DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

DIVISION OF HORTICULTURE

REPORT

OF THE DOMINION HORTICULTURIST

W. T. MACOUN

FOR THE YEAR 1926

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REPORT OF THE DIVISION OF HORTICULTURE

W. T. MACOUN, DOMINION HORTICULTURIST

Following is the fortieth annual report of the Division of Horticulture, and the twenty-eighth since the present Dominion Horticulturist was appointed Chief of the Division in 1898. In the forty reports which have been published there has been much information of value to both the commercial grower and the amateur, and it is gratifying to know that this is appreciated by horticulturists throughout Canada.

The growth of the correspondence of the division is a good indication of the increase of interest and appreciation of the work of the division. The first record of letters received during a year is in the report for 1889, when 247 were received by the horticulturist. By 1897 this had risen to 2,576 letters received, and 2,495 dispatched for that year. In 1926, there were 9,759 letters received and 10,890 dispatched, a very marked increase. The attention to this large correspondence by the staff involves much time, but it is considered well spent as those who take the trouble to ask for information will, no doubt, follow the directions given in most cases.

This report has been prepared by various members of the staff. The section dealing with experiments in fruit growing has been prepared by Mr. M. B. Davis, B.S.A., Chief Assistant, except the list of names given to apples in the Horticultural Division and the technical descriptions of apples named in 1926. That part of the report dealing with vegetables has been prepared by Mr. T. F. Ritchie, B.S.A., Assistant in Vegetable Gardening. Miss Isabella Preston, Specialist in Ornamental Gardening, has prepared the notes on gladiolus. The Dominion Horticulturist prepared the remainder. The collection of water-colour paintings of fruits and vegetables, made by Miss Faith Fyles, B.A., Artist, and the herbarium of horticultural plants, also under her charge, were materially increased during the year. Miss Ethel W. Hamilton continued in charge of the experimental work in canning and dehydration in 1926, and the results of the work in canning up to the end of that year have been published as Bulletin No. 77 New Series, "Preserving Fruits and Vegetables in the Home." The efficient work of the office staff and other workers in the field make it possible to present the details of the experiments here.

THE SEASON

The success or failure of horticultural plants depends very much on the weather, and there is always great interest in the character of the weather during each year, hence some of the temperatures and other climatic conditions in 1926 are given here, as in past reports, for other years.

There was a covering of six inches or more of snow at the end of December, 1925, and, during January, 1926, this did not increase much, though there were a number of light snowfalls. The coldest day in January was on the 29th, when it was —24° F. It was below zero on fourteen days during the month, but on only one of these days was it more than fourteen degrees below. The temperature was above freezing on five days. In February, it was below zero.

on thirteen days, the coldest being February 21, when it was —24° F. There was only one day when it was above freezing, the 26th, and previous to that time there had been no thawing since January 19. By the end of February there was over two feet of snow on the level.

It was below zero on seven days in March. The lowest temperature was —19° F. on the 6th. From the 18th to the end of the month the temperature rose above freezing on every day but two. There was still about eighteen inches of snow on the level at the end of the month.

April was a much cooler month than usual. The highest temperature was 65° F. on the 22nd, and frost was recorded on all but three days. There was snow on the level in places until April 22. It was possible to dig in most places on April 21, the first really spring-like day. This is ten days later than the average for the past twenty-nine years, the average date for digging being April 11.

The last spring frost was on May 21, when the temperature was 27° F. The highest temperature in May was 81° F. on the 30th, but there were only eight days during the month when it reached 70° F. or above. Vegetation was still much later than the average at the end of May.

The foliage of the hard maples and some of the other trees, which is usually fully out by May 24, was not out this year until about June 8, or two weeks later. The temperature did not get up to eighty degrees or above until the 29th, when it was 85° F., and at the end of the month the development of most vegetation was nearly two weeks later than the average. Most things, however, looked well.

Bearded Irises were still in good condition on June 26.

July helped to make up for the cool weather earlier. It was 80° F. and over on nineteen days, the highest temperature being 87° F. on the 20th. The hottest spell was between July 16 and 28. As there was a good precipitation during the month, plants did not suffer.

August was a moderately warm month with the temperature 80° F. and over on five days. The warmest day was the 6th, when it was 85° F.

The only day in September when the temperature reached the eighties was on the 24th, when it was 81° F. The nights were cool in September, and conditions were unfavourable for ripening of the grapes. There was frost on only one day, however, the 27th, when the temperature was 30° F. This frost touched the grape leaves slightly. Corn was also injured, but most things were not hurt.

October was a cool, rainy month, there being precipitation on twenty days. There was no frost recorded until the 16th, when the temperature was 30° F. The first really killing frost was on the 18th, when the temperature was 26° F., most of the flowers which had been good up to this time being either killed then or on the 20th, when it was 21° F.

November was a cool, but not a cold month. The highest temperature was 62° F. on the 16th and the lowest was zero on the 28th. Winter may be said to have set in on November 21, 1926, with the ground frozen and practically no snow. The average date for winter setting in for twenty-nine years is November 25.

The ground continued bare of snow until December 1, when there was a fall of nearly four inches, and by the end of the month there were about ten inches on the level. It was below zero on ten days in December, but the lowest temperature of the month was only —13° F. on the 16th.

Precipitation was well distributed in 1926.

POMOLOGY

The season of 1926 was in many ways anything but a normal year for the fruit growers in this district. The spring was very late and long drawn out which resulted in a very poor set of plums and the late maturation of most fruits. At this station our apple crop was light although this was not typical of all sections. All other fruits yielded well although some difficulties in harvesting strawberries due to wet weather resulted in a loss heavier than usual. The fall was exceptional, being wet until very late, which resulted in the encouragement of late growth of most plants and where drainage was poor there can be little question of severe injury which will not show up until the spring of 1927. We anticipate reports of severe injury from strawberries and raspberries especially where grown under poorly drained conditions. Even the fruit and tender roots may suffer to some extent. The importance of site in locating for small fruit growing has been brought home rather severely this last two years and future growers will do well to heed the lessons thus learned.

THE MELBA APPLE

Reports of the value of Melba as an acquisition to the fruit list, continue to come in from all parts of the country. It seems safe now to predict that this variety has found a permanent place in the orchards of America as an early dessert apple.

One typical report from Massachusetts claims it to be hardy, a vigorous grower, resistant to blight; productive and a juvenile producer; very attractive, comparable to McIntosh in quality; earlier than Duchess, and that it has a great future. To date we have had favourable reports from British Columbia, Ontario (eastern and western), Quebec, New Brunswick, Massachusetts, New York, Vermont, New Jersey, Ohio, Nova Scotia, and England.

A few extracts from reports of experimenters.

1. *From New Jersey.*

The fruit does not drop as easily as many summer and fall varieties. Fruit may be too tender for long distance shipments, but is ideal for local or nearby markets. Thus far crop ripens quite uniformly. Does not drag along like Red Astrachan or Gravenstein.

2. *From Nova Scotia*

A beautiful tree with best crotches I know.
A fine cropper.
A good fair size, not many small apples.
Fine quality.
It is a magnificent acquisition for the cooler parts of Nova Scotia.

3. *From Ontario*

The standard early apple is the Duchess, and I think the Melba beats it in every way.

4. *From Eastern Ontario*

From our experience here, cannot say anything but good about it.

5. *From Quebec*

Not as good as Fameuse or Spy but slightly better than McIntosh and Delicious. Personally the flavour of the latter two are too pronounced and I prefer the Melba because it is milder.

6. *From New York*

I have never seen it blight even when grafted on quite susceptible stock. I used it for this last spring. A scion of McIntosh growing on the opposite side of the same cleft with Melba blighted and the latter was unaffected.

A splendid nursery tree. While it may not caliper quite as much as McIntosh it holds its size better to the tip and is less inclined to branch when forced into strong growth so grows taller, here.

7. *From Western Ontario.*

I consider the Melba superior to all other varieties of early summer apples that I am acquainted with, and judging by attractive appearance, fine flavour and early ripening, the planting of this apple should be a good commercial proposition.

DESCRIPTIONS OF NEW VARIETIES OF APPLES ORIGINATED IN THE HORTICULTURAL DIVISION AND NAMED DURING THE YEAR 1926-27

Many new varieties of apples have originated and fruited in the Horticultural Division at Ottawa. A considerable number of these has been propagated for further test, a relatively small number has been named, and a few of these have already become popular among the fruit growers who have grown and fruited them. There is no perfect variety of apple known. Apples of high quality are now demanded by a large and growing number of people with discriminating tastes, and it is the object of the work in this Division to endeavour to originate new varieties, the season of which will cover the whole year, and which will be of the highest quality, attractive in appearance, and have the other desirable characteristics necessary to ensure popularity.

Following are descriptions of a few varieties named during the year 1926-27 (or named previously but no description published), which show promise for some part of Canada:—

Coxstone (Stone Seedling).—Fruit above medium to large; form roundish, ribbed; cavity open, medium depth; stem medium length, stout; basin open, deep, wrinkled; calyx open; colour yellow washed and splashed with orange red; predominant colour orange red; seeds medium size, obtuse; dots few, small, yellow, indistinct; skin moderately thick, tender; flesh yellowish, crisp, tender, moderately juicy; core medium; flavour subacid, pleasant; quality good; season probably December to March. No marked resemblance to Stone, except in flavour. A nice dessert apple, attractive in appearance.

Forsweet (McIntosh x Forest).—Fruit medium to above; form roundish conical; cavity open, deep; stem medium length, stout; basin deep, medium width, abrupt, wrinkled; calyx open; colour thinly washed and splashed with carmine approaching orange red; predominant colour carmine approaching orange red; seeds medium size, acute; dots few, white distinct; skin thick, tough; flesh yellowish, firm, moderately juicy; core small; flavour sweet, good; quality good for a sweet apple; season December 1 to March. A good late keeping sweet apple attractive in appearance. No marked resemblance to McIntosh, but resembles Forest considerably in flavour and shape.

Fortosh (McIntosh x Forest).—Fruit medium to above; form roundish, regular; cavity medium depth and width; stem medium length, stout; basin medium depth and width, wrinkled; calyx partly open; colour greenish yellow well washed and splashed with deep orange red approaching crimson; predominant colour deep orange red; seeds above medium, acuminate; dots moderately numerous, small, yellow, distinct; skin moderately thick, tough; flesh dull white, tinged with red, firm, tender, juicy; core medium; flavour subacid, pleasant; quality good; season probably December to March. An attractive looking winter apple of good quality. Promising as a winter dessert apple. No marked resemblance to either parent.

Forwood (Forest Seedling).—Fruit medium to above; form roundish conic, ribbed; cavity medium depth and width, sometimes lipped; stem medium length to long, stout; basin medium width to open, shallow to medium depth, wrinkled; calyx open or partly open; colour yellow well washed with deep orange red approaching crimson; predominant colour deep orange red approaching crimson; seeds large, acuminate; dots numerous, yellow, conspicuous; bloom medium, lilac; skin moderately thick, moderately tender; flesh yellowish tinged with red, crisp, breaking, firm, moderately juicy; core medium; flavour subacid, pleasant; quality good; season probably December to March. No marked resemblance to Forest except in character of flesh and in having good flavour. A good keeper. Not quite shapely enough.

Roslin (Russian Seedling).—Fruit medium to below medium; form roundish conical, ribbed; cavity open, very shallow, russeted; stem medium length, stout; basin shallow, medium width, wrinkled; calyx closed or partly open; colour very pale yellow thinly splashed with carmine; predominant colour about fifty per cent of each; seeds large, acute; dots obscure; skin moderately thick; tough; flesh white, tender, juicy; core large, open; flavour subacid, pleasant; quality good; season early August. A very early variety. Not quite large enough.

Spikee (Northern Spy x Milwaukee).—Fruit large; form oblate to roundish, regular; cavity deep, medium width to open, russeted; stem short to medium stout; basin open, medium depth, nearly smooth; calyx open; colour greenish yellow washed with dull red; predominant colour dull red or fifty per cent of each; seeds medium size to below, acute and acuminate; dots obscure; skin moderately thick, tender; flesh yellow, crisp, tender, juicy; core medium; flavour mildly subacid, pleasant; quality good; season probably November to late February. No marked resemblance to either parent. A nice dessert apple, but not quite attractive enough in appearance.

Toshfor (McIntosh x Forest).—Fruit medium; form roundish, regular; cavity open, medium depth to shallow; stem medium length, very stout; basin open, shallow to medium, wrinkled; calyx open; colour yellow well washed with deep but lively crimson approaching orange red; predominant colour deep but lively crimson approaching orange red; seeds medium size, acute; dots moderately numerous, pale yellow, distinct; skin moderately thick, moderately tough; flesh yellowish with traces of red, firm, crisp, juicy; core medium; flavour briskly subacid, pleasant but not much flavour; quality good; season probably late December to March. Resembles McIntosh considerably in colour of skin, but no marked resemblance otherwise to either parent.

Redman (Prince x McIntosh).—Fruit very large for a crab, below medium for an apple; form oblate to roundish; cavity medium depth and width, russeted, sometimes lipped; stem long, stout; basin open, shallow to medium, wrinkled;

calyx closed; colour yellow well washed with dark crimson; predominant colour dark crimson; seeds above medium size even for an apple, acute; dots few, yellow, distinct; bloom bluish, moderate; core medium; season evidently September. A handsome apple. May be useful on the Prairies. Colour of skin suggestive of deeply coloured McIntosh.

NAMES GIVEN TO APPLES ORIGINATED IN THE HORTICULTURAL DIVISION, CENTRAL EXPERIMENTAL FARM, OTTAWA, ONT., UP TO MARCH 31, 1927, OF WHICH DESCRIPTIONS HAVE BEEN PUBLISHED IN THE ANNUAL REPORTS

The following list of names given to apples originated in the Horticultural Division is published in order that those interested in any of the varieties may refer to the publication in which the variety was first described. Taking the variety Melba, for instance, "R. 1909, P. 111" means that this variety was described in the Annual Report of the Horticultural Division for 1909, and the name and description occur on Page 111 of that report.

It will be seen that 175 varieties have been named and described up to date. In naming a variety its possible value under one of the many climatic conditions of the Dominion is taken into consideration. If only the best fruit sections of the country had been in mind, the number of names given would have been much less.

There are too many varieties of apples being grown in Canada to-day, but the varieties being grown are none of them perfect and are being gradually replaced with the newer and better ones, which are introduced from time to time.

In order that the Horticultural Division may not unduly multiply the number of varieties being grown, great care has been exercised in not recommending for general planting any of those in the following list unless the variety has been well tested. Hence, of this long list of varieties, the few sorts that may be said to have been recommended for planting are: Melba, Joyce, Lobo, Hume, Lawfam, Linda, all apples of the McIntosh or Fameuse type.

Open Pollinated Varieties	Female Parent	Date of sowing seed	Date of planting tree	Date of first fruiting	Where fruit described
Humber	American Golden Russet	Autumn 1898...	Spring 1902...	1911	R. 1913, P. 293
1 Variety.					
Herald	Fameuse	" 1898...	" 1902...	1909	R. 1910, P. 135
1 Variety.					
Beforest	Forest	" 1908...	" 1911...	1919	R. 1925, P. 6
Forpear	"	" 1908...	" 1911...	1920	R. 1925, P. 6
Forwood	"	" 1908...	" 1911...	1919	R. 1926
3 Varieties.					
Ganmore	Gano	" 1899...	" 1902...	1911	R. 1925, P. 6
Roger	"	" 1898...	" 1902...	1908	R. 1911, P. 112
2 Varieties.					
Brisco	Langford Beauty	" 1898...	" 1903...	1910	R. 1913, P. 292
Cora	" "	" 1898...	" 1902...	1907	R. 1911, P. 110
Diana	" "	" 1898...	" 1903...	1912	R. 1913, P. 292
Dulcet	" "	" 1898...	" 1903...	1911	R. 1914, P. 494
Galena	" "	" 1898...	" 1903...	1911	R. 1913, P. 293
Garner	" "	" 1898...	" 1902...	1907	R. 1908, P. 101
Gerald	" "	" 1898...	" 1903...	1911	R. 1912, P. 92
Horace	" "	" 1898...	" 1902...	1908	R. 1912, P. 93
Kildare	" "	" 1898...	" 1902...	1908	R. 1911, P. 111
Kim	" "	" 1898...	" 1902...	1908	R. 1911, P. 111
Linda	" "	" 1898...	" 1902...	1908	R. 1915, P. 595
Moreno	" "	" 1898...	" 1902...	1908	R. 1913, P. 293
Monitor	" "	" 1898...	" 1903...	1909	R. 1912, P. 93
Peace	" "	" 1901...	" 1904...	1912	R. 1920-21, P. 6
Ripon	" "	" 1898...	" 1902...	1908	R. 1911, P. 111
Sonora	" "	" 1898...	" 1902...	1907	R. 1908, P. 102
16 Varieties.					
Cobalt	Lawyer	" 1898...	" 1902...	1908	R. 1910, P. 134
Congo	"	" 1898...	" 1901...	1906	R. 1906, P. 107
Danville	"	" 1898...	" 1902...	1908	R. 1909, P. 111

Open Pollinated Varieties	Female Parent	Date of sowing seed	Date of planting tree	Date of first fruiting	Where fruit described
Lawseed	Lawyer	Autumn 1899	Spring 1902	1911	R. 1925, P. 6
Spilaw	"	" 1899	" 1902	1912	R. 1925, P. 8
5 Varieties.					
Brock	McIntosh	" 1898	" 1901	1908	R. 1910, P. 134
Carno	"	" 1898	" 1901	1907	R. 1911, P. 110
Caruso	"	" 1898	" 1903	1909	R. 1912, P. 91
Casco	"	" 1898	" 1903	1913	R. 1914, P. 494
Forerunner	"	" 1898	" 1904	1901	R. 1915, P. 595
Garnet	"	" 1898	" 1901	1908	R. 1912, P. 92
Gilda	"	" 1898	" 1904	1909	R. 1914, P. 494
Grover	"	" 1898	" 1901	1908	R. 1913, P. 293
Hume	"	" 1903	" 1906	1916	R. 1920-21, P. 5
Lobo	"	" 1898	" 1901	1906	R. 1910, P. 135
Melba	"	" 1898	" 1901	1908	R. 1919, P. 111
Maclate	"	" 1901	" 1904	1916	R. 1925, P. 7
McSweet	"	" 1900	" 1903	1913	R. 1920-21, P. 5
Nemo	"	" 1898	" 1901	1908	R. 1912, P. 93
Joyce	"	" 1898	" 1901	1911	R. 1912, P. 93
Oshtosh	"	" 1898	" 1901	1909	R. 1920-21, P. 6
Patricia	"	" 1901	" 1904	1914	R. 1920-21, P. 6
Pedro	"	" 1898	" 1903	1911	R. 1913, P. 294
Service	"	" 1898	" 1901	1908	R. 1912, P. 94
Seton	"	" 1898	" 1901	1908	R. 1911, P. 112
Sweetmac	"	" 1901	" 1904	1911	R. 1923, P. 5
Sweetosh	"	" 1900	" 1903	1913	R. 1920-21, P. 7
Toshlet	"	" 1898	" 1901	1912	R. 1914, P. 495
Valerie	"	" 1898	" 1903	1908	R. 1914, P. 495
Winton	"	" 1898	" 1901	1908	R. 1915, P. 596
25 Varieties.					
Ascot	Northern Spy	" 1898	" 1903	1912	R. 1913, P. 222
Bingo	" "	" 1898	" 1902	1910	R. 1911, P. 110
Currie	" "	" 1903	" 1906	1916	R. 1920-21, P. 5
Donald	" "	" 1898	" 1902	1909	R. 1912, P. 92
Elmer	" "	" 1898	" 1902	1911	R. 1912, P. 92
Emilia	" "	" 1898	" 1902	1914	R. 1915, P. 595
Epsom	" "	" 1898	" 1902	1912	R. 1913, P. 293
Galton	" "	" 1898	" 1906	1912	R. 1915, P. 595
Glenton	" "	" 1898	" 1902	1909	R. 1911, P. 111
Homer	" "	" 1898	" 1902	1908	R. 1910, P. 135
Lipton	" "	" 1898	" 1902	1914	R. 1915, P. 595
Marcus	" "	" 1898	" 1902	1911	R. 1912, P. 93
Marne	" "	" 1898	" 1903	1913	R. 1915, P. 595
Nestor	" "	" 1898	" 1904	1912	R. 1912, P. 93
Niobe	" "	" 1898	" 1902	1909	R. 1911, P. 111
Orlando	" "	" 1898	" 1902	1911	R. 1913, P. 294
Pandora	" "	" 1898	" 1902	1908	R. 1913, P. 294
Rocket	" "	" 1898	" 1902	1910	R. 1911, P. 112
Rosalie	" "	" 1898	" 1901	1908	R. 1911, P. 112
Sandow	" "	" 1898	" 1902	1911	R. 1912, P. 94
Sparta	" "	" 1898	" 1901	1912	R. 1914, P. 495
Spiana	" "	" 1900	" 1903	1919	R. 1925, P. 8
Spiland	" "	" 1901	" 1904	1915	R. 1923, P. 5
Spimore	" "	" 1901	" 1904	1915	R. 1923, P. 5
Spiotta	" "	" 1900	" 1903	1911	R. 1920-21, P. 6
Spiretta	" "	" 1899	" 1902	1916	R. 1923, P. 5
Spiro	" "	" 1901	" 1904	1914	R. 1920-21, P. 6
Spiza	" "	" 1903	" 1906	1916	R. 1922, P. 8
Tasty	" "	" 1898	" 1902	1911	R. 1912, P. 94
Thurso	" "	" 1898	" 1901	1909	R. 1908, P. 108
Wilgar	" "	" 1901	" 1904	1911	R. 1920, P. 7
31 Varieties.					
Claire	Russian	" 1889	" 1890	1906	R. 1906, P. 107
Neville	"	" 1889	" 1890	1904	R. 1906, P. 108
Oscar	"	" 1889	" 1890	1897	R. 1908, P. 102
Percival	"	" 1889	" 1890	1906	R. 1906, P. 108
Roslin	"	" 1889	" 1890		R. 1926
Rupert	"	" 1889	" 1890	1897	R. 1906, P. 109
6 Varieties.					
Cleaver	Salome	" 1898	" 1902	1910	R. 1912, P. 92
Lucia	"	" 1898	" 1902	1912	R. 1914, P. 494
Manda	"	" 1898	" 1902	1910	R. 1913, P. 293
Nepean	"	" 1898	" 1902	1908	R. 1910, P. 135
Omeal	"	" 1899	" 1902	1911	R. 1920-21, P. 5

Open Pollinated Varieties	Female Parent	Date of sowing seed	Date of planting tree	Date of first fruiting	Where fruit described
Oswald	Salome	Autumn 1898	Spring 1902	1908	R. 1910, P. 136
Rondo	"	" 1898	" 1902	1911	R. 1912, P. 94
Rouleau	"	" 1898	" 1902	1907	R. 1910, P. 136
Stella	"	" 1898	" 1902	1908	R. 1910, P. 136
9 Varieties.					
Macearly	Seedling of Lawver x McIntosh	" 1908	" 1912	1918	R. 1924, P. 17
1 Variety.					
Bruno	Scott Winter	" 1898	" 1901	1907	R. 1908, P. 101
1 Variety.					
Merlin	Shiawassee	" 1899	" 1902	1911	R. 1920-21, P. 5
Orsino	"	" 1900	" 1903	1914	R. 1920-21, P. 5.
Petrel	"	" 1898	" 1901	1907	R. 1910, P. 136
Ramona	"	" 1898	" 1902	1908	R. 1913, P. 294
Shishee	"	" 1899	" 1902	1912	R. 1920-21, P. 6
5 Varieties.					
Coxstone	Stone	" 1908	" 1912	1922	R. 1926
Stonecrop	"	" 1908	" 1912	1921	R. 1925, P. 8
Stonehenge	"	" 1908	" 1912	1921	R. 1925, P. 8
3 Varieties.					
Ambo	Swayzie	" 1898	" 1904	1912	R. 1914, P. 493
Cromer	"	" 1898	" 1902	1905	R. 1909, P. 111
Navan	"	" 1898	" 1902	1906	R. 1906, P. 108
Nome	"	" 1898	" 1904	1909	R. 1915, P. 596
Ottawa	"	" 1898	" 1902	1906	R. 1906, P. 108
Radnor	"	" 1898	" 1902	1907	R. 1909, P. 111
Severn	"	" 1898	" 1901	1906	R. 1908, P. 102
7 Varieties.					
Adonis	Wealthy	" 1898	" 1901	1905	R. 1905, P. 107
Battle	"	" 1898	" 1901	1906	R. 1910, P. 134
Clive	"	" 1898	" 1902	1907	R. 1908, P. 101
Consort	"	" 1898	" 1901	1908	R. 1914, P. 494
Crusoe	"	" 1898	" 1901	1903	R. 1906, P. 107
Galetta	"	" 1898	" 1902	1906	R. 1906, P. 108
Jethro	"	" 1898	" 1902	1911	R. 1914, P. 494
Luke	"	" 1898	" 1902	1906	R. 1911, P. 111
Medford	"	" 1898	" 1901	1906	R. 1908, P. 102
Melvin	"	" 1898	" 1901	1905	R. 1910, P. 135
Mendel	"	" 1898	" 1902	1906	R. 1906, P. 108
Pinto	"	" 1898	" 1902	1906	R. 1909, P. 111
Prosper	"	" 1898	" 1902	1908	R. 1910, P. 136
Noel	"	" 1898	" 1901	1905	R. 1906, P. 108
14 Varieties.					
Rosena	Winter Rose	" 1908	" 1912	1918	R. 1924, P. 17
Rosetta	"	" 1908	" 1912	1917	R. 1923, P. 5
2 Varieties.					
Albert	Winter St. Lawrence	" 1898	" 1901	1909	R. 1912, P. 91
Anson	" "	" 1898	" 1901	1909	R. 1910, P. 134
Atlas	" "	" 1898	" 1902	1910	R. 1912, P. 91
Drumho	" "	" 1898	" 1902	1910	R. 1915, P. 594
Linton	" "	" 1898	" 1901	1907	R. 1908, P. 102
Nile	" "	" 1898	" 1902	1908	R. 1912, P. 94
Wintlaw	" "	" 1899	" 1902	1911	R. 1925, P. 8
7 Varieties.					

Cross-bred Varieties	Parentage	Date of sowing seed	Date of planting tree	Date of first fruiting	Where fruit described
Antmil	Antonovka x Milwaukee	Autumn 1909	Spring 1913	1918	R. 1925, P. 5
Bethanis	Bethel x Anis	" 1909	" 1913	1918	R. 1922, P. 7
Dorval	McMahan x Scott Winter	" 1895	" 1896	1905	R. 1906, P. 107
Foreland	Lowland Raspberry x Forest	" 1909	" 1913	1919	R. 1924, P. 16
Forsweet	McIntosh x Forest	" 1907	" 1910	1921	R. 1926
Fortosh	" "	" 1907	" 1910	1920	R. 1926
Granby	McMahan x Scott Winter	" 1895	" 1896	1907	R. 1908, P. 101
Holz	Lawver x McIntosh	" 1899	" 1903	1911	R. 1912, P. 92
Keefor	Milwaukee x Forest	" 1908	" 1912	1919	R. 1925, P. 6
Keetosh	Milwaukee x McIntosh	" 1904	" 1907	1920	R. 1922, P. 8
Kelso	McMahan x Scott Winter	" 1895	" 1896	1907	R. 1908, P. 102
Lawfam	Lawver x Fameuse	" 1899	" 1902	1918	R. 1921, P. 5
Lawmac	Lawver x McIntosh	" 1898	" 1902 & 1911	1920	R. 1925, P. 6
Lawtosh	" "	" 1899	" 1902	1913	R. 1925, P. 7
Lowbeth	Lowland Raspberry x Bethel	" 1909	" 1913	1919	R. 1921, P. 5
Mavis	McIntosh x Lawver	" 1899	" 1903	1909	R. 1915, P. 599
Macfor	McIntosh x Forest	" 1907	" 1910	1922	R. 1924, P. 17
Maclaw	McIntosh x Lawver	" 1899	" 1903 & 1911	1921	R. 1922, P. 8
Macver	" "	" 1899	" 1903 & 1911	1917	R. 1925, P. 7
Milfor	Milwaukee x Forest	" 1908	" 1912	1921	R. 1925, P. 7
Milmac	Milwaukee x McIntosh	" 1904	" 1907	1914	R. 1925, P. 7
Miltosh	Milwaukee x McIntosh	" 1904	" 1907	1914	R. 1921, P. 5
Newtosh	McIntosh x Newton	" 1905	" 1910	1920	R. 1922, P. 8
Roberval	McMahan x Scott Winter	" 1895	" 1896	1905	R. 1906, P. 108
Rustler	McIntosh x Lawver	" 1899	" 1903	1912	R. 1913, P. 294
Sorel	McMahan x Scott Winter	" 1895	" 1896	1907	R. 1908, P. 102
Spikee	Northern Spy x Milwaukee	" 1904	" 1907	1920	R. 1926
Spimil	Northern Spy x Milwaukee	" 1904	" 1907	1920	R. 1922, P. 8
Stonetosh	Stone x McIntosh	" 1908	" 1912	1921	R. 1922, P. 8
Toshfor	McIntosh x Forest	" 1907	" 1910	1924	R. 1926
Toshkee	McIntosh x Milwaukee	" 1904	" 1907	1914	R. 1923, P. 6
Toshlaw	McIntosh x Lawver	" 1899	" 1903 & 1911	1921	R. 1925, P. 8
Valois	McMahan x Scott Winter	" 1895	" 1896	1905	R. 1906, P. 108
Vermac	Lawver x McIntosh	" 1899	" 1902	1908	R. 1913, P. 295
Walton	McMahan x Scott Winter	" 1895	" 1896	1903	R. 1906, P. 109

35 Varieties. Total, 174 Varieties.

The following names recorded first in the Annual Report of the Experimental Farms for 1906 were given to seedling varieties of Russian origin, descriptions of which have not yet been published. These were among the best and apparently the hardiest of 3,000 trees. They have been sent to the Prairie Provinces for trial, and, should any of them prove promising, descriptions will appear in the annual reports: Arcola, Birtle, Bowie, Bolton, Beaver, Bomba, Bison, Carlyle, Carman, Cicero, Cecil, Carrie, Crescent, Cottage, Dauphin, Dewar, Earliana, Grenfell, Hanley, Hamlet, Harbinger, Jarvis, Jasper, Jacko, Lang, Leroy, Mentor, Melfort, Morden, Murillo, Morley, Nepigon, Osler, Otter, Pingree, Ponoka, Parma, Polaris, Rawdon, Selkirk, Snelling, Solina, Sorley, Sanford, Souris, Selwyn, Vesta, Virgil, Varna, Virden, Woburn and Wesley—52 varieties.

CROSS-BRED VARIETIES (CRAB X APPLE) NAMED AND DESCRIBED IN THE DIVISION OF HORTICULTURE, BUT ORIGINATED BY THE LATE DR. WM. SAUNDERS WHILE DIRECTOR OF EXPERIMENTAL FARMS

A large number of varieties, mainly crosses between the Siberian Crab (Pyrus baccata) and Apple varieties, were originated outside the Horticultural Division by the late Dr. Wm. Saunders while he was Director of Experimental Farms. The result of most of his work was published by him in Bul. 68 "Progress in the Breeding of Hardy Apples for the Canadian Northwest." These crosses were transferred to the Horticultural Division, and, from time to time, the best of them have been described and named.

The following names, with descriptions of the varieties, have been published in the reports of the Horticultural Division. Most of these are the results of

crossing the best varieties of the first generation of Siberian Crab crossed with the apple, with the apple. The largest of these second crosses are about two and one-half inches in diameter.

Second Crosses from Crab Apple x Apple	Parentage	Date of sowing seed	Date of planting tree	Date of first fruiting	Where fruit described
Angus	Dean x Ontario	Autumn 1901	Spring 1904	1913	R. 1913, P. 295
Elkhorn	Jewel x Gideon	" 1904	" 1906	1912	R. 1913, P. 295
Gretna	Pioneer x Northern Spy	" 1903	" 1904	1914	R. 1913, P. 295
Lora	Progress Seedling	" 1898	" 1901	1907	R. 1920-21, P. 7
Martin	Pioneer x Ontario				R. 1913, P. 296
McPrince	Prince x McIntosh	" 1903	" 1906	1917	R. 1922, P. 9
Piotosh	Pioneer x McIntosh	" 1903	" 1906	1912	R. 1916, P. 615
Printosh	Prince x McIntosh	" 1905	" 1908	1914	R. 1920-21, P. 7
Redman	Prince x McIntosh	" 1905	" 1908	1918	R. 1926
Rosilda	Prince x McIntosh	" 1905	" 1908	1916	R. 1920-21, P. 7
Ruth	Pyrus prunifolia x Pewaukee	" 1897	" 1900	1910	R. 1913, P. 296
Toshprince	Prince x McIntosh	" 1905	" 1908	1920	R. 1923, P. 6
Trail	Northern Queen x Rideau	" 1904	" 1906	1911	R. 1913, P. 296
Wapella	Dean x Ontario	" 1903	" 1906	1912	R. 1913, P. 296

IMPROVEMENT OF THE RUSSIAN PEARS

In the report for 1925 a note was made concerning the F_1 population of our hybrid pear orchard. At that time we had not found anything of quality in this F_1 and while optimistic of the ultimate outcome were not at all sanguine as to the possible results from the first generation.

During the past season, however, three of these have shown up as possible commercial propositions for this part of Canada and one in particular has proved to be among the best for canning purposes.

The best of the three, No. 2C, is a cross betwen Kurskaya and Flemish Beauty. It is a medium sized pear, shaped somewhat like its male parent Flemish Beauty, green in colour, firm flesh, being ready for use about September 20 to October 1. While not a dessert pear it cans remarkably well, having an excellent texture and handsome golden colour with good quality and flavour.

The tree is a vigorous grower, so far hardy and free from blight.

The other two varieties which have proved themselves in the canning room are both crosses between Zuckerbirn and Clapp Favourite. These are No. 8E and 8F.

No. 8E is a yellow pear with a pink blush and resembling Clapp. It is a very handsome fruit of large size, fair quality for dessert use, and cans excellently, although not having the handsome colour of 2C.

No. 8F is a very small pear, shaped like Flemish Beauty, greenish yellow in colour with a dull pink blush. The flesh is very firm and it lacks in flavour for dessert use. When canned it has a pinkish colour, but possesses very high quality for eating. Probably only useful for home purposes on account of its small size.

These trees are now being propagated for trial but material will not be available for distribution until the end of 1929.

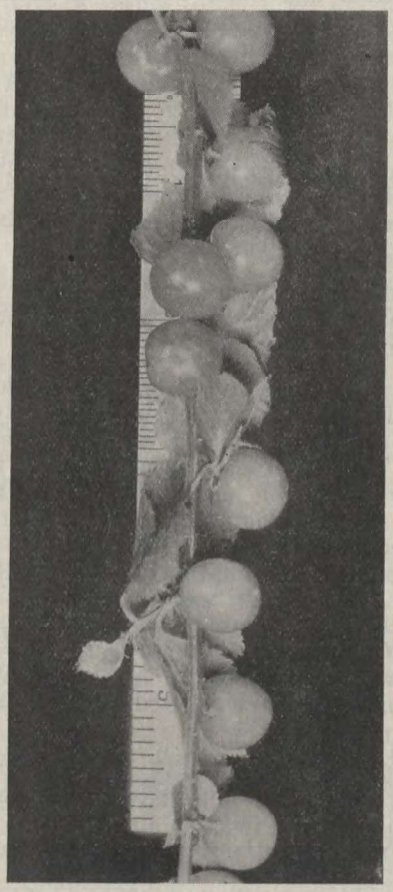
IMPROVEMENT OF PRUNUS TOMENTOSA—JAPANESE CHERRY

This little fruit has attracted considerable attention from American horticulturists. It is a bush form of cherry, a native of Central Asia and commonly called the Japanese cherry. As an ornamental shrub it is rather attractive.

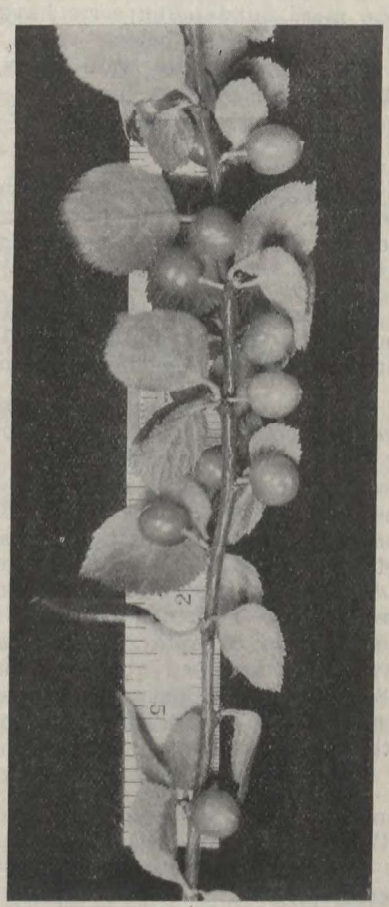
In addition to its ornamental value its fruit is of edible quality and makes a most delicious jelly, and at the same time it is quite desirable for eating out of hand. The bush is generally very hardy although there appears to be some variation in this respect, which it is hoped will be utilized in the improvement

work now underway. In addition to its variation in hardiness it varies considerably in size, colour and quality of its fruit when grown from seed. These variations have been used as a basis for the improvement of the variety and while the possibilities of this species have by no means been exhausted some progress has attended the efforts expended on this work. As soon as more land is available it is hoped that further progress will be made in the improvement of this fruit.

In accompanying photographs the size of the fruit on the original bush is shown, also the size of the fruit from one of the best selections. As will be noted the increase in size is very marked.



Prunus tomentosa—actual size of one of our best selections.



Prunus tomentosa—actual size of average specimens.

The picking of this fruit is very easy. The fruit is borne on long branches and can be stripped by a quick motion of the hand. As it separates from its short stem or pedicel quite readily it is rarely that a basket contains anything but stemmed fruit. While we have been unable to grow these bushes individually the yields from the bushes in the hedge rows augur well for its productiveness. It is not at all uncommon for a single bush badly crowded in the row to produce as high as a full eleven-quart basket of fruit. On account of its dwarf size the bushes could be planted not further than 8 by 8 feet. This means a yield of

about 8,000 quarts of cherries per acre, based on the yields from a crowded hedge row. These yields should increase materially when the bushes are given more room and a better opportunity at production. In addition to selection within the species, attempts are being made to hybridize this fruit with other species of cherries.

NEW OR NOT WELL KNOWN VARIETIES OF FRUITS

A large number of new varieties of apples, plums, strawberries, raspberries and gooseberries have been offered to the public during the past few years. While it has not been possible for this station to test them all, some of the more outstanding sorts have been tried and those worthy of further trial are enumerated below.

As the gooseberries were reported in 1925, there is not any necessity of further mention of these here.

Apples

In apples, there have been several bud sports recently introduced which differ from their parents by having a deeper colour. As colour is an all important factor in apple marketing, advantage should be taken of these bud sports.

Starking.—This is a bud sport of Delicious, and being much redder in colour but otherwise similar should be planted in preference to that variety wherever Delicious has been recommended in the past.

Crimson Gravenstein.—Gravenstein seems to be a very unstable variety as regards colour. Several sports of the old Gravenstein have been reported. The Banks' Red Gravenstein, one of the early bud sports of this variety showed a marked improvement in colour. The Crimson Gravenstein from the same orchard, viz., that of A. S. Banks at Waterville, N.S., shows a further improvement in this respect. This new bud sport is practically solid red instead of striped as was the case of the Banks' Red Gravenstein.

Another bud sport of Gravenstein called Red Gravenstein has been introduced in New York and described by the Geneva Experiment Station. This variety is also a solid red sort and appears very similar to the Crimson Gravenstein described above. This Red Gravenstein originated in 1907 or 1908 in San Juan county, Washington. Wherever Gravenstein is being planted either the new Red or the Crimson Gravenstein should be used in preference to the original variety.

Red Northern Spy.—For many years the serious defect of lack of colour on many of our Northern Spys has been keenly felt. Fortunately bud sports of this variety have recently appeared which make possible the retention of this famous old variety with improved colour and without loss of other characters.

While several Red Spys have been reported the outstanding authentic one, proved to breed true is the one from New York found by C. E. Green of Victor, New York, and propagated and sold under the name Red Spy.

Red Tompkins King.—Another variety which has thrown a bud sport of deeper colour is Tompkins King. This sport originated on the farm of Enos Thorpe, Lakeville, King's county, N.S., and has been propagated by A. S. Banks, Waterville, N.S. As the colour is much deeper than on the original it marks a distinct advance for this variety, and should be used in preference for all new plantings or even for the top-working of younger trees of the original variety.

Red Ribston.—This is still another bud sport from Nova Scotia, and like the two Gravensteins, it originated in the orchard of A. S. Banks at Waterville, N.S. While the colour is all that can be desired Mr. Banks doubts if it will prove of much value because the English market prefer the old Ribston, not being able to believe that the new bud sport is identical in all respects except in colour.

Plums

For the more severe districts of Canada which up to the present have been dependent upon varieties of *Prunus nigra* and *Prunus americana,* several distinct acquisitions have been introduced in comparatively recent years.

There seems to be little doubt but that the old Americanas and nigras have almost served their day. About the only field left them in Eastern Canada is for earliness, and in this respect some of the very early varieties of *Prunus nigra* are rather outstanding for that one character. At Ottawa there are one or two nigra seedlings such as Carstesen which are nearly always marketable by August 4; a feat which so far has not been equalled by other varieties that will succeed here. Among the earlier hybrids are two productions from Theodore Williams, Nebraska, which we have recommended for some time.

Omaha.—The first of these is an Americana Triflora hybrid and is a very desirable early plum for dessert use. Of medium size, roundish in form, with a purplish colour and abundant bloom it presents a handsome appearance which with its good quality places it in a class above the Americana and nigra varieties.

Emerald.—A sister of the above is somewhat similar in appearance but much later and rather superior in quality, having firmer flesh, more like its Japanese parent in that respect. These two have always made a good combination for hardy, early and late varieties of good dessert quality.

Waneta & Kahinta.—Of still more recent origin are two productions from N. E. Hansen, South Dakota, and are the two outstanding acquisitions among those we have tried. There is practically no difference between these two sorts except that Waneta has a pointed apex and does not make quite as good a tree as Kahinta, so that it really settles down to a case where Kahinta may be recommended alone.

This variety is outstanding in dessert quality, size, appearance and productiveness. In addition it is a surprisingly good canner. While not equal to the best domesticas it has much merit and for Eastern Ontario, Quebec, and even Southern Manitoba can easily be accepted as a satisfactory substitute for the best Japanese and domestica varieties.

Raspberries

A considerable change is taking place in the list of raspberries recommended. Some of the newer introductions are seriously challenging the old stand-bys, and there is even much competition among these newer sorts themselves.

Newman (No. 23).—Introduced some few years ago and is still holding a prominent place as a large, firm shipper and desirable canner. Being a smooth cane variety and a good yielder it has come to stay for a long time.

Latham.—This is an introduction of the Minnesota Fruit Breeding Station and is making a large number of friends. This variety is somewhat more vigorous than Newman, and while not as firm a berry, has good size, quality and productiveness to commend it.

Viking.—The most recent introduction from the Vineland Experiment Station in Ontario is in many respects the most outstanding of the trio. It is by far the most vigorous red variety we have grown, and has stood three winters at Ottawa without protection. It is a very upright grower, very large fruit, and a fairly good shipper with good quality behind it. It is rather early to finally decide its place among the varieties for this part of Canada, but certainly every raspberry grower should give it a fair trial.

Ohta.—An introduction of Hansen's in South Dakota is outstandingly noticeable for its hardiness on the prairies and similar areas. For such a hardy variety it is a distinct advance over the smaller fruited varieties available up to the time of its introduction. It has good quality and is productive. Recommended for trial where hardiness is the limiting factor.

Strawberries

The number of varieties of strawberries which have been introduced in recent years is legion. To attempt a discussion of all would be impracticable in a report of this nature. A few of the outstanding ones, however, are commented on below:—

Beacon (per.).—Orig. N.Y. Experiment Station, Geneva, N.Y. About the season of Dunlap. Quality good, appearance good; size large, somewhat wedge-shaped. Said to be productive but has not proved so during the one year it has been at Ottawa, may show up better in later years. Its greatest asset is its handsome appearance being very lustrous, almost as if varnished.

Boquet (per.),—Another introduction of the N.Y. Experiment Station. Large roundish fruit, very glossy dark red in colour, with a few white tips. Flesh is dark red, a very desirable quality, mild in flavour and good in quality. Appears to be very promising so far. Its greatest objection is that it is a little rough in shape. Season, about main crop. Worthy of extended trial.

Big Late (per.).—Introduced by Kellogg. A long, pointed, cone-shaped berry, of large size. Very dark in colour with dark flesh; poor flavour, and poor quality; too soft for shipping. Promising for size, appearance and productiveness but too poor in quality and too soft.

Dr. Burrill (per.).—Introduced by Kellogg. Not a very new variety, but of comparatively recent origin. Very much like Dunlap, in fact almost impossible to distinguish from that variety. We have been unable to see any advantage in this variety over that of Dunlap.

Delicious (per.).—Introduced by Kellogg. Delicious has been one of those remarkable-appearing fruits that has been a keen disappointment when it comes to yield. A very large, oblong wedge, with glossy bright crimson colour and fairly dark red flesh; quality good. A very handsome berry, does not make runners under our conditions and has not proved productive. Worth a small trial on other soils.

F. E. Willard (per.).—Obtained by us from H. L. McConnell, Port Burwell, Ontario. A fairly shapely berry of rather rough appearance. Late in season; only moderately productive. Too subject to mildew to be desirable. Has one outstanding virtue and that is its firmness for shipping. A good plant-maker. Quality is good.

Ford (per.).—A roundish wedge-shaped berry, rather rough in appearance; good size; dark crimson colour, with prominent seeds. Flesh is a dark salmon. Rather acid and only moderate in quality. Inclines to green tips. Not promising.

Grand Prize (per.).—Introduced by H. L. McConnell of Port Burwell, Ont. Very similar to Parson. Has given good yields in some seasons, but appears to be very subject to mosaic which has eliminated it from our plantations. Mostly wedge-shaped fruit, slightly necked; good quality and size. A good runner-maker. No improvement over Parson.

Great Northern (imp.).—An introduction of Kellogg that has not done well at Ottawa. Large size; bright scarlet with salmon flesh. Too soft for commercial use, and not outstanding in any respect.

Kellogg Prize (imp.).—Introd. by R. M. Kellogg. Said to be a chance seedling. A late variety, of good size; light red, with light red flesh, vigorous and a good runner-maker. Apparently a good shipper. While not very productive at Ottawa, worth a trial under other conditions.

Marvel (per.).—Introduction of Kellogg. A below-medium-size, necked, conical berry, with white tips and unattractive colour. Very subject to mildew. Not at all promising at Ottawa.

Olga Petrova (per.).—Introd. by C. B. Stevenson, Guelph, Ont. A medium-to small-sized berry; rather dull scarlet colour with bright scarlet flesh; seeds very sunken; quality poor; too soft for commerce. A good runner-maker but not promising.

Premier (per.).—Another introduction from Kellogg. A short conic wedge; size rather on the small side; bright scarlet with deep salmon flesh; quality medium; fairly firm. Too small and not productive enough at Ottawa. The same as Howard 17. Very popular in other places.

W. H. Gale (per.).—A large-sized, rough fan-shaped berry, similar to Wm. Belt; good quality; probably a fair shipper. Appears promising as a late berry.

Willard (per.).—Probably the same as Francis Willard, introduced by the Crawford Company. A very handsome berry; strongly necked and of long shape; large size and very attractive; rather dry and lacking in flavour; appears to be an excellent shipper. Worth an extended trial, being one of the most handsome berries grown.

Westney (per.).—An angular conic-shaped berry, of large size, colour a bright scarlet with salmon flesh; prominent seeds; flavour rather acid; medium to below in quality; apparently a good shipper. Resembles Pocomoke somewhat. While not outstanding, has proved an excellent parent in breeeding work.

Vanguard (per.).—A new early berry possessing good shipping qualities and good colour. Not as heavy in early yield as Cassandra at Ottawa, but promising. The following description from the Experimental Station, Vineland, Ontario (the originator) is appended. "This variety is a cross of Pocomoke and Early Ozark. It is a good, though not an excessive plant-maker. Plants are vigorous, healthy and productive. Flowers are perfect. In season it is early, ripening about one week before Dunlap. Fruit is of medium size, round conic, regular in shape, colour bright red, quality good, sweeter than most early varieties. The berries are firm and should ship well. The fruit holds its size well throughout the season, the late pickings being of good size.

NEWER VARIETIES UNDER TRIAL WHICH WILL BE REPORTED UPON IN THE ANNUAL REPORTS OF THE HORTICULTURAL DIVISION

Easy Picker.—Introduced by the Minnesota Fruit Breeding Farm.

Large.—From W. H. Etter, Ettersburg, California.

Bliss.—An introduction from the New York Experiment Station, Geneva.

Bun Special.—From H. L. McConnell, Port Burwell, Ont.

51090—3

Chaska.—Introduction of Minnesota Fruit Breeding Farm.

King Wealthy.—From C. W. Potter, Leslie, Michigan.

Minnehaha.—Introduction from the Minnesota Fruit Breeding Farm.

Given's Late.—An introduction from Thos. Rivers, England.

H.E.S. No. 1.—An introduction from the Experimental Station, Vineland, Ont.

King George V.—A notable introduction from Thos. Rivers, England.

Elgin.—An introduction from H. L. McConnell, Port Burwell, Ont.

Mastodon.—A new everbearing variety from Emlong, of Michigan.

YIELDS OF CURRANTS AND GOOSEBERRIES

The following tables give the last five-year average of the yield of the currant varieties under test at this station. While the yields of our currants and gooseberries have not been placed on a probable error basis as yet owing to lack of land, it is significant to note that there are six or eight varieties which year after year exhibit much greater yielding ability under our conditions than some of the other varieties they are tested with.

In the black currant test, the Saunders' hybrids still stay at the top. Such varieties as Saunders, Ontario, Clipper and Magnus, being constant high performers. While Champion does not do as well under our conditions as any of the above it still continues to be a popular berry for commercial planting.

In red currants it is unfortunate that the largest yielders are not the largest fruited sorts. Of the few at the very top London Red and Red Grape are of fair size and merit an extended trial in any plantation. Perfection, one of the largest and handsomest currants known does not average up in yield with these others. The nearest approach to it in size is Red Cross, which is an exceedingly fine currant with a fair yield average. Some one will probably miss Fay Prolific from this list. This old stand-by while a large fruited sort with a high production record has not proved as hardy at Ottawa as these other varieties so has been dropped from our plantation during the past few years.

Among white currants Climax White still continues to be the outstanding variety of merit.

In gooseberries the yields should not be accepted as a final criterion of the variety's value. For instance, Van Fleet as reported in 1925 is disappointing in all but yield. Downing is, of course, an old stand-by and is always among the highest yielders. Of the high producers our own variety Mabel is probably the best venture. Silvia is a much better berry but under our conditions has not yielded as heavily as Mabel. On heavier soils it does, however, do much better. Poorman, the best quality berry in the patch, had not been here long enough to get properly established when these yields were calculated.

AVERAGE YIELD FROM SIX BUSHES OF BLACK CURRANTS, 1922-1926 INCLUSIVE

Variety	lbs.
Eagle	29·65
Saunders	29·35
Ontario	26·88
Schwarze Traube	25·45
Clipper	24·65
Magnus	24·35
Buddenborg	23·5
Topsy	23·5
Kerry	23·1
Beauty	22·15
Champion	21·53
Eclipse	20·15
Victoria	19·8
Climax	18·25
Collins Prolific	17·8
Merveille de la Gironde	15·84
Goliath Black	15·8
Boskoop Giant	14·5
Black Grape	11·55

AVERAGE YIELD FROM SIX BUSHES OF RED CURRANTS, 1922-1926 INCLUSIVE

Variety	lbs.
Red Grape	65·15
London Red	54·05
Simcoe King	53·56
Wentworth Seedling (4 year aver.)	49·12
Red Dutch	46·39
Knight Large	39·55
London Market	39·55
Cumberland Red	37·7
Holland	35·71
Greenfield	35·53
Franco-German	35·6
Moore Seedling	32·64
New Red Dutch	32·25
Red Cross	31·25
Red English	30·66
Ringens	30·55
Prince Albert	30·5
Raby Castle	29·93
Pomona	26·28
Red	23·49
Victoria Red	20·58
Early Scarlet	17·5
Perfection (4 year aver.)	15·84
Everybody	11·63

AVERAGE YIELD FROM SIX BUSHES OF WHITE CURRANTS, 1922-1926 INCLUSIVE

Variety	lbs.
Climax White	41·3
White Dutch	30·45
White Grape	24·4
Eyatt Nova	20·95
White Cherry	17·3
White Imperial	15·43
Large White (4 year average)	13·33

AVERAGE YIELD FROM SIX BUSHES OF GOOSEBERRIES, 1922-1926 INCLUSIVE

Variety	lbs.
Downing	45·20
Lorne	45·16
Pearl	43·137
Van Fleet	41·475
Mabel	39·187
Deacon	35·05
Queen Anne	28·75
Chautauqua	27·51
Silvia	26·8
Richland	24·237
Alma	24·15
Lancashire Summer	22·6
Josselyn	21·9
Keepsake	21·7
Carrie	20·68
Houghton x Broom Girl	19·095
10/47	18·85
Oregon Champion	17·80
Charles (4 year average)	15·30
Rideau	14·425
10/33	13·15

TIME OF APPLICATION OF NITROGENOUS FERTILIZERS TO THE STRAWBERRY

In the reports for 1924 and 1925 data has been presented giving the results of our work with the time of application of nitrogenous fertilizers to the strawberry plantation.

This work was with plantations not more than one year old. In the following paragraphs the second year results from the same plantation reported in 1925 are given. In general the data corroborated the results of previous years and pretty well substantiated those of other workers.

The complete series of plots together with the treatment accorded is given below:—

Series	Treatment 1924 (planting year)	Treatment 1925 and 1926 (1st and 2nd fruiting years)
G	Not nitrated	Not nitrated
A	Nitrated at planting	Nitrated Aug. 15, 1925
B	" 1 month after planting	" Sept. 15, 1925
C	" Aug. 15th	Not nitrated
D	" Sept. 15th	Nitrated spring 1926
E	" " 15th	" " 1925
F	" " 15th	" " 1925 and spring 1926

Each series was made up of six plots each consisting of three rows fifteen feet long, and equally distributed over the entire area.

The yields of all six plots for 1926, the second year of planting, are given below. For the purpose of comparison the probable error of this experiment has been calculated by the deviation from the mean method as given by Hayes, and for the benefit of those interested in the experimental phase of this project the steps involved are extended in the tables.

TABLE 1—COMPARISON OF THE PLOT YIELDS BY THE DEVIATION FROM THE MEAN METHOD

Plot	Yield	Mean	Deviation in lbs.	Deviation in %	Deviation² in %
A-1	9·47	16·35	6·88	42·07	1,769·88
A-2	16·79		0·44	2·69	7·24
A-3	16·06		0·29	1·77	3·13
A-4	14·00		2·35	14·37	206·50
A-5	14·66		1·69	10·34	106·92
A-6	27·09		10·74	65·69	4,315·18
B-1	10·47	13·96	3·49	25·00	625·00
B-2	19·47		5·51	39·47	1,557·88
B-3	20·63		6·67	47·78	2,282·93
B-4	8·19		5·77	41·33	1,708·17
B-5	8·22		5·74	41·12	1,690·85
B-6	16·75		2·78	19·92	396·81
C-1	3·59	12·42	8·83	71·10	5,055·21
C-2	13·75		1·33	10·71	114·70
C-3	18·16		5·74	46·22	2,136·29
C-4	12·44		0·02	0·16	0·03
C-5	8·59		3·83	30·84	951·11
C-6	18·00		5·58	44·93	2,018·70
D-1	4·06	10·38	6·32	60·89	3,707·59
D-2	10·16		0·12	1·15	1·32
D-3	10·31		0·07	0·67	0·45
D-4	21·25		10·87	104·72	10,966·28
D-5	4·84		5·54	10·37	107·54
D-6	11·63		1·25	12·04	144·96
E-1	6·91	16·14	9·23	57·19	3,270·70
E-2	17·72		1·58	9·79	95·84
E-3	17·94		1·80	11·15	124·32
E-4	20·91		4·77	29·55	873·20
E-5	12·00		4·14	25·65	657·92
E-6	21·35		5·21	32·28	1,042·00
F-1	7·28	13·08	5·80	44·34	1,966·04
F-2	15·31		2·23	17·05	290·70
F-3	13·00		0·08	0·61	0·37
F-4	13·22		0·22	1·68	2·82
F-5	11·06		2·02	15·44	238·39
F-6	18·63		5·55	42·43	1,800·30

TABLE 1—COMPARISO N OF THE PLOT YIELDS BY THE DEVIATION FROM THE MEAN METHOD—*Concluded*

Plot	Yield	Mean	Deviation in lbs.	Deviation in %	Deviation² in %
G–1	2·16	9·81	7·65	77·98	6,080·88
G–2	7·16		2·65	27·01	729·54
G–3	12·53		2·72	27·73	768·95
G–4	11·34		1·53	15·59	243·05
G–5	13·88		4·07	41·49	1,721·42
G–6	11·84		2·03	20·69	428·08
					60,209·19

$$\delta = \sqrt{\frac{60209 \cdot 19}{42}} = \sqrt{1433 \cdot 552} = 37 \cdot 86$$

Probable error of single plot in % = 37·86 x ·6745
= 25·54

$$\text{P.E. of a series} = \frac{25 \cdot 54}{6} = \frac{25 \cdot 54}{\sqrt{2 \cdot 449}} = 10 \cdot 428$$

taken as 10½%

COMPARISON OF THE YIELDS OF THE VARIOUS SERIES BY THE DEVIATION FROM THE MEAN METHOD, PROBABLE ERRORS IN POUNDS

Series	Mean yield	Probable error in %	Probable error in lbs.
A	16·14	10·5	1·69
B	13·96	10·5	1·47
C	12·42	10·5	1·30
D	10·38	10·5	1·09
E	16·14	10·5	1·69
F	13·08	10·5	1·37
G	9·81	10·5	1·03

An inspection of these results brings out the distinct advantage of the nitrated plots over those not receiving any nitrogen. There apparently was considerable variation within each series, but even when the significance of the results are tested by the application of the probable error concept there is still a marked difference in the treatments in at least three instances.

The outstanding series are the ones in which nitrate was applied on August 15 (the year previous to the second crop) and in the spring of 1925. Both these series have significant differences over the non nitrated series as will be seen from the following:—

Average yield of series A = 16·14 lbs. ± 1·69 lbs.
" " G = 9·81 " ± 1·03 "

Difference = 6·33 ± 1·98

This shows a difference in favour of series A of 6.33 pounds per plot with a probable error of 1.98 pounds which may be safely accepted as a difference due to other causes than that of random sampling.

As series E gave exactly the same yield as series A the same reasoning applies in that case also.

The other possible significant difference is in the case of series A and E over series D, given as follows:—

Average yield of series A and E = 16·14 lbs. ± 1·69 lbs.
" " D = 10·38 " ± 1·09 "

Difference = 5·76 + 2·01

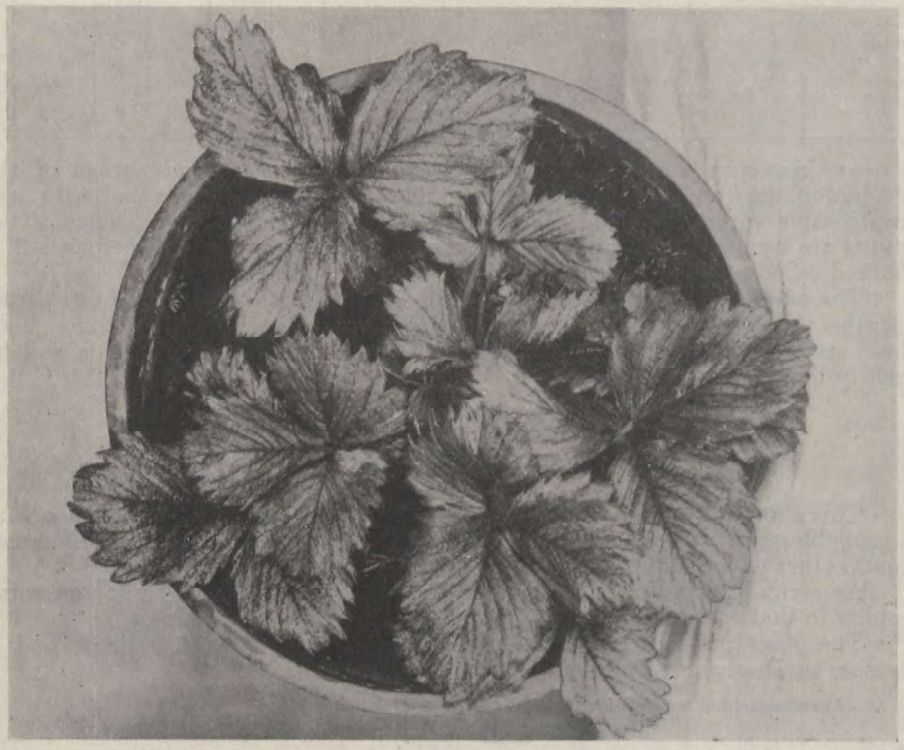
In all the other instances there are practically no significant differences as tested by the probable error method. There are, however, several interesting speculations which might be further investigated.

For instance series F which in treatment differed only from E by an application made in the spring of the second fruiting year showed a much lower yield. In 1924 we reported as follows on spring applications when applied during the first fruiting season:—

"An examination of the details of the results from A series plots and the C series reveals the fact that the older plants, i.e., those formed previous to September 7, were considerably affected by the nitrate applications and showed a considerable reduction of blossoms per plant. On the other hand, the later-formed stolons, or younger plants, showed an increase in the number of blossoms produced on the nitrated series.

In addition to again calling attention to the necessity of knowing the age of the plants being dealt with in making deductions, this indicates that there might be a difference in the effect of spring applications of nitrate of soda upon plants of different ages. This point will receive further attention in future work along this line."

In the series of experiments here reported we are dealing in the second year with plants which would be largely classed as "old" plants, so that this reduction while not mathematically significant may be actually due to the spring applications. In 1925 this same series during the first fruiting year did not show any decrease due to spring applications of nitrogen, so there seems to be fairly good evidence available that spring applications when made during the spring of the first fruiting season are not liable to cause a reduction in numbers and may cause an increase in size, but that when made to older plants during the spring of the second fruiting season there may be a net reduction in yield as a result.



Strawberry trouble designated type 1. See text for description.

Another difference that is very suggestive if not absolutely significant is that between series A and B. Series A was nitrated on August 15-25, while series B received its nitrate on September 15-25. While this latter date gave as good or better results the first year, the second year yields show that the August 15 series produced more fruit the following season. This would suggest that for second year plantations August 15 is the latest date in this district for the most economic application of nitrogenous fertilizers.

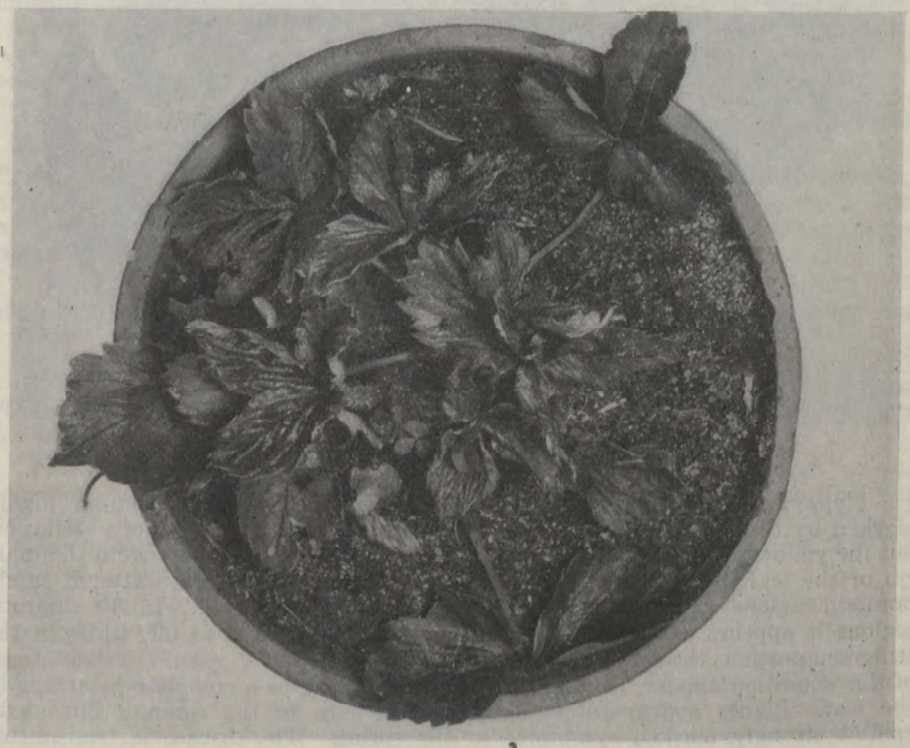
Leaving out of consideration the differences that may be of doubtful value the data seems to show us that for a second crop the following is true:—

(1) Even on soils that may be termed in good tilth, artificial nitrogenous fertilizers have a distinct value and may cause an increase in yield up to 65 per cent. The need of this additional nitrogen may not be detectable from an observation upon the vegetative condition of the plants. (See reports for 1924 and 1925).

(2) Applications of nitrogenous fertilizers made during the first fruiting season materially affected the production the second year.

(3) August 15th (of the first fruiting year) seems to be as late a date as it would seem advisable to apply nitrogenous fertilizers to a plantation for its second crop, while as late as September 15 during the first year gave the best results.

(4) While spring applications may cause an increase in size of fruit they are of doubtful value for the second crop, although apparently quite safe for the first.

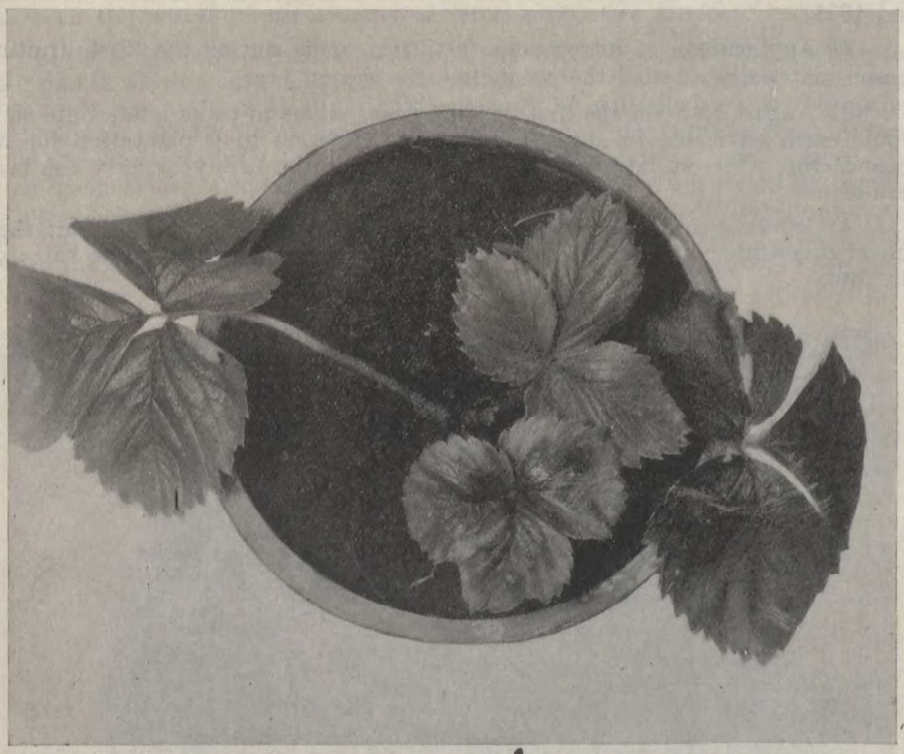


Strawberry trouble designated type B. See text for description.

CHLOROSIS OF STRAWBERRY FOLIAGE

During the summer of 1923 we observed chlorotic conditions of strawberry foliage, which for the last two seasons have been of common occurrence in our plantations. Similar observations have also been made in different commercial plantations in this vicinity. Plakidas in the June, 1926, issue of Phytopathology, reports a chlorotic condition of strawberry foliage occurring in California. He considers this to belong to the virus group of diseases and suggests the term " strawberry yellows." In view of the fact that the abnormal conditions present here may represent a new disease of economic importance, we are recording our observations.

In a symptomatic study of the abnormal foliage we have been able to isolate three distinct types.



Strawberry trouble designated type 1. See text for description.

Type I.—This condition appears early in the spring, becoming highly marked by the middle of May. At this stage the foliage is distinctly yellowed, but the yellowing does not occur in solid areas. Yellowing occurs from the main rib of the leaf, between the veins. In the chlorotic areas are scattered small, upraised regions where the chlorophyll has not been extracted. In the chlorotic regions it appears as though the epidermis had been scraped off, while in the stillgreen portions the epidermis appears as a superimposed layer. Various stages of this condition appear, from a very slight yellowing to a complete bleaching of the leaf. Plants appear to partially recover late in the summer but again exhibit strongly marked symptoms in the spring. The disease is transmitted through the runners, *i.e.*, every daughter plant will be diseased.

The root system appears perfectly healthy. The condition appears to exist independent of the type of soil as plants under varied soil conditions were affected. Potting the plants in good soil or the feeding of nutrient solution has had no effect. Efforts were made to induce the disease by placing various insects—Tarnished plant bug, leaf-hoppers and aphis on healthy plants,—but without success. These insects were also placed on plants exhibiting the diseased condition, then immediately transferred to healthy plants. The results were completely negative. Attempts were made to transfer the condition by the inoculation of healthy plants with the juice of plants exhibiting this condition; but without success. Although the foliage of affected plants is mosaic-like in appearance and the runners of such plants are also affected, we have been unable as yet to transfer the condition from one plant to another.

Type II.—This condition is quite distinct from that previously described. Plants so attacked appear to develop normally and healthy in the spring and so continue until after the fruiting period. Toward the end of July, individual plants in different situations exihibited this condition. By the first week in August the condition was strikingly noticeable.

The condition was not confined to the strawberry plant alone. A condition with like symptoms was observed on apple nursery stock and on the Manitoba maple.

Description.—The foliage has not the general yellowed appearance as in the former type. The chlorotic regions are in definite areas, inwards from the margin. The chlorotic areas are solid, not mosaic-like in appearance. The non-chlorotic regions of the leaf appear to be somewhat darker than normal, thicker, water-logged in appearance. Towards fall the affected plants appeared to recover. With this condition a small green leaf-hopper was constantly found associated. Affected plants held in the greenhouse over winter appeared to be perfectly healthy in the spring.

Type III.—This condition is apparently present throughout the season and is widespread. It is, however, not primarily a case of chlorosis. The plants so affected are very much dwarfed, a large number of small, crinkled leaves rosetting from the crown. The petioles are decumbent. When taken in the greenhouse and held over winter a considerable percentage of these plants regained a normal appearance.

THE INFLUENCE OF AMMONIUM SULPHATE AS A DIRECT SOURCE OF NITROGEN FOR APPLE TREES

During the past decade the increased use of nitrogenous fertilizers for orchard purposes has aroused much interest in the various forms of fertilizers now offered to the public.

Nitrate of soda has, until recently, been the main source of nitrogen for our fruit crops, but with the increased manufacture of ammonium sulphate from our coke ovens with reduced cost of manufacture, this material is now being offered in larger quantities than ever before, and as a consequence information is being sought as to the actual value as compared with Sodium Nitrate.

The importance of a nitrogenous fertilizer having its nitrogen in the immediately available form of nitrate has long been stressed. Such statements as—"but this result can usually be best and most quickly attained by the addition of nitrates." Palladin (1) pp. 65 are frequently found in the literature. Russell (2) pp. 57, say: "Of all the nitrogen compounds yet investigated nitrates are the best, and in natural conditions, probably the only nitrogenous food for non-leguminous plants."

Palladin (1), pp. 70 and 71, gives briefly the results of Wagner's work which showed that nitrates and ammonium salts have different effects according to the nature of the soil employed. In effect Wagner showed ammonium salts have but little value as fertilizers for soils poor in lime, but that soils rich in that element show almost as good yields with ammonium salt as with nitrates.

The possibility of the direct assimilation of ammonium salts by plants is not new, and has been considered at least as early as 1893, by Pitsch, and by Breal (see Palladin (1) pp. 72). More recently Hutchinson & Miller (3) have presented results to show that wheat plants could utilize ammonia directly but preferred nitrates, but that peas did not exhibit any preference.

Jones and Shivo (4) who have done considerable work with ammonium sulphate in nutrient solutions, have shown that where ammonium sulphate was used as a source for part of the nitrogen the ammonium sulphate solutions became more acid in reaction.

Schrader and Auchter (5), working with bearing apple trees in poor vegetative condition, concluded that such trees will respond to the application of either nitrate of soda or ammonium sulphate, but that a decided difference in favour of nitrate of soda may be expected for at least the first season.

The authors state that " it is rather difficult to explain why the total and soluble nitrogen of the spurs of the spring sulphated trees at blossoming time is lower than that of the check trees in sod." They submit, however, as a possible explanation the suggestion of Truog *et al.*, viz., " High amounts of potash salts or ammonium sulphate on acid soils liberate so much soluble acidity that nitrification and other bacterial activity is hindered." The authors further state: " The increased spur growth where ammonium sulphate was used suggest, however, that a portion of the ammonium sulphate became available shortly after the ' pink ' stage, although not early enough to influence growth as markedly as an application of sodium nitrate."

Russell *et al.* (6) point out the effect of both temperature and moisture on nitrate production, and draw attention to the significant difference in the quantity of nitrate produced in two soils under the same conditions of temperature and moisture.

Although their work was with wheat their findings have equal significance for the orchardist and may account for the conflicting reports as to the merits of different forms of nitrogenous fertilizer.

Gowda (7) demonstrated the value of limestone in aiding the oxidation of ammonium sulphate under laboratory conditions.

The same author (8) showed that acid phosphate increased the nitrifying power of the soil more than rock phosphate, and that for the particular soil in question there existed an optimum water content for nitrification.

Albrecht and Uhland (9) concluded that a straw mulch by cutting down evaporation, lowering the soil temperature and preventing aeration induced an unfavourable environment for nitrate accumulation.

Shutt and Emslie (10) present results showing that if the value of the influence of nitrogen as nitrate of soda is taken as 100 the value of nitrogen in the form of sulphate of ammonia has a value of only 84. These values were deduced from results with field crops on eight stations.

From the foregoing it would appear that for maximum results ammonium sulphate must undergo oxidation to nitrates, that the rate of this oxidation will depend upon soil temperature, soil moisture, aeration, calcium content, and soil acidity and soil type.

This would indicate that the value of ammonium sulphate for orchard purposes would depend upon the type of soil and soil conditions of the orchard in question. The ultimate weight to be placed upon these two sets of limiting factors would in turn be influenced by what is found out in the near future concerning the optimum period for nitrogen application to orchard soils and the ability of apple trees to utilize ammonia as a direct source for nitrogen.

The Experiment

In order to obtain some information on the ability of apple trees to utilize ammonium sulphate as a direct source for nitrogen a pot experiment with apple trees was organized at the Horticultural Division, Central Experimental Farm, Ottawa, in 1925.

Thirty-eight trees were used for this purpose, all two years old, of the variety Melba, and all selected for uniformity of size and condition as far as possible. These thirty-eight trees were divided into three groups of ten and one of eight, the three groups of ten being placed in the following series: Sulphate of Ammonia, Nitrate of Soda, No Nitrogen; and the group of eight constituting a total check.

All trees were sterilized in corrosive sublimate 1-500 for two hours, this strength and period having been previously determined as being sufficient to kill the nitrifying organisms attached to the tree roots.

The Substratum

Pure sandstone ground especially for the occasion was used as a substratum. This sand analysed as follows:—

Moisture	0·02
Loss on ignition	0·30
Mineral matter insoluble in acid	98·84
Oxide of iron and Alumina	0·45
Lime (CaO)	0·10
Magnesia (MgO)	0·04
Potash (K_2O)	0·07
Phosphoric acid (P_2O_5)	0·05
Undetermined	0·13
	100·00

This analysis was supplied by the Division of Chemistry, Central Experimental Farm, Ottawa.

All pots and sand were sterilized in a high-pressure sterilizer for a period of five hours, and all utensils, including work table, were thoroughly scrubbed with a strong solution of corrosive sublimate. The trees were watered with water determined as being free of nitrifying organisms, and the tops of all pots were covered with sterilized cotton wool to guard against inoculation with nitrifying organisms.

The Nutrient Solutions

The pots were placed in a greenhouse on March 16, and the following solutions were applied to the different series:—

NITRATE SERIES

A.		B.	
$MgSO_4$	2·0 grams	$Cacl_2$	3·0 grams
KH_2PO_4	2·0 "	$CaSO_4$	2·0 "
$NaNo_3$	7·5 "	H_2O	95 c.c.
Kcl	1·0 gram		
H_2O	87·5 c.c.		

Both A and B were diluted 1 to 6, mixed together and applied in the proportion of one-ninth of the dilute solution to each pot.

Ammonium Sulphate Series

Exactly the same as above except that 5·1 grams $(NH_4)_2SO_4$ were substituted for 7·5 grams $NaNo_3$ in Solution A, and in Solution B, 4 grams $CaCl_2$ instead of 3 grams.

No Nitrogen Series

Formula the same as for the Ammonium Sulphate Series except that $(NH_4)_2SO_4$ was withdrawn.

Check Series

This series received only water. No nutrients whatever were applied.

Quantities Applied

The first application was made on March 26, followed by one on April 7, and April 23, all at the same rate, making a total application of one-third the formula strength per pot. In addition a fourth application at twice the former rate was made on May 18.

This gave the two nitrogen series the following total amounts of each element per pot.

—	Nitrate of soda series	Ammonium sulphate series
	grams	grams
Sulphur	0·544	1·286
Magnesium	0·223	0·223
Potassium	0·605	0·605
Phosphorous	0·251	0·251
Calcium	0·925	2·203
Sodium	1·111	.....
Nitrogen	0·682	0·594
Chlorine	1·311	1·660
Totals	5·662	6·822

The amounts of each element for the No Nitrogen and check series would be the same as for the Ammonium Sulphate series less the nitrogen and minus ·732 grams of sulphur.

The Hydrogen Ion Value of the Solutions

The pH. value of each of the solutions before application as determined by the Chemistry Division with the Potentiometer was:—

Nitrate of Soda Solution	6·23
Ammonium Sulphate Solution	6·46
No Nitrogen Solution	6·23

The effect of the sand on the pH. value may be judged by the following, which shows the pH. value of the sand itself and the pH. value of the solution after having been passed through the sand.

pH. value of the sand	= 7·14
pH. value of the $NaNo_3$ solution after being passed through the sand	= 6·96

In addition the following values of the sand were determined in late summer by the Potentiometer and supplied by the Chemistry Division, Experimental Farm, Ottawa.

Check Series	7·75
Nitrate Series	7·55
Sulphate Series	7·55
No Nitrogen Series	7·60

While it is regrettable that the pH. values of the sand were not collected at different periods yet it is evident from the above that neither of the nitrogenous solutions very greatly disturbed the pH. value of the sand over the check for any extended period.

Tests for Nitrifying Bacteria

Tests of the Ammonium Sulphate Series for the presence of nitrifying bacteria were conducted by the Dominion Bacteriologist (Dr. A. G. Lochead and Staff). The following table as supplied by Dr. Lochead shows fairly conclusively that the pots were kept practically sterile until after April 20, and that even as late as June 10, only traces and very small amounts of nitrates were found.

APPLE TREE NUTRITION EXPERIMENT (HORTICULTURAL DIVISION)

TESTS FOR NITRIFYING BACTERIA IN SAMPLE OF SAND TAKEN FROM POTS OF AMMONIUM SULPHATE SERIES

—	Date of test	Pot number										Check		
		1	2	3	4	5	*6	*7	8	9	10	Uninoc.	Garden soil	Tap water
1.....	Mar. 20–25.....	–	–	–	–	–	–	–	–	–	–	–	† † † †	–
2.....	April 3–25.....	–	–	–	–	–	–	–	–	–	–	–	† † † †	–
3.....	April 15–25.....	–	–	–	–	–	–	–	–	–	–	–	† † † †	–
4.....	April 20–25.....	–	–	–	tr.	–	†	†	–	–	–	–	† † † †	–
5.....	June 10–25.....	–	–	–	tr.	tr.	†	tr.	tr.	†	–	–	† † † †	–

Tests were made for the presence of nitrites in a nutrient solution containing ammonium sulphate as only source of nitrogen, which were inoculated with sand from different pots, and incubated for two weeks.
Test used—alpha-naphthyl-amine and sulphanilic acid.
On June 10, tests were also made on additional pots as follows, all giving negative tests for nitrites—
1. Check pot without nutrient solution.
2. Check pot containing solution without nitrogen.
3. Check pot containing nitrates.
* Inoculated with nitrifying organisms April 17-25.

Results

Notes were taken from time to time on the condition of the trees and measurements of total growth were recorded on the dates referred to in the following tabulations.

The Ammonium Sulphate Series were somewhat slower in breaking than any of the other series. No difference could be noted in the other three. As will be observed from the presentation of the growth data none of the series showed any increased growth over the Check until after May 14, when the Nitrate of Soda series, and the No Nitrogen series did shoot ahead. It is also noticeable that the Nitrate of Soda series did not exhibit any marked improvement over the No Nitrogen series until May 25, when it began to show pronounced effects from the nitrate treatment. The qualitative notes bear out the deductions from the quantitative data, and it was remarkable to note how the Check and No Nitrogen series grew and looked on their stored food supply during the first two months of the season. Throughout the early part of the season the Sulphate series appeared to be somewhat retarded and certainly did not exhibit any superiority over the Check or No Nitrogen series until the latter part of June and even then only a slight superiority over the No Nitrogen series. The foliage of this series began to take on the typical look characteristic of insufficient nitrogen, at precisely the same time as the Check and No Nitrogen series and at this time the Nitrate series began to assume the richer green which characterizes a sufficient supply of that element.

Results, 1925

Following is a summary of the average total growth measurements during the season of 1925, for the various individuals of each series:—

AMMONIUM SULPHATE SERIES

AVERAGE TOTAL GROWTH IN INCHES AT DIFFERENT DATES

Tree No.	April 24	May 4	May 14	May 20	June 2	June 29	Aug. 8	Nov. 10
1	2·125	4·75	6·75	8·87	19·0	50·50	50·50	50·37
2	0·500	1·75	8·0	14·87	40·50	68·50	68·50	68·75
3	1·250	7·50	8·25	19·87	40·50	63·00	63·00	63·25
4	0·375	3·75	9·12	30·32	55·25	63·12	63·12	64·25
5	5·125	6·50	7·00	6·62	7·12	8·12	8·12	9·00
6	0·500	1·50	3·25	7·87	27·00	41·00	41·00	41·00
7	1·500	4·75	7·00	8·25	17·12	46·00	46·62	47·75
8	2·250	6·00	6·80	9·25	12·50	28·00	28·00	28·75
9	.....	.....	.....	.....	10·75	61·25	61·87	62·00
10	5·375	18·00	23·00	64·25	76·12	73·75	76·25	78·00
	19·00	54·50	79·17	170·17	305·86	503·24	506·98	513·12
Mean	1·9	5·45	7·91	17·01	30·58	50·32	50·69	51·31

Mean total growth = 51·31 ± 4.
δ = 19·6
C = 38·1

NO NITROGEN SERIES

Tree No.	April 24	May 4	May 14	May 20	June 2	June 29	Aug. 8	Nov. 10
11	0·50	1·0	2·37	3·50	22·87	57·75	58·5	58·50
12	2·0	4·75	18·0	27·0	47·0	52·0	52·62	52·62
13	10·50	15·25	18·61	20·75	39·62	47·25	51·25	57·87
14	2·12	5·00	8·87	11·00	18·25	32·50	32·50	32·75
15	0·50	1·25	2·12	3·00	3·00	3·00	6·12	8·37
16	0·50	29·50	64·24	76·25	77·25	92·75	92·75	99·12
17	8·75	20·25	37·86	46·87	55·62	58·50	59·00	59·25
18	3·25	14·25	39·36	49·50	52·00	57·75	58·75	60·25
19	3·00	4·75	8·00	12·00	21·50	39·00	42·00	42·50
20	11·00	31·25	36·61	37·00	39·50	41·00	41·00	41·31
	48·12	127·25	236·04	290·87	376·61	481·50	494·49	512·54
Mean	4·81	12·72	23·60	29·08	37·66	48·15	49·44	51·25

Mean total growth = 51·25 ± 4·47.
δ = 22·1
C = 43·1

NITRATE OF SODA SERIES

AVERAGE TOTAL GROWTH AT DIFFERENT PERIODS

Tree No.	April 24	May 4	May 14	May 20	June 2	June 29	Aug. 8	Nov. 10
30	3·50	9·0	18·75	25·25	32·75	37·50	37·50	37·75
29	12·75	35·0	61·99	76·0	94·50	100·37	101·75	102·37
28	1·37	9·25	26·25	47·25	60·00	87·75	89·37	89·37
27	3·00	6·00	20·25	41·50	68·75	97·50	97·50	99·12
38	8·75	22·50	49·87	64·50	83·62	91·75	96·25	112·62
25	4·50	8·25	14·50	16·50	23·25	64·25	63·00	63·62
24	.....	.....	.....	.....	.....	5·25	6·25	10·12
23	1·00	1·75	2·37	4·50	25·25	72·00	73·25	75·00
22	7·50	10·00	20·98	28·25	41·50	60·75	71·00	73·00
26	14·49	31·75	48·00	53·50	56·62	47·12	59·00	60·50
	56·86	133·50	262·96	357·25	486·24	664·24	694·87	723·47
Mean	5·68	13·35	26·29	35·72	48·62	66·42	69·48	72·34

Mean total growth = 72·34 ± 6.
δ = 29·7
C = 41

CHECK SERIES

AVERAGE TOTAL GROWTH AT DIFFERENT PERIODS

Tree No.	April 24	May 4	May 14	May 20	June 2	June 29	Aug. 8	Nov. 10
21	2·75	10·75	29·25	36·50	47·25	48·75	49·25	52·75
37	6·25	11·75	14·75	16·00	18·50	30·25	30·87	30·87
36	2·25	25·75	59·75	68·75	41·00	84·25	85·12	92·87
35	.....	0·25	5·75	11·50	24·75	23·00	23·50	23·87
34	1·25	1·75	2·00	2·50	2·50	3·00	3·50	3·50
33	8·12	18·25	25·25	46·25	60·50	67·50	66·50	68·25
32	1·75	3·25	14·49	20·25	24·50	26·15	26·75	28·00
31	9·62	18·75	30·00	36·00	48·75	45·34	52·75	53·75
	31·99	90·50	172·24	237·75	267·75	328·24	338·24	353·86
Mean	3·99	11·31	21·53	29·71	33·47	41·03	42·28	44·23

Mean total growth $=44·23 \pm 6·3$
$\delta = 26·5$
$C = 59·9$

In a comparison of differences in average total growth for each series it will be found that there is a significant difference between the Nitrate of Soda series and all others. As an example this comparison between the Nitrate of Soda series and the Ammonium Sulphate series is given:—

Nitrate of Soda series mean = $72·34 \pm 6·0$
Sulphate of Ammonia series mean = $51·31 \pm 4·0$

Difference = $21·03 \pm \sqrt{36+16}$
= $21·03 \pm 7·2$

As the difference is practically three times its probable error, it may be considered as significant.

On the other hand, by this method there is not any significant difference between the Sulphate series and the No Nitrogen or Check.

By the modified method of Student as used by Love and Brunson (11), which is more applicable to small numbers, odds of 30:1 in favour of the Ammonium Sulphate over the No Nitrogen were obtained. By arranging each series in ascending order and making comparisons in this manner the following odds are obtained by the Love and Brunson method. As an example of the application of this method the data for the comparison between the Nitrate of Soda series and the Ammonium Sulphate series are appended.

COMPARISON BETWEEN NITRATE OF SODA AND AMMONIUM SULPHATE SERIES BY LOVE AND BRUNSON METHOD

—	Nitrate of soda	Ammonium sulphate	Gain nitrate of soda over ammonium sulphate	D	D^2
1	10·12	9·00	+ 1·12	−20·91	437·21
2	37·75	28·75	+ 9·00	−12·03	144·72
3	60·50	41·00	+19·50	− 2·53	6·40
4	63·62	47·75	+15·87	5·16	26·62
5	73·00	50·37	+22·63	+ 1·60	2·56
6	75·00	62·00	+13·00	− 8·03	64·48
7	89·37	63·25	+26·12	+ 5·09	25·90
8	99·12	64·25	+34·87	+13·84	191·54
9	102·37	68·75	+33·62	+12·59	158·50
10	112·62	78·00	+34·62	+13·59	184·68
	.....	.....	210·35	.....	1,242·61

Mean diff. $=21·03$

$E = \frac{21·03}{11·15}$ $\quad d = \sqrt{\frac{1,242·61}{10}} = 11·15$

$=1·89$ taken as $1·9$

Odds $=9999 : 1$

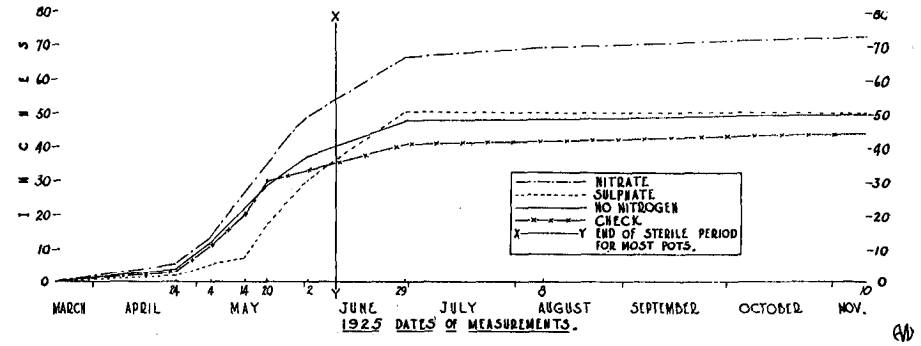
Odds Obtained by Love and Brunson Method

Odds in favour of Nitrate of Soda over Ammonium Sulphate = 9999:1; odds in favour of Ammonium Sulphate over No Nitrogen series = 30:1; odds in favour of No Nitrogen series over Total Check = 90:1.

From these odds the only significant difference is that of the Nitrate of Soda series over all others, with a possible significance between the No Nitrogen and Ammonium Sulphate series over the Check.

Graph No. 1 portrays the trends of the four series in growth response at the different periods and it is interesting to note the parallelism of the Nitrate line, the Check and the No Nitrogen up to May 14, accompanied by the lag of the Sulphate line which began to parallel and exceed the No Nitrogen on June 29.

GRAPH No I.



The Root System

At the end of the season, two trees representative of the sample in each series were lifted, washed free of the substratum and the roots separated from the trunk, weighed and photographed. The attached illustration shows the weights of one set of these roots and brings out some of the characteristic differences. The Check series was characterized by a sparse root system, evenly distributed through the pot. The No Nitrogen series while possessing a larger number of feeding roots did not weigh much more than the Check series. Its root system was confined more to the top half of the pot.

In the Sulphate of Ammonia series there was a noticeable comparative absence of roots at the bottom of the pot, with a large number of newly formed roots on the top two inches. This would indicate a rapid root formation at the latter part of the season after the admission of nitrifying organisms.

In the Nitrate of Soda series the root system was well and evenly distributed and contained many more fine feeding roots than the other series.

Discussion of the 1925 Results

From this data there is certainly no indication that apple trees are capable of using ammonia as a direct source of nitrogen. Apparently a certain degree of toxicity existed in the Sulphate series as it not only failed to respond as the Nitrate series but for a time lagged behind even the Total Check. As there was an increased amount of sulphate ion in the ammonium sulphate solution as applied this toxicity might be considered due to that alone. The results from these same trees the second year (minus the ones used for analytical purposes) indicate, however, that the increased sulphate ion had little effect as will be observed from the following data.

It will be recalled that by the end of the first season the sulphate pots showed positive results from tests for nitrifying organisms. As the results for 1926 showed the Sulphate series practically equal to the Nitrate series for total seasonal growth response, this would lead us to conclude that the toxicity of 1925 was due to the absence of oxidation of the ammonium sulphate, and to suspect that the trees had been able to absorb some of the ammonium sulphate but not utilize it efficiently.

Root development of nitrate of soda tree. Wt.=22 oz.
Note the numerous fine feeders and their distribution.

RESULTS OF THE 1925 TREES IN 1926

AVERAGE TOTAL NEW GROWTH AT DIFFERENT PERIODS IN 1926

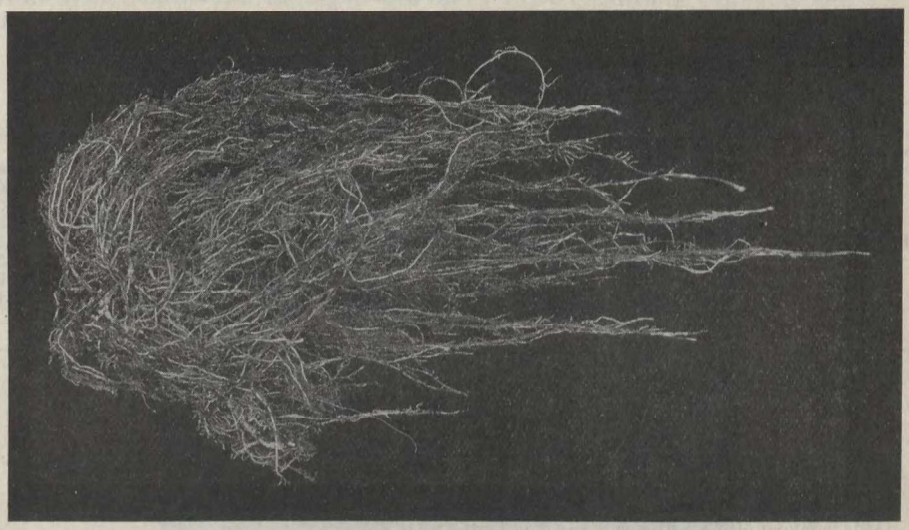
Tree	June 6	Oct. 10	—
2	30·12	53·36	Ammonium Sulphate Series.
4	60·50	72·75	
5	68·12	72·12	
6	50·25	70·36	
7	5·00	23·25	
8	35·25	53·60	
9	46·60	69·00	
10	61·25	69·75	
	357·09	484·19	
Means	44·64	60·52	

Tree	June 6	Oct. 10	—
30	58·50	67·60	Nitrate of Soda Series.
28	76·50	95·60	
27	34·84	63·00	
25	32·00	50·12	
24	65·25	85·50	
23	39·25	66·25	
22	19·75	61·75	
26	41·50	69·50	
	367·59	559·32	
Means	45·94	69·92	

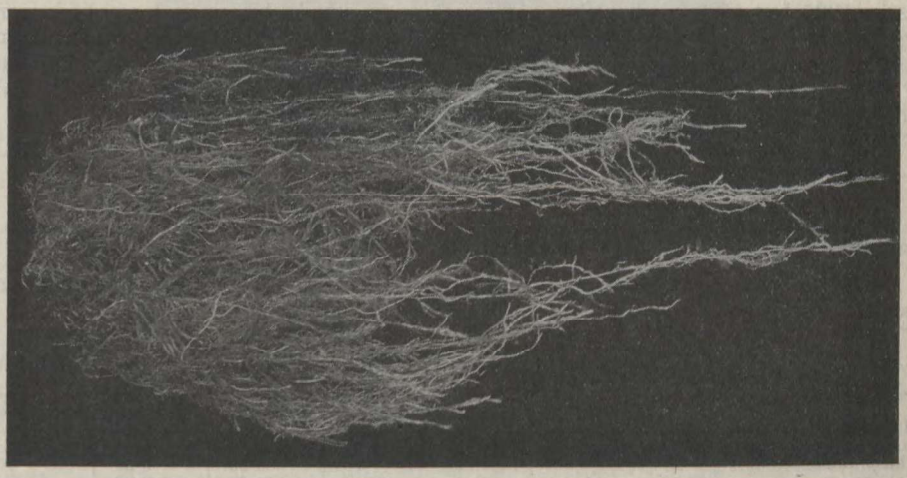
Tree	June 6	Oct. 10	—
12	6·50	8·00	No Nitrogen Series.
13	24·75	30·00	
14	14·25	19·60	
15	25·36	25·36	
16	5·50	11·00	
18	.....	9·50	
19	10·50	11·00	
20	14·12	33·84	
	100·98	148·30	
Means	12·63	18·53	

Tree	June 6	Oct. 10	—
21	7·12	11·12	Check Series.
37	14·50	14·50	
36	13·12	13·50	
35	6·50	14·75	
34	41·84	43·75	
32	6·50	16·60	
	89·58	114·22	
Means	14·93	19·04	

From these tables it will be seen that there is little difference between the Nitrate Series and the Sulphate Series. Making comparison by Love's and Brunson's method we find that the odds for these comparisons are as follows, the details for the Ammonium Sulphate and Nitrate of Soda Series being given.



Root development of check trees. Wt.=11½ oz.



Root development of no nitrogen tree. Wt.=13 oz.

1926 RESULTS—1925 GROUP

AVERAGE TOTAL GROWTH

Ammonium Sulphate vs. Nitrate of Soda Series

	Ammonium sulphate	Nitrate of soda	Gain of nitrate of soda over ammonium sulphate	D
Tree—				
7	23·25	25 50·12	26·87	17·48
2	53·36	22 61·75	8·39	1·00
8	53·60	27 63·00	9·40	0·01
9	69·00	23 66·25	− 2·75	6·64
10	69·75	30 67·60	− 2·15	7·24
6	70·36	26 69·50	− 0·86	8·53
5	72·12	24 85·50	13·38	3·99
4	72·72	28 95·60	22·85	12·46
			80·89	

Mean of Diff. =9·39

$$Z = \frac{9·391}{8·9985} = 1·0436$$

Odds=1 to 70·4 in favour of Nitrate of Soda .

$$S = 646·99$$

$$\delta = \sqrt{\frac{646·9}{8}}$$

$$= \sqrt{80·8737}$$

$$\delta = 8·9985$$

Odds in favour of Nitrate of Soda over Ammonium Sulphate=70 : 1.
Odds in favour of Ammonium Sulphate over No Nitrogen Series=3,332 : 1.
Odds in favour of No Nitrogen Series over Check=5 to 1.

While this does not give any information as to the speed of the availability of Ammonium Sulphate under orchard conditions, it is of interest to note that here was a pure sand, devoid of organic matter which after sterilization and without any artificial inoculation acquired sufficient organisms to oxidise Ammonium Sulphate to a high degree of efficiency for plant use.

The 1926 Group

In 1926 a duplicate experiment of that described under 1925 was started with trees of the same age. In this series the nutrients supplied were the same as in 1925 but instead of only four applications the solution was applied more frequently. A twelve-inch pot contains 19,826 grammes of the dry substratum, so the applications of nutrient solution using the same formula as in 1925 but with different dilutions gave for each series the following periodic total salt concentrations calculated on the dry weight basis of the sand.

Nitrate Series	0·0117 per cent
Ammonia Series	0·010 "
*Cyanamide Series	0·009 "
No Nitrogen Series	0·007 "

*As noted in this list of salt concentrations a new series giving Cyanamide treatment was included. In addition a series in best greenhouse soil mixture was also added.

These concentrations gave the following total amounts of each element per pot for the season:—

	Ammonia Series	Nitrate Series	Cyanamide Series
	grammes	grammes	grammes
Magnesium	0·50	0·50	0·50
Potassium	1·36	1·36	1·36
Phosphorus	0·56	0·56	0·56
Calcium	2·09	2·09	5·28
Sodium	.....	2·53	.....
Nitrogen	1·42	1·54	2·85
Sulphur	2·89	1·24	0·71
Chlorine	2·97	2·97	0·70
Totals	11·79	12·79	11·96

It will be observed that the total amount of elements applied in this instance is just about double the amount applied to the 1925 series. As will be pointed out later this quantity proved toxic in all cases, so that the optimum amount of nutrient solution for an apple tree under these conditions evidently lies below the concentrations reported for 1926.

Root development of sulphate of ammonia. Wt.=14½ oz.
Note lack of fine feeders and location near top of pot.

The following summary of notes from field records taken during the season will give the qualitative data available:—

Summary of Notes for 1926 Group

Soil Treatment—Trees in advance of any of the other series, wood heavier, growth more vigorous, leaves larger. This series continued to be outstanding throughout the season having heavier blossom, and making stronger growth.

Check.—This series though not as good as the previous series showed fair growth as compared with the other series. Two of the trees did not break their leaf buds. For a certain time this series showed equal growth with those obtaining nutrient solution but after a certain period the lack of food made itself felt and was demonstrated by a lighter foliage, less vigorous growth. Initial growth considered to be due to stored-up food.

No Nitrogen—In this series three trees did not break their leaf buds. The rest of this series showed good vigorous growth. For a considerable period, even into mid-summer there was no appreciable difference between this and the Sodium Nitrate series. At present, however, it is to be noted that in this series the foliage is lighter, the wood less heavy and the new twig growth less.

Sodium Nitrate—With the exception of the Soil series it is undoubtedly the best series in the experiment. Three trees did not break their leaf buds. Foliage dark green, wood heavier and twig growth greater.

Cyanamide—The initial growth in this series was not as good as the Sodium Nitrate or No Nitrogen series. The leaf buds unfolded at a later date and the rate of growth was not so vigorous.

After several applications of solution, about the end of July the trees began to give evidence of signs of distress. The leaves and leaf stalks turned brown, shrivelled up and died. This was true for practically every tree in the series. From these results it was assumed that the nutrient supplied was exercising a toxic effect.

Ammonium Sulphate—Eight trees in this series did not break their leaf buds. The trees in this series remained dormant for a considerable period after the other trees had unfolded their leaf buds. The growth was very weak—very little new wood being formed.

Total Growth Measurements of 1926 Group

To save space only the means of each series are here given. In each case, the series included fifteen trees; two sets of means are given (1) being the mean growth when the fifteen trees are considered, the other (2) being the mean when the trees which did not break are withdrawn.

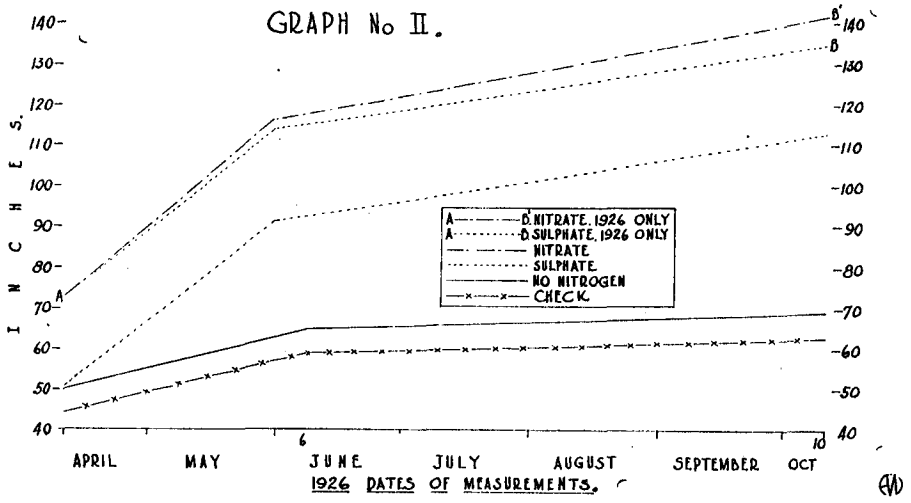
SUMMARY OF AVERAGE GROWTH RESPONSES IN 1926 GROUP

AVERAGE GROWTH ON FOLLOWING DATES

Series	25-6-26	13-7-26	10-8-26	20-10-26
Ammonia (1)	0·43	0·624	4·88	8·94
" (2)	0·92	1·330	10·46	19·17
Nitrate (1)	4·33	7·88	12·52	16·02
" (2)	5·91	10·76	17·07	21·85
Cyanamide (1)	.....	.....	2·26	9·45
" (2)	.....	.....	2·83	11·68
Soil (1) and (2)	32·37	46·54	58·85	68·40
No Nitrogen (1)	6·49	11·48	16·31	18·81
" (2)	6·95	12·32	17·47	20·15
Check (1)	7·32	10·70	12·61	14·26
" (2)	10·32	14·98	17·65	19·95

The outstanding thing from this year's work was that in all cases the nutrient solutions appeared to be somewhat toxic as compared with the Soil Series which did not receive any solution. It is of further interest to note that the Check Series which did not receive any solution made only an average growth of 19.95 inches (when the trees not breaking were deducted), whereas in the 1925 group this same series averaged 44.23 inches total growth. As the 1925 group had a growing period from March 16, to November 10 (being in the greenhouse from March to June) as compared with a season of from May 15 to November 10 for the 1926 group, it is probable that this extra two months of growing season had the effect of more than doubling the total growth of the trees.

As further evidence that the solution applied in 1925 was somewhere near the optimum in the Nitrate of Soda series the growth response of the Soil series in 1926 is valuable. The Nitrate of Soda series in 1925 gave a response of 72.34 inches while the Soil series in 1926 gave a response of 68.40. Of course the effect of the longer season is not known and an attempt to determine this is now under way.



Comparison of the Ammonia and Nitrate Series by Love's and Brunson's Method

As the main object of the experiment was to determine the comparative availability of Nitrate of Soda and Ammonia Sulphate without nitrification the direct comparisons of the series other than these two will be omitted.

COMPARISON BETWEEN AMMONIUM SULPHATE AND NITRATE OF SODA SERIES —1926 GROUP

Nitrate Series	Ammonium Sulphate Series	Gain of Nitrate of Soda over $(NH_4)_2SO_4$	D
1·00	.....	+ 1·0	7·75
1·12	.....	1·12	7·63
5·25	.....	5·25	3·50
12·60	.....	12·60	3·85
17·12	2·50	14·62	5·87
14·75	7·0	7·75	1·0
24·25	15·25	9·0	0·25
29·84	19·84	10·0	1·25
36·12	29·12	7·0	1·75
40·25	29·25	11·0	2·25
58·12	31·25	16·87	8·12
		96·21	S.256·49

Mean diff. = + 8·75

$$\delta = \sqrt{\frac{256 \cdot 49}{11}} = \sqrt{23 \cdot 31} = 4 \cdot 83$$

$$Z = \frac{8 \cdot 75}{4 \cdot 83} = 1 \cdot 81$$

P = ·99978 + ∴ odds = 4999 to 1 in favour of Nitrate of Soda over Ammonium Sulphate.

The odds as in the 1925 group are infinitely in favour of Nitrate of Soda over Ammonium Sulphate.

Other odds derived by this method for the 1926 group are:—

6·5:1 in favour of No Nitrogen over Check.
22·9:1 in favour of Nitrate of Soda over Check.
9999:1 in favour of Soil series over Check.
6·0:1 in favour of Ammonium Sulphate over Cyanamide.

It is easily seen from this that none of the nutrient solutions showed any appreciable advance over the Check, in other words all solutions can be considered as having had a toxic influence at the concentrations used under these conditions. Nitrate of Soda had by far the least toxic effect of any of the nitrogenous group, and thus far no evidence of the availability of Ammonium Sulphate under sterile soil conditions has been accumulated.

Summary

In summarizing the results from the two seasons work with three separate groups of growth responses, viz., 1st year results from 1925 group; 2nd year results from 1925 group; 1st year results from 1926 group; the following evidence appears:—

(1) These experiments have failed to demonstrate that nitrogen is available for apple trees in the form of Ammonium Sulphate.

(2) As soon as nitrifying organisms are present in the substratum the Ammonium Sulphate Series appeared to give about as good growth response as did Nitrate of Soda.

(3) The root development of the 1925 Series 1st year, bore out the deductions from the growth responses of the top.

(4) When applied in quantities which appear to be above the optimum concentration toxicity existed in the order named:—

Most toxic—Cyanamide,
Next toxic—Sulphate of Ammonia,
Least toxic—Nitrate of Soda,

indicating that under conditions where nitrifying bacteria are not present, Nitrate of Soda is a less dangerous proposition than either of the other two nitrogenous compounds.

(5) From the evidence obtained in these experiments it would appear that Sulphate of Ammonia becomes available on a very poor sand when nitrifying organisms are present.

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VEGETABLE GARDENING

From the vegetable growers standpoint the spring of 1926 showed every promise of being early. In fact the first sowing of vegetable seed out of doors was made April 6, which was one month earlier than the previous year. Germination was rapid due to a few days of fine warm weather, followed however by cool dull weather which continued until after the tomatoes were planted in the field, retarding growth quite seriously. The tender crops such as beans, corn, cucumbers, melons, squash and tomatoes, were severely checked. However, despite all this the first ripe tomatoes were harvested from Alacrity on August 6, being two weeks later than the previous year. The sweet corn crop was retarded considerably but Pickaninny and Banting were ready for use as green corn in less than 70 days, indicating that these two early sorts can be relied upon to make quick growth under quite unfavourable conditions. The seed saved from this crop was well ripened.

Apparently the previous reports concerning the Alacrity tomato, Pickaninny and Banting corn have created interest in these productions of the Horticultural Division. This belief is substantiated by the fact that growers and seedsmen both in Canada and the United States have been making requests for seed in quantity. These orders were filled, in part only, as long as the seed supply lasted, as it was pointed out that only a limited quantity of each could be grown here to insure maintaining their earliness and purity as foundation seed.

Stock seed of the Banting corn was supplied to the Experimental Station at Morden, Man., where a considerable quantity of seed was produced. This was undertaken to have a supply of available seed for Western Canada. It is proposed to duplicate this work at some of the other Experimental Stations in the west as this will serve of value to further prove the value of this corn when grown in bulk under the conditions existing there.

POTATOES

During the past four years a further effort was made to determine if disease-free seed could be produced under Ottawa conditions when the rules for maintaining freedom from disease were adhered to closly. In 1923 certified northern grown seed of eight varieties was obtained and one lot of local grown certified seed. In the report for 1924 reference was made to this work, and from the results obtained to that time with this seed it seemed that it would be possible to maintain the vigour and yielding ability of all the varieties. However, with the 1925 crop it was found that a loss of vigour had occurred coupled with a falling off in the yield per acre. In fact some of the varieties were so degenerated, indications of which were shown by the top growth and decrease in yield, that they were discarded entirely. On the other hand, those that showed signs of greater vigour were kept for planting in 1926. In the table, it is quite clearly shown that a serious decrease in yield resulted from this seed and furnishes evidence to further prove the value of using certified northern grown seed.

Variety	1923			1924			1925			1926		
	Record No.	Marketable	Unmarketable	Record No.	Marketable	Unmarketable	Record No.	Marketable	Unmarketable	Record No.	Marketable	Unmarketable
		bush.	bush.		bush.	bush.		bush.	bush.		bush.	bush.
Irish Cobbler	0–5046	338·75	53·0	0–6508	426·2	76·7	0–8915	255·10	58·07	.....	.....	.....
Early Ohio	0–5048	268·0	53·54	0–6510	477·0	26·4	0–8906	172·14	60·14	.....	.....	.....
Early Rose	0–5049	483·9	46·5	0–6503	607·1	94·4	0–8905	165·65	62·22	0–10620	41·48	21·77
Early Puritan	0–5050	603·1	11·1	0–6487	623·7	21·7	0–8904	244·73	33·18	0–10636	132.73	16·59
Extra Early Eureka	0–5051	435·5	27·9	0–6483	565·2	38·3	0–8907	452·13	54·95	0–10631	207·40	30·07
Carman No. 1	0–5053	446·7	22·3	0–6498	606·7	50·8	0–8909	248·88	43·55	0–10628	92·29	15·55
Carman No. 3	0–5072	360·8	4·2	0–6482	619·6	11·8	0–8908	344·28	25·92	.....	.....	.....
Gold Coin	0–5055	569·6	14·8	0–6493	554·5	48·2	0–8911	352·58	62·22	0–10625	74·59	15·55
Dooley	0–5056	333·3	13·0	0–6481	519·0	10·3	0–8910	297·25	30·17	.....	.....	.....

The plots each year were replicated four times.

The bearing that this test has on the future of potato growing in the Ottawa district is that certified seed of northern origin should be introduced every year.

In no wise would it seem advisable to save seed for a third and fourth crop as indicated by the results as above stated.

The fact that there is a great difference in varieties and even strains of vegetables, makes it necessary to continually test and compare those offered to keep abreast with the varieties and strains advertised. A list of suitable varieties as found satisfactory at the Central Experimental Farm, would seem to be of value to growers, thereby eliminating the necessity for costly mistakes made by growing varieties that are not suited to the conditions or requirements of the market.

In the following will be found mentioned the varieties that have proved of highest merit and can be relied upon to give satisfaction under normal conditions.

Asparagus

There have been several varieties recommended and grown during former years with a fair degree of success but now that something better has been found, the old sorts have to make way for the new. MARY WASHINGTON is one of the most outstanding varieties, being a strong grower that is quite immune to asparagus rust, a disease that seriously weakens the plant, reducing the productiveness of the plantation. The shoots are, as a rule, dark green with a heavy purple tinge towards the tip, with a tightly pointed bud. Branching out does not take place until the stalks are well above the market length. This last feature renders the variety highly desirable for market, and coupled with disease resistance, places this variety pre-eminently first over all others.

PALMETTO.—A strong growing variety of considerable merit, does not compare with the former but certainly has been a very productive and profitable variety. Failing to get Mary Washington this variety will be found to give good returns, provided that rust is not prevalent. The stalks are a handsome green colour, medium to large in size, with a moderately tight, bluntly pointed tip, that is shaded with purple.

Beans (Dwarf or Bush)

Some very fine varieties are in existence, and to this crop few originations of recent origin have been added. In both wax and green podded sorts are to be found varieties that will meet the needs of both the market garden and the home garden.

ROUND POD KIDNEY WAX: This is also known as Brittle Wax and is an outstanding high quality variety, meeting the needs of the grower for an early maturing bean. The plants are very upright strong growers, producing an abundant crop of waxy yellow, stringless, extremely fleshy, rounded pods, measuring about seven inches in length, which are slightly curved backwards. The dried seed is quite suitable for baking, being a medium sized kidney, with a white seed coat, marked with an elongated brown spot.

PENCIL-POD BLACK WAX: A very prolific dwarf variety, producing an abundant crop of tender, rich, long, yellow, stringless pods. Where a good quality variety is required for either home garden, or market garden use, this one is highly recommended. For shipping, however, there are other sorts that are much better adapted. Golden Wax and Davis Wax are slightly earlier and stand shipping very well.

HODSON WAX: A decidedly desirable late variety that is almost entirely free from anthracnose. The plants are strong, upright growing, producing an abundant crop of long, slender, straight pods. This bean is a desirable one for canning purposes.

RED VALENTINE: The plants are medium in size, very compact, early, of moderate bearing period, quite productive. The snap pods are an attractive green, very uniform in size, medium length, curved and broadly rounded through the cross section, deeply crease-backed, very brittle, moderately stringy, but very good quality. This variety is quite free from anthracnose. Without doubt this is a very satisfactory variety for early snap-pod production for either the home or market garden, as the pods remain in good marketable condition as long as any of the other varieties including the stringless sorts.

STRINGLESS GREEN POD: Probably one of the best known high quality varieties, quite early. The plants may be described as large to medium in size, though compact in most cases, but occasionally developing shoots high above the plants. When fully grown the plants show a tendency to droop or spread considerably. As a market garden or home garden variety it is unsurpassed. The yield is usually heavy being very reliable, hardy and possessing the highest quality. The pods range around five inches long, are decidedly scimitar curved, round, sharply divided between seeds, dark green, decidedly stringless, very brittle and without fibre. This variety is quite subject to anthracnose but, despite this, there are few varieties that compare with it for quality.

Pole Beans

There are two groups in this crop, namely, wax podded and green podded sorts. As this crop requires a considerably longer time to mature than the dwarf kinds it has been found that by planting at the same time the crop will follow the dwarf sorts giving a succession of crop late in the season, thereby eliminating the necessity of successional sowings of the dwarf sorts.

Pole beans may be grown on stout six-foot poles, one pole to each hill with three plants to the hill, and spaced four feet apart each way, or an overhead wire may be attached to posts planted at either end of the rows, and a coarse twine, for each plant, fastened to pegs at the bottom and to the over head wire at the top. Training the plants to these twines is comparatively easy. By this latter method two plants may be grown together on each twine, spacing them twelve to fourteen inches apart in the row.

KENTUCKY WONDER WAX: This is a very productive early variety. The pods are of medium length, wax coloured, slightly streaked with pink when old, very uniform, the quality is very good. The vines are not strong or branching, being a moderate grower.

GOLDEN CLUSTER: A very high quality wax variety much later in maturing than the former. Of all the varieties this one produces the finest quality pods with exceedingly high flavour. The vines are good climbers, large, moderately branched.

Beets

There are several types of beets that are suited to the needs of the most exacting grower, but of them all only three are being considered.

FLAT EGYPTIAN: This is without doubt a very early maturing variety and exceedingly desirable for the first early crop. For early bunched beets this variety ranks first. The roots are round in circumference but flattened to the extreme on the bottom, terminating in a single tap root. This is a very fine quality variety when the roots are small.

CROSBY EGYPTIAN: A decidedly high quality variety that is well suited for early sowings or main crop. The roots differ from the Flat Egyptian by having a decided fullness on the under side and tapering to a tap root.

DETROIT DARK RED: One of the best dual purpose varieties to grow, being suited for second early, main crop and an excellent variety for canning. The roots are round and smooth, with a full crown and base tapering smoothly to a tap root. The colour of the flesh is deep red with inconspicuous rings, very tender and sweet.

Brussels Sprouts

The Brussels sprouts crop seldom proves of sufficient value to be grown to any great extent. Occasionally a good crop may be obtained but the crop cannot be considered a commercial success. Improved Half Dwarf (Paris Market) and Dalkeith are both good and may be considered as the most outstanding.

Cabbage

The varieties that have proved most satisfactory are as follows:—

GOLDEN ACRE: This is a round headed variety, resembling Copenhagen Market but very much earlier. The plants are short stemmed, with pale green leaves that are quite saucer shaped. The inside structure of the head is very open, consequently producing a light type of head. The quality is exceedingly good.

EARLY JERSEY WAKEFIELD.—The heads of this variety are medium to small, very conically pointed, with the outer leaves showing a characteristic fold or wave, with deep green colour. The heads are compact, hard, tender and rank second early.

COPENHAGEN MARKET.—A round compact headed, early maturing variety that has been found exceedingly satisfactory; some strains have been found to be much earlier than Early Jersey Wakefield. The heads grow quite large, but retain their tender high quality even in the mature state, and is recommended.

ENKHUIZEN GLORY.—A mid-season variety of outstanding merit that may be used for winter storage. The heads are rounded, slightly flattened, of medium size.

DANISH BALLHEAD.—There are several strains of this variety, long stem, intermediate and short stem. All strains are good for late cabbage for winter storage but the short stem is considered by far the most outstanding. The heads are roundly flattened across the top, gradually tapering to a stem. The leaves of the head are very close, fine, tender and very sweet.

DANISH STONEHEAD.—One of the best of the red varieties, producing very uniform, solid, dark red heads. The plants are very compact with short stems and leaves that are broadly saucered.

Cauliflower

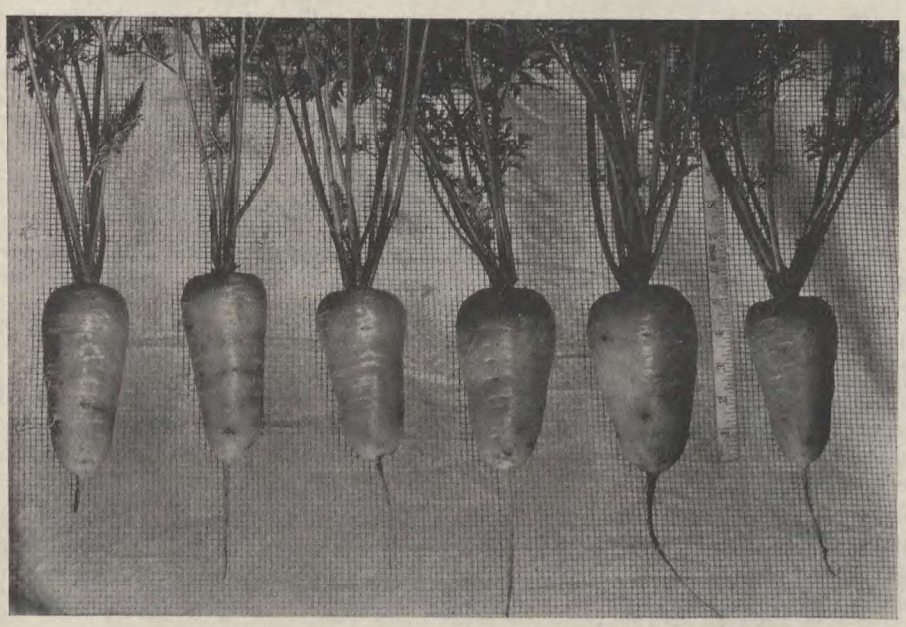
Of the many varieties there are probably only two that may be considered as entirely satisfactory.

EARLY SNOWBALL.—This is a very outstanding dwarf variety that produces heads of a desirable size, that are compact, fine and smooth. It has been found that if successional sowings are made this variety will provide for early, mid-season and late crop alike.

VEITCH AUTUMN GIANT.—This is about the best of the late sorts, being a very large grower, producing heads of excellent quality.

Carrots

Being one of the main market garden crops both for bunching and for winter storage it is therefore necessary to choose varieties that will meet the requirements of the market. There is a type of carrot to suit every requirement, but after all it has been found that of all the varieties available there are only two, or probably three, that are outstanding.



Chantenay Carrot. Inbred for two generations and showing uniformity.

CHANTENAY.—A variety that has been found outstandingly good by repeated tests. The roots are very symmetrical, being quite sharply hollowed in the top around the neck, having a pronounced shoulder and tapering gradually to a blunt apex, ending in a fine tap root, being a good, rich, orange red. The average length of the roots is about 6 inches. This variety may be used for either early or main crop. The texture and quality is very good, being sweet and tender with a medium sized core in proportion to the bark. This variety is strongly recommended to both home and market gardeners.

DANVERS.—A true market garden variety that has been very popular. The quality is almost equal to that of Chantenay. The roots are full at the crown, broad, tapering gradually almost to the apex where the root is slightly blunt, pointed, terminating in a short tap root. The length from crown to apex is on an average of 6 inches. Growers using this variety will make no mistake, but there is slightly more core in proportion to bark than in Chantenay.

Celery

As celery is an important crop in both the truck and home garden, it is necessary to know the most desirable variety to use. There has been a large number of strains of the self blanching types offered during the past few years as well as green types. Amongst these have been some very good strains as well as some very poor ones.

GOLDEN PLUME.—This, without doubt, is an outstanding variety, as the plants grow large but do not become coarse or stringy. This, combined with a considerable freeness from celery blight, makes it a decided improvement over all the other self blanching varieties. When ready for market the foliage and stalks have a rich golden yellow tinge making a very attractive product, coupled with the long clean attractive leaf stalks that are free from fibre and have a pleasant sweet nutty flavour.

GOLDEN SELF BLANCHING.—This has been and is still a popular variety. The bunches are large, as produced by some strains, with leaf stalks of medium length. The quality of the variety is good. There is a tendency towards celery blight to a greater extent than in the case of Golden Plume.

FRENCH SUCCESS.—This is a green variety of considerable merit. The bunches are large and compact with thick leaf stalks that are ivory white when fully blanched; tender and sweet.

Corn

Corn is a very popular crop, being considered as one of the best cash crops. There are many varieties offered to meet the requirements of the most discriminating growers. These include varieties maturing in less than seventy days and others that require considerably over 100 days. The varieties best suited to Ottawa conditions are those maturing for green corn in less than 100 days.

PICKANINNY.—This is an extremely early maturing variety, being ready for use as green corn in less than seventy days. The stalks are dwarf, not over four feet in height, bearing two and frequently more ears per stalk. The ears range around 5½ inches in length and are chiefly eight rowed. When ready for use the kernels are white with a purplish tinge, broad, deep and very sweet. As the ripened stage is reached the colour changes to a purplish black. Originated in the Division of Horticulture, Ottawa.

BANTING.—A variety of recent origin that is in many respects the same as Pickaninny, especially height of plants, length of ears, number of rows per ear, but differs in that the kernels are a good yellow. This variety is by all means one of the most promising introductions of recent years. Originated in the Division of Horticulture, Ottawa.

EARLY MALCOLM.—A quite strong growing white sweet corn selected from Russian stock growing to a height of about 5½ feet, bearing medium to large ears that conform to the following very closely: length, six inches; number of rows of kernels, twelve, and very sweet. This variety is far superior to either Early Mayflower or Cory. Originated in the Division of Horticulture, Ottawa.

GOLDEN BANTAM.—This has always been a decidedly popular variety, but as there are many strains of this variety it is sometimes difficult to get a good strain that will mature, consequently, it is necessary for growers to test several strains to ascertain which one will be best suited to the locality. This variety grows to a height of six feet and produces slender, attractive ears ranging around six inches in length, with eight rows per ear. The kernels are broad, deep, tender, of a rich yellow hue, and possess a flavour not duplicated in any other sort as yet. This variety is easily a standard for quality.

Cucumbers

Being a quite profitable crop, cucumbers deserve considerably more consideration. There are a number of varieties of the white spine class that are grown but few, if any, compare with the Davis Perfect for a table variety.

DAVIS PERFECT: This is a very productive moderately strong grower that matures quite early. The fruits range from 7 to 8 inches in length, are 1½ inches in diameter, being well rounded out at both ends, with deep green colour. There is a slight amount of white showing at the blossom end with few spines scattered over the surface of the cucumber. This variety is strongly recommended.

WHITE SPINE: A very popular variety that has been grown for many years, giving excellent results; fruiting early and producing quite abundantly. The fruits vary as to colour from quite dark green to pale green with a decided white blossom end tip and striping.

SNOW PICKLING: This is one of the best varieties to grow. This variety produces very symmetrical, uniform, attractive green fruit.

Kohl Rabi

Kohl Rabi is not as popular as it really should be with the consumers. In fact, it is little known and as a consequence people do not realize the true value.

WHITE VIENNA is one of the best.

Lettuce

Lettuce belonging as it does to one of the most important salad crops in the country thrives well under the conditions suited to the particular type grown. In most of the sections of this country the curled or loose leaved varieties thrive best, and are grown almost to the exclusion of the heading varieties.

GRAND RAPIDS: This is without doubt the most outstanding variety of the loose leaved sorts, being a rapid grower producing a very tender, good quality product. The leaves are wavy, fringed and very curly.

ICEBERG: This is certainly an excellent heading variety that has proved extremely satisfactory, belonging to the curled or crisp heading type, medium large; medium green, with leaves that are wavy with fringed edges and a brown tinged margin. The heads are compact and crumpled, very white inside.

NEW YORK: A very satisfactory curled, crisp heading variety, large in size, dark green, being slightly curled at the edges. When mature the heads are flatly globular. The heads are very firm, white inside and tender.

Cos lettuce is probably not as popular as the other types but is really deserving of a place. This type is outstanding for quality and sweetness. The leaves grow very upright clasping closely, forming an upright elongated head, that when tied at the top forms an excellent blanched head. The leaves are tender and very sweet.

PARIS WHITE: This is one of the best varieties.

Muskmelon

Muskmelons are a popular crop, but are difficult to grow some years. Some varieties succeed better than others, however, due to being earlier maturing.

EARLY KNIGHT: A very good green fleshed variety that matures quite early and has fair quality. The fruits are of medium size with remarkably good quality flesh that is quite tasty.

EMERALD GEM: This has been a very satisfactory red fleshed variety. The vines are not large but produce a moderate crop of dark green, shallow ribbed, finely netted, round oval to slightly flattened melons. The flesh is a rich salmon pink, thick, fine, sweet and juicy. The seed cavity is as a rule quite small. This variety can be relied upon to produce a crop every year.

CHAMPLAIN: A variety of merit in the red fleshed class that has proved valuable during the past three years. The vines are moderately strong growers producing melons of medium size, roundly oblong. The flesh is a rich salmon pink, tender, fine, sweet and juicy.

HEARTS OF GOLD: A very prolific medium to small fruited variety, that is very popular in some sections. The flesh is red, fine, sweet, tender and juicy. This variety succeeds well under Ottawa conditions.

Onions

There are many varieties of onions all of which can be grown successfully but it has been found that early maturing varieties can be relied upon to give a well ripened product each year by sowing out of doors without resorting to the transplanting method.

EARLY FLAT RED: This has been found to be one of the best of the early maturing, medium sized, red sorts. The bulbs are a good red colour with thin papery skins, round, flattened both on the top around the neck and decidedly flattened on the bottom side.

RED WETHERSFIELD: A slightly later maturing variety than the former mentioned, but may be considered a good red variety for home and market garden purposes. The bulbs are round ovate, being full around the neck with the bottom well filled in a rounded fashion. This is one of the best varieties for winter storage.

RED GLOBE: A dark red variety of outstanding merit. The bulbs are a splendid globe shape and are well adapted to transplanting. As a variety for sowing out of doors they require a longer season to mature than either of the former varieties. This is an onion of superior quality.

EBENEZER OR JAPANESE: This has been found to be a very promising variety that matures early. The bulbs are a good yellow colour, flattened, developing to a medium size. For winter storing this variety is exceedingly good.

YELLOW GLOBE DANVERS.—This still maintains a place as one of the best yellow globe onions. The bulbs mature moderately early, are firm, small necked and possess very fine quality, besides being very mild.

PRIZETAKER *(Denia)*.—One of the large growing yellow types, it is outstanding for growing as a transplanted onion. The bulbs grow large, but are not coarse nor strong flavoured. This is a decidedly late maturing variety.

EARLY BARLETTA.—A small growing, thin-skinned white variety, it is well suited for picklers. The bulbs are as a rule flattened on under side, being very shallow growers.

Parsley

Parsley is a very valuable garnish plant of which there are many types. The Triple Curled and Moss Curled are the best.

Parsnip

Parsnip is a crop that is not as popular as it should be, due to the fact that it is necessary to develop a taste for this vegetable. Roots that have been left in the ground over winter possess the finest flavour, but should be dug as soon as the frost is out of the ground sufficiently, and then stored in a cool dark cellar.

HOLLOW CROWN.—One of the best varieties, having a broad shoulder that is well hollowed around the stalk and tapering gradually to a slender point. This, being a long seasoned crop, the seed should be sown very early.

Peas

Peas are a very popular market and home garden crop and at the present time there are many varieties to choose from to suit the growers requirements.

BLUE BANTAM.—A very valuable, early maturing, wrinkled, dwarf variety that produces pods of large size, medium to large peas, that are sweet and tender.

ENGLISH WONDER.—An early maturing dwarf variety that is very prolific. The pods are medium in size but are crowded with medium sized peas of exceedingly good quality.

THOMAS LAXTON.—This is without doubt one of the best all round varieties. The vines are pale green, rather scantly leaved, producing pods of medium to large size and peas of medium size, which are very tender and sweet. This is without doubt one of the best varieties for both market and home garden.

ADVANCER.—A decidedly good variety, the vines grow to a height of 36 inches, the foliage is very dark green, quite dense and produces pods of medium size with medium sized peas. This variety is later in maturing than Thomas Laxton.

STRATAGEM.—This is one of the well known prolific late varieties and grows to a height of 30 inches, the vines being quite coarse. The foliage is large and produces large, dark green, tender, sweet peas that are quite loosely arranged in the pods. This is an exceptionally good variety.

Pepper

Peppers are not grown very extensively in this locality, but some varieties maturing early have been found very satisfactory.

HARRIS EARLIEST.—This has proved to be a decidedly early maturing variety that can be depended upon every year to produce a crop. The plants are medium to small in size, allowing closer planting, and produce numerous, medium-sized, deliciously sweet flavoured fruits. The shape varies from bluntly pointed to bluntly indented and slightly tapering fruits; rich red in colour with thick tender flesh. A crop of fully ripened fruit can be depended upon every season when this variety is used.

Pumpkin

Pumpkins are of considerable value as a companion crop with corn and prove quite profitable. There are several types of which two may be considered of greatest value.

Pie.—This develops small fine vines and foliage, producing pumpkins of small size; round, flattened at the blossom and stem ends. The ribs are shallow to almost absent, with a fine firm skin that is a rich yellow when the pumpkins are ripe. The flesh is fine in texture, thick and sweet, and of a rich golden colour.

Mammoth King.—A large growing variety of considerable merit. The vines are large with dense foliage, bearing numerous large, cream to pale pink coloured smooth skinned fruits, that are indented at the stem end and bluntly pointed at the blossom end; very thick fleshed, fine grained, with rich yellow colour; excellent for canning on account of the fine texture and large amount of flesh per fruit.

CHEESE OR KENTUCKY FIELD.—An old standard variety that is very popular with growers. The vines are strong growing, producing medium to large, round, flattened fruits, that are quite deeply ribbed. The skin is creamy buff coloured; the flesh being a good yellow, moderately fine and sweet.

Radish

Of the many varieties of radish offered the following have been found extremely good.

Saxa.—One of the earliest of the forcing radishes, besides being slow to develop seed stalks; remaining in condition for a long time. They are round, bright scarlet, with a very few small leaves.

SCARLET TURNIP WHITE TIP.—A well known variety of great merit, being a true turnip shape with carmine red on the upper portion of the root, tipped with white at the base. This is an excellent general purpose variety.

FRENCH BREAKFAST.—An oblong shaped variety, the roots are quite cylindrical, bluntly terminating at the base. The main colour is a bright red with a white tip.

ICICLE.—One of the best white varieties. The roots are long, gradually tapering from the middle to the apex, white in colour; very tender and brittle.

Rhubarb

Rhubarb, this crop is an important perennial crop and is relied upon by growers for the first crop returns each year.

RUBY.—This is without doubt one of the most outstanding red varieties, not only is the skin red but the colour is found entirely throughout the leaf stalk. The stalks are medium in size, very brittle, tender, juicy and free from stringiness. This is an origination of the Division of Horticulture, Central Experimental Farm.

Salsify

Salsify is not an important crop in this locality but is nevertheless worthy of mention on account of the value for soup purposes.

SANDWICH ISLAND.—This is without doubt the best variety of the white sorts. The roots are very straight and free from pronginess, especially when grown in deep loam soil.

SCORZONERA OR BLACK SALSIFY: This is used probably less than the white varieties, producing long straight roots that are very free from prongs. Apart from the skin colour this is one of the best varieties to grow where straight roots are desired.

Spinach

Spinach comprises the chief greens crop grown in most sections. Many varieties have been tested, but of them all the following have been found to be exceedingly good.

KING OF DENMARK (Antvorskov): A very popular variety being a fine long-season spinach remaining in condition a much longer time without bolting to seed. The plants are dark green in colour, with large leaves, rounded, crumpled or blistered.

NEW ZEALAND (Tetragonia expansa): This variety is distinct from all other spinach; the plant is very spreading and late, and produces numerous side shoots, with medium to small pointed leaves that are pale green colour. Grows well under quite adverse conditions and in hot weather.

Squash

Squash is a popular crop in which is to be found varieties suited for all seasons.

YELLOW SUMMER CROOKNECK: Though not of very great merit this is ready for use before other varieties and is therefore of value from this standpoint. The fruits are, as the name implies, decidedly crooked necked, constricted to half the length with an enlarged portion towards the blossom end; yellow in colour with many warts on the surface. The flesh is fine and rather tasty.

DES MOINES: A very prolific small fruited variety of exceedingly good quality. The fruits are blunt ended at the stem, tapering to the blossom end slightly and terminating bluntly. The ribs are angular; skin dark green; flesh fine, thick and a very good substitute for sweet potatoes; will keep well into the winter.

DELICIOUS: A very good quality hardshelled sort that has been found desirable for autumn and winter. The fruits are medium sized, round, flattened and indented at the stem end, tapering quite abruptly to a point at the blossom end. The skin colour is grayish green, smooth with shallow ribs. Flesh, thick, fine, with rich golden yellow colour. A very desirable winter variety.

HUBBARD: This is probably the most popular winter keeping variety. The fruits are of medium size, depending upon the strain; skin smooth to slightly warted, dark green. Shape, round, pointed at both stem and blossom ends. The flesh is a rich golden hue, thick, sweet. Well matured specimens will keep throughout the winter.

Swede Turnips

Swede turnips are indispensable where this class of vegetable is relished.

CANADIAN GEM (New Century or Universal): This is without doubt the most satisfactory; the roots are really round, purple top, golden yellow flesh; small top and neck. An extremely hardy variety with quality above the average.

Tomato

Tomatoes being an important truck and home garden crop deserve considerable attention. At the present there is a very large number of varieties and strains some of which are very good. The varieties that have been found satisfactory are as follows.

HERALD: A very early maturing hybrid variety, being a cross between Alacrity and Hipper, that has been matured in almost every section of Canada. The plants are medium in size with scant foliage that is very much like Alacrity. The fruits are of medium size, smooth, round, slightly flattened, rich red colour; maturing in 104 days. When canned the product possesses unequalled flavour and retains the rich red colour.

ALACRITY: This is still one of the earliest varieties in existence having been ripened successfully where other varieties have failed. For early tomatoes or where the season is short this variety is indispensable. The vines are small with scant fine foliage, showing relationship to Earliana from which the first selections were made; fruit is red, smooth and of remarkable quality for this type of tomato, maturing ripe fruit in 104 days.

The above two varieties are originations of the Horticultural Division, Central Experimental Farm, Ottawa. Seed of these varieties may be obtained direct from this Division.

BONNY BEST: Probably one of the most popular tomatoes, being very prolific, coupled with high quality and having a good, rich, red colour, very symmetrical, smooth and round. The plants are decidedly strong growers, adapting them for staking and general field crop. This is one of the outstanding varieties for canning. Ripens in 109 days from the time of seed sowing.

LIVINGSTON GLOBE: This is without doubt one of the best pink varieties. The plants are large, strong, with large sized leaves that are very dense. The fruits are produced in large clusters, pink in colour, firm, smooth and large, varying from round oval to round conical. Ripe fruit may be got in 112 to 120 days from seed sowing.

Turnip

Turnips are grown to some extent but are not extremely popular.

PURPLE TOP MILAN: An extremely early sort, possessing very good quality; roots of medium size, flat and white, with a purple top, and true strap leaves.

Vegetable Marrow

Vegetable Marrow is a quite desirable crop and should be grown more extensively.

WHITE TRAILING: This is without doubt the most satisfactory, bearing an abundant crop of marrows ranging from 12 to 16 inches in length, by 6 inches in diameter, blunt at both stem and blossom ends; skin cream white turning pale yellow when mature. The flesh is deep, fine texture and flavour.

THE ALACRITY TOMATO

The development of an early maturing tomato is a project that was undertaken by the Horticultural Division previous to the year 1900. It was during those years that great efforts were made to assist in every possible way with providing varieties of vegetables that would be suitable for the northern parts of Canada. It was during the season of 1900 that the Earliana tomato was first tested in the trial plots in this division and recognized as an early maturing variety of considerable merit, but showing considerable variation, indicating possibilities for further improvement by selection. Mr. W. T. Macoun, Dominion Horticulturist, was the first to start the selection of plants showing early maturity and heavy yield, saving seed from these plants. After several generations had been grown and seed saved from early maturing desirable plants, it was found that this method of selection had so altered the type of the plants and fruit from the original Earliana, that it was decided to call this segregation "Alacrity". To the settlers of Northern Canada this variety has been a great boon, making it possible to grow tomatoes where they could not have been grown had it not been for these early efforts.

At the present time the selection of individual plants as the basis of seed production is being carried on. The strain to be grown having been decided upon, a block of 80 plants is planted out, being allowed to grow as an ordinary field crop. In order of ripening the plants are marked, until 10 plants have been selected. A record of performance is kept for each plant showing the yield of ripe fruit for the first two weeks, month and total season, besides noting the amount of rough fruit produced. Then a study of the performance of the individual plants reveals the desirable strain to use for further selection work. In addition to this a strain test is conducted to ascertain the segregation of greatest merit by actually growing plants from the selected strain in comparison with strains of other varieties.

At any rate Alacrity as it is to-day has been found to mature or ripen the first fruit in 95 to 100 days.

FOUNDATION STOCK SEED PRODUCTION

The development of pure strains of vegetable seed has been the subject of discussion for a considerable time, but little impetus was given to this work until very recent years, when an effort was made to establish standards for the various varieties found in the seed catalogues. In fact, few people realized the importance, or that there could be pure strains of vegetables, but this is quite possible if sufficient time be devoted to the selection and breeding necessary to eliminate the undesirable characters to, at least, a point where there will be a strong resemblance between the plants of a given strain.

It was at the meeting of the Canadian Seed Growers' Association held at the Ontario Agricultural College, Guelph, in June, 1924, that the first Vegetable Committee was called together for the purpose of deciding upon the varieties of vegetables to be accepted as standards and to restrict the use of synonymous names, as no doubt it is well known the confusion caused by a variety being listed three or four times in the same catalogue under a different name. A list of standard names was tentatively prepared at that meeting, that since, with minor alterations, is known as the Official List of Standard Names. Copies of this list, as corrected at the Oka meeting, June, 1926, have been printed and are available to interested parties.

From the inception of this undertaking the Horticultural Division, Central Experimental Farm, Ottawa, has co-operated very closely with the Seed Branch in conducting the preliminary tests with seed samples collected for verification, and in fact, Mr. W. T. Macoun, the Dominion Horticulturist, has been Chairman of the Vegetable Committee as well as referee and member of the Plant Breeders Committee. In no small measure has the Horticultural Division contributed to the furtherance of this work, because with limited land available for the regular work of plant breeding, cultural tests, strain tests, the testing of many additional samples was carried out each year, as can be seen by previous reports on this work. In addition, the writer, Mr. T. F. Ritchie, was acting Secretary and a member of the Vegetable Committee, just previously mentioned. As a result of this close contact with the work a careful study was made of the seed supply existing or at least as indicated by the samples supplied from the many sources, placing the writer in a position to visualize the situation from every angle. It was found that a small percentage of the strains of the varieties submitted could be considered as very good, and could be used as the basis for seed stock productions.

The assignments of varieties for Foundation Stock seed growing was definitely discussed at the Oka meeting, June, 1926, with the following assignments made to the Horticultural Division.

Beans, Round Pod Kidney Wax; beets, Detroit Dark Red; carrot, Chantenay; corn, Pickaninny; cucumber, Davis Perfect; lettuce, Grand Rapids; onions, Yellow Globe Danvers, Red Wethersfield; parsnip, Hollow Crown; squash, Warty Hubbard; tomato, Livingston Globe.

For many years individual plant selection with all the above varieties had been conducted with the exception of Warty Hubbard squash and Livingston Globe tomato, which is to be commenced with the season of 1927. Similar awards of suitable varieties were made to other Experimental Farms and Stations and Agricultural Colleges in other parts of Canada.

To the readers of this report it might be of value to know the regulations governing the production of the different grades of seed from Foundation Stock to Elite and the Registered grades. The following regulations cover this phase of the work.

REGULATIONS CONCERNING THE PRODUCTIONS OF FOUNDATION SEED, ELITE STOCK SEED AND REGISTERED SEED, UNDER THE C.S.G.A.

A. Self-Fertilized Plants

(Including such crops as Beans and Garden Peas)

1. "Foundation Seed" should constitute the traceable progeny of a strain proven by inspection to be of uniform type and outstanding merit and be produced from one, or in special cases, more plants, of recorded origin in the hands of the original breeder or Station or legal successors.

(*a*) Before Foundation Seed may be registered with the C.S.G.A. as such, it must be proven by inspection, to be of uniform type and outstanding merit.

(*b*) There should be a standard percentage of uniformity for each kind of vegetable.

(*c*) The acreage of "Foundation Stock" of any one strain produced by any one grower or station is limited to one quarter of an acre.

(*d*) Immediately after Foundation Seed is passed out of the hands of the original breeder, it becomes Elite Stock Seed.

2. "Elite Stock Seed" constitutes the multiplied progeny of "Foundation Seed" or subsequently of "Elite Stock Seed" when registered with the C.S.G.A.

(*a*) Before Elite Stock Seed may be registered with the C.S.G.A. as such, it must be proven by inspection, of uniform type and outstanding merit.

(*b*) Such official inspection includes two examinations of the outstanding crop at times as required.

(*c*) Beans and Garden Peas, to be recognized in official inspection for Elite Stock Seed must be planted at not less than 5 yards distance from plants of the same variety or kind.

(*d*) The seed must be planted in a manner to permit effective rogueing with adequate pathways at least every four feet.

(*e*) The acreage of "Elite Stock Seed" of any one strain produced by one grower or station is limited to five acres.

3. "Registered Seed" constitutes the multiplied progeny of "Elite Stock Seed" or subsequently of "Registered A Seed" of less than the fourth generation.

(*a*) In every case such multiplication, to be recognized as "Registered Seed," must be examined and passed upon by authorized inspectors, and must meet the requirements laid down in the Seed Act.

(*b*) "Registered Seed," to be recognized in official inspection must be planted at not less than 5 yards distance from plants of the same variety or kind.

(*c*) When registered seed has completed its fourth generation, the grower, who desires to produce "Registered A Seed" must secure for foundation either, and preferably, "Elite Stock Seed" or "Registered A Seed" of a younger generation.

(*d*) "Registered B Seed" cannot be used for the production of registered seed.

B. Open-Fertilized Plants

(Including such crops as Sweet Corn, Cabbage, Kale, Kohl Rabi, Brussels Sprouts, Broccoli, Cauliflower, Mustards, Onions, and Leeks, Celery, Cucumbers, Melons, Pumpkins, Squash, Parsley, Chicory, Endive—the only slightly crossing lettuce, Tomatoes, Peppers and Egg Plant—and the dioecious, Spinach, and Asparagus.)

1. "Foundation Seed" should constitute the traceable progeny of a strain, proven by inspection to be of uniform type and outstanding merit and be produced from one, or in special cases, more plants, of recorded origin, in the hands of the original breeder or station, or their legal successors.

(*a*) Before Foundation seed may be registered with the C.S.G.A. as such, it must be proven by inspection, to be of uniform type and outstanding merit.

(*b*) There should be a standard percentage of uniformity for each kind of vegetable.

(*c*) The acreage of Foundation Seed of any one strain produced by any one grower or station is limited to one quarter of an acre.

(*d*) Immediately after Foundation Seed is passed out of the hands of the original breeder, it becomes Elite Stock Seed.

2. "Elite Stock Seed" constitutes the multiplied progeny of "Elite Seed" or subsequently of "Elite Stock Seed" when registered with the C.S.G.A.

(*a*) Before Elite Stock Seed may be registered with the C.S.G.A. as such, it must be proven by inspection, to be of uniform type and outstanding merit.

(*b*) Such official inspection includes one or more examinations of the crop at times as required.

(*c*) Except in the case of the same identical strain. "Elite Stock Seed," to be recognized in official inspection, must be planted at sufficient distance from plants of the same variety or kind. Unless otherwise protected, I.E. by intervening woods, orchards or other suitable insulation, a distance of approximately one-half mile should be allowed between different sorts, except in the case of Lettuce, Tomato, Pepper and Egg Plants, which may be grown at 25 yards distance between different sorts.

(*d*) The seed and plants must be planted in rows with sufficient distance between individual plants to permit effective rogueing and inspection.

(*e*) Strains which have already been accorded registration may be used for the production of "Elite Stock Seed" provided the regulations for the growing and inspection of such seed are complied with.

(*f*) "Stock Seed" which has been officially "Blanketed-in" by the C.S.G.A. may be used for the production of "Registered B Seed," until recognized "Elite Stock Seed" has been produced from the variety or strain in question.

(*g*) The acreage of "Elite Stock Seed" of any one strain produced by any one grower or station is limited to five acres.

3. "Registered Seed" constitutes the multiplied progeny of "Elite Stock Seed" whether obtained from a grower of "Elite Stock Seed" or produced by the grower of "Registered Seed" provided the conditions as set forth above regarding the production of "Elite Stock Seed" are complied with.

(*a*) "Registered A Seed" may be used as foundation for "Registered B Seed" but, "Registered A Seed" can only be produced from "Elite Stock Seed."

(*b*) In every case such multiplication to be recognized as "Registered Seed" must be examined and passed upon by authorized inspectors and must meet the requirements laid down in the Seed Act.

(*c*) Such official inspection includes one or more examinations of the crop in question at times when required.

(*d*) Except for Lettuce, Tomatoes, Peppers and Egg Plants, which may be grown for seed at 10 yards distance from plants of the same variety or kind, no "Registered Seed" of this class to be recognized in official inspection can be planted at less than one quarter of a mile distance from plants of the same variety or kind, unless properly protected by adequate insulation.

(*e*) With the exception of such strains which have already been accorded registration. "Registered Seed" which has been produced from "Blanketed-in" stock seed shall not be graded higher than "Registered B."

SUGGESTIONS FOR FOUNDATION STOCK SEED GROWING

The following suggestions for Foundation Stock Seed growing are the direct outcome of an effort to establish this industry in Canada and to be of assistance to growers desiring to commence the establishment of stock seed. The need of a standard method is obvious since uniformity is of great importance. The preparation of these suggestions has been based upon many years of experience with seed growing in the Horticultural Division, Central Experimental Farm, Ottawa, and if followed closely should be helpful to the beginner in connection with establishing and maintaining pure line strains.

At the Vancouver meeting of the Canadian Seed Growers' Association, these suggestions were submitted to, and approved by the Horticultural Committee. Therefore, it would seem that a further step has been made in the direction of establishing the foundation of the seed growing industry in Canada.

The growing of Foundation Stock Seed of vegetables in Canada is yet in its infancy and for this reason it is necessary to formulate some suggestions to place in the hands of intending growers. It is impossible at the present time to get stock seed of many of the varieties and as a consequence it will be necessary for growers to establish by breeding and selection strains that may be considered as foundation seed.

The establishment of such stock seed cannot be accomplished in one or two seasons, but will require careful testing of many strains, subjecting them to rigid rogueing and the elimination of those strains that are inferior.

A series of suggestions have been drawn up to cover the establishment of foundation stock, from which may later be produced elite stock seed, when the strains have been proven to be fixed and possess outstanding merit.

Asparagus

In this type of crop there are male and female plants therefore it is necessary to select plants of both sex that conform to the ideal, from the standpoint of type, earliness and productiveness, plant these in pairs in isolation or one male plant with two or more of the other sex. Seed from each female plant should be kept separate and the progeny observed for desirable characters. The male and female plant producing the most desirable type offspring should be retained for further seed production.

Beans—Peas

Both beans and peas being quite closely self-fertilized do not require the careful isolation that some other crops require. There is however about 5 per cent crossing that takes place by open pollination but this usually occurs in crowded fields. Of the variety being selected for seed growing it will be necessary to grow as large a population of plants as can be handled to advantage. Plant the seed at a distance apart in the row that will allow the individual plants space to develop and allow a proper study of the character of each. In the case of bush beans, dwarf and intermediate peas, eight inches or more apart in the row with the rows thirty or more inches apart will suffice. In selecting plants from the general population, tagging and numbering should be employed and the seed of each plant harvested as a unit. Recognized statistical methods should be employed to determine the selection to be used for propagation. The progeny of individual plants should each year form the basis of the seed production. In the case of pole beans and tall peas more space would be required and methods of training them to stakes or trellis will suggest themselves to the grower.

Beet—Carrot—Parsnip

To establish stock plants, the grower should obtain seed of a proven strain of the variety decided upon. Should this be impossible, it will be necessary to obtain seed of several strains; test them for trueness to type and purity, selecting the strain conforming nearest to the ideal and from this material, select the roots possessing the desirable conformation. Obtain full data concerning the different strains as this will be found advantageous when testing the progeny of the selected roots. This should contain notes on tops and roots and should indicate the degree of variation measured by statistical methods if possible.

It is recommended that as large a population of plants as possible be grown each year, as this will enable a better selection to be obtained. In no wise should the plants be grown thickly in the rows as it is highly desirable to obtain well developed full grown roots, so that the form may be observed.

With complete notes on the characters of the plants decided upon for isolation as individuals or where two plants are to be grown together the following season, it would be advisable to label the plants accordingly at harvest time so that when planting the following spring the correct plants will be isolated according to the breeders idea. This will facilitate the work greatly.

Plant the roots out in the spring as early as soil and weather conditions will permit.

Where plants show a tendency to not set seed it may be necessary to resort to hand pollination. For this work a soft hair brush has been found very satisfactory. Care should be taken to sterilize the brush in alcohol after each cross or selfing is made.

From the seed of the parent plants a progeny test should be conducted each year, and from the test plots stock plants should be again selected. After the progeny has been found to run true to a reasonable range of variation the roots possessing good form may then be used for Foundation and Elite Stock seed production.

Onions

While the onion is considered in the group of biennial plants yet the requirements for seed production are slightly different from that of the root crops. Many plants may be grown in quite close proximity to one another and just before the blooms open the flower heads can each be covered with a five pound paper bag. Fasten the bag around the stalk by means of a paper clip. Where particular plants are grown for seed production it is advisable to do the pollination with a small soft hair brush. First remove the paper bag, then pass the brush across the anthers shedding pollen touching the pistils. It has also been found that pollination may be successfully accomplished by rapping the flower stalk and paper bag; this method will not produce as good a set of seed, and while being more rapid yet it is not as satisfactory as the brush method.

The same method applies to onions for the establishment of stock plants as to the other biennial crops. The bulbs should be carefully dried before storing in the autumn, and placed in ventilated crates, then stored in a dry dark cool room where the temperature can be maintained just above freezing.

Cabbage—Cauliflower—Celery

These three crops being biennials may be treated similarly to the root vegetables in so far as the production of seed is concerned. The plants are selected for the type of head produced, and should conform to the ideal type for the variety. In-breeding is recommended as a means of obtaining a homozygous or fixed type of plant. Each year the progeny of the parents should be grown in a progeny test to obtain the range of variation and seed produced from the selected plants as indicated for the other biennials.

Corn

The corn crop belonging to the open or wind pollinated group of plants is quite easy of culture. The first requisite is to obtain seed of known origin and should this be impossible then it will be necessary to obtain several of the best strains of the desired variety, grow them in test plots and from these select a strain of outstanding merit. In-bred seed can be obtained from the strains decided upon. In this work it will be necessary to resort to bagging both the tassels and ears. Half pound manila paper bags may be used for covering the ears, while seven pound bags are used to enclose the tassel. These can be fastened on by folding the bags close around the ear and stalk and by means of a "fast grip" paper clip the bag may be held in place. When the pollen is running free the bag should be removed from the ear, exposing the silks and the pollen from the tassel of the same plant dusted on, then replace the bag over the silk and fasten securely. It is advisable to self-fertilize a number of ears to be sure of having several strains to grow the following year. Once a homozygous strain has been obtained the progeny must be carefully grown to avoid further combinations. The ear to row method may be employed once a fixed strain has been obtained.

Cucumber, Melons, Pumpkin, Squash, Vegetable Marrow:

If possible obtain seed from a strain of known origin of the variety desired. Should this be impossible, it will be necessary to obtain several strains and grow as large a number of plants of each as can be handled. Grow the plants at a suitable distance apart to permit notes to be taken on each vine, which should include the character of fruits produced, earliness, uniformity and yield. Self-fertilize flowers on each plant to insure getting seed from the most desirable strain or strains. The seed from the plants chosen as parents will then be used for further selection work the following season, and from these plants will be obtained inbred seed for the next generation. Each year fruits are to be self-fertilized on several vines and progeny tests conducted to determine the most desirable strain.

Lettuce:

This is an annual crop that is usually self pollinated. It is quite simple to grow seed that will be pure with the plants only a short distance apart. It is not advisable however to practice such planting close as a small percentage of crossing may take place. The variety to be grown having been decided upon, obtain seed of as good a strain as is procurable and commence with saving seed from the most desirable plants; the following year conduct a progeny test to ascertain which strain will prove most satisfactory, selecting stock plants from this population and discarding undesirable plants. When the progeny shows fixation the seed from these selected plants may be used for stock seed.

Egg Plant, Pepper, Tomato:

These crops are included in the group of plants that slightly cross in open pollination and therefore can be treated from a standpoint of each plant as a unit for selection without much isolation. A few rods apart should be found sufficient to guard against cross fertilization.

It is recommended, however, that seed of known origin be obtained if possible, of the variety desired, and failing to obtain such seed, then it would be necessary to obtain seed of several strains and select a strain from these conforming to the ideal. From the seed of the selected plants a progeny test

should be conducted each year, growing as large a population as possible, possibly one hundred plants and from these select by statistical methods the progeny to be used for further work. By all means the individual plant must be the basis of each year's selection.

Radish:

This crop may be divided into annuals and biennials. The summer varieties fall in the first group while the winter sorts come under the latter group.

Obtain seed of known origin if possible or failing this procure seed of several strains of the variety desired and conduct progeny tests to ascertain the most desirable strain from which the plants to be used as stock plants would be selected. The best method to employ is to sow the seed early in a mild hot bed or a cold frame and when the radishes are ready for use the roots should be pulled and selected for type, retaining those with the proper conformation. The tops should be carefully removed from these, and the roots immediately planted out in an isolated place. The following year strain tests are to be conducted with the progeny of each of the plants and selections made from these as previously mentioned. In the case of the winter sorts the roots would have to be grown, selected and stored over winter, being treated as other biennials.

Spinach:

As this is an annual crop it is rather easy to handle. Obtain seed of known origin if possible. Should this be impossible, it will be necessary to obtain a number of strains and conduct a test to ascertain which one will yield the most uniform plants. It is advisable to grow as large a population as possible so as to be able to rogue out the undesirable types and retain those that conform to the ideal. It is advisable to bear in mind that the flowers produced on these plants are usually unisexual, the pistillate usually axillary and the staminate in terminal spikes or panicles.

The progeny from isolations or selections should be grown each year in a strain test from which the parent plants should be chosen and this continued from year to year.

The greatest ambition of a grower should be to produce a strain of a variety that will bring repeat orders. If the production of pure strains is successfully accomplished by Canadian growers, the demand for such seed will warrant the extra time spent in segregation work. No doubt many disappointments will be experienced first in obtaining the desirable material, second in the segregations from parent plants selected for perpetuation, but one of the chief things to keep in mind is conformation to the ideal type for the variety. Therefore to obtain a suitable stock plant, it will be necessary to grow a large population from which to select for type and quality.

STANDARD DESCRIPTIONS OF VEGETABLES

The preparation of a type book as a guide to seed growers has been a direct outgrowth of the undesirable condition of the seed supply, especially vegetable seeds. During the period from 1914 until the present a lot of seed had been sold to growers as seed that would produce true to type as described in the catalogues, that proved entirely different from the description given, when the crops were harvested. With this difficulty and the feared shortage of seed, an effort was made to stimulate seed production in Canada. The results proved beyond doubt that seed of excellent quality could be grown, and to the present time there are seed growers, that started then, that are producing seed of good quality and of no mean repute. To meet the needs of this young industry it

was found necessary to prepare some kind of a guide to enable growers to produce crops with a common ideal for each variety in mind, but to complete such an undertaking would require a considerable time, due to the great difficulty of securing strains of the varieties bred true enough that they could be used for description purposes.

In 1924, at the annual meeting of the Canadian Seed Growers' Association held at O.A.C., Guelph, the Standard List of Variety Names was decided upon to serve as a tentative guide, subject to alterations if it was found necessary. This list was again revised in 1925 at the Edmonton meeting of the association, and at this meeting the committee under the chairmanship of Mr. W. T. Macoun, Dominion Horticulturist, and comprised of representatives of the various Experimental Farms, Agricultural Colleges, seed growers, and T. F. Ritchie, acting secretary, decided upon type pictures of the various varieties that would serve as a guide in the preparation of the standard descriptions in connection with the preparation of a type book.

During the summer of 1924 and 1925 field notes were obtained on a large proportion of the varieties included in the Standard List of Variety Names. Photographs were taken of the plants conforming closely to the type decided upon by the Horticultural Committee, and as far as possible this material was made ready for the preparation of the type book which is to be published in a series in bulletin form.

The first bulletin of the series entitled Beets and Carrots, as a Guide to Seed Growers, by T. F. Ritchie, Assistant in Vegetable Gardening, is now in print, and available to seed growers and other interested parties. The other publications are to be published as quickly as possible or at least as soon as the incomplete notes on some of the varieties have been completed.

OTHER LINES OF WORK

The other lines of work being carried on embrace cross-breeding of sweet corn for earliness, vigour and quality; breeding tomatoes for earliness, smoothness, disease resistance and quality; peas for canning, to obtain high sugar content, small size and productiveness; inbreeding such crops as beets, cabbage, carrots, muskmelons, onions, parsnips and squash.

To the present, considerable success has been obtained with the above crops, in fact some of the productions as mentioned in former reports have proved of considerable merit.

Cultural and variety tests are conducted, and coupled with this is the purity test work in connection with the licensing for sale of alleged new varieties or permitting the use of a new variety name.

ORNAMENTAL GARDENING

The ornamental grounds at the Central Experimental Farm continue to attract thousands of people during the growing season, when there is an attractive display of flowers and ornamental trees and shrubs from early in the spring to late in the autumn. Many varieties are under test, and, as these are well labelled, visitors obtain much useful information. The results of the experiments with ornamental plants are published, from time to time, in the annual report and in bulletins. Assistance in making more beautiful the home surroundings in Canada in this way is, it is believed, an important part of the work of the Horticultural Division. The more attractive the home grounds are made the happier and more contented are the people likely to be.

AGNES ROSE

Much publicity has been given this rose because in 1926 it was awarded the Walter Van Fleet Gold Medal of the American Rose Society, the first time that this medal was awarded, although it had been available since 1923. The medal was offered for an American originated rose that could be termed an outdoor rose.

The Agnes rose is a cross between the Japanese rose (*Rosa rugosa*), which was the seed parent, and the Persian Yellow, the pollen parent. The cross was made by the late Dr. Wm. Saunders at the Central Experimental Farm, Ottawa, in 1900. It bloomed first in 1902, and has been under test at Ottawa ever since, during all of which time it has never been noticeably injured by winter. The habit of the plant and the texture of the leaves somewhat resemble *Rosa rugosa*. The flowers are double, and pale amber in colour, and are borne singly and in great profusion. The originator described it as "pale yellow, the outer petals with a delicate creamy salmon hue." It is fragrant and blooms early, but only once in the season. Because of its extreme earliness, great hardiness, and the distinct and attractive colour of the flower, this rose is proving a valuable addition to the roses of the Rugosa group. The Rugosa hybrid roses are among the most satisfactory for the colder parts of Canada and the United States, but the range of colour in the flowers of this group has been very limited, and the Agnes rose introduced a new colour.

Plants of this rose were sent to the trial grounds of the American Rose Society in 1923, and to other places, and when it bloomed attracted much attention.

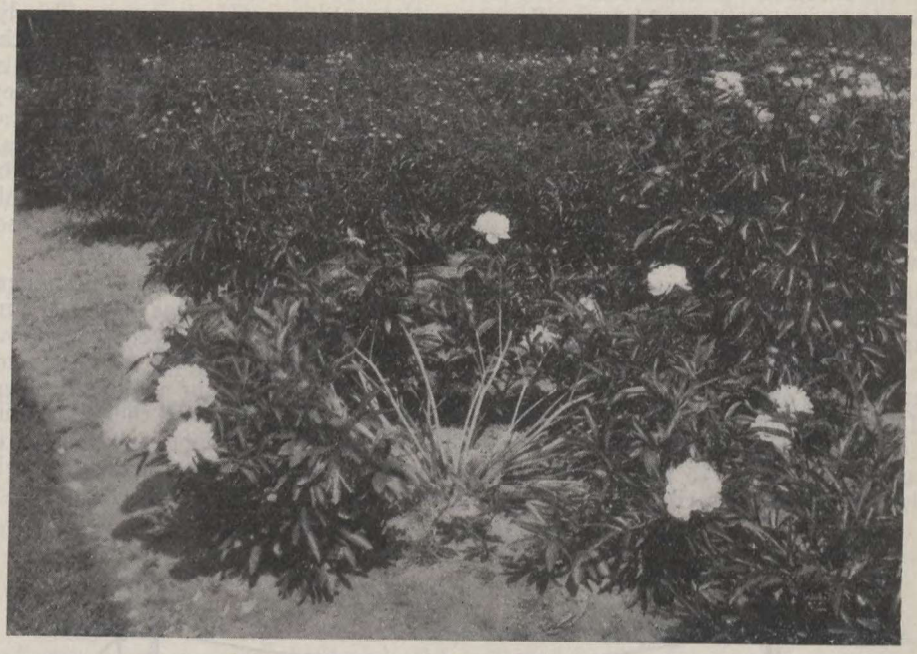
The presentation of the Walter Van Fleet Gold Medal was made at Port Stanley, Ont., on July 2, 1926, on the occasion of a banquet given by the citizens of St. Thomas in connection with a pilgrimage of the members of the American Rose Society to Canada. The medal was presented by Mr. F. L. Atkins, Rutherford, N.J., president of the society, in the presence of Mr. W. E. Saunders, London, Ont., son of the originator, and was received for the Department of Agriculture, Experimental Farms Branch, Division of Horticulture, by Mr. M. B. Davis, Chief Assistant in the division.

THE PEONY

Next to the rose and gladiolus, the peony is, perhaps, the most popular flower in Canada, and there are, undoubtedly, many more persons growing the peony successfully than the rose.

The collection of peonies at the Central Experimental Farm is a good one, including, as it does, most of the best varieties. As, with the gladiolus and other important flowers, it is not planned to have a very large collection, but rather to have the best sorts so that they may be compared with novelties and seen by those who desire to establish peony gardens. There are now some 220 varieties in the collection.

The peony is one of the hardiest ornamental plants, and succeeds well in every province of the Dominion. Few insects or diseases affect it. Even when not in bloom, it looks well as the foliage is quite ornamental throughout the growing season. The wonderful range of form of the flowers, the delightful colouring from the purest white to the deepest crimson through pale pink, pink, deep pink, rosy pink, and other charming shades, and the delicate perfume give the strong combination of good qualities which help to make it the popular flower that it is. Its culture is easy. It succeeds in a great range of soils, providing the drainage is good, but gives, perhaps, the best blooms when planted in a clay loam. There is little difficulty, however, in growing it in most gardens. For freest blooming it should be in bright sunlight for the longest possible time. It does not bloom well in shade, and in very shady places will not bloom at all.

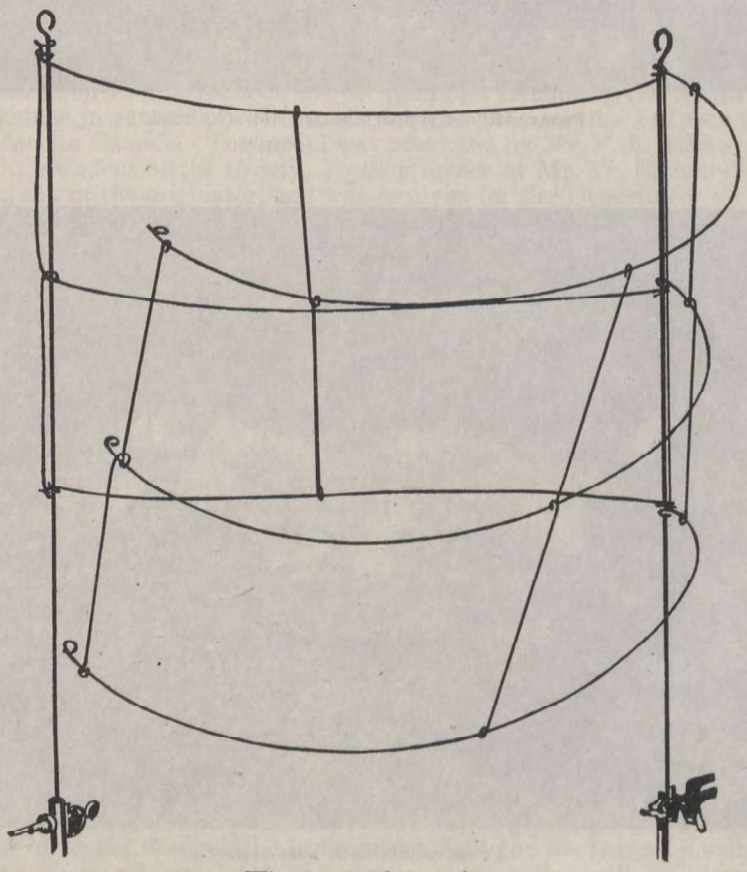


Peony without support beaten down by rain.

Peony plants with wire supporter.

It should not be planted near trees whose roots run through the ground where it would be as it will not bloom well under such conditions. If planted too deeply, it will not bloom well, if at all. The best time to plant peonies is during the autumn months of September, October, and November. The month of September is, perhaps, the best time, though, if planted in November, they succeed very well. If planted in the spring, they should be planted as early as possible. When planting, the crown or dormant buds should not be more than about three inches below the surface of the ground. As peonies should not be disturbed for many years after they are planted for best results, it is desirable to give them plenty of room, hence the plants should not be less than four feet apart.

Until recently no satisfactory method of supporting peony plants at blooming time had been found, but the support now used, which was designed and made locally, has been found very satisfactory, and supports the peonies without any appearance of stiffness. The support has a flair at the top so the stems may hang over in a natural manner, but, at the same time, do not break down. It is made of stiff wire, in two pieces, which are put around the plant and fastened together by two wire pins. The height of the support for peonies of average height is 15 inches. It is 20 inches in diameter. The illustrations will help further to describe this very satisfactory support.



Wire support for peonies.

While some of the very expensive varieties of high merit are not included in the following list of desirable sorts there will be found there some of the best, taking into consideration the desirability of having early, medium, and late blooming varieties with a good range of colour—

Best Varieties of Peonies

White.—Duchesse de Nemours (Calot), Le Cygne, Marie Lemoine.

White, edged or flecked with crimson or carmine; and flesh white.—Avalanche, Baroness Schroeder, Couronne d'Or, Festiva maxima, La Rosière, Madame de Verneville, Madame Emile Lemoine, Marie Jacquin.

Pale pink and pale pink fading to white, or edged with white.—Asa Gray, Eugène Verdier, Grandiflora (Richardson's), Mademoiselle Leonie Calot, Madame Jules Dessert, Marguerite Gérard, Octavie Demay, Solange, Tourangelle, Triomphe de l'Exposition de Lille.

Pink.—Claire Dubois, Edulis Superba, Livingstone, Madame Auguste Dessert, Madame Geissler, Modeste Guérin, Monsieur Jules Elie, Thérese, Walter Faxon, Sarah Bernhardt.

Red.—Felix Crousse, Longfellow.

Dark Red.—Adolphe Rousseau, Monsieur Martin Cahusac, Philippe Rivoire.

THE GLADIOLUS

Many varieties of gladioli have been tested in the Horticultural Division, and each year some are added and others discarded, the object being to have a collection of the best, which may be seen by visitors to the Experimental Farm; which may be also used for comparison with novelties; and in order that short lists of best varieties may be published, from time to time, as in this report. There were under test in 1926 some 555 varieties, of which 157 are primulinus.

The gladiolus is one of the most popular of garden flowers. This is not surprising as they are easy to grow and the colours are so numerous that everyone can find some varieties that fit in the garden plan. Any good garden soil will grow gladiolus well. If manure is needed it should be dug into the soil in the fall and not when the corms are planted. The time to plant varies according to the locality and season. When the frost is out of the ground and the soil can be got into good condition then planting can be started. Gladiolus are generally grown in rows but if desired they can be put in clumps of five or six in the flower border. The corms should be planted three or four inches deep in a double row with three or four inches between each bulb and two or three feet between each row. A sunny position should be chosen if possible. Thorough cultivation must be practised all through the season in order to keep down weeds and to conserve moisture. In very dry weather a good soaking of water about once a week is beneficial. For cut flower purposes the stems are cut when the first bud opens, but when the flowers are needed for display in the garden they can be left on the plant as long as they are decorative; but they should not be allowed to go to seed. When cutting leave two sets of leaves on the plant as these are needed to give strength to the new corm that is growing. When the leaves show signs of ripening or as generally happens in the colder sections of the country the frost damages them, dig up the corms and lay them in shallow boxes taking care not to lose the cormels. If there are only a few of a variety they can be put in paper bags. The best way to ripen the corms is to leave them in the open air during fine weather but if there is danger of frost they must be taken inside at night, or they can be kept in an airy shed or room. When the stems are dried and can be easily broken off, remove and destroy them and the old corms. The new corms and

cormels should be put in boxes or bags and kept in a frost proof cool cellar for the winter. In spring the small cormels should be sown in a shallow trench and kept well cultivated. In a few years time these will grow into flowering sized corms and a large collection can soon be obtained from quite a small outlay.

All corms should be examined at planting time for signs of disease and during the growing season if any leaves begin to show yellowing or leaf spotting the plant should be dug up with the surrounding soil and removed to some place where it can be destroyed at once. Diseased bulbs can be sent to the Division of Botany, Central Experimental Farm, Ottawa, and information will be sent on the control of disease.

There are two distinct types of gladiolus generally grown in gardens,—the large flowered and the primulinus. In the first as the name implies the flowers are large and the plants strong. The colours range through white pink, red to purple and in recent years quite a number of good yellows have appeared. The primulinus hybrids have been produced from a species of the same name which is deep yellow in colour and has the upper petal hooded. Many of these hybrids are different in habit as well as in size of bloom, and a trace of the hooded petal is generally present. The chief charm of these is in the beautiful apricot shade of many of them, and the daintiness of the flowers makes them very useful as cut flowers.

The number of varieties of gladiolus is very large and as new ones are constantly being put on the market it is impossible to know them all. The following lists are made up of good sorts that have been tested at the Central Experimental Farm, and most of them can be bought at reasonable prices.

Large-flowering Varieties

White.—Albania, Carmen Sylva, Imperator, La Beauté, L'Immaculée, Mary Pickford, Peace; Joerg's White is rather expensive but very fine.

Yellow.—Flora, Gold, Golden Measure, Schwaben, Golden Dream is much the finest of its colour but it is still very expensive.

White or Cream with dark blotch.—Elora, La Couronne, La Luna, Mme. Mounet Sully.

Pink.—Catherine Coleman, Century, Dr. W. Van Fleet, E. J. Shaylor, Elizabeth Tabor, Evelyn Kirtland, Halley, Jenny Lind, Louvain, Mrs. Dr. Norton, Mrs. Richard Lohrman, Nautilus, Pink Perfection, Pink Wonder, Roem van Kennermerland, Sheila, W. H. Phipps.

Red.—Britannia, Crimson Glow, Dr. F. E. Bennett, Majestic (Groff), Mrs. Velthuys, Neoga, Pride of Hillegom, Scarlano, War.

Blue and Purple shades.—Anna Eberius, Baron J. Hulot, Blue Jay, Duchess of York, Kalamazoo, Purple Glory, Rev. Ewbank.

Primulinus Varieties

Yellow.—Butterboy, La Lys (Vilmorin), Souvenir, Golden Gate.

Cream.—La Divette (Vilmorin), Thoth.

Apricot, Salmon or Pink.—Alice Tiplady, Hermione, Lady Byng, La Cousance (Vilmorin), Linton, L'Yser (Vilmorin), Ming Toy, Mrs. Cran (Kelway), Salmon Beauty.

Red.—Arden, Firefly, Midsummer Dream.

GREENHOUSE EXPERIMENTS

The main experiments being conducted in the greenhouses at present are:—

Florists' Flowers

Antirrhinum.—Comparison of novelties with older varieties and methods of culture.

Carnation.—Comparison of novelties with older varieties and methods of culture.

Chrysanthemum.—Comparison of varieties, origination of new ones, and methods of culture.

Gladiolus.—Comparison of varieties for forcing.

Sweet Pea.—Comparison of novelties with older varieties recommended for forcing, and methods of culture.

Among other flowers being grown are: Cineraria, Cyclamen, Geranium, Schizanthus, and Bulbs.

Vegetables

Cucumber.—Development of a variety especially suitable for forcing, and methods of culture.

Lettuce.—Development of a head lettuce especially suitable for forcing.

Tomatoes.—Development of a tomato for forcing with large clusters, and good size.

Breeding work with fruits and vegetables for outside is also done in the greenhouses.

Fruits

Many kinds and varieties of fruits are grown in pots and brought into bloom in the greenhouse, where cross-breeding is done.

NEW CHRYSANTHEMUMS

Two new Chrysanthemums, originated in the greenhouses of the Horticultural Division, were named this year; one on the occasion of the reception given by the Canadian Government to Her Majesty, the Queen of Roumania, in the greenhouses, on October 28, 1926, which was named by Her Majesty "Regina Maria." The other was named "Marie Adelaide" by Her Excellency, the Viscountess Willingdon, when she opened the Chrysanthemum Exhibition on November 6, 1926.

Regina Marie.—Parentage White Mensa x H. Marie Totty. A very attractive, single flowered variety. Colour terra cotta.

Maria Adelaide.—Parentage open pollinated seedling of Portia, 1924. A fine, single flowered variety. Colour reddish bronze.

Name of Variety and Source of Seed	Number of plants	Date of first bloom	Date of first cutting	Date of last cutting	Number of cuttings	Average number of flowers per stem, first cutting	Average number of flowers per stem, all cuttings
Aviator—Dobbie	8	10-3-26	16-3-26	20-4-26	16	2	3
Blue Jacket—Burpee	8	18-3-26	22-3-26	20-4-26	15	2	3
Bright and Early—Dobbie	8	12-3-26	16-3-26	20-4-26	11	2	3
Cheerful—Burpee	8	8-3-26	16-3-26	20-4-26	14	2	3
Cherry Ripe—Burpee	8	16-3-26	22-3-26	20-4-26	17	2	3
Chevalier—Burpee	8	10-3-26	16-3-26	20-4-26	15	2	3
Christmas Carol—Dobbie	8	10-3-26	16-3-26	20-4-26	12	2	3
Columbia—Burpee	8	18-3-26	22-3-26	20-4-26	18	3	3
Columbia—Dobbie	8	18-3-26	23-3-26	20-4-26	15	2	3
Early Bluebird—Burpee	8	10-3-26	16-3-26	20-4-26	17	2	3
Early Daintiness—Burpee	8	25-2-26	1-3-26	20-4-26	14	2	2
Early Daybreak—Burpee	8	13-3-26	16-3-26	20-4-26	13	2	3
Early Exquisite—Burpee	8	12-3-26	16-3-26	20-4-26	12	2	3
Early Flambeau—Skidelsky	8	4-3-26	7-3-26	20-4-26	15	2	3
Early Flowering Yarrawa—Burpee	8	18-3-26	23-3-26	20-4-26	10	2	3
Early King—Burpee	8	10-3-26	16-3-26	20-4-26	15	2	3
Early Lavender—Burpee	8	10-3-26	16-3-26	20-4-26	17	2	3
Early Mauve Beauty—Burpee	8	12-3-26	16-3-26	20-4-26	16	2	3
Early Princess—Burpee	8	7-3-26	16-3-26	20-4-26	16	2	3
Early Rose Dore—Skidelsky	8	3-3-26	5-3-26	20-4-26	20	2	3
Early Sweet Briar—Burpee	8	8-2-26	1-3-26	20-4-26	16	2	3
Early Zephyr—Burpee	8	7-3-26	16-3-26	20-4-26	15	2	3
Enchantress—Burpee	8	20-2-26	1-3-26	20-4-26	12	2	3
Fair Maid—Skidelsky	8	10-3-26	16-3-26	20-4-26	16	2	3
Fairy Queen—Burpee	4	19-3-26	23-3-26	20-4-26	7	2	2
Fire King—Burpee	8	17-3-26	23-3-26	20-4-26	13	2	3
Flamingo—Burpee	8	7-3-26	16-3-26	20-4-26	12	2	3
Fordhook—Burpee	8	10-3-26	16-3-26	20-4-26	14	2	3
Fordhook Rose Imp.—Burpee	8	10-3-26	16-3-26	20-4-26	15	2	3
Glitters—Burpee	8	10-3-26	16-3-26	20-4-26	15	2	3
Glitters—Dobbie	8	17-3-26	22-3-26	20-4-26	13	2	3
Glorious—Burpee	8	7-3-26	16-3-26	20-4-26	15	2	3
Grenadier—Burpee	8	12-3-26	16-3-26	20-4-26	12	2	3
Harlequin—Burpee	8	10-3-26	16-3-26	20-4-26	15	2	3
Harmony—Burpee	8	12-3-26	16-3-26	20-4-26	13	2	3
Harmony—Dobbie	8	17-3-26	22-3-26	20-4-26	13	2	3
Hercules—Dobbie	8	18-3-26	23-3-26	20-4-26	12	2	3
Illumination—Burpee	8	12-3-26	16-3-26	20-4-26	17	2	3
Improved Snowstorm—Burpee	8	14-3-26	16-3-26	20-4-26	14	2	3
Irene—Skidelsky	4	19-3-26	23-3-26	20-4-26	9	2	3
King Tut—Burpee	8	18-3-26	23-3-26	20-4-26	14	2	3
Lemon Beauty—Burpee	8	23-3-26	26-3-26	20-4-26	9	2	2
Loveliness—Burpee	8	27-2-26	5-3-26	20-4-26	12	2	3
Maroon Prince—Burpee	8	10-3-26	16-3-26	20-4-26	14	2	3
Milkmaid—Burpee	8	8-3-26	16-3-26	20-4-26	12	2	3
Miss Spokane—Burpee	8	10-3-26	16-3-26	20-4-26	12	2	3
Mrs. Kerr—Skidelsky	8	10-3-26	16-3-26	20-4-26	15	2	3
Mrs. Kerr—Burpee	8	7-3-26	16-3-26	20-4-26	12	2	3
Mrs. W. G. Harding—Burpee	8	7-3-26	16-3-26	20-4-26	12	2	3
Orange Beauty—Skidelsky	8	7-3-26	16-3-26	20-4-26	13	2	3
Orange—Burpee	8	12-3-26	16-3-26	20-4-26	18	2	3
Peace—Dobbie	8	10-3-26	16-3-26	20-4-26	15	1	3
Peach Blossom—Burpee	8	12-3-26	16-3-26	20-4-26	13	2	3
Penrose—Burpee	8	16-3-26	22-3-26	20-4-26	12	2	3
Pink Beauty—Burpee	8	4-3-26	16-3-26	20-4-26	13	2	3
Pink Beauty—Skidelsky	8	10-3-26	16-3-26	20-4-26	16	2	3
Quaker Lady—Burpee	8	7-3-26	16-3-26	20-4-26	15	2	3
Rosebud—Burpee	8	24-2-26	1-3-26	20-4-26	19	2	3
Rose Queen—Burpee	8	16-3-26	19-3-26	20-4-26	14	2	3
Snowflake—Burpee	4	10-3-26	16-3-26	20-4-26	10	2	3
Snowstorm—Skidelsky	8	10-3-26	16-3-26	20-4-26	17	2	3
Splendor—Burpee	8	8-3-26	16-3-26	20-4-26	15	2	3
Sunburst Improved—Burpee	8	7-3-26	16-3-26	20-4-26	20	3	3
Torch—Burpee	8	4-3-26	16-3-26	20-4-26	15	2	3
Torch—Dobbie	4	19-3-26	23-3-26	20-4-26	9	1	3
True Blue—Burpee	8	18-3-26	19-3-26	20-4-26	16	2	3
White Star—Burpee	8	12-3-26	16-3-26	20-4-26	13	2	3
Zvolanek Blue—Skidelsky	8	8-3-26	16-3-26	20-4-26	17	2	3
Zvolanek Rose—Burpee	8	10-3-26	16-3-26	20-4-26	16	2	3
Zvolanek Rose—Skidelsky	8	8-3-26	16-3-26	20-4-26	16	2	3
Zvolanek Rose—Dobbie	8	18-3-26	22-3-26	20-4-26	16	2	3

CONDUCTED IN GREENHOUSE

Average length of stem at first cutting inches	Average length of stem, all cuttings inches	Number of stems cut first two weeks from time earliest variety was cut	Number of stems cut first month from time earliest variety was cut	Total number of stems cut	Average number of stems per plant	Height of plants when pulled ft.	in.	Value commercially: xxx 1st in quality, xx 2nd in quality, x 3rd in quality
11	15	43	164	249	31	8	..	xxx
11	12	64	260	260	33	7	6	xxx
9	14	24	101	159	20	9	4	xx
10	13	19	129	187	23	8	..	xxx
12	12	84	267	267	33	5	10	xxx
10	12	49	116	164	21	9	4	xxx
9	10	35	96	127	16	7	2	xx
11	14	75	248	248	31	8	..	xx
12	12	63	217	217	27	8	4	xx
12	15	59	186	271	34	8	4	xxx
9½	13	10	53	177	22	8	4	xx
9	11	38	143	195	24	7	..	xxx
11	12	27	123	178	22	7	..	xx
9	10	12	113	245	31	8	..	xxx
12	12	55	169	169	21	8	4	xx
14	15	30	154	236	30	7	2	xxx
11	12	34	136	211	26	8	4	xxx
12	12	28	108	146	18	10	..	xxx
13	13	24	197	288	36	6	..	xxx
10	12	31	129	290	36	5	6	xx
8	9	33	83	193	24	5	..	x
10	10	40	190	226	28	6	..	xxx
7½	12	8	50	147	18	8	..	xx
10	11	24	58	77	10	8	2	xx
9	10	6	34	34	9	6	6	xx
13	14	53	169	169	21	6	6	xxx
12	10	28	106	147	18	7	6	xxx
13	14	18	128	186	23	6	4	xxx
8½	12	15	153	181	23	8	2	xxx
9½	10	40	129	179	22	6	..	xxx
10	10	50	152	152	19	8	2	xxx
11	12	74	226	328	41	8	2	xxx
14½	18	35	126	158	20	7	8	xxx
10	12	34	110	162	20	6	8	xx
12	16	34	112	144	18	8	4	xxx
12	12	47	116	116	15	8	6	xxx
12	10	26	105	105	13	8	..	xx
10	10	34	133	184	23	6	4	xx
14	14	22	109	159	20	7	..	xxx
11	12	19	106	106	27	6	6	xx
12	12	75	217	217	27	6	..	xx
13	13	19	69	69	9	6	4	xx
10	14	17	57	148	19	5	8	xx
11	13	23	155	242	30	7	6	xxx
11½	14	27	121	169	21	8	4	xxx
13½	16	30	148	222	28	9	..	xx
10	13	32	138	199	25	8	..	xxx
11	13	27	110	135	17	8	2	xxx
9½	13	39	147	204	26	6	6	xxx
11	12	31	123	168	21	8	2	xxx
12	13	32	163	213	27	7	4	xxx
11	17	24	115	176	22	9	6	xxx
13	13	36	146	213	27	8	2	xxx
10	11	29	81	81	10	5	..	xxx
10½	10	40	129	216	27	5	6	xx
10	12	38	150	218	27	8	2	xxx
10	12	47	163	247	31	7	6	xxx
8	13	11	53	254	32	6	4	xxx
12	13	22	121	141	18	5	10	xxx
10½	13	9	44	85	21	6	8	xxx
12	13	28	161	250	31	8	4	xxx
10½	12	43	140	200	25	7	..	xxx
13	13	39	214	283	35	7	..	xxx
10½	13	31	145	214	27	6	2	xxx
12	16	10	61	61	15	6	3	xx
10	11	37	130	145	18	7	4	xx
12	15	26	81	156	20	8	..	xxx
11	12	72	209	288	36	8	2	xx
13	12	36	129	184	23	8	4	xxx
15	16	39	202	302	38	8	2	xxx
12	14	42	176	176	22	8	..	xxx

The popularity of sweet peas grown during the winter months has increased with great rapidity in Canada in recent years. This has been brought about partly by the introduction of varieties especially suitable for forcing and partly because it was found that the sweet pea did well under glass, and was one of the most profitable flowers to grow.

In order to obtain some data as to the relative value of the different varieties recommended for winter blooming, an experiment was conducted in one of the greenhouses at Ottawa during the winter of 1925-26, and seventy-one different lots were grown. Of these, sixty-three had distinct names and eight names were duplicated.

The seed was sown in two and one-half inch pots on November 10, 1925, and the plants were set in the bed on December 21, 1925. The soil was rotted sod and manure. The plants were set six inches apart in rows twenty-five inches apart. Binder-twine was used on which to string the plants. The night temperature was kept at an average of 50° F. The total area occupied by the plants was 576 square feet and the total number of plants set out was 552. The plants grew well, and conditions were quite favourable for a good test. The headings in the table indicate the records that were kept and the results obtained.

As the greenhouse was new, and a proper rotation of crops had not yet been established, it became necessary to remove the sweet peas on April 20, 1926, to make room for another crop. The plants were still in good condition at that time, and sweet peas could have been cut for another month or more.

Another plantation of sweet peas was made in the winter of 1926-27, and provision was made to leave the plants until well into spring. The results here published give, however, information which it is hoped will be of value to sweet pea growers.

Some of the Most Attractive Varieties of Sweet Peas

White.—Improved Snowstorm, Snowstorm, Milkmaid.

Cream.—Burpee's Lemon Beauty.

White suffused with mauve pink.—King Tut, Fair Maid, Early Flowering Yarrawa.

Pale pink to pink suffused with white.—Sunburst Improved.

Pink or clear pink suffused with white.—Christmas Carol, Peace.

Mauve pink suffused with white.—Zvolanek Rose, Pink Beauty, Hercules, Fordhook Improved.

White and mauve pink.—Loveliness.

White and rosy pink.—Columbia.

Deep rose.—Penrose, Torch.

Rosy red.—Fire King, Illuminator.

Deep rosy red.—Grenadier.

Salmon pink suffused with white.—Mrs. Kerr, Cheerful.

Rosy red and salmon suffused with white.—Early Flamingo.

Light mauve—lavender.—Mrs. W. G. Harding, Quaker Lady, Early Princess.

Mauve-lavender—.Harmony, Burpee's Early Lavender.

Light bluish lavender.—Irene, Early Zephyr.

Bluish purple.—Early Bluebird, Zvolanek Blue.

Violet purple and bluish purple.—Burpee's Blue Jacket.

Rosy purple.—Burpee's Glorious.

CARNATION EXPERIMENT

There is very little in regard to the cultivation of Carnations about which it seems possible to render useful service to florists through experimental work as Carnations are grown to such a high state of perfection by good growers, but there is very little information available as to the number of blooms that may be cut during the winter months either from the older varieties or from the newer ones. A comparison was, therefore, made of these in the winter of 1925-26 to obtain some information in regard to this, and the results obtained are given in the tables which follow.

Object of the Experiment.—To compare the newer varieties of Carnations with the established varieties.

How the Experiment was Conducted.—The middle side house (No. 6) was used for the experiment.

Varieties Grown:

Autumn	Laddie
Belle Washburn	Maine Sunshine
Betty Jane	Matchless
Betty Lou	Mrs. C. Joy
Brilliant	Mrs. C. W. Ward
Cupid	Mrs. Wm. Hemers
Donald	Othello
Edward Allwood	Pocohontas
Enchantress Supreme	Red Laddie
Good Cheer	Red Superb
Gypsy	Sensation
Harvester	Spectrum
Iora	Superb
Johnson's Crimson	Topsy

Date of making cuttings—5/2/25 to 6/3/25.
Date of transplanting into 2½-inch pots—18/3/25 to 8/4/25.
Date of planting in the field—19/5/25.
Distance apart of planting in the field—Rows 2 feet with plants 1 foot.
Date of planting in greenhouse—17/9/25 and 18/9/25.
The soil was rotted sod and manure.
Distance apart of planting on benches in greenhouse—10 inches.
Distance apart of planting in bed in greenhouse—15 inches.
The average night temperature was 50° F.
Total number of plants on benches—480.
Total number of plants on bed—128.
Total area occupied by plants on benches—468 square feet.
Total area occupied by plants in bed—180 square feet

EAST

Variety	Number of plants	Date of first flowering	Number of marketable flowers, Nov.
Belle Washburn	21	6- 1-26	.....
Betty Jane	21	24-12-25	.....
Betty Lou	12	4-12-25	.....
Enchantress Supreme	12	4-12-25	.....
Gypsy	9	6- 1-26	.....
Harvester	24	7-12-25	.....
Johnson's Crimson	12	18-12-25	.....
Laddie	12	29- 1-26	.....
Matchless	12	24-12-25	.....
Mrs. C. Joy	24	4-12-25	.....
Mrs. C. W. Ward	12	15- 1-26	.....
Othello	12	21-11-25	20
Pocohontas	12	6- 1-26	.....
Red Superb	12	4-12-25	.....
Sensation	9	9- 1-26	.....
Spectrum	21	6- 1-26	.....
Total	237	.....	20

WEST

Variety	Number of plants	Date of first flowering	Number of marketable flowers, Nov.
Autumn	12	18-12-25	.....
Belle Washburn	18	6- 1-26	.....
Betty Lou	9	15- 1-26	.....
Brilliant	12	18-12-25	.....
Cupid	12	18-12-25	.....
Donald	9	23-11-25	5
Edward Allwood	12	12-12-25	.....
Good Cheer	12	19-12-25	.....
Gypsy	12	6- 1-26	.....
Harvester	9	9- 1-26	.....
Iora	12	6- 1-26	.....
Laddie	18	11- 1-26	.....
Maine Sunshine	12	8- 3-26	.....
Matchless	12	28-11-25	3
Mrs. Wm. Hemers	12	18-12-25	.....
Othello	12	27-11-25	2
Red Laddie	12	9- 1-26	.....
Sensation	12	9- 1-26	.....
Superb	12	14-12-25	.....
Topsy	12	23-12-25	.....
Total	243	.....	10

BENCH

Number of marketable flowers, Dec.	Number of marketable flowers, Jan.	Number of marketable flowers, Feb.	Number of marketable flowers, Mar.	Number of marketable flowers, April	Total number of marketable flowers, Nov.-April	Total number of unmarketable flowers, Nov.-April	Average number of marketable flowers per plant, Nov.-April
.....	10	13	38	40	101	1	4·8
5	6	9	26	32	78	.....	3·7
12	9	13	34	55	123	.....	10·2
17	12	11	23	50	113	11	9·4
.....	7	10	16	20	53	2	5·8
14	22	29	74	41	180	.....	7·5
4	9	14	16	19	62	.....	5·1
.....	1	9	18	28	56	.....	4·6
4	13	18	33	18	86	.....	7·1
53	52	53	86	55	299	3	12·4
.....	2	8	13	21	44	16	3·6
23	19	11	22	30	125	9	10·4
.....	4	14	20	18	56	.....	4·6
11	7	10	17	16	61	10	5·0
.....	6	14	13	15	48	1	5·3
.....	17	21	31	39	108	46	5·1
143	196	257	480	497	1,593	99	6·5

BENCH

Number of marketable flowers, Dec.	Number of marketable flowers, Jan.	Number of marketable flowers, Feb.	Number of marketable flowers, Mar.	Number of marketable flowers, April	Total number of marketable flowers, Nov.-April	Total number of unmarketable flowers, Nov.-April	Average number of marketable flowers per plant, Nov.-April
7	10	18	18	28	81	.....	6·7
.....	4	4	15	23	46	.....	2·5
.....	5	12	12	28	57	.....	6·3
7	15	17	13	28	80	12	6·6
8	12	15	30	30	95	14	7·9
17	8	9	19	28	86	3	9·5
12	21	13	43	35	124	4	10·3
4	9	9	14	22	58	2	4·8
.....	8	16	18	38	80	4	6·6
.....	7	14	28	98	147	5	16·3
.....	9	20	23	32	84	.....	7·0
.....	6	16	27	48	97	.....	5·3
.....	.....	.....	11	23	34	.....	2·8
44	11	14	23	28	123	3	10·2
21	14	27	39	37	138	9	11·5
6	18	17	19	21	83	17	6·9
.....	3	6	14	23	46	10	3·8
.....	7	23	23	24	77	2	6·4
12	12	19	26	30	99	2	8·2
3	15	18	20	38	94	5	7·8
141	194	287	435	662	1,729	92	7·3

AVERAGE OF EAST

Variety	Number of plants	Date of first flowering	Number of marketable flowers, Nov.
Autumn	12	18–12–25	.....
Belle Washburn	39	6– 1–26	.....
Betty Jane	21	24–12–25	.....
Betty Lou	21	4–12–25	.....
Brilliant	12	18–12–25	.....
Cupid	12	18–12–25	.....
Donald	9	23–11–25	5
Edward Allwood	12	12–12–25	.....
Enchantress Supreme	12	4–12–25	.....
Good Cheer	12	19–12–25	.....
Gypsy	21	6– 1–26	.....
Harvester	33	7–12–25	.....
Iora	12	6– 1–26	.....
Johnson's Crimson	12	18–12–25	.....
Laddie	30	11– 1–26	.....
Maine Sunshine	12	8– 3–26	.....
Matchless	24	28–11–25	3
Mrs. C. Joy	24	4–12–25	.....
Mrs. C. W. Ward	12	15– 1–26	.....
Mrs. Wm. Hemers	12	18–12–25	.....
Othello	24	21–11–25	22
Pocohontas	12	6– 1–26	.....
Red Laddie	12	9– 1–26	.....
Red Superb	12	4–12–25	.....
Sensation	21	9– 1–26	.....
Superb	12	14–12–25	.....
Spectrum	21	6– 1–26	.....
Topsy	12	23–12–25	.....
Total	480	.....	30

EAST

Variety	Number of plants	Date of first flowering	Number of marketable flowers, Nov.
Autumn	8	8– 2–26	.....
Belle Washburn	8	15– 2–26	.....
Brilliant	8	15– 1–26	.....
Cupid	8	15– 1–26	.....
Edward Allwood	16	8– 2–26	.....
Good Cheer	8	8– 2–26	.....
Harvester	8	29– 1–26	.....
Iora	8	8– 2–26	.....
Mrs. C. Joy	8	15– 2–26	.....
Mrs. C. W. Ward	8	12– 3–26	.....
Mrs. Wm. Hemers	8	8– 2–26	.....
Red Superb	8	15– 2–26	.....
Sensation	8	8– 3–26	.....
Superb	8	15– 2–26	.....
Topsy	8	29– 1–26	.....
Total	128	.....	.....

AND WEST BENCHES

Number of marketable flowers, Dec.	Number of marketable flowers, Jan.	Number of marketable flowers, Feb.	Number of marketable flowers, Mar.	Number of marketable flowers, April	Total number of marketable flowers, Nov.-April	Total number of unmarketable flowers, Nov.-April	Average number of marketable flowers per plant, Nov.-April
7	10	18	18	28	81	.....	6·7
.....	14	17	53	63	147	1	3·8
5	6	9	26	32	78	.....	3·7
12	14	25	46	83	180	.....	8·5
7	15	17	13	28	80	12	6·6
8	12	15	30	30	95	14	7·9
17	8	9	19	28	86	3	9·5
12	21	13	43	35	124	4	10·3
17	12	11	23	50	113	11	9·4
4	9	9	14	22	58	2	4·8
.....	15	26	34	58	133	6	6·3
14	29	43	102	139	327	5	9·9
.....	9	20	23	32	84	.....	7·0
4	9	14	16	19	62	.....	5·1
.....	7	25	45	76	153	.....	5·1
.....	.....	.....	11	23	34	.....	2·8
48	24	32	56	46	209	3	8·7
53	52	53	86	55	299	3	12·4
.....	2	8	13	21	44	16	3·6
21	14	27	39	37	138	9	11·5
29	37	28	41	51	208	26	8·6
.....	4	14	20	18	56	.....	4·6
.....	3	6	14	23	46	10	3·8
11	7	10	17	16	61	10	5·0
.....	13	37	36	39	125	3	5·9
12	12	19	26	30	99	2	8·2
.....	17	21	31	39	108	46	5·1
3	15	18	20	38	94	5	7·8
284	390	544	915	1,159	3,322	191	6·8

BED

Number of marketable flowers, Dec.	Number of marketable flowers, Jan.	Number of marketable flowers, Feb.	Number of marketable flowers, Mar.	Number of marketable flowers, April	Total number of marketable flowers, Nov.-April	Total number of unmarketable flowers, Nov.-April	Average number of marketable flowers per plant, Nov.-April
.....	.....	5	13	16	34	.....	4·2
.....	.....	8	29	20	57	.....	7·1
.....	6	13	10	51	80	.....	10·0
.....	4	10	30	28	72	.....	9·0
.....	.....	21	36	50	107	.....	6·6
.....	.....	8	7	20	35	.....	4·3
.....	2	21	7	33	63	.....	7·8
.....	.....	5	10	20	35	.....	4·3
.....	.....	13	30	32	75	8	9·3
.....	.....	.....	6	40	46	.....	5·7
.....	.....	8	23	66	97	.....	12·1
.....	.....	3	9	33	45	2	5·6
.....	.....	.....	8	38	46	2	5·7
.....	.....	3	13	57	73	5	9·1
.....	1	11	19	28	59	.....	7·3
.....	13	129	250	532	924	17	7·2

AVERAGE FOR WHOLE HOUSE

Variety	Colour of flower	Total number of plants in House	Total number of marketable flowers in House Nov.-April	Average number of marketable flowers per plant in House Nov.-April	Average number of unmarketable flowers per plant in House Nov.-April
Autumn	Deep salmon	20	115	5·7	.....
Belle Washburn	Brilliant scarlet	47	204	4·3	·02
Betty Jane	Rose pink	21	78	3·7	.....
Betty Lou	Rose pink	21	180	8·5	.....
Brilliant	Scarlet	20	160	8·0	·6
Cupid	Salmon pink	20	167	8·3	·7
Donald	Crimson	9	86	9·5	·3
Edward Allwood	Scarlet	28	231	8·2	·1
Enchantress Supreme	Pale salmon pink	12	113	9·4	·9
Good Cheer	Rose pink	20	93	4·6	·1
Gypsy	Scarlet	21	133	6·3	·2
Harvester	White	41	390	9·5	·1
Iora	Salmon pink	20	119	5·9	.....
Johnson's Crimson	Crimson	12	62	5·1	.....
Laddie	Salmon pink	30	153	5·1	.....
Maine Sunshine	Deep sulphur yellow	12	34	2·8	.....
Matchless	White	24	209	8·7	·1
Mrs. C. Joy	White	32	374	11·6	·3
Mrs. C. W. Ward	Rose pink	20	90	4·5	·8
Mrs. Wm. Hemers	Light rose pink	20	235	11·7	·4
Othello	Scarlet	24	208	8·6	1·0
Pocohontas	Crimson	12	56	4·6	.....
Red Laddie	Scarlet	12	46	3·8	·8
Red Superb	Scarlet	20	106	5·3	·6
Sensation	Light rose pink	29	171	5·8	·1
Superb	Salmon pink	20	172	8·6	·3
Spectrum	Rich scarlet	21	108	5·1	2·1
Topsy	Deep crimson	20	153	7·6	·2
		608	4,246	6·9	·34

The plants in this experiment grew well, and the results give a fair idea of the number of blooms which might be expected from some varieties, though several years' tests are necessary as averages are, of course, more reliable. Moreover, as some of the plants for this experiment were received from different sources at different times and in different condition, the results obtained from this first year's test are not reliable so far as showing how one variety compares with another, but give an indication of what blooms may be cut per plant during the winter months. The plants in the bed were in rows 15 inches apart with Gladioli between. The Carnations flowered well, but there were few blooms on the Gladioli, and a greater distance apart would seem to be necessary to grow these two crops together satisfactorily.

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