proper plans to be made for their inclusion in the trial plots.

STANDARD DESCRIPTION WORK WITH VEGETABLES

With a demand for a suitable descriptive publication dealing with vegetable crops, and particularly to bring out the chief characteristics of each variety in a clear way, samples of seeds were obtained from representative seed firms for the purpose of obtaining the technical data necessary in the preparation of such a treatise. The original idea was to obtain samples of seed from five seed firms, but this was found impossible, as these firms did not all carry the same varieties; which necessitated ordering quite a few strains from other sources.

The crops dealt with were beans, beets, carrots, cabbage, corn, cucumbers, lettuce, peas and radish; and from the notes on germination it would seem that the prospects were very promising for the success of the undertaking; but when the material was pulled for the descriptions to be written, the results were far from being satisfactory. In many of the samples it was found that not a single plant resembled the type generally accepted to be representative of the variety, which in some cases pointed clearly to the fact that the sample of seed supplied was

merely a mechanical mixture of a number of sorts; other samples showed signs of carelessness, in growing the seed in too close proximity to some other sort, and possibly carelessness in selection and roguing. This complaint applies chiefly to the beet, carrot, cabbage, radish and swiss chard, as these crops showed the greatest mixtures of any.

FIG. 7—Crimson Globe beet true type

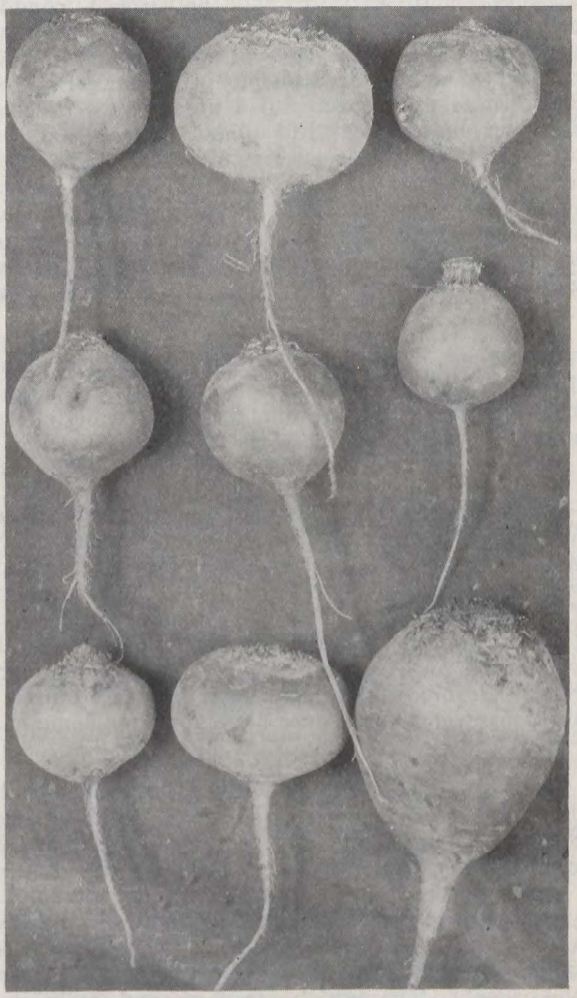

FIG. 8—Crimson Globe beet; showing variations

The two accompanying pictures of beets illustrate the type desired and the impurities found in one sample, are very representative of the particular sample from which they were taken.

It is hoped that this work will be found of value when completed, because there is every reason to believe that seed can be grown that will produce true to type, with some known range of variation. The latter point is what should be stressed, because, if the range of variation cannot be determined, then standards of allowable variation will be difficult to establish.

ORNAMENTAL GARDENING

SOME RESULTS IN CROSS-BREEDING ORNAMENTAL PLANTS AT THE CENTRAL EXPERIMENTAL FARM, OTTAWA, ONTARIO

AQUILEGIA.—There seemed to be a need of an early flowering strain of hardy columbines so crosses were made between *A. canadensis* the native plant and *A. oxysepala* an early flowering species with blue flowers. The seedlings of this cross resembled *A. canadensis* in habit, shape of flower and hardiness but were much earlier and reddish purple in colour. Self-fertilized and open-fertilized seeds of these were sown and a great range of colours have come out in the seedlings including beautiful pinks, mauves and purples, all early blooming. Another cross that was successfully made was between *A. oxysepala* and *A. flabellata nana alba.* This gave medium dwarf early flowering plants with large, short-spurred, wide petalled, bright-violet-blue flowers. Seedlings from these show a large number like the parent and a few white ones. *A. oxysepala* crossed with a strain of long-spurred hybrids raised at the Farm gave an early flowering long-spurred blue. The seedlings from these showed many different types.

PYRUS.—Hardy ornamental crab apples with reddish foliage and flowers were the object of the work with this family of plants. *P. niedzwetzkyana* is a reddish-leaved species that is not quite hardy at Ottawa. This was crossed with various varieties of *P. baccata,* the hardy Siberian crab, and a number of forms with reddish foliage and flowers, and purplish red small fruits appeared amongst the seedlings, several of which seem to be hardy and of good habit.

IRIS.—Crosses of tall bearded varieties were made hoping to obtain improved forms especially amongst the yellows and pinks. No good yellows have been obtained but there are several seedlings of a pinkish shade which are being grown for further test with some of the choicest seedlings of other types. Crosses of *I. sibirica* variety *maxima* were made with *I. orientalis* Snow Queen. In the first generation all the seedlings were blue but the shade varied from very pale to very dark and the size of bloom also showed great variation. Some large flowered pale-blue forms have been greatly admired by visitors. In the second generation several white ones have appeared some of which are taller than Snow Queen.

SYRINGA.—There are not many flowering shrubs which are hardy in the colder sections of the country so it was decided to use the late blooming species of *Syringa* (Lilac) to try and get improved forms. *S. villosa,* the late blooming species of lilac frequently seen in shrubberies, is very hardy, so was chosen as the female parent, and *S. reflexa,* a species not quite so hardy as *S. villosa,* with drooping panicles of rosy-pink flowers closely packed on the stem, as the male parent. This cross proved quite successful and about two hundred and fifty seedlings were obtained, a large proportion of which show some improvement on the parents. The panicles are large and freely produced and make the bushes one mass of bloom. The colour varies from very pale pink to pinkish lilac. One plant, of which *S. reflexa* was the seed and *S. lutèce* (a hybrid of *S. villosa*) the pollen parent, shows more of the drooping panicle and pinkish colour of *S. reflexa.*

S. villosa X S. chinensis (Rothamagensis) are not so ornamental as the parents and will be discarded.

S. villosa X S. vulgaris makes a smaller shrub than the other crosses and has leaves that show its hybrid origin. The panicles are small and the flower purplish. This is more curious than beautiful but may be useful for further breeding work.

S. reflexa X S. Josikaea is a handsome shrub with large panicles of lilac flowers.

ROSA.—There is a great need for varieties of roses that will be hardy in Canada so two of the hardiest species were chosen as parents. These are *R. rugosa* the well known Japanese rose with shiny green rugose leaves and large flowers and *R. rubrifolia* with red leaves and small flowers. The seedlings, of which *R. rubrifolia* was the female parent, are very ornamental shrubs with reddish green foliage and flowers intermediate in size between the parents and deep pink in colour. When *R. rugosa* was the female the leaves are green and the flowers bright red and intermediate in size. All these seedlings are perfectly hardy at Ottawa. The specific name *Rosa rubrosa* has been given to this hybrid.

R. rugosa X R. spinosissima hispida is a compact shrub with light-green foliage and large blush flowers very freely produced. This also is quite hardy.

Some open-fertilized seeds of the wichuriana hybrid Evangeline were sown and several beautiful seedlings were obtained, one of which is double pink rather deeper in shade than Dorothy Perkins. It has retained the fragrance of the parent.

Many open-fertilized seeds of *R. Harrisonii* were sown but as is generally the case with this rose very few of them germinated. However, twelve seedlings bloomed in 1926. None of them was so deep in colour as the parent and there was great variation amongst them. The best one had large semi-double cream flowers and was quite ornamental.

LILIUM.—It is a well-known fact that imported lily bulbs are generally unsatisfactory, so it was decided to try and see how many species could be grown successfully from seed at the Central Experimental Farm at Ottawa. The following were found to grow easily from seed: *L. longiflorum* var. *formosum, concolor, concolor* var. *buschianum, Davidii, Henryi, monadelphum, pardalinum, pseudo-tigrinum, regale, speciosum, tenuifolium* and *Willmottiæ*. There are three species of lilium which do not set seed naturally. *L. testaceum*, generally considered to be a natural hybrid, has never shown any sign of seeding when pollinized with its own pollen but crossed with *L. candidum* several seed-pods have been obtained. Two seedlings bloomed in July, 1924. One has the form of *L. testaceum* but is pure white in colour and has golden anthers. The other resembled *L. candidum* except that the anthers had the reddish colour of *L. testaceum*.

L. Hansoni, another hardy lily which rarely seeds naturally, was pollinized with *L. marhan* and *L. dalhansoni* and a large number of seeds were obtained. These have not yet bloomed.

L. tigrinum the well-known late blooming tiger-lily never seeds but by pollinizing it with *L. Maximowiczii* seed-pods were formed and the first known tiger lily seedling bloomed at the Central Experimental Farm, Ottawa, in September, 1923. A cross of *L. tigrinum* with *L. Willmottiæ* was made and several seedlings have bloomed. When crossed with *L. pseudo-tigrinum* seed-pods developed but the seed failed to germinate.

L. Davidii X L. Willmottiæ seeded freely and large handsome plants are the result but whether they are sufficiently distinct from the parents to be named has yet to be decided.

LONICERA.—It was thought desirable to try and get a hardier form of climbing honeysuckle that would have sweet scented flowers so crosses were made with *L. japonica* and *L. periclymenum* the former being the female parent. One of the seedlings resembles the male parent in appearance and has some fragrance.

BEST ORNAMENTAL DECIDUOUS TREES HARDY AT OTTAWA

During the past few years there have been published in the annual reports of the Division of Horticulture lists of trees, shrubs, and woody climbers which have been found most satisfactory since the Central Experimental Farm was established in 1887.

There appeared in the report for 1922 a list of "Best Ornamental Shrubs Hardy at Ottawa"; in the report for 1923, "Perennial Climbing Plants"; in the report for 1924, "Best Conifers Hardy at Ottawa"; and there now follows in this report a list of best deciduous trees hardy at Ottawa considered the most satisfactory of the large number of species and varieties tested since planting was begun on the Central Farm nearly forty years ago. Many of those tested have not proved sufficiently hardy at Ottawa to be recommended, and others are not thought sufficiently attractive, but the following, unless otherwise stated, develop satisfactorily and are sufficiently ornamental for planting on private grounds or about public institutions.

The photographs of trees in this section are by Dr. Frank T. Shutt, Dominion Chemist.

Acer ginnala (Amur Maple).—Though usually resembling a shrub more than a tree, this small maple is one of the most useful ornamental small trees. No matter what the character of the season may be the leaves always turn red at Ottawa, and, while the season is rather short from the time the leaves turn until they fall, these trees are so effective at that time that they should be used more for colour effects. Moreover, this tree is quite attractive throughout the summer as the relatively small leaves give it a pleasing look. The seeds also have a rosy appearance while developing, which adds to the ornamental value of this little tree, which reaches only about 25 feet in height.

Acer Negundo (Box Elder, Manitoba Maple).—The Box Elder may be considered a weed among ornamental trees, and often springs up where it is not needed or wanted, growing very readily from seed. Because of its very rapid growth, this tree has been planted much more extensively than it should have been as it is very subject to insect pests, which render it unsightly by disfiguring the leaves and causing them to wither and fall prematurely. While the Box Elder may be planted in the colder parts of Canada because of the few kinds of trees which can be successfully grown, there is no need for it in most of Eastern Canada, where there are so many better trees available. Good specimens of this tree free from insects are, however, quite attractive in appearance, and the sight of such often tempts one to plant them, but, later, on experience proves that a mistake has been made.

Acer nigrum (Black Maple).—The Black Maple is closely related to the Sugar Maple, but is not as ornamental a tree as the latter. The leaves are downy, of a duller green, and do not colour as highly in the autumn as the Sugar Maple, but turn a pleasing shade of yellow.

Acer pennsylvanicum (Striped Maple).—The Striped Maple is a very interesting small tree because of the white stripes on the green bark of the trunk, which make it conspicuous. The large bright-green leaves also add to the attractiveness of this tree. It seems to succeed best in partial shade or associated with other trees rather than as an individual specimen in the open.

Acer platanoides (Norway Maple).—The Norway Maple has been much planted in Eastern Canada, and often it has been used when it would have been better to have planted the Sugar Maple, for it has no advantage over the Sugar Maple and is less useful in that it is not so hardy as the Sugar Maple and, unless very carefully pruned when young, the tree is liable to be low headed and to have bad crotches, and these, with winter injury, result in a breaking down of the trees when they are making fine large specimens. Furthermore, the leaves

never turn red, always yellow, and, except for a contrast with the red leaves of the other Maples, this also makes them not so desirable. The Norway Maple grows rapidly, however, and makes an ornamental tree of considerable size. This tree thirty-five years planted is 44 feet high with a spread of 43 feet.

Acer platanoides Schwedleri (Schwedler Maple).—There are many varieties of the Norway Maple, but the most useful and the most ornamental is the Schwedler Maple. This is very similar to the species in growth and habit of tree, but the leaves in the early part of the season are of an attractive shade

FIG. 9—Wier Maple *(Acer saccharinum Wieri)*

of purple, making this variety very striking and ornamental. Later in the summer most of this purple disappears. This tree thirty-five years planted is now 44 feet high with a spread of 40 feet. In the variety *Reitenbachi,* the leaves, while duller in colour, remain purple all summer.

Acer rubrum (Red Maple).—Where one can grow the Sugar Maple successfully, one does not need the Red Maple, but, for low ground, where the Sugar Maple does not succeed well, it makes an excellent substitute. It usually colours more highly and earlier in the season than the Sugar Maple, and, where a colour effect with large trees is desired, this is a very useful tree. Its brilliant colour makes a fine contrast with evergreens in autumn. The Red Maple has a long range from north to south when growing wild and, if ordered from nursery firms for planting in the colder parts of Canada, one should be sure they have been grown from trees near the northern limit of their range, otherwise they are liable to winter injury.

Acer saccharinum (Silver Maple).—The Silver Maple is a very rapid growing species and reaches a larger size than either the Sugar or the Red Maple. It is moisture-loving, and it is on bottom land or near the edges of streams where it usually reaches its greatest size. As it grows naturally in southern Manitoba, it is, next to the Box Elder, the hardiest of the Canadian tree Maples, but, if tried on the prairies, trees should be grown from Manitoba stock. It is the most graceful of all the Maples, the deeply cut leaves giving it a lighter look than the others. A pendulous form of this, the Wier Maple, *Acer saccharinum Wieri*, is one of the most satisfactory large ornamental trees in Eastern Canada. It has been said that the branches of this tree break readily, and the trees become disfigured because of this, but this has not been the case at the Experimental Farm, Ottawa, where trees have been growing for thirty-seven years in an exposed position. This tree thirty-seven years planted is 66 feet high with a spread of 56 feet.

Acer saccharum (Sugar Maple).—The Sugar Maple is the best all round ornamental tree hardy at Ottawa. It is of attractive form, though there are trees more graceful in habit, but it gives the impression of strength and fitness both for planting in avenues as well as for single specimens or groups on the lawn. The foliage, as a rule, suffers little from diseases or insects, and, when the autumn tints are upon it, is very effective in the landscape and pleasing to the eye. When growing wild it is usually found in well-drained sandy loam soil, hence it is not desirable to plant it in low or poorly drained soil.

Acer tataricum (Tartarian Maple).—The Tartarian is not so graceful as the Amur Maple, and the leaves are not so deeply cut, but it is even hardier than the Amur Maple, though the latter is usually quite hardy except in the coldest parts of the Prairie Provinces, where it is sometimes considerably injured. On account of its greater hardiness, the Tartarian Maple is, therefore, more useful for the coldest places and, as the leaves colour highly, it is a very valuable small ornamental tree where the number of hardy species is limited. The variety *adjuense* has very highly coloured seeds.

Aesculus glabra (Ohio Buckeye).—This has made a fine attractive-looking tree at Ottawa, and has reached a height of about forty feet. While the flowers are not so ornamental as the Horse Chestnut, it is much hardier, the leaves are healthier, it fruits abundantly, and is altogether a desirable small ornamental tree.

Aesculus hippocastanum (Horse Chestnut).—The Horse Chestnut is not quite hardy enough to make a satisfactory tree at Ottawa, although some trees do very well when young, but seldom reach a great age. As it is a very handsome tree when in bloom, it is worth trying in protected situations on a large place, but is not recommended where one has space for but a few trees.

Amelanchier laevis (Allegheny Shadbush).—The Shadbush, of which this is considered the best species of those which take tree form, are useful for giving bloom early in the spring when few trees are in flower, they being literally

covered with white flowers before the leaves open. The Downy Shadbush, *Amelanchier canadensis*, is also of tree form, and blooms freely, but is not as graceful a tree as the other. These trees are also known under the name of Shadblow, Juneberry, Serviceberry, and Saskatoon.

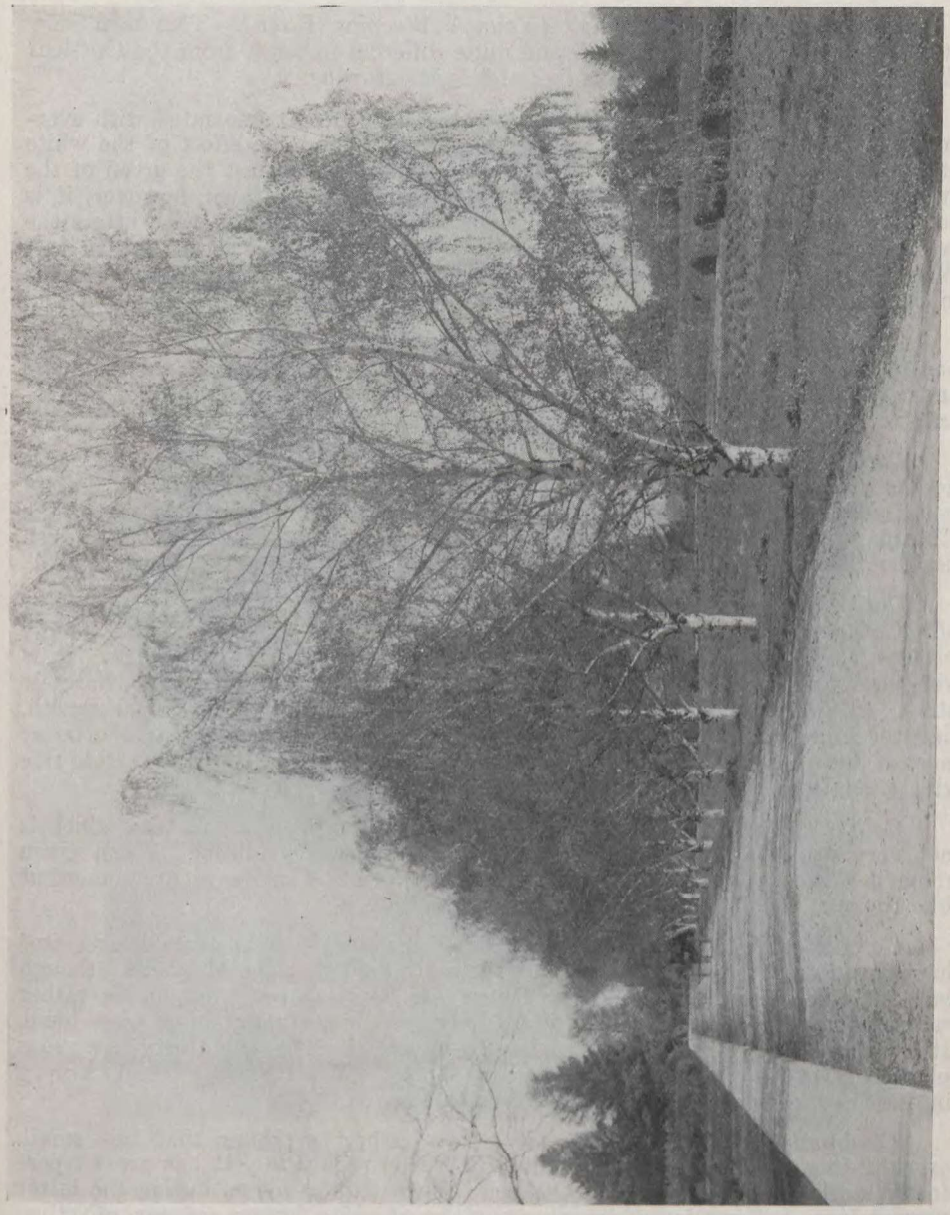

Fig. 10—Avenue of Cutleaf Weeping Birch, Experimental Farm, Ottawa, Ont.

Betula alba laciniata (Cut-leaf Weeping Birch).—The Cut-leaf Weeping Birch is very effective as a specimen on the lawn, the deeply cut leaves and pendulous branches giving it a very light and graceful appearance. It is very hardy and succeeds in most places where tried in Canada. Unfortunately, there

is an insect, the Bronze Birch Borer, which attacks the wood, causing the branches to die, and where this is troublesome it renders the trees unsightly. There is no practical remedy for this once the tree is badly infested, but, if the branches affected are removed and burned as soon as noticed, it may be checked. This tree thirty-eight years planted is 48 feet high with a spread of 38 feet.

Betula alba pendula Youngii (Young's Weeping Birch).—This is a very attractive form of Weeping Birch and quite different in habit from the Cut-leaf Weeping Birch, being more spreading and lower growing.

Betula papyrifera (Canoe Birch).—This native Birch, associated with evergreens, is a familiar sight in a Canadian landscape, and the effect of the white and yellow paper-like bark of the trunks and branches against the green of the evergreens is very pleasing. As a single specimen on the lawn, however, it is not especially desirable as the frequent dropping of small dead twigs litters the lawn and makes their removal necessary, as is the case also with the Cut-leaf Weeping Birch. Because of its hardiness, however, it is particularly valuable in the colder parts of Canada.

Catalpa hybrida (Tea's Catalpa).—This is a hybrid between the Common and the Japanese Catalpas, and at Ottawa has proven as hardy as the Japanese and, as the flowers are more ornamental than the latter, may be grown in preference to it, and would seem more reliable for planting than *C. speciosa.*

Catalpa Kaempferi (Japanese Catalpa).—While the Japanese Catalpa is not as ornamental a tree when in bloom as the Western Catalpa, the flowers being yellowish and relatively small, it has the large conspicuous leaves of the Catalpa, making it a striking specimen on the lawn. Moreover, it has proven hardier than the Western Catalpa at Ottawa.

Catalpa speciosa (Western Catalpa, Hardy Catalpa).—Some specimens of this Catalpa have proven quite hardy at Ottawa while others have been more or less injured by winter, much depending on the source of the stock. It is very desirable, therefore, when obtaining trees, to endeavour to get the hardiest stock. The Western Catalpa makes a very striking-looking tree of rapid growth, and the large, showy, white-and-purple flowers, which appear during the latter part of June, are a fine sight. The very large leaves also help to make this tree give a semi-tropical effect to the landscape.

Celtis occidentalis (Hackberry).—The Hackberry is a native tree, which is not very well known. It grows wild as far west as Manitoba. When given room it makes a spreading tree, of attractive form. The leaves are somewhat like those of the Elm, but are oblique at the base.

Cercidiphyllum japonicum (Katsura Tree).—This attractive-looking tree has proved quite hardy at Ottawa. It is closely related to the Magnolias, though has not conspicuous flowers. The leaves are heart-shaped, and, being rather small, give the tree a very light appearance, which not many large trees have. It is of broadly pyramidal habit and much branched. This tree thirty-five years planted is 44 feet high with a spread of 43 feet. The Katsura Tree is a very interesting tree and is the only species in the genus.

Cladrastis lutea (Yellow Wood).—It is rather surprising that this small, graceful tree has been so little planted in Eastern Canada. It has proved perfectly hardy for many years at Ottawa. When it is in bloom during the latter part of June the long, loose, drooping panicles of white flowers are very effective. The foliage, which is bright green, is attractive also. The tree is somewhat suggestive of a white-flowered Laburnum. It is one of the most desirable small trees. This tree thirty-five years planted is now 32 feet high with a spread of 23 feet.

Crataegus coccinea (Thicket Hawthorn).—There are many species of Hawthorns hardy at Ottawa, but those having attractive flowers, foliage, and fruit are among the most desirable. This is a native species which is quite useful for mixed plantations, and is singled out for mention here as it is so easily obtained.

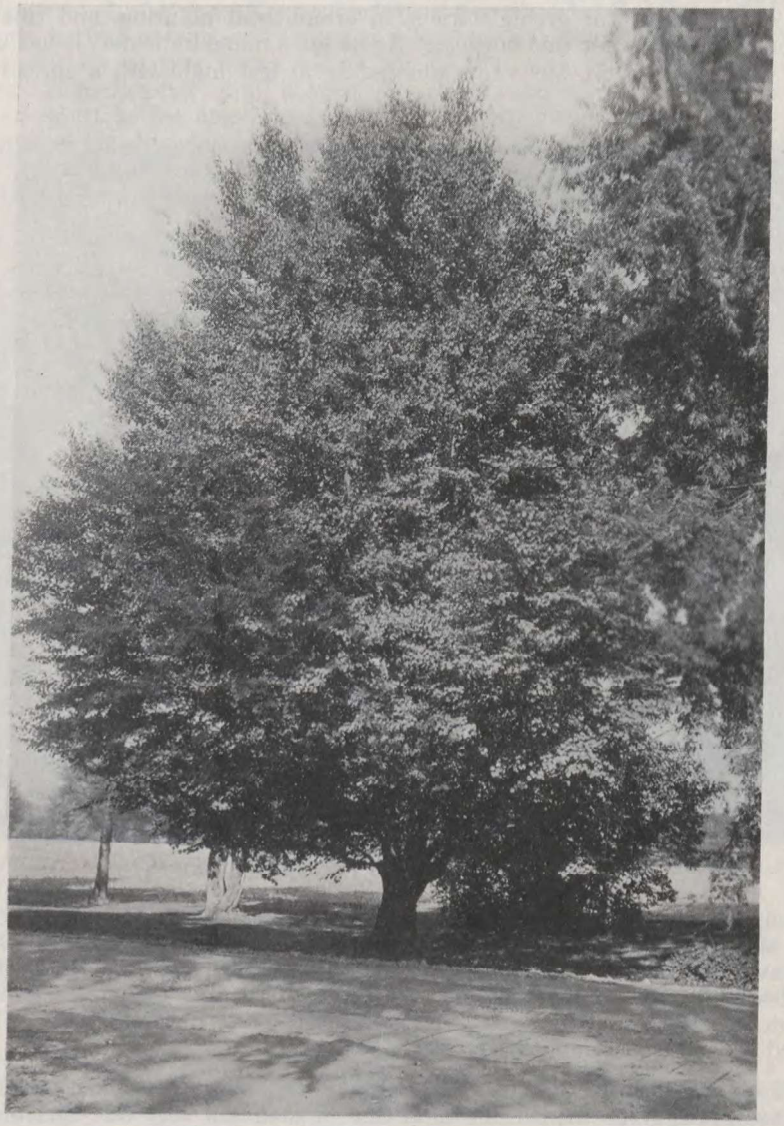

FIG. 11—Katsura Tree *(Cercidiphyllum japonicum)*

Crataegus crusgalli (Cockspur Thorn).—The glossy leaves of this Thorn make it especially attractive and, while very thorny, this is expected in Hawthorns. The Cockspur Thorn makes a good hedge plant. This tree thirty-five years planted is 25 feet high with a spread of 23 feet.

Crataegus oxyacantha (English Hawthorn).—The double pink-and-red flowered varieties of this Hawthorn are very attractive and, while they are not quite hardy at Ottawa, if planted in a protected place, some flowers may be obtained.

Elaeagnus angustifolia (Russian Olive).—Trees with greyish or silvery foliage are desirable for giving variety in ornamental planting, and this small tree is one of the best for this purpose. As its latin name indicates, it has narrow leaves. This tree thirty-five years planted is 30 feet high with a spread of 31 feet.

FIG. 12—Yellow Wood *(Cladrastis lutea)*

Euonymus atropurpureus (Wahoo).—It is difficult to decide whether certain plants should be classed as small trees or shrubs. The Wahoo, however, as grown at Ottawa, developed into tree form, and might be considered a small tree. It is a desirable tree to plant because of the ornamental fruit, which becomes crimson in autumn. The leaves, also, have attractive autumn tints. This has reached a height of about 18 feet at Ottawa.

Fagus americana (American Beech).—One seldom sees a native Beech tree on a lawn, but, given room to develop well, it makes a very fine specimen and, where one has spacious grounds and room for several large trees, at least one should be planted. The Purple Beech, which is a variety of the European Beech, kills back to the snow-line nearly every year at Ottawa, hence is not desirable.

Fraxinus americana (White Ash).—This is the most ornamental species of Ash. The tree is shapely, the foliage attractive in appearance throughout the growing season, and in the autumn has a purplish tint, which is very pleasing. It would make a good street tree but that the leaves are late in coming out and fall rather early in the autumn.

Fraxinus lanceolata (Green Ash).—The Green Ash is hardier than the White, though both succeed well at Ottawa. The glossy, bright-green foliage makes this a useful and attractive tree for a mixed plantation, but it is not quite good enough in form as an individual specimen.

Gymnocladus dioica (Kentucky Coffee Tree).—The Kentucky Coffee Tree is a very distinct species, and is useful where one has plenty of room and desires a great variety of tree forms. It is one of the more southern trees hardy at Ottawa. It makes few small branches, however, and when the foliage is off has a rather unattractive appearance. When in leaf, however, it is very striking. The long seed-pods, which are very conspicuous, add to the interest of this tree. The leaves come late and fall early, which are disadvantages. This tree planted thirty-five years is 37 feet high with a spread of 24 feet.

Halesia tetraptera (Silverbell).—This is a small tree or shrub, not quite hardy enough at Ottawa, though sometimes blooming well. The white, pendulous, bell-shaped flowers, which come in early spring, make it quite attractive at that time. The Mountain Silverbell, *H. monticola*, has not been thoroughly tested at Ottawa and may prove more hardy.

Hicoria ovata (Shagbark Hicory).—The Hicory is a rather slow-growing tree, but makes, eventually, a very handsome specimen, and seems to suggest the strength or toughness of wood, for which it is noted, in its general appearance. The glossy, deep-green foliage gives it a clean appearance also. A hicory tree will be much appreciated by the family for its nuts and at the same time will add to the appearance of the home grounds. This tree twenty-five years planted is 45 feet high with a spread of 32 feet.

Juglans cinerea (Butternut).—The Butternut is quite an attractive-looking tree when young, but later on is not quite leafy enough when grown as an individual specimen. On a large place, however, it may be planted, a Butternut tree being a great delight to the young people as the nuts can scarcely be surpassed in flavour. This tree planted about forty years is 43 feet high with a spread of 47 feet.

Juglans nigra (Black Walnut).—The Black Walnut, while not a species for small places, makes an attractive-looking tree, and succeeds very well in the warmer and well-drained soils at Ottawa.

Juglans Sieboldiana (Japanese Walnut).—This is a very rapid-growing spreading tree, which makes a fine lawn specimen, but, like the Black Walnut and Butternut, the leaves come late and fall early. On large grounds, however, a tree of this species is desirable and is more attractive than either the Black Walnut or Butternut because of its more abundant foliage. The nuts, however, are not as good as the Butternut. This tree planted thirty-five years is 37 feet high with a spread of 51 feet.

Liriodendron tulipifera (Tulip Tree).—Although this fine tree is a native of southwestern Ontario, it is not very satisfactory at Ottawa, killing back in severe winters, but the foliage is ornamental, and, where one has the room, one might plant this tree in a fairly sheltered place, and thus add to the variety on the lawn.

Magnolia acuminata (Cucumber Tree).—The Cucumber Tree, if obtained from near its northern limit, proves hardy at Ottawa. While not particularly ornamental, it is interesting to have a specimen as it is the only Magnolia which has proved hardy. The flowers are not conspicuous, as are those of most of the Magnolias, being greenish tinged with yellow, and not noticeable at a distance. This tree planted thirty-five years is 30 feet high.

Malus baccata (Siberian Crab).—Its great hardiness and freedom of bloom make the Siberian Crab a valuable ornamental tree and, where it is desired to have a tree of one of the cultivated varieties of crab apples for culinary purposes, one might very well plant one of the best of these, such as Transcendant

FIG. 13—Siberian Crab *(Malus baccata)*

and Hyslop, and have something both useful and ornamental. They are highly ornamental both in flower and fruit. This tree thirty-five years planted is 28 feet in height and has a spread of 40 feet.

Malus ioensis plena (Bechtel Crab).—The Bechtel Crab is one of the most beautiful, hardy, small trees when in bloom. It flowers later than most crab apples or apples, usually being at its best during the last week of May to early June at Ottawa. The flowers are large and double and of a delicate shade of pink and, with their exquisite perfume, are among the most charming flowers. The tree is not particularly ornamental after blooming, hence should be planted where it will not be very noticeable after flowering but where it will be most effective when in full bloom. It does not set any fruit.

Malus niedzwetskyana (Redvein Crab).—This remarkable apple or crab apple has proven hardy at Ottawa and is a desirable ornamental tree. The leaves are reddish purple, the flowers pinkish purple in colour, and the apples, though not useful for eating or culinary purposes, are very interesting in that the flesh is heavily stained with reddish purple. The habit of the tree is not very good, hence it should be planted where the foliage and flowers will be seen but where the tree itself will not be very conspicuous.

Phellodendron amurense (Amur Cork Tree).—This tree has proved hardy at Ottawa, and is interesting and fairly attractive in appearance, somewhat suggesting a Black Walnut in leaf.

Phellodendron sachalinense (Sakhalin Cork Tree).—A more attractive looking tree than the Amur Cork Tree at Ottawa, and quite desirable for planting when one is making a collection of hardy species.

FIG. 14—Bechtel Crab *(Malus ioensis plena)*

Platanus occidentalis (American Plane Tree).—The European Plane Tree is much used for street planting in some of the large British and European cities and in some parts of the United States, but this species is not hardy at Ottawa. The American Plane Tree, however, though killing back somewhat at the tips is fairly hardy, and the Colorado form especially has developed into a striking looking tree of considerable size. The leaves are large and, though they are very late in appearing, this tree, being about the last to leaf out at Ottawa, arouses much interest, and the natural peeling of the bark adds to this. This tree planted thirty-five years is 48 feet high.

Populus angustifolia (Narrow-leaf Cottonwood).—This native Poplar makes quite an attractive lawn specimen. Unless familiar with it, one might not, at a distance, take it for a Poplar, the narrow leaves giving it a very unusual appearance for a Poplar.

Populus eugenei (Carolina Poplar).—The Carolina Poplar has had several scientific names, and the one used here is that adopted in "Standardized Plant Names." This handsome, strong-growing, leafy Poplar has been much used in Eastern America where a quick-growing tree is desired. It is supposed to be a hybrid. The Eastern Cottonwood, *Populus deltoides, var. monilifera,* is often called Carolina Poplar, but is not as ornamental a tree as *P. eugenei.*

Populus nigra italica (Lombardy Poplar).—The Lombardy Poplar is too well known to need much said about it. It is a most useful tree for accentuating certain effects in the landscape, its tall, upright form being very conspicuous wherever it is growing. As the centre of a group, as a single specimen behind or at the end of a building to give a tower-like effect, it helps to give character to the picture. It is very useful also in screening uninteresting walls and chimneys.

FIG. 15—Effective group of Lombardy Poplar

Populus petrowskyana (Russian Poplar).—The Russian Poplar under this name has proven to be the most satisfactory of the many Russian species and varieties tried. It is very hardy, a rapid grower, and makes an attractive, clean-looking tree.

FIG. 16—Shingle Oak *(Quercus imbricaria)*

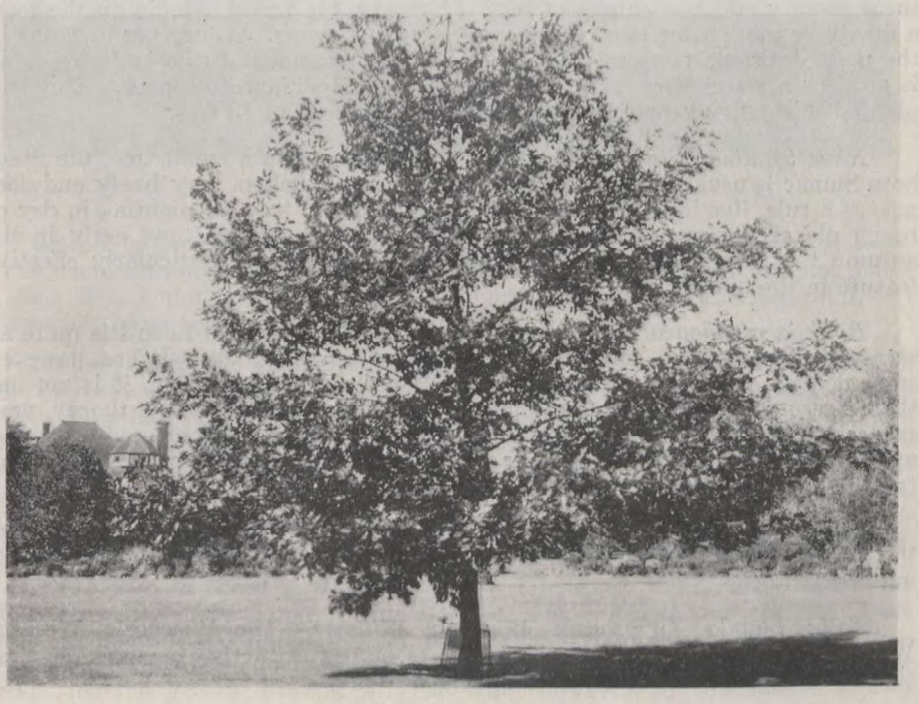

FIG. 17—Red Oak *(Quercus rubra)*

Prunus Maacki (Amur Cherry).—This is a very hardy cherry, the tree looking somewhat like a very large specimen of choke cherry and the flower clusters being also suggestive of the choke cherry. The tree is covered with these flowers in the spring, the tree at that time being very conspicuous. This is a useful tree on large grounds where striking effects with bloom are desired. This tree planted thirty-five years is 41 feet high.

Prunus Padus Albertsi (Albert Bird Cherry).—A very attractive, hardy form of the European Bird Cherry with large flower clusters grown in the greatest profusion. A good deal like the choke cherry, but a larger tree and with more abundant bloom.

Quercus imbricaria (Shingle Oak).—This Oak makes a small tree at Ottawa, and is usually quite hardy. The foliage is not dentated or cut as most Oaks, but the leaves are entire, so that it is often not recognized as an Oak. The leaves are glossy and of an attractive shade of green. It makes an interesting lawn specimen, but should prove especially valuable where one wanted an effect in the shrubbery suggestive of Laurel as it resembles Laurel very much. It also makes a good hedge plant.

Quercus palustris (Pin Oak).—The Pin Oak has not done as well at Ottawa as the Red Oak, but there is at least one specimen which is all that could be desired. However, where its success is doubtful, it would be well to plant the Red Oak. The Pin Oak, because of its smaller and more cut foliage, is a more graceful tree than the Red, and the leaves colour very highly in autumn also. This tree planted thirty-five years is 41 feet high.

Quercus rubra (Red Oak).—The red oak is a very satisfactory tree. It is a relatively fast grower compared with some of the Oaks, being about as rapid a grower as the Sugar Maple. It makes a spreading tree of attractive form, the foliage is quite ornamental during the summer months, and in the autumn it turns to very effective shades of red. Moreover, the leaves remain on the trees a month or more after most other trees have lost theirs. Altogether it is one of the most desirable trees to plant where a large ornamental tree is desired, and is good as a street tree also, but must have abundance of space. This tree planted thirty-five years is 49 feet high with a spread of 53 feet.

Rhus typhina (Staghorn Sumac).—While becoming a small tree, the Staghorn Sumac is usually seen in shrub-like form as it suckers very freely and does not, as a rule, live long as a tree. It is a very useful tree for planting in dry or rough places for ground cover as it is attractive in summer and early in the autumn the leaves take on very brilliant hues, making a particularly effective feature in the landscape.

Robinia pseudoacacia (Common Locust).—The Common Locust is quite an attractive tree in form, foliage, and flower, and grows rapidly. It has, however, some defects and, as there are many good species to choose from, it is not one that is recommended for general planting. Its defects are that it is thorny, very subject to borers, and many seedlings are likely to grow, from seed scattered, over a wide area, making it become a nuisance. The suckers also are sometimes troublesome.

Salix alba x *fragilis (Niobe Weeping Willow).*—This seems identical with the Golden Weeping Willow as grown at Ottawa, and is one of the best weeping trees.

Salix blanda (Wisconsin Weeping Willow).—The Wisconsin Weeping Willow is satisfactory at Ottawa, but it is not as attractive in appearance as the Weeping Golden Willow or the Niobe Willow.

Salix pentandra (S. laurifolia) (Laurel Willow).—The Laurel Willow is a rapid growing, ornamental tree, which is very useful on large grounds. It becomes a large tree. The leaves are deep green, glossy, and suggestive of Laurel. It is one of the most attractive looking Willows. Occasionally red spiders disfigure it at Ottawa. This tree planted thirty-five years is 52 feet high.

FIG. 18—Niobe Weeping Willow

Salix vitellina pendula (Golden Weeping Willow).—This is the most satisfactory and attractive Weeping Willow at Ottawa. The graceful, weeping habit of this tree, combined with the yellow bark, make it very ornamental. It becomes a large tree.

Sorbus aucuparia (European Mountain Ash).—The European Mountain Ash, or Rowan Tree, as it is so often called, is one of the most ornamental small trees. It is hardy, a rapid grower, graceful in form, and, when in bloom and fruit, particularly attractive. The berries, unless eaten by birds, remain ornamental well up to winter. Where one has room for very few small trees this should be one of them. It is, however, sometimes affected by borers, by fire blight, and by sap suckers, but, even with these enemies, it is well worth planting. This tree thirty-five years planted is 38 feet high with a spread of 40 feet.

Sorbus decora (Showy Mountain Ash).—There are three native species of Mountain Ash, *S. americana, S. sambucifolia,* and *S. decora,* but the last is the most ornamental, and compares very favourably in that respect with the European Mountain Ash, and is hardier than the last, which, however, is not important except for the Prairie Provinces. The fruit, however, of this native species

ripens before the European and the trees are soon denuded of it by birds in migration, hence where one wishes to have the fruit remain longer it is better to plant the European, which is a larger tree also than the native. This tree thirty-five years planted is 39 feet in height with a spread of 32 feet.

Sorbus pekinensis (Chinese Mountain Ash).—A closely related species to *S. americana* with pinkish fruit, which makes an interesting contrast with the scarlet-fruited species.

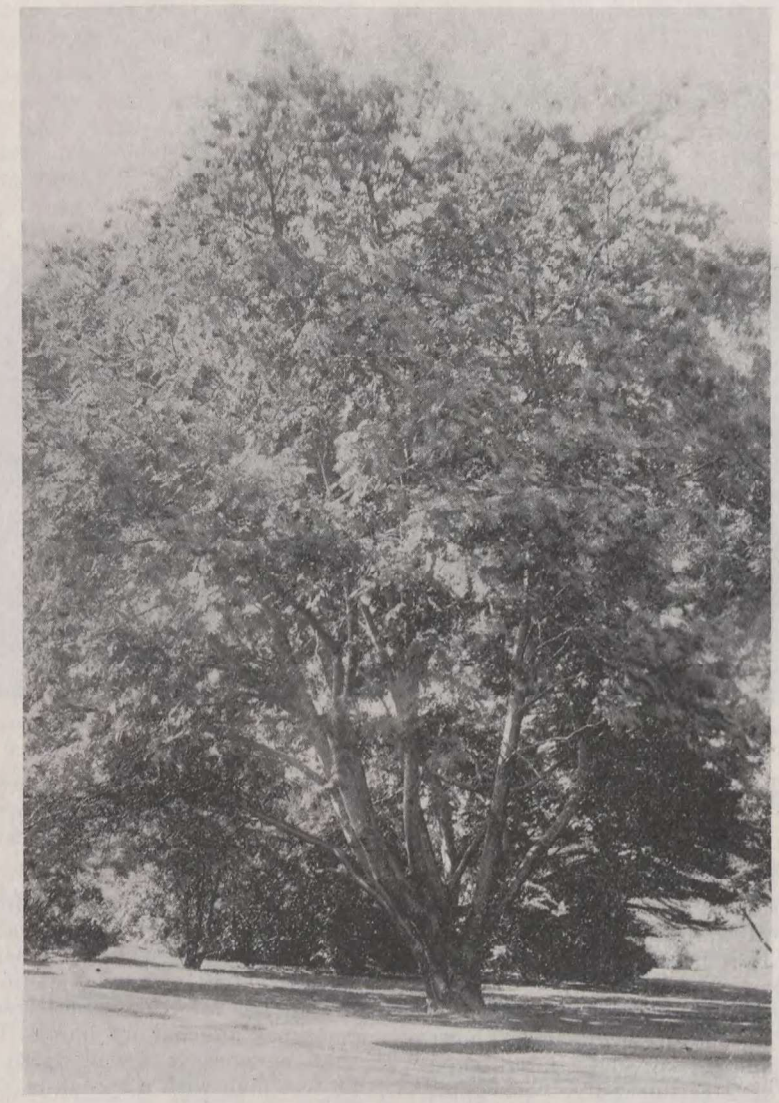

FIG. 19—European Mountain Ash. *(Sorbus aucuparia)*

Syringa japonica (Japanese Tree Lilac).—This is a very satisfactory small tree or shrub as it blooms late, and is tall and effective on the lawn when it is in bloom about the end of June, and is a mass of creamy-white flowers, which,

however, have not the perfume of the common lilac. Trees at the Experimental Farm, Ottawa, after being over thirty-five years planted are over 20 feet high. The Manchurian lilac, *Syringa amurensis*, is very much like it. This tree thirty-five years planted is 21 feet high with a spread of 24 feet.

Tilia americana (American Linden).—The American Linden or Basswood is a large, spreading native tree, which is very effective on extensive grounds. Where one is limited for space, however, because of its spreading habit it is not so desirable. The foliage is often disfigured by insects, which is also somewhat against it where one is limited to a few trees. This tree planted thirty-five years is 40 feet high.

Tilia cordata (Little Leaf European Linden).—Because of the small size of its leaves and its graceful form, this is, perhaps, the most attractive of the European Lindens. It has proven hardy at Ottawa so far.

Tilia platyphyllos (Big Leaf European Linden).—This European Species has grown well at Ottawa, but does not seem any more desirable than the native American Basswood, and may not live as long. The variety *vitifolia* is a more attractive form than the species.

FIG. 20—Japanese Tree Lilac *(Syringa japonica)*

Tilia vulgaris (Common Linden).—The Common Linden is succeeding very well at Ottawa as a relatively young tree, but may not reach a great age. It is safer to depend on the American Linden.

Ulmus (European Elm).—The European Elms have, on the whole, not proved satisfactory at Ottawa. They continue growing too late in the season and are split by the frosts or killed back. The Camperdown Weeping Elm, however, does fairly well.

Ulmus americana (American Elm).—This fine, graceful tree is too well known to need much commenting upon here. Large specimens of the American Elm are well known landmarks throughout Eastern Canada and the United

States. It makes a fine avenue tree, and for best effect should be at least 50 feet apart in the row. It grows rapidly and when planted much less than this the trees will meet in comparatively few years. At 40 feet apart, the trees in an avenue at the Experimental Farm, Ottawa, planted in 1888, have been interlacing for some years. It should not be planted on narrow streets or near houses as the roots extend for long distances and are liable to do damage to buildings. This tree planted thirty-eight years is 72 feet high with a spread of 70 feet.

Ulmus pumila (Dwarf Asiatic Elm).—This is a rapid-growing small tree with small leaves, and makes a rather graceful specimen, and, where there is room for small trees other than those with conspicuous flowers, this Elm might be planted with good effect.

Ulmus racemosa (Rock Elm).—The Rock Elm is a fine, rugged-looking tree, and is well worthy of a place on large grounds. The rather short pendulous branches and cork-like bark are very characteristic of this tree. This tree planted thirty-five years is 45 feet high.

OTHER DECIDUOUS TREES WHICH ARE CONIFERS

There are two deciduous trees which are conifers which should be mentioned here as they are both very desirable.

Gingko biloba (Maiden Hair Tree).—This is not an evergreen conifer, but it is such a striking and attractive tree that it should be much more generally planted than it is. The leaves remind one of the Maiden Hair Fern. While not particularly graceful, being of rather upright growth, it is very pleasing to the eye, owing to its remarkable fan-shaped foliage. While a rather slow grower, it is used as an avenue tree in some places in the United States with very good effect, and is quite hardy at Ottawa where trees are now about 35 feet in height.

Larix europœa (European Larch).—This has proved a very satisfactory Larch at Ottawa, trees which have been planted thirty-six years being still in good condition. It is a very rapid grower of pyramidal and somewhat pendulous form.

TEN BEST SMALL TREES FOR ONTARIO

Acer ginnala—Amur Maple.
Amelanchier laevis—Allegheny Shadbush.
Catalpa hybrida—Teas' Catalpa.
Cladrastis lutea—Yellow Wood.
Crataegus coccinea—Thicket Hawthorn.
Malus baccata—Siberian Crab.
Malus ioensis plena—Bechtel Crab.
Aesculus glabra—Ohio Buckeye.
Sorbus aucuparia—European Mountain Ash.
Syringa japonica—Japanese Tree Lilac.

TEN BEST LARGE TREES FOR ONTARIO

Acer platnoides Schwedleri—Schwedler Maple.
Acer saccharinum Wieri—Wier Maple.
Acer saccharum—Sugar Maple.
Betula alba laciniata—Cut-leaf Weeping Birch.
Cercidiphyllum japonicum—Katsura Tree.
Fagus americana—American Beech.
Populus eugenei—Carolina Poplar.
Quercus rubra—Red Oak.
Tilia americana—American Linden.
Ulmus americana—American Elm.

To these might be added the deciduous conifers, Gingko biloba (Maiden Hair Tree), and Larix europaea (European Larch).

GREENHOUSE EXPERIMENTS

The erection of a new greenhouse has made it possible to carry on more experimental work, part of which, it is hoped, will be of especial value to florists, who have been most anxious for this Division to have more glass. As it is important to compare the novelties of the principal flowers with the standard sorts, as they appear, tests were made with Antirrhinums, Carnations, Chrysanthemums, and Sweet Peas. The relative merits of different varieties of Gladioli for forcing were also determined. Most of these experiments were not completed before the end of the year, but the following information obtained in regard to different varieties of Chrysanthemums grown for cut flowers should prove of value to florists.

Experiments in the forcing of vegetables was continued, among the most important being the breeding of head lettuce suitable for forcing in greenhouses, and breeding of cucumbers and tomatoes for forcing.

CHRYSANTHEMUM EXPERIMENT CONDUCTED IN GREENHOUSE

The object of the experiment is to compare so-called commercial varieties of Chrysanthemums to determine which are the best for commercial purposes. The middle side house was used for this experiment and the plants were planted in the beds.

Date of making cuttings—Plants brought in as rooted cuttings.
Dates of potting into different sized pots—Potted into 2½-inch pots as they arrived.
Date of planting into beds—June 1, 1925.
The soil was manure and rotted sod.
The plants were set in the beds 9 inches apart each way, 5 plants to a row.
Time and method of disbudding or pinching, if any, before planting—None.
Time and method of disbudding or pinching after planting and with what object in view—Pinched July 20, 1925, with object of getting three stems from each plant.
Condition of plants after final pinching or disbudding (What number of stems left)—3 stems.
Method of staking—3 stakes per plant.
The average night temperature was 50° F.
Total area occupied by plants in beds—355 square feet.
Total number of plants—535.

Name of Variety	Number of plants	Date when ready to cut	Length of stems	Length of secondary stems	Number of secondary stems	Total number of flowers from all plants	Average number of flowers per plant
			ft. in.	inches			
Angelo	15	28-10-25	2 ..	10	9	1,620	108
Bessie Dale	15	3-11-25	2 10	11	9	1,620	108
Celebration	25	16-11-25	4 ..	18	5	1,125	45
Chadwick Improved	25	16-11-25	3 ..	16	5	1,125	45
Chadwick Supreme	25	24-10-25	3 10	18	5	1,500	60
Comeleta	15	28-10-25	2 ..	15	3	675	45
December Glory	5	23-11-25	3 8	16	6	450	90
Early Frost	15	10-11-25	3 2	10	18	1,620	108
Favorite	15	23-11-25	3 6	10	3	405	27
Glorious	15	9-11-25	2 10	15	4	540	36
Golden Chadwick	20	21-10-25	3 8	18	4	960	48
Golden Chadwick	25	21-11-25	2 6	16	4	1,200	48
Golden Early Frost	15	14-11-25	2 4	14	7	1,260	84
Golden Glory	15	3-11-25	2 9	9	9	2,025	135
Golden Wedding	25	16-11-25	4 ..	14	8	2,050	82
Harvard	25	23-11-25	2 6	18	10	750	30
Ma Ferguson	5	23-11-25	2 5	11	5	225	45
Major Bonnafon	25	14-11-25	3 ..	None	None	375	15
Maud Dean	25	1-12-25	3 ..	24	10	2,250	90
Nellie Blake	15	27-10-25	3 1	None	None	420	28
Nellie T. Ross	5	23-11-25	4 ..	12	5	225	45
Richmond	15	7-11-25	4 ..	None	None	315	21
Silver Sheen	5	3-11-25	4 2	8	5	375	75
Smith Enchantress	5	24-10-25	3 ..	18	3	225	45
Smith Peerless	5	23-11-25	2 6	8	5	75	15
Snow White	15	10-11-25	3 3	9	4	540	36
T. Eaton	25	18-11-25	3 6	13	8	2,050	82
Tekonsha	25	18-11-25	3 3	7	6	1,350	54
Thanksgiving Pink	25	23-11-25	4 ..	7	6	450	18
Towantic	5	1-12-25	4 ..	24	5	300	60
White Chieftain	15	10-11-25	2 10	14	4	720	48
W. H. Waite	25	10-11-25	2 ..	12	4	900	36

COMMERCIAL VARIETIES

Average number of flowers per secondary stem	Strength of stem	Kind of flower	Diameter of flower	Substance of flower	Colour of flower	Value commercially	Any other notes
			inches				
4	Strong	Large Pompon	3	Good	Pink	x x x	Close flowered head.
4	Strong	Incurved	5	Good	Pale yellow.	x x x	
3	Strong	Incurved	4½	Good	Yellow	x x x	
3	Strong	Incurved	6	Good	White	x x x	
4	Strong	Reflexed	5	Good	Pale pink.	x x x	
5	Medium	Incurved	3	Medium	Yellow	x x	
5	Strong	Incurved	4½	Good	White	x x x	Late.
2	Medium	Incurved	3	Medium	White	x x	
3	Strong	Incurved	4½	Good	White	x x x	
3	Strong	Incurved	3½	Good	Pink	x x x	
4	Strong	Incurved	5	Good	Golden yellow.	x x x	
4	Strong	Incurved	5	Good	Yellow	x x x	
4	Strong	Incurved	2¾	Medium	Yellow	x x	
5	Medium	Incurved	3½	Medium	Golden yellow.	x x	
3	Strong	Loosely incurved	5	Good	Golden yellow.	x x x	
1	Medium	Japanese reflexed	4¾	Good	Red	x x x	
3	Medium	Irregular, outer petals reflexed, centre incurved	4½	Medium	Yellow	x x	
None	Strong	Incurved	3¾	Good	Yellow	x x x	Cluster head.
3	Strong	Incurved	3½	Good	Pink	x x x	Very late.
None	Strong	Incurved	2¼	Good	Rich bronze.	x x x	
3	Strong	Incurved	4	Good	Yellow	x x x	
None	Strong	Incurved	3	Good	Yellow	x x x	
5	Strong	Incurved	4	Good	White	x x x	Close head.
5	Strong	Incurved	3½	Good	Bright pink.	x x x	Close head.
1	Medium	Incurved	4¼	Medium	White	x x	
3	Strong	Incurved	4	Medium	Ivory white.	x x	
3	Strong	Incurved	4¼	Good	White	x x x	
3	Strong	Incurved	4½	Medium	Bronze	x x	
1	Strong	Incurved	4¼	Good	Pink	x x x	
4	Strong	Incurved	5½	Medium	White	x x	Very late.
4	Strong	Incurved	5	Good	White	x x x	
3	Strong	Incurved	5½	Very good	Bronze	x x x	

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