APPENDIX TO THE REPORT OF THE MINISTER OF AGRICULTURE

EXPERIMENTAL FARMS

REPORTS

OF THE

DIRECTOR		WM. SAUNDERS
AGRICULTURIST		JAS. W. ROBERTSON
HORTICULTURIST		JOHN CRAIG
CHEMIST		F. T. SHUTT, M.A.
ENTOMOLOGIST and BOTANIST		JAS. FLETCHER
POULTRY MANAGER		A. G. GILBERT
SUPT. EXPERIMENTAL FARM,	Nappan, N.S.	WM. M. BLAIR
" "	Brandon, Manitoba	S. A. BEDFORD
" "	Indian Head, N.W.T.	ANGUS MACKAY
" "	Agassiz, B.C.	THOS. A. SHARPE

FOR

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1896

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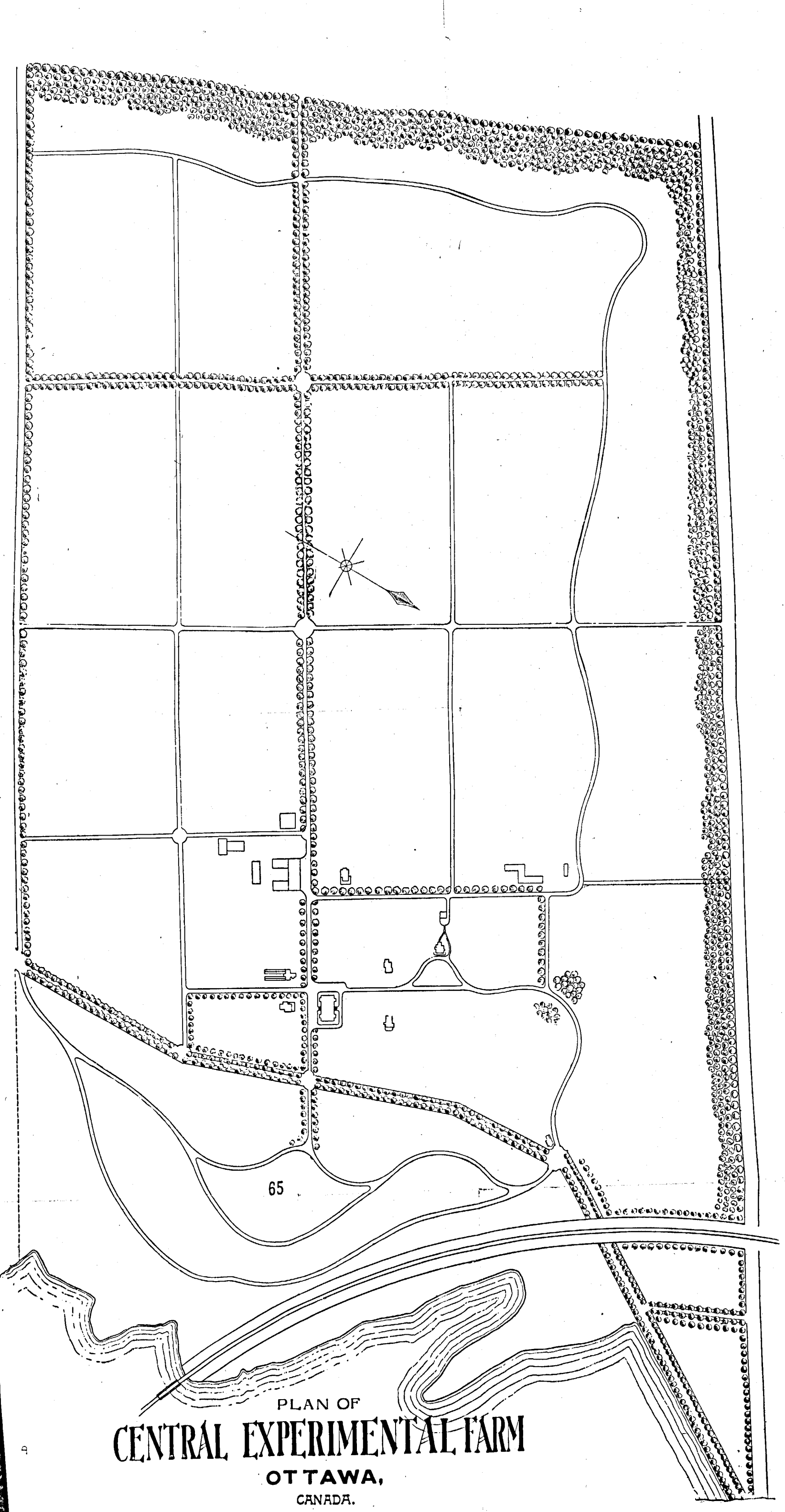
Fig. 1. Office Building, Museum and Chemical Laboratory of the Central Experimental Farm.



PLAN OF

CENTRAL EXPERIMENTAL FARM

OTTAWA,

CANADA.

APPENDIX

TO THE

REPORT OF THE MINISTER OF AGRICULTURE

ON

EXPERIMENTAL FARMS.

—o—

OTTAWA, 30th November, 1895.

SIR,—I have the honour to submit for your approval the ninth annual report of the work done and in progress at the several experimental farms established in different parts of the Dominion.

You will also find appended reports from the following officers of the Central Experimental Farm: From the Agriculturist, Mr. James W. Robertson; from the Horticulturist, Mr. John Craig; from the Chemist, Mr. Frank T. Shutt; and from the Entomologist and Botanist, Mr. James Fletcher. A report is also submitted from the Poultry Manager, Mr. A. G. Gilbert.

From the branch experimental farms there are reports from Mr. Wm. M. Blair, superintendent of the experimental farm for the Maritime Provinces, at Nappan, Nova Scotia; from Mr. S. A. Bedford, superintendent of the experimental farm for Manitoba, at Brandon; from Mr. Angus McKay, superintendent of the experimental farm for the North-west Territories, at Indian Head; and from Mr. Thos. A. Sharpe, superintendent of the experimental farm for British Columbia, at Agassiz.

These reports contain particulars of the results of the experimental work which has been conducted in agriculture, horticulture and arboriculture embodying the outcome of much practical work in the fields, orchards, barns, dairy and poultry buildings; also of scientific investigation of chemical problems in the laboratory and the careful study of the life history and habits of noxious insects and plants, with suggestions of measures calculated to lessen the injury they cause. Also details of the experiments which have been carried on during the past year in bee-keeping.

The increasing demand among farmers for these reports is a gratifying indication of the desire for information among this class of the community and of the high esteem in which these records of the work of the experimental farms are held. It is hoped that the facts brought together in the present issue will be found of practical value to the agricultural community, and that the information given will assist in the advancement of agriculture in Canada.

I have the honour to be, sir,

Your obedient servant,

WM. SAUNDERS,

Director.

The Honourable
The Minister of Agriculture,
Ottawa.

ANNUAL REPORT

ON THE

EXPERIMENTAL FARMS.

REPORT OF THE DIRECTOR.

(WM. SAUNDERS, F.R.S C., F.L.S. F.C.S.)

In submitting the results of the ninth year of work in connection with the experimental farms, it is gratifying to be able to record good returns at all the farms and unusually large yields on some of them, especially in regard to the grain grown on the two branch farms in the Canadian North-west. At the experimental farm at Indian Head, in the North-west Territories, the crops have been unusually heavy, much more than double the produce of 1894, and the returns at the experimental farm at Brandon have been a substantial advancement on the previous year. These unusually favourable returns indicate good climatic conditions, and from the crop reports issued by the Agricultural Department of the Government of Manitoba, it is evident that these favourable conditions have prevailed over a very large part of that province, and have resulted in an unprecedented yield of all the more important grain crops. Much advancement has been made throughout the north-western part of the Dominion in stock raising. In beef cattle alone there has been exported from Manitoba 22,000 head, which is about double the number exported in 1894. In the dairying industry continued and rapid progress has been made in nearly all the settled districts in the Dominion, there has also been much increase in the production of swine and poultry. Some smaller branches of agricultural industry have received increased attention, the area under flax has been more than doubled in Manitoba, and there has been a larger output of fruits in Nova Scotia and British Columbia.

The crops which have been obtained during the past year at the several experimental farms are believed to fairly represent the agricultural capabilities of much of the land in the provinces and territories whose interests these farms are intended to serve. At the central farm however, the crops are less representative than usual owing to exceptional conditions of weather. While the greater part of Ontario suffered during the summer from a protracted drought which proved injurious to most agricultural crops, a section of the province lying adjacent to the boundary of Quebec in which the Central Experimental Farm is located has been favoured with an abundant rainfall most of which has been favourably distributed throughout the season. For this reason the crops at the central farm as compared with many parts of the province of Ontario are exceptionally good.

The experimental tests which have been carefully carried on with many varieties of all the more important agricultural crops for some years, have been continued during

the past season and the accumulated results obtained are increasing in value and trustworthiness as the facts which are gleaned each season are added to the information gained in previous years. In this way evidence of the strongest character is being accumulated as to the relative yield, earliness of ripening and other valuable qualities of the many different sorts of agricultural products under test. Also as to the best methods of preparing the land and the most suitable times for sowing.

As the experimental farms are too few and too widely separated to fully represent all the different climates and other conditions affecting agriculture throughout the Dominion, the endeavour has been made to enlist the co-operation of farmers everywhere in the useful work of testing varieties by distributing among them for this purpose samples of such products as have proved most valuable at the experimental farms. The heartiness with which the farmers of Canada have entered into this work has made it difficult to meet the wishes of all, and for lack of sufficient material some of those who have applied for samples late in the season have been unavoidably disappointed. During the spring of 1895, the number of applications received for samples for test was more than 31,000 and the number sent out was 26,036. In this way more than 40 tons of excellent seed all of which had been thoroughly cleaned, was distributed in three pound bags among about 26,000 farmers. A first distribution has also been made during the past season of some of the more promising varieties of new cereals which have been produced by cross fertilization at the experimental farms. About 2,000 samples of these have been sent out in one-pound bags for trial, and from the reports already received there is reason to believe that some of these will prove valuable additions to the list of varieties now in general cultivation. This work in all its branches has been undertaken with the hope that the samples distributed will with careful management, shortly produce sufficient quantities to sow in large acreage and that by thus gradually introducing without cost to the grower seed of the best and most productive varieties to replace such as are inferior, the yields of the various crops grown by Canadian farmers may be increased and their quality improved. The appreciation which has been manifested by the large class of producers for whose special benefit the experimental farms have been established not only of this but of all branches of the work undertaken is most encouraging.

EXPERIMENTS WITH OATS.

Comparative tests have been made during the season of 1895 with 45 varieties of oats, to ascertain their relative yield, earliness, and other qualities. They were all sown on the 29th and 30th of April, on plots of $\frac{1}{20}$th acre each. The soil was a clay loam of fair quality, which was manured in the spring of 1891 with about 20 tons of barn-yard manure per acre. It also received an application of wood ashes late in the autumn of 1893, about 150 bushels to the acre. No fertilizers have been applied since. The previous crop was wheat. The land was ploughed about 2 inches deep after the harvest of 1894 with the gang plough, and harrowed with the smoothing harrow, to cover and germinate weed seeds, and later in the autumn it was ploughed 8 inches deep. In the spring of 1895 it was gang-ploughed and harrowed with the smoothing harrow before sowing.

OATS—TEST OF VARIETIES.

Name of Variety.	Date of Ripening.	No. of days Maturing	Length of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	Weight per bushel.	Rusted.
			Inches.	Inches.		Bush. lbs.	Lbs.	
Banner	Aug. 6	98	48 to 55	9 to 10	Branching	74 4	34	Slightly.
Abundance	do 6	98	50 to 54	8 to 10	do	73 8	34½	do
American Beauty	do 8	100	51 to 55	8 to 10	do	72 12	35	do
Improved Ligowo	do 6	99	48 to 54	7½ to 9	do	70 20	38	do
Golden Beauty	do 8	101	48 to 55	8 to 9	do	69 4	33½	do
Columbus	do 7	100	48 to 54	8 to 10	do	69 4	32¾	do
American Triumph	do 7	100	48 to 57	8 to 10	do	68 18	34½	do
White Russian	do 6	98	52 to 55	8 to 10	Sided	67 32	33¾	do
Bavarian	do 8	100	48 to 55	8 to 9	Branching	67 2	33½	do
White Schonen	do 7	100	45 to 56	8 to 10	do	66 2	34¼	do
Wide Awake	do 9	102	48 to 57	8 to 10	do	65	35	do
Wallis	do 8	100	50 to 56	8 to 10	do	63 28	34	do
Cream Egyptian	do 7	99	48 to 55	7½ to 9	Half sided	62 22	39½	Very slightly.
Oderbruch	do 7	99	48 to 57	7 to 8	do	60 20	38½	do
Abyssinia	do 6	98	48 to 56	7 to 9	do	60	38	Slightly.
Early Golden Prolific	do 5	97	48 to 52	8 to 10	Branching	59 24	32¼	do
Joanette	do 9	102	42 to 50	7 to 9	do	59 24	34½	do
Californian Prolific Blk.	do 11	104	48 to 60	8 to 9	Sided	59 14	33	do
Lincoln	do 5	97	42 to 54	8 to 10	Branching	58 28	32¾	do
Golden Giant	do 13	105	45 to 53	10 to 11	Sided	58 8	30¾	Considerably.
Giant Cluster	do 13	105	42 to 54	10 to 11	do	58 8	31½	do
Flying Scotchman	do 1	93	54 to 60	8 to 10	Branching	58 8	36¾	Very slightly.
Coulommiers	do 22	115	51 to 55	8 to 10	do	56 16	33½	Slightly.
Early Archangel	July 27	88	42 to 55	8 to 10	do	56 6	40½	Very slightly.
Prolific Black Tartarian	Aug. 11	104	50 to 60	8 to 9	Sided	56 6	31¾	Slightly.
Early Blossom	do 11	103	48 to 54	8 to 10	Half sided	55 30	36¾	Considerably.
Imported Irish	do 1	93	52 to 56	10 to 12	Branching	55 30	41½	Very slightly.
Rosedale	do 6	98	48 to 55	7½ to 9	Half sided	55 30	38	Slightly.
Poland	do 1	93	42 to 54	7 to 9	Branching	55 10	38¼	Very slightly.
Holstein Prolific	do 8	101	48 to 57	8 to 9	do	54 4	34	Slightly.
Early Gothland	do 5	97	48 to 55	7½ to 8½	Half sided	52 2	36½	do
Scottish Chief	July 29	91	48 to 60	9 to 11	Branching	51 6	39½	Very slightly.
Victoria Prize	do 30	92	52 to 60	9 to 11½	do	51 6	40¼	do
Bonanza	Aug. 1	94	52 to 55	10 to 11	do	51 6	40¾	Slightly.
Welcome	do 5	98	52 to 57	10 to 12	do	49 14	37	Considerably.
Early Etampes	do 9	102	40 to 51	7 to 9	do	48 28	34	Slightly.
Prize Cluster	do 1	93	53 to 57	10 to 11	do	48 28	40½	Very slightly.
White Wonder	July 29	91	50 to 54	10 to 12	do	46 6	40½	do
Siberian	Aug. 13	106	50 to 60	9 to 11	Sided	45 10	33	Slightly.
Winter Grey	do 1	94	46 to 54	9 to 11	Branching	42 22	40½	Very slightly.
Hazlett's Seizure	do 7	100	48 to 55	9 to 11	do	42 12	38½	do
Rennie's Prize White	do 4	96	52 to 57	9 to 11	do	40	40	do
White Monarch	do 15	108	40 to 50	7 to 11	do	34 24	37½	Considerably.
Scotch Hopetown	do 20	112	51 to 55	8 to 10	do	28 8	31	Badly.
Royal Doncaster Prize	do 16	109	48 to 60	9 to 11	do	16 16	38	Considerably.

FIELD CROPS OF OATS.

Abundance.—Five acres. Sown on soil chiefly sandy loam, with a small proportion of peaty loam. The land was manured in the spring of 1894, with about 18 tons of barn-yard manure to the acre and cropped in 1894 with Prize Cluster oats It was gang-ploughed after harvest about two inches deep, and harrowed with the smoothing harrow to cover and germinate weed seeds, and ploughed about 8 inches deep later in the season. In the spring of 1895 it was gang-ploughed again about 4 inches deep and harrowed with the smoothing harrow immediately before sowing. Sown 10th of May ; two bushels per acre ; came up 21st of May, and was ripe on 13th August. The time to mature was 95 days. The yield per acre was 44 bushels 22 lbs.; weight per bushel, 32½ lbs.; length of head, 8 to 9 inches, branching ; length of straw, 40 to 46 inches ; lodged in a few spots where land was low ; made a strong even growth, and was very slightly rusted.

Bavarian.—Five acres. Sown on sandy loam adjoining the Abundance, the land having had the same manuring and treatment. The previous crop in this instance was also Prize Cluster oats. Sown 10th of May ; two bushels per acre ; came up 21st May, and was ripe on 19th August. The time to mature was 101 days. The yield per acre was 39 bushels 11 lbs. ; weight per bushel, 34 lbs. Length of head, 9 to 10 inches ; branching ; length of straw 45 to 48 inches ; standing fairly well—a few small spots only lodged ; medium growth and very even ; leaves and stems slightly rusted.

Wallis.—Eight acres. This was on sandy loam adjoining the Bavarian, and the manuring and treatment of the land was the same as for that variety. The previous crop was oats. Sown 10th May ; two bushels per acre ; came up 21st of May, and was ripe on 16th of August. The time to mature was 98 days. The yield per acre was 43 bushels 13 lbs.; weight per bushel, 34¾ lbs. Length of head, 8 to 10 inches ; branching ; length of straw, 45 to 48 inches ; standing fairly well ; only a few spots lodged ; strong even growth ; leaves and stems slightly rusted.

Golden Giant Side.—Six and one-half acres. The soil was sandy, with a whitish sandy subsoil, and was previously in meadow. This land was ploughed in the autumn when a fair second crop of clover was turned under. In the spring about 12 tons of barn-yard manure per acre was applied; the manure being distributed in small piles just as the snow was melting in the spring and spread over the land as soon as it was dry. This was ploughed under by turning a furrow about 5 inches deep, and it was harrowed with the smoothing harrow before sowing. Sown 11th of May ; two and one-quarter bushels per acre ; came up 21st of May, and was ripe 23rd of August. The time to mature was 104 days. The yield per acre was 39 bushels 11 lbs.; weight per bushel, 28½ lbs. Length of head, 7 to 9 inches ; sided ; length of straw, 46 to 50 inches ; all standing well ; made a strong even growth, and was very slightly rusted.

Banner.—Five acres. The land on which these oats were grown was sandy loam. The previous crop was part tobacco, part fall wheat, part Indian corn, and part oats. That portion of the land which was cropped with oats and tobacco in 1894, was manured in the spring of that year with about 12 tons of barn-yard manure per acre. This was not ploughed in the autumn of 1894, but was ploughed in the spring of 1895 from 6 to 7 inches deep, and harrowed with a smoothing harrow before sowing. The other part of the land, which was under fall wheat and Indian corn in 1894, was manured in the spring of 1893 with about 10 tons of barn-yard manure per acre, and cropped with oats that year. This land was ploughed in the autumn of 1894 about 8 inches deep and again in the spring of 1895 about 5 to 6 inches deep. Sown 17th May ; two bushels per acre ; came up 25th of May, and was ripe 20th of August. The time to mature was 95 days. Yield per acre, 45 bushels 6 lbs. ; weight per bushel 30 lbs. Length of head, 8 to 10 inches ; branching ; length of straw, 44 to 52 inches ; standing fairly well, only a few small spots lodged ; growth strong and even ; leaves and stems slightly rusted.

Early Gothland.—Five acres. In this instance the soil was a sandy loam, which was manured in the spring of 1894 by an application of about 15 tons of barn-yard manure per acre. This land was previously in meadow and the manure was used as a top dressing. It was ploughed in the autumn of 1894 about 8 inches deep, and ploughed again in the spring from 5 to 6 inches deep, and disc-harrowed and harrowed with the smoothing harrow before sowing. Sown 15th of May ; 1½ bushels per acre ; came up 23rd of May, and was ripe 19th of August. The time to mature was 96 days. Yield per acre, 48 bushels 8 lbs. ; weight per bushel, 32¾ lbs. Length of head, 8 to 9 inches ; sided ; length of straw, 48 to 54 inches ; straw coarse and badly lodged ; leaves and stems slightly rusted.

Oderbruch.—Three-fourths of an acre. This was sown adjoining the Early Gothland, and the soil and treatment of the land was similar. Sown 15th of May ; 1½ bushels per acre ; came up 23rd of May, and was ripe 17th of August. The time to mature was 94 days. Yield per acre, 45 bushels 12 lbs. ; weight per bushel, 32½ lbs. Length of head, 7 to 9 inches ; sided ; length of straw, 45 to 50 inches ; made a strong and even growth, but was considerably lodged ; leaves and stems slightly rusted. This variety has a stiff straw and has usually stood well. The lodging in this instance was

probably due to the fact that the land on which it was sown was considerably elevated, and the oats were thus exposed to the full force of the winds.

Siberian.—Seven-eighths of an acre. This also was sown on land adjoining Early Gothland, and on similar soil, with the same treatment. Sown 15th of May; 1¾ bushels per acre; came up 23rd of May, and was ripe 25th of August. The time to mature was 102 days. Yield per acre, 38 bushels 28 lbs.; weight per bushel, 32½ lbs. Length of head, 8 to 9½ inches; sided; length of straw, 48 to 55 inches; made a strong, even growth, but was considerably lodged, probably for the reason that the land was elevated and the oats thus exposed to the full force of the winds. The leaves and stems were very slightly rusted.

Rosedale.—Five and one-half acres. In this field the greater part of the soil was peaty, with a small proportion of sandy loam. The land was manured late in March, 1895, after most of the snow had melted, leaving just enough for sleighing, and the manure was distributed in small heaps, convenient for spreading as soon as the ground was dry. This land was previously in meadow. It was ploughed in the autumn of 1894 about 8 inches deep, and again in the spring of 1895 to a depth of 5 or 6 inches, and harrowed with the smoothing harrow before sowing. Sown 21st of May; 1½ bushels per acre; came up 29th of May, and was ripe 23rd of August. The time to mature was 94 days. Yield per acre, 29 bushels 24 lbs; weight per bushel, 24½ lbs. Length of head, 8 to 9 inches; half sided; length of straw, 45 to 51 inches; all standing well; growth fairly strong and even; leaves and stems badly rusted. This variety of oats has hitherto given large crops, and the unusually low yield in this instance may be attributed to the unsuitable character of the land, and the rust.

Rennie's Prize White.—One and one-half acres. The soil was sandy loam, which was manured and treated in the same manner as the field of Rosedale oats. Sown 21st of May; 1½ bushels per acre; came up 27th of May, and was ripe 14th of August. The time to mature was 85 days. Yield per acre, 22 bushels 9 lbs.; weight per bushel, 27¾ lbs. Length of head, 8½ to 9¼ inches; branching; length of straw, 42 to 45 inches, made a strong and even growth, but was considerably lodged; leaves and stems badly rusted. The comparatively small yield and light weight given by this usually good variety was no doubt due to the lodging and rust.

Early Golden Prolific.—Three and one-fifth acres. This was sown on land adjoining Rennie's Prize White; the soil was similar, and the manuring and treatment the same. Sown 21st of May; 2 bushels per acre; came up 27th of May, and was ripe 22nd of August. The time to mature was 93 days. Yield per acre, 35 bushels 22 lbs.; weight per bushel, 27¾ lbs. Length of head, 7 to 9 inches; branching; length of straw, 40 to 45 inches; growth medium and even, but badly lodged and broken down before fully ripe; leaves and stems considerably rusted. This oat is a new candidate for public favour. It is rather light in the grain, and, judging from the results of the test at Ottawa this year, it does not compare favourably, either in yield or quality, with many of the most esteemed sorts already in cultivation.

Joanette.—Two acres. This field was adjoining that of the Rosedale; the manuring and treatment of the land was the same, but the soil was peaty. Sown 22nd of May; 1½ bushels per acre; came up 30th of May and was ripe 6th September. The time to mature was 107 days. Yield per acre, 24 bushels 16 lbs; weight per bushel, 25¼ lbs. Length of head, 6 to 8 inches; branching; length of straw, 32 to 45 inches; made a medium but rather uneven growth, and the straw was badly broken down; the leaves and stems were badly rusted.

This is a small black oat, which makes a short growth of straw, and which, in ordinary loamy soils, usually stands well and yields a good crop. The oat also retains its colour well. The comparatively small crop given in this instance, was no doubt due to the unsuitable character of the soil. This variety is not distinguishable from that formerly grown under the name of Longfellow.

Poland White.—Two and one-sixth acres. This was sown adjoining the Joanette and on similar soil, and the manuring and treatment were the same. Sown 22nd of May; 1½ bushels per acre; came up 30th of May and was ripe 26th of August. The time to mature was 96 days. Yield per acre, 29 bushels 32 lbs.; weight per bushel, 28¼ bs

Length of head, 6 to 8 inches; branching; length of straw, 45 to 52 inches; the growth was strong and even and the straw stood fairly well; leaves and stems considerably rusted. The light crop and light weight of the grain in this instance also may be attributed to the unsuitable character of the land, and the rust.

EXPERIMENTS WITH BARLEY.

Thirty-six varieties of barley have been tested during the past season, nineteen of which were two-rowed sorts, and seventeen six-rowed. These were all sown in plots of $\frac{1}{20}$th acre each; the two-rowed varieties were all sown on the 2nd of May and the six-rowed sorts on the 1st and 2nd of May. These plots were adjoining those for the test of varieties of oats, the soil was similar and the treatment of the land the same. The previous crop was oats.

TWO-ROWED BARLEY—TEST OF VARIETIES.

Name of Variety.	Date of sowing.	Date of ripening	No. of days maturing.	Length of Straw.	Length of head.	Kind of head.	Yield per acre.	Weight per bushel.	Rusted.
				Inches.	Inches.		Bush. Lbs.	Lbs	
Sidney	May 2..	Aug. 1.	91	42 to 48	3 to 4	Two-rowed .	43 16	49¾	Very slightly.
Nepean	do 2..	do 1.	91	46 to 49	2½ to 3½	do ..	37 34	48	do
Duck-bill	do 2..	do 7.	97	46 to 50	3 to 3½	do ..	37 24	48	do
Pacer	do 2..	do 1.	91	42 to 45	2½ to 3½	do ..	36 12	48	do
Bolton	do 2..	do 4.	94	43 to 48	3½ to 5	do ..	35 30	47¾	Slightly.
Beaver	do 2 .	do 7.	97	45 to 48	4 to 4½	do ..	35 ..	48¼	do
French Chevalier	do 2..	do 7.	97	43 to 48	4 to 5	do ..	34 18	46	Considerably.
Victor	do 2..	do 1.	91	40 to 47	3 to 4	do ..	33 26	48¾	Very slightly.
Prolific (Wrinch)	do 2..	do 4.	94	36 to 42	3½ to 4½	do ..	30 40	46½	Slightly.
Suffolk Coast Chevalier No. 1	do 2..	July 30.	89	36 to 42	4 to 5	do ..	30 10	44	do
Newton	do 2..	Aug. 9.	99	45 to 46	3 to 4	do ..	29 18	47¾	Considerably.
Monck	do 2..	do 9.	99	52 to 55	3 to 4	do ..	28 36	51	Very slightly.
Suffolk Coast Chevalier, No. 2	do 2..	July 30.	89	34 to 42	4 to 5	do ..	28 36	43¾	Slightly.
Prize Prolific	do 2..	Aug. 7.	97	44 to 47	4½ to 5	do ..	28 6	44¼	Considerably.
Danish Chevalier	do 2..	do 8.	98	39 to 43	4 to 5	do ..	27 34	47½	Slightly.
Kinver Chevalier	do 2..	do 4.	94	42 to 45	4 to 5	do ..	26 42	44	do
Californian Prolific	do 2..	do 8.	98	40 to 44	3 to 3¾	do ..	26 2	46¼	do
Canadian Thorpe	do 2..	do 8.	98	42 to 45	3 to 4	do ..	25 40	46¼	do
Improved Thanet	do 2..	do 7.	97	41 to 45	4 to 5	do ..	21 42	44½	do

SIX-ROWED BARLEY—TEST OF VARIETIES.

Mensury	May 1..	July 24.	84	45 to 48	3 to 4	Six-rowed ..	58 6	47½	No rust.
Petschora	do 2..	do 19.	78	33 to 42	2½ to 3½	do ..	51 42	47½	do
Royal	do 2..	do 20.	79	35 to 43	2½ to 3½	do ..	51 12	49¼	Very slightly.
Success	do 2..	do 17.	76	39 to 46	2 to 2¾	do ..	51 12	45	No rust.
Odessa	do 2..	do 24.	83	36 to 42	2½ to 3	do ..	47 24	46¾	Very slightly.
Oderbruch	do 2..	do 28.	87	41 to 45	2½ to 3	do ..	47 14	48¼	do
Trooper	do 1..	do 22.	82	39 to 42	2½ to 3	do ..	46 42	50	do
Stella	do 2..	do 19.	78	41 to 45	2¼ to 3	do ..	46 2	46½	do
Vanguard	do 2..	do 20.	79	40 to 42	2¼ to 3	do ..	44 28	46¼	do
Common	do 1..	do 20.	80	40 to 44	2½ to 3	do ..	43 46	49	do
Nugent	do 1..	do 25.	85	40 to 43	2¼ to 3	do ..	42 44	45¾	do
Pioneer	do 2..	do 22.	81	42 to 46	2¼ to 3	do ..	42 34	47¾	do
Baxter's	do 2..	do 20.	79	36 to 43	2 to 2½	do ..	40 10	48½	do
Summit	do 1..	do 24.	84	42 to 45	2½ to 3	do ..	39 28	47¾	do
Phœnix	do 2..	do 22.	81	42 to 48	2¼ to 2¾	do ..	37 14	47½	do
Surprise	do 1..	do 26.	86	36 to 45	2¼ to 3	do ..	36 12	49¾	No rust.
Rennie's Improved	do 2..	do 24.	83	41 to 48	2¼ to 2¾	do ..	32 14	48	Very slightly.

FIELD CROPS OF BARLEY—TWO-ROWED SORT.

Canadian Thorpe.—3¾ acres. In this instance most of the soil was sandy loam, a small proportion only was peaty. This land was manured in the spring of 1893 with about 18 tons of barn-yard manure per acre and was cropped that year with oats. In 1894 it was under wheat. It was ploughed in the autumn of 1894 about 8 inches deep, and disc-harrowed in the spring of 1895 and harrowed with the smoothing harrow before sowing. Sown 3rd May, 2 bushels per acre, came up 8th May, and was ripe 6th August. The time to mature was 95 days. Yield per acre 24 bushels 34 lbs. ; weight per bushel 49¾ lbs. Length of head 3¾ inches ; two-rowed ; length of straw, 36 to 38 inches, growth medium but very uneven in character on account of variation in the quality of the land, all standing well, leaves considerably and stems very slightly rusted.

SIX-ROWED SORTS.

Royal.—One acre. The soil on which this barley was sown was clay loam ; the previous crop was oats. The land was manured in the spring of 1894 with about 18 tons of barn-yard manure per acre. It was gang-ploughed after harvest about 2 inches deep, and harrowed to cover and start weed seeds, and ploughed again about 8 inches deep later in the autumn. In the spring of 1895 it was gang-ploughed, and harrowed with the smoothing harrow before sowing. Sown 2nd May, 1¾ bushels per acre, came up 8th May, and was ripe July 24th. The time to mature was 83 days. Yield per acre 39 bushels 8 lbs.; weight per bushel 51 lbs.; length of head, 3 to 3½ inches ; six-rowed ; length of straw, 34 to 38 inches ; growth medium and fairly even, all standing well, no smut or rust.

Trooper.—One acre. This was sown adjoining Royal on similar soil which had received the same manuring and treatment. The previous crop was oats. Sown 2nd May ; 1¾ bushels per acre, came up 8th May, and was ripe 26th July. The time to mature was 85 days. Yield per acre, 39 bushels, 23 lbs.; weight per bushel, 51 lbs.; length of head, 2½ to 3 inches ; six-rowed; length of straw, 30 to 36 inches ; growth medium to under medium, no rust or smut. In this plot the grain ripened irregularly.

Mensury.—One acre. This also was adjoining Royal, and was manured and treated in the same manner, the soil being partly clay loam and partly peaty. It was sown 2nd May, 1¾ bushels per acre, came up 8th May, and was ripe on the clay loam 26th July, and on the lower peaty land August 6th. The time to mature was from 89 to 96 days. Yield per acre, 40 bushels 20 lbs.; weight per bushel, 49¼ lbs.; length of head, 3½ to 4 inches ; six-rowed ; length of straw 36 to 40 inches ; all standing well, growth very strong and even, leaves slightly rusted, no rust on stems.

Vanguard.—One-half acre. This was sown adjoining Mensury on soil the larger portion of which was sandy loam, the remainder peaty. The manuring and treatment of the land was the same as that given under Royal. The previous crop was oats. Sown 2nd May, 1¾ bushels per acre, came up 8th May, and was ripe on the higher sandy loam 23rd July, and on the lower peaty soil on 6th August. The time to mature was from 82 to 96 days. Yield per acre 27 bushels 34 lbs.; weight per bushel, 49 lbs.; length of head, 2½ to 3½ inches ; six-rowed ; length of straw 30 to 35 inches, all standing well ; growth medium and even, leaves considerably rusted, no rust on stems.

Summit.—One-half acre. This was adjoining Vanguard on similar land, and the manuring and treatment was the same as for Royal. The previous crop was oats. Sown 2nd May, 1¾ bushels per acre came up 8th May, and was ripe on the higher sandy loam 1st August, and on the peaty land 5th August. The time to mature was from 91 to 95 days. Yield per acre, 30 bushels 4 lbs.; weight per bushel, 50 lbs.; length of head, 2½ to 3 inches; six-rowed ; length of straw, 36 to 40 inches ; all standing well ; growth medium and even ; leaves considerably rusted, no rust on stems.

Nugent.—One-half acre. This land adjoined that on which Summit was sown, was of similar character and had the same manuring and treatment. Sown 2nd May, 1¾ bushels per acre, came up 8th May, and was ripe on the higher sandy loam 1st August, and on the lower peaty land 5th August. The time to mature was from 91 to 95 days.

Yield per acre, 30 bushels 20 lbs.; weight per bushel, 48 lbs.; length of head, 2½ to 3 inches; six-rowed; length of straw, 36 to 40 inches; all standing well; growth medium and even; leaves considerably rusted, no rust on stems. A frost which occurred on the 17th of May injured the plants on that part of this plot where the land was low and peaty and thus lessened the yield.

EXPERIMENTS WITH SPRING WHEAT.

During the season of 1895, forty-three varieties of spring wheat were tested, all on plots of $\frac{1}{20}$th acre each. The land on which these wheats were grown was adjoining that used for the test of varieties of oats, the soil was similar and the treatment of the land the same. The previous crop was barley.

SPRING WHEAT—TEST OF VARIETIES.

Name of Variety.	Date of sowing.	Date of ripening	No. of days maturing.	Length of Straw.	Length of head.	Kind of head.	Yield per acre.	Weight per bushel.	Rusted.
				Inches.	Inches.		Bush. Lbs.	Lbs	
Preston	May 1.	Aug. 5.	96	50 to 52	3 to 3¾	Bearded	30 40	62¼	Slightly.
Goose	do 1.	do 12.	103	48 to 54	2 to 2¾	do	28 20	60¾	do
Old Red River	do 1.	do 12.	103	44 to 50	2¾ to 3½	Beardless	26 30	59¼	do
Pringle's Champlain	do 1.	do 7.	98	46 to 52	3 to 3¾	Bearded	26 20	59	Very slightly.
Hungarian	Apr. 30.	do 10.	102	44 to 50	2½ to 3	do	26 10	61¾	Slightly.
Huron	May 1.	do 7.	98	48 to 53	2¾ to 3½	do	25 40	59½	do
Wellman's Fife	do 1.	do 12.	103	48 to 56	3 to 4	Beardless	25 20	59½	Considerably.
Dion's	do 1.	do 9.	100	46 to 54	3 to 4	Bearded	24 40	61	Very slightly.
White Russian	do 1.	do 12.	103	52 to 55	3 to 4	Beardless	24 27	59	Slightly.
Red Fern	do 1.	do 9.	100	46 to 54	3¼ to 4	Bearded	24 20	60¼	Very slightly.
Monarch	do 1.	do 12.	103	51 to 56	3½ to 4½	Beardless	24 10	60¾	Slightly.
Alpha	Apr. 30.	do 6.	98	48 to 53	2½ to 3¼	do	24	61½	do
Admiral	do 30.	do 5.	97	44 to 51	2¾ to 3½	do	24	58¾	Considerably.
Advance	May 1.	do 7.	98	48 to 54	2¾ to 3¾	Bearded	24	58¾	Slightly.
Emporium	do 1.	do 9.	100	48 to 52	3 to 3¾	do	24	60¼	Very slightly.
Percy	Apr. 30.	do 5.	97	48 to 54	3 to 4	Beardless	23 40	59	Slightly.
Red Fife	do 30.	do 9.	101	45 to 48	2¾ to 3¼	do	23 40	60	do
Captor (red chaff)	May 1.	do 5.	96	50 to 54	3 to 3¾	do	23 34	58¼	do
Vernon	do 1.	do 7.	98	42 to 52	2¼ to 3	Bearded	23 30	59¾	Considerably.
Colorado	do 1.	do 7.	98	40 to 45	2½ to 3	do	23 20	60¾	Slightly.
Blenheim	do 1.	do 7.	98	51 to 54	2¾ to 3¼	do	23 10	57¾	do
Percy (white chaff)	Apr. 30.	do 5.	97	48 to 54	3 to 3¾	Beardless	22 50	60¼	do
Stanley	do 30.	do 4.	96	45 to 51	3 to 3½	do	22 43	59½	do
Progress	do 30.	do 5.	97	48 to 50	3 to 3¾	do	22 40	60¼	do
White Fife	do 30.	do 9.	101	36 to 48	2½ to 3	do	22 39	60½	do
Crown	May 1.	do 7.	98	52 to 57	2¾ to 3¾	Bearded	22 30	59¼	do
Captor	do 1.	do 4.	95	48 to 54	3 to 3¾	Beardless	22 10	58¾	do
Ladoga	do 1.	do 1.	92	48 to 53	2¾ to 3½	Bearded	21 40	59	do
White Connell	do 1.	do 12.	103	46 to 50	2¾ to 3½	Beardless	21 34	59¾	do
Campbell's White Chaff	do 1.	do 8.	99	46 to 52	2½ to 3½	do	20 20	58¾	do
Rio Grande	do 1.	do 14.	105	51 to 58	3½ to 4½	Bearded	20 20	60	do
Beauty	Apr. 30.	do 7	99	48 to 51	3 to 4	Beardless	20 10	57¾	Considerably.
Beaudry's	May 1.	do 6.	97	38 to 46	2½ to 3½	Bearded	19 40	59¼	Very slightly.
Gehun with Ladoga	do 1.	do 2.	93	40 to 45	2¼ to 3¼	do	19	55¾	Slightly.
Black Sea	do 1.	do 2.	93	48 to 52	2½ to 3¼	do	19	59¾	Very slightly.
Herisson Bearded	do 1.	do 7.	98	40 to 44	1½ to 1¾	do	18 20	59½	Slightly.
Dawn	Apr. 30.	July 30.	91	38 to 42	2½ to 3	Beardless	17 50	58	Considerably.
Countess	do 30.	Aug. 4.	96	42 to 48	2½ to 3½	do	17 40	61¼	Slightly.
Golden Drop	May 1.	Aug. 7.	98	44 to 50	2¼ to 3	do	17 20	55¾	do
Dufferin	do 1.	July 30.	90	43 to 48	2½ to 3½	Bearded	16 10	55	do
Rideau	do 1.	Aug. 4.	95	42 to 48	2½ to 3	Beardless	15 50	54¾	Considerably.
Early Sonora, with Red Fife	do 1.	do 4.	95	42 to 48	2¾ to 3½	do	14 40	59	do
Gehun	do 1.	do 9.	100	42 to 47	2¾ to 3¾	do	13 40	60¾	Slightly.

FIELD CROPS OF SPRING WHEAT.

The following acre and half acre plots of spring wheat were all sown in the one field. The soil was clay loam of fair quality. The previous crop was pease. The land was manured in the autumn of 1894 with about 18 tons of barn-yard manure per acre which was immediately ploughed under. In the spring of 1895 it was gang-ploughed and harrowed with the smoothing harrow before sowing.

Percy.—One acre, sown 2nd May, 1½ bushels per acre, came up 8th May, and was ripe 8th August. The time to mature was 98 days. Yield per acre, 16 bushels 27 lbs.; weight per bushel, 58 lbs. Length of head, 3 to 3½ inches; beardless, length of straw, 40 to 44 inches; standing fairly well, medium to strong growth and even. Leaves and stems considerably rusted.

Advance.—One acre, sown 2nd May, 1½ bushels per acre, came up 8th May, and was ripe 5th August. The time to mature was 95 days. Yield per acre, 18 bushels 39 lbs.; weight per bushel, 56 lbs.; length of head, 3 to 3¼ inches, bearded; length of straw, 40 to 42 inches, all standing well; growth strong and even, leaves considerably and stems slightly rusted.

Preston.—One acre, sown 2nd May, 1½ bushels per acre, came up 8th May, and was ripe 4th August. The time to mature was 94 days. Yield per acre, 21 bushels 39 lbs.; weight per bushel, 57½ lbs. Length of head, 3 to 3¼ inches, bearded; length of straw, 44 to 46 inches, all standing well; growth medium and even, some smut; leaves considerably and stems slightly rusted.

Huron.—One acre, sown 2nd May, 1½ bushels per acre, came up 8th May, and was ripe 7th August. The time to mature was 98 days. Yield per acre, 21 bushels, 5 lbs.; weight per bushel, 58¾ lbs. Length of head, 3 to 3½ inches, bearded; length of straw, 40 to 42 inches, all standing well; growth medium to strong and even, some smut, leaves and stems considerably rusted.

Crown.—One acre, sown 2nd May, 1½ bushels per acre, came up 8th May, and was ripe 7th August. The time to mature was 98 days. Yield per acre, 17 bushels 38 lbs.; weight per bushel 58¼ lbs. Length of head 3 to 3½ inches, bearded, length of straw 40 to 44 inches; all standing well; growth medium and even, some smut, leaves and stems badly rusted.

Rio Grande.—One acre, sown 2nd May, 2 bushels per acre, came up 8th May, and was ripe 13th August. The time to mature was 104 days. Yield per acre 20 bushels 31 lbs.; weight per bushel, 60¾ lbs. Length of head, 4 inches, bearded; length of straw, 44 to 46 inches, all standing well; growth strong and even, some smut, leaves considerably and stems slightly rusted.

Alpha.—One-half acre, sown 2nd May, 1½ bushels per acre, came up 8th May, and was ripe 8th August. The time to mature was 99 days. Yield per acre, 20 bushels 54 lbs.; weight per bushel, 58½ lbs. Length of head, 3 to 3½ inches, beardless; length of straw, 36 to 41 inches; all standing well; growth medium and even, some smut, leaves considerably and stems slightly rusted.

Dion's.—One-half acre, sown 2nd May, 1½ bushels per acre, came up 8th May, and was ripe 12th August. The time to mature was 103 days. Yield per acre 23 bushels, 4 lbs.; weight per bushel, 61 lbs. Length of head, 3½ to 4 inches, bearded; length of straw about 40 inches; very little smut, leaves and stems slightly rusted.

EXPERIMENTS WITH FALL WHEAT.

Twenty-five varieties of fall wheat have been under under test during the past season most of them in plots of $\frac{1}{40}$th of an acre each. They were all sown on the 6th of September, 1894, and harvested from the 17th to the 22nd of July, 1895. The soil was sandy loam and the previous crop was barley. The land was ploughed shallow after harvest to germinate weed seeds and was ploughed again in September and harrowed before sowing, sown September 6th, 1¾ bushels per acre. The growth was all strong to very strong and even, and no winter killing occurred in any of the varieties named.

FALL WHEAT— TEST OF VARIETIES.

Name of Variety.	Length of Straw.	Length of Head.	Kind of Head.	Yield per Acre.		Weight per Bushel.	Rusted.
	Inches.	Inches.		Bush.	Lbs.	Lbs.	
Dawson's Golden Chaff	52 to 60	2¾ to 3½	Beardless	45	20	61	Considerably.
Hungarian	48 to 52	2¼ to 3	Bearded	44		64¼	Slightly.
Genesee Giant	48 to 52	2¼ to 2¾	"	43		61	"
Democrat	45 to 54	2¾ to 3½	"	42		63½	Very slightly.
Bailey	46 to 52	2½ to 3	"	41	20	61¼	Slightly.
Manchester with Democrat (Bearded White Chaff)	48 to 52	2½ to 3¼	"	40	40	64	Very slightly.
Johnson	48 to 50	2½ to 3	"	40	40	61	Slightly.
Pride of Genesee	45 to 54	3 to 3¾	"	38	40	63¾	Considerably.
Early White Leader	48 to 54	3 to 3½	Beardless	38		59	"
Jones' Winter Fife	45 to 52	3 to 3½	"	36	40	62¼	Very slightly.
American Bronze	47 to 55	3 to 4	"	36	40	60¾	Considerably.
Golden Cross	46 to 52	2¼ to 2¾	Bearded	34	40	63¾	Slightly.
Jones' No. 87	52 to 60	3 to 4	Beardless	34	40	62¾	Considerably.
Weld's No. 4	48 to 52	2¾ to 3½	"	33	50	62½	Very slightly.
Manchester	45 to 48	3 to 3¾	"	33	20	62	"
Early Red Clawson	45 to 48	3 to 3¾	"	33		61¼	"
Willits	48 to 52	2¾ to 3½	"	32	2	60½	Slightly.
Tasmania	45 to 54	2½ to 3¼	Bearded	32		63¾	Very slightly.
Stewart	46 to 52	2¾ to 3½	Beardless	31	35	59	"
Roberts	48 to 54	3 to 3½	Bearded	31	20	62¾	"
Surprise	45 to 48	2¾ to 3¼	Beardless	30	40	60½	"
From South of Russia	36 to 42	1¾ to 2½	Bearded	29	40	64	No rust.
White Chaff Rivet	45 to 60	2¾ to 3½	"	29	20	60½	Very slightly.
Manchester with Democrat (Bearded Red Chaff)	42 to 48	3 to 3½	"	27	33	63½	"
Martin's Amber	41 to 55	3 to 3¾	Beardless	27	20	64½	"

EXPERIMENTS WITH PEASE.

Seventeen varieties of pease were grown in plots of one-twentieth acre each, these embrace the standard sorts associated with four of the new cross-bred sorts produced at the Experimental Farm, the results of this test are given in table No. 1. Forty-one additional varieties were sown on plots of one-fortieth acre each. These were all cross-bred sorts produced at the farm; and the particulars of this test will be found in table No. 2. In table No. 3 are recorded the results of ten additional cross-bred sorts sown in smaller plots for the reason that the seed was not available in sufficient quantity to admit of sowing them in the larger plots.

The soil on which these pease were sown was sandy loam and the previous crop was wheat. The land was manured in the spring of 1893 with about 18 tons of barn-yard manure per acre and cropped that year with oats. It was ploughed in the autumn of 1894, about 8 inches deep and disc-harrowed in the spring of 1895 and harrowed with the smoothing harrow before sowing.

It will be observed that two of the new cross-bred sorts head the list as to yield in the one-twentieth acre plots, that the first six of the cross-breds in table No. 2 and the first two in table No. 3, have given larger returns than the best of those in table No. 1. Among these best yielders there are some very promising sorts which with the seed now available can be tested on larger areas next season.

PEASE—Test of Varieties. Table No. 1. On plots of $\frac{1}{20}$th acre each.

Name of Variety.	Date of sowing.	Date of ripening	No. of days maturing.	Character of growth.	Length of straw.	Length of pod.	Size of pea.	Yield per acre.	Weight per bushel.
					Inches.	Inches.		Bush. Lbs.	Lbs.
Paragon	May 4..	Aug. 19	107	Strong	60 to 84	$2\frac{1}{4}$ to 3	Medium	45 40	$60\frac{3}{4}$
Prince	" 6..	" 16	102	"	48 to 60	2 to 3	Large...	43 20	$60\frac{1}{4}$
Black-eyed Marrowfat	" 3..	" 11	100	"	60 to 84	$2\frac{1}{2}$ to 3	" ..	40 10	$63\frac{1}{4}$
Mummy	" 4..	" 11	99	"	48	$1\frac{3}{4}$ to $3\frac{1}{2}$	Medium	39 30	$64\frac{1}{2}$
Prussian Blue	" 4..	" 9	97	"	60 to 70	2 to $2\frac{1}{2}$	" ..	39 20	63
Pride	" 3..	" 7	96	Medium	24 to 30	2 to $2\frac{3}{4}$	Large..	39 ..	$62\frac{3}{4}$
Pearl	" 4..	" 18	106	Very strong.	84 to 96	$2\frac{1}{2}$ to 3	" ..	38 30	62
Large White Marrowfat	" 3..	" 13	102	" ..	84 to 96	$2\frac{1}{4}$ to 3	" ..	36 50	$63\frac{1}{4}$
Prince Albert	" 4..	" 20	108	" ..	84 to 96	2 to $2\frac{3}{4}$	Small ..	36 20	$63\frac{1}{2}$
Centennial	" 3.	" 12	101	Strong	60 to 72	$2\frac{1}{2}$ to 3	Medium	34 40	$63\frac{1}{4}$
Crown	" 4..	" 9	97	"	51 to 56	2 to $2\frac{1}{2}$	Small ..	33 30	$63\frac{3}{4}$
Creeper	" 3..	" 7	96	"	48 to 54	2 to $2\frac{1}{2}$	" ..	33 20	$63\frac{1}{2}$
New Potter	" 3..	" 10	99	"	60 to 72	2 to $2\frac{3}{4}$	Large...	33 ..	63
Multiplier	" 3..	" 12	101	"	60 to 72	2 to $2\frac{1}{2}$	Small ..	31 50	$63\frac{3}{4}$
Golden Vine	" 4..	" 9	97	"	48 to 56	$1\frac{1}{2}$ to 2	" ..	30 30	$64\frac{1}{2}$
Canadian Beauty	" 3..	" 12	101	"	60 to 78	$2\frac{1}{2}$ to 3	Large...	30 20	63
Weston	" 4..	" 20	108	"	72 to 84	$2\frac{1}{4}$ to 3	Medium	24 50	$62\frac{1}{2}$

PEASE—Test of Varieties. Table No. 2, all cross-bred sorts. On plots of $\frac{1}{40}$th acre each.

Name of Variety.	Date of sowing.	Date of ripening	No. of days maturing.	Character of growth.	Length of Straw.	Length of pod.	Size of pea.	Yield per acre.	Weight per bushel.
					Inches.	Inches.		Bush. Lbs.	Lbs.
Macoun	May 6..	Aug. 21	107	Strong	72 to 84	$2\frac{1}{2}$ to 3	Large...	51 40	$63\frac{1}{4}$
Arthur	" 6..	" 14	100	Medium to strong	36 to 72	2 to $2\frac{1}{2}$	Medium	51 ..	62
Bedford	" 6..	" 16	102	Medium to strong	48 to 84	2 to $2\frac{1}{2}$	" ..	49 20	$62\frac{1}{4}$
Mackay	" 6..	" 14	100	Strong	48 to 60	$2\frac{1}{2}$ to 3	Large...	47 40	$61\frac{3}{4}$
Agnes	" 6 .	" 10	96	"	66 to 78	$2\frac{1}{2}$ to 3	" ..	47 ..	$61\frac{1}{4}$
Bruce	" 4..	" 13	101	Medium	48 to 54	$2\frac{1}{2}$ to 3	" ..	46 ..	$61\frac{1}{4}$
Carleton	" 6..	" 18	104	Strong	60 to 72	2 to $2\frac{1}{2}$	Medium	45 ..	62
Kent	" 6..	" 19	105	"	60 to 96	$2\frac{1}{2}$ to 3	Large...	44 20	62
Duke	" 4..	" 13	101	Medium	48 to 60	$2\frac{1}{2}$ to 3	" ..	44 20	$61\frac{1}{2}$
Trilby	" 6..	" 15	101	do to strong	36 to 60	$2\frac{1}{2}$ to 3	Medium	44 ..	$60\frac{3}{4}$
Luther	" 6..	" 15	101	Strong	48 to 72	$2\frac{1}{2}$ to 3	Large ..	43 40	$61\frac{1}{4}$
Victoria	" 4..	" 15	103	"	60 to 84	$2\frac{1}{4}$ to 3	" ..	43 20	62
Tracey	" 6..	" 14	100	Medium	36 to 60	$2\frac{1}{2}$ to 3	" ..	43 20	62
Alma	" 6..	" 18	104	Strong	72 to 84	2 to $2\frac{1}{2}$	Small ..	43 20	62
Surrey	" 6..	" 20	106	"	72 to 84	$2\frac{1}{2}$ to 3	Large...	43 ..	$61\frac{1}{4}$
Elva	" 4..	" 21	109	"	60 to 84	$2\frac{1}{2}$ to 3	Medium	41 40	$62\frac{3}{4}$
Vincent	" 6..	" 10	96	Medium	48 to 57	$2\frac{1}{2}$ to 3	Large...	41 20	$61\frac{1}{4}$
Vasey	" 6..	" 18	104	Strong	60 to 84	$2\frac{1}{4}$ to 3	Large...	41 ..	$61\frac{1}{4}$
Bright	" 6..	" 18	104	"	60 to 84	$2\frac{1}{4}$ to 3	Medium	40 40	$61\frac{1}{4}$
Archer	" 6..	" 16	102	"	48 to 60	2 to $2\frac{1}{2}$	"	40 40	63
Derby	" 6..	" 21	107	"	60 to 72	$2\frac{1}{2}$ to 3	Large...	40 40	$61\frac{3}{4}$
Fenton	" 6..	" 10	96	Medium	48 to 54	$2\frac{1}{2}$ to 3	"	40 40	$60\frac{1}{4}$
Nelson	" 6..	" 10	96	Strong	42 to 60	$1\frac{3}{4}$ to $2\frac{1}{2}$	Medium	40 20	$62\frac{1}{4}$
No. 13	" 6..	" 20	106	"	72 to 84	$2\frac{1}{2}$ to 3	Large...	38 20	$61\frac{3}{4}$
No. 49	" 6..	" 17	103	"	60 to 72	$2\frac{1}{2}$ to 3	Medium	38 ..	$61\frac{3}{4}$

PEASE—TEST OF VARIETIES.

TABLE No. 2. Continued.—All Cross-bred Sorts on Plots of $\frac{1}{40}$th th acre each.

Name of Variety.	Date of sowing.	Date of ripening	Number of days maturing.	Character of growth.	Length of straw.	Length of pod.	Size of pea.	Yield per acre.	Weight per bushel.
					Inches.	Inches.		Bush. Lbs.	Lbs
No. 21	May 4..	Aug. 14	102	Medium to strong	36 to 60	2½ to 3	Large...	37 40	61½
No. 58	" 6..	" 13	99	Strong	72 to 84	2½ to 3	"	37 40	61¾
No. 43	" 4..	" 14	102	"	60 to 84	2 to 2½	Small ..	37 20	63¼
No. 5	" 4..	" 19	107	"	60 to 84	2½ to 3	Medium	37 20	61¼
No. 9	" 6..	" 17	103	"	60 to 72	2½ to 3	Large...	37 ..	60¾
No. 3	" 6..	" 15	101	Medium	48 to 60	2½ to 3	Medium	36 40	61
No. 24	" 6..	" 21	107	Strong	72 to 84	2 to 2½	Small ..	36 ..	62¼
No. 52	" 6 ..	" 9	95	"	48	2½ to 3¼	Large...	34 40	61
No. 39	" 4..	" 19	107	"	48 to 84	2½ to 3	Medium	33 ..	61¼
No. 55	" 6..	" 14	100	Medium	48 to 54	2½ to 3	Large...	32 ..	61¼
No. 80	" 6..	" 20	106	Strong	72 to 84	2½ to 3	Medium	31 40	62¾
No. 40	" 6..	" 21	107	"	72 to 84	2 to 2½	Small ..	30 20	62¾
No. 30	" 6..	" 21	107	"	72 to 84	2 to 2½	"	29 ..	63
No. 28	" 4..	" 20	108	Very strong.	84 to 96	2 to 2½	"	27 40	62¼
No. 35	" 6..	" 19	105	Strong	72 to 84	2½ to 3	Large...	27 40	62¼
No. 36	" 6..	" 19	105	"	72 to 84	2½ to 3	Medium	26 ..	61¾

Table No. 3.—All Cross-bred Sorts on Small Plots.

No. 70	May 6..	Aug. 13	99	Strong	60 to 72	2½ to 3	Large...	54 ..	61¾
No. 66	" 6..	" 13	99	"	48 to 60	2½ to 3	Medium	48 ..	61¾
No. 65	" 6..	" 14	100	"	60 to 72	2½ to 3	"	41 ..	61
No. 77	" 6..	" 13	99	"	72 to 84	2½ to 3	"	32 ..	59½
No. 76	" 6..	" 13	99	"	60 to 72	2 to 2½	"	29 ..	60¾
No. 71	" 6..	" 16	102	"	72 to 84	2½ to 3	Large...	24 52	62½
No. 73	" 6..	" 13	99	Medium	48 to 60	2½ to 3	"	21 30	59½
No. 72	" 6..	" 17	103	Strong	72	2 to 2½	"	21 3	61½
No. 64	" 6..	" 20	106	"	72 to 84	2½ to 3	"	21 3	62½
No. 68	" 6..	" 16	102	"	60 to 72	2½ to 3	"	18 10	60¾

FIELD PLOTS OF PEASE.

Mummy.—One and a half acres of this variety were sown on a soil which was clay loam mixed with more or less peat. The previous crop was oats. The land was manured in the spring of 1892 with about 18 tons of barn-yard manure per acre—no fertilizer has been applied since. It was ploughed very shallow in the autumn of 1894 to cover and start weed seeds, and later in the season it was ploughed 8 inches deep. In the spring it was gang-ploughed and harrowed with the smoothing harrow before sowing. Sown 15th May; 2½ bushels per acre; came up 27th May, and was ripe 20th August. The time to mature was 97 days. Yield per acre, 21 bushels 4 lbs.; weight per bushel, 63¼ lbs. The growth was fairly even and strong, but the land was weedy, and the soil unsuitable, which will to some extent account for the comparatively light crop.

Five additional varieties of pease were sown on one acre and half acre plots, adjoining each other on similar soil, where all had the same treatment. The soil was sandy loam, rather light in character; the previous crop was part sunflowers and part corn. The land was manured in the spring of 1893, when about 18 to 20 tons of barn-yard manure was applied per acre. Late in the autumn of 1894, after the sunflower heads were harvested, the stalks were burnt on the field and the land ploughed about 8 inches

deep. In the spring it was disc-harrowed and harrowed with the smoothing harrow before sowing.

New Potter.—½ acre; sown 9th May; 2½ bushels per acre; came up 21st May, and was ripe on 17th August. The time to mature was 100 days. Yield per acre, 29 bushels 30 lbs.; weight per bushel, 61¾ lbs. Growth very strong and even.

Canadian Beauty.—½ acre; sown 9th May; 3½ bushels per acre; came up 21st May, and was ripe 16th August. The time to mature was 99 days. Yield per acre, 30 bushels 54 lbs.; weight per bushel, 63½ lbs. Growth strong and even.

Pride.—½ acre; sown 9th May; 3 bushels per acre; came up 21st May, and was ripe 14th August. The time to mature was 97 days. Yield per acre, 36 bushels 2 lbs.; weight per bushel, 62¼ lbs. Growth strong and even.

Large White Marrowfat.—One acre, sown 9th May; 3½ bushels per acre, came up 21st May, and was ripe 19th August. The time to mature was 102 days. Yield per acre, 36 bushels 6 lbs.; weight per bushel, 63 lbs. Growth strong and even.

RESULTS OF EARLY, MEDIUM AND LATE SOWING.

These tests were all conducted on similar land, the plots adjoining each other. The soil was a light sandy loam, fairly uniform in character, which has been devoted to these experiments for the past six years. The arrangement of these plots has been changed from year to year so that the different varieties of grain have followed each other in regular succession. No barn-yard manure has been applied to this land since 1891, but it received a dressing of wood ashes, about 150 bushels to the acre, during the winter of 1894-95, the ashes being applied when the land was free or nearly free from snow. Thirty-six plots of $\frac{1}{10}$th acre each, have been used for this purpose, twelve of which have been devoted to six successive sowings of two varieties of oats and a like number to barley, wheat and pease. The first sowing in each case has been made as soon as the land was in fit condition to receive the seed, and the subsequent sowings a week apart, until six successive sowings were made. Full particulars of the results of these tests which have been conducted at all the experimental farms will be found in Bulletin 21, from which fairly reliable data can be had as to the best time for seeding in the several provinces and territories of the Dominion.

The land has been ploughed each year in the autumn and disc-harrowed in the spring, and immediately before sowing each set of plots the smoothing harrow has been used, so as to destroy any weeds which may have germinated, and thus give to each series of plots the same chance at the start as to condition of soil.

OATS SOWN AT DIFFERENT DATES.

Name of Variety.	When Sown.	Date of Ripening.	No. of days maturing.	Length of Straw.	Weight of Straw per acre.	Yield of Grain per acre.	Weight per bushel.	Rusted.
				Inches.	Lbs.	Bush. lbs.		
Abundance	April 20..	Aug. 2..	104	38 to 40	2,870	45 ..	34	Very slightly.
"	" 27..	" 8..	103	40 to 42	4,445	76 1	33½	Considerably.
"	May 4..	" 12..	100	38 to 40	3,500	58 33	32	Very slightly.
"	" 11..	" 17..	98	38 to 42	3,685	47 17	32½	Slightly.
"	" 18..	" 21..	95	40 to 48	2,845	50 5	28	Considerably.
"	" 25..	" 24..	91	30 to 42	3,250	31 26	31	"
Banner	April 20..	" 2..	104	38 to 40	3,375	65 15	35½	Very slightly.
"	" 27..	" 8..	103	40 to 45	4,575	81 1	33¼	Considerably.
"	May 4..	" 12..	100	38 to 40	3,510	64 4	33¼	Very slightly.
"	" 11..	" 17..	98	40 to 48	4,170	56 26	33	Slightly.
"	" 18..	" 21..	95	40 to 48	4,705	49 19	32	Considerably.
"	" 25..	" 24..	91	38 to 48	3,460	32 32	30¾	"

BARLEY SOWN AT DIFFERENT DATES.

Name of Variety.	When Sown.	Date of Ripening.	No. of days maturing.	Length of Straw.	Weight of Straw per acre.	Yield of Grain per acre.	Weight per bushel.	Rusted.
				Inches.	Lbs.	Bush lbs.		
Oderbruch	April 20	July 15	86	36 to 38	3,590	42 44	45¾	None.
"	" 27	" 20	84	36 to 40	3,320	40 20	42½	"
"	May 4	" 24	81	36 to 40	3,400	33 36	42¾	Considerably.
"	" 11	" 29	79	32 to 36	3,170	26 2	41⅓	"
"	" 18	Aug. 2	76	30 to 36	2,925	32 39	44½	"
"	" 25	" 8	75	30 to 33	3,155	26 7	43¾	"
Canadian Thorpe	April 20	July 29	100	40 to 45	2,785	30 45	48	Slightly.
"	" 27	Aug. 3	98	40 to 46	2,925	32 24	49	"
"	May 4	" 8	96	35 to 39	2,405	20 35	47	Very slightly.
"	" 11	" 12	93	32 to 38	3,420	16 32	46	Badly.
"	" 18	" 15	89	30 to 38	3,680	23 16	44½	Considerably.
"	" 25	" 20	87	30 to 38	2,900	17 39	40	Badly.

SPRING WHEAT SOWN AT DIFFERENT DATES.

Stanley	April 20	Aug. 3	105	36 to 38	1,720	6 40	54¾	Very badly.
"	" 27	" 10	105	42 to 45	3,085	12 ..	55	Badly
"	May 4	" 14	102	40 to 45	2,745	9 20	56¼	"
"	" 11	" 20	101	40 to 42	3,040	6 ..	55	"
"	" 18	" 26	100	38 to 42	3,130	6 20	58	"
"	" 25	" 30	97	18 to 36	3,680	7 50	56½	"
Red Fife	April 20	" 11	113	38 to 40	1,640	12 ..	56½	"
"	" 27	" 14	109	40 to 45	3,840	10 50	56	"
"	May 4	" 19	107	30 to 40	2,360	6 ..	56¼	"
"	" 11	" 25	106	36 to 42	3,325	6 20	56¼	"
"	" 18	Sept. 1	106	18 to 36	4,320	5 ..	56½	"
"	" 25	" 4	102	30 to 36	5,250	5 55	56¾	"

PEASE SOWN AT DIFFERENT DATES.

Mummy	April 20	Aug. 13	115	55 to 60	3,820	39 40	63½
"	" 27	" 17	112	55 to 60	3,380	30 40	62¼
"	May 4	" 20	108	55 to 60	3,985	39 55	62¾
"	" 11	" 23	104	55 to 60	4,415	28 5	61¼
"	" 18	" 29	103	55 to 60	3,970	24 10	62¼
"	" 25	Sept. 3	101	55 to 60	4,105	23 35	63
Golden Vine	April 20	Aug. 12	114	55 to 60	3,295	38 40	62½
"	" 27	" 17	112	55 to 60	3,385	36 55	62¼
"	May 4	" 19	107	55 to 60	4,080	37 20	62½
"	" 11	" 22	103	55 to 60	3,980	26 10	63
"	" 18	" 29	103	55 to 60	4,750	25 50	63¾
"	" 25	Sept. 3	101	55 to 60	4,355	20 55	63½

The very small yield of Stanley wheat from the first sowing was mainly due to the fact that it was almost destroyed by rust, and the comparatively low yields throughout, both of the Stanley and Red Fife wheats may be attributed to the same cause. The heavy yields of straw from the 6th sowing of Stanley and the 5th and 6th sowings of Red Fife was due to the very strong growth of weeds on these plots.

EXPERIMENTS WITH INDIAN CORN.

Twenty-seven varieties of Indian corn were tested side by side on sandy loam. The previous crop was oats. This land received a dressing of barn-yard manure in 1892, no fertilizer has since been applied. It was ploughed in the autumn of 1894 about 8 inches deep, and gang-ploughed in the spring and harrowed with the smoothing harrow before sowing. All the plots were sown on May 23rd in hills 3 feet apart each way, four or five kernels being placed in each hill. The yield per acre has been estimated from the yield of two rows of hills each 66 feet long.

Name of Variety.	Character of Growth.	Description of Variety.	Height.	Leafiness.	When Tasselled.	In Silk.	Early Milk.	Condition When cut.	Weight per Acre grown in hills.	
			Inches.						Tons.	Lbs.
Rural Thoroughbred White Flint	Very strong	White flint	108 to 132	Very leafy	Aug. 9	Aug. 14		Nearly in late milk	37	470
Giant Prolific Ensilage	"	White dent	120 to 138	" "	do 12	" 18		Almost in early milk.	28	1970
Sanford White Flint	"	White flint	96 to 108	" "	July 30	" 7	Sept. 4	Late milk.	23	1300
Canadian White Flint	"	"		" "	" 26	" 3	Aug. 29	"	23	750
Champion White Pearl	"	White dent	108 to 126	Fairly "	Aug. 7	" 13	Sept. 6	Early milk.	23	200
Red Cob Ensilage	"	"	114 to 126	" "	" 12	" 18		"	22	1320
Livingston's Gold Coin	"	Yellow dent	96 to 108	Very "	" 9	" 17		"	22	1160
White Cap Yellow Dent	Strong	Yellow and white dent	108 to 114	Fairly "	July 30	" 7	Sept. 3	Late milk	22	990
Early Mammoth Sugar	Very strong	Sugar corn	108 to 114	Very "	Aug. 7	" 11	" 4	Early milk	20	1800
Country Gentleman	Strong	White dent	96 to 102	" "	" 7	" 12	" 6	"	18	1400
North Dakota (C.E.F., seed)	"	Pink and white flint		Fairly "	July 23	July 28	Aug. 26	Nearly ripe.	18	520
Gold Medal Dent	"	Red and yellow dent	96 to 108	" "	" 31	Aug. 8	Sept. 3	Late milk	17	1640
Compton's Early (McDonald)	"	Yellow flint	96 to 102	" "	" 25	July 30	Aug. 29	Nearly ripe.	17	1420
No. 5 from Minnesota	Fairly strong	Red and yellow dent	90 to 102	Very "	" 29	Aug. 6	Sept. 1	Early milk	17	1420
Compton's Early (Steele)	Very strong	Yellow flint	102 to 108	Fairly "	" 23	July 29	Aug. 26	Late milk	17	1200
Angel of Midnight	"	"	6 to 102	Very "	" 25	" 29	" 29	"	17	100
No. 13 from Minnesota	Strong	Red and yellow dent	102 to 114	" "	" 29	Aug. 3	" 28	"	16	450
Mammoth Yellow Flint	"	Yellow flint	96 to 108	Fairly "	" 23	July 30	" 27	Nearly ripe.	15	1900
Longfellow (McDonald)	"	"	90 to 96	" "	" 23	" 29	" 26	"	15	1680
" (Pearce)	Fairly strong	"	90 to 102	" "	" 23	" 29	" 26	"	15	140
No. 39 from Minnesota	Strong	White dent	96 to 108	" "	" 24	" 29	" 28	Late milk	15	140
North Dakota (Brandon seed)	Medium	Pink and white flint	72 to 84	" "	" 20	" 26	" 16	Nearly ripe.	14	1700
Extra Early Huron Dent	Strong	Red and yellow dent	96 to 108	" "	" 25	" 30	" 28	Late milk	14	1150
Canadian Dent	"	"	90 to 102	" "	" 29	Aug. 3	" 27	"	14	1150
Pearce's Prolific	"	Yellow flint	96 to 102	" "	" 23	July 30	" 26	Nearly ripe.	14	50
Mitchell's Early	Medium	White flint	54 to 72	" "	" 16	" 18	" 13	"	13	1280
White Flint from Vilmorin	"	"		" "	" 17	" 19	" 11	"	10	1670

The varieties under numbers from Minnesota are new western sorts kindly sent for test by Prof. W. M. Hays, of the Experiment Station, St. Anthony's Park, Minn.

FIELD CROPS OF CORN.

These were all on sandy loam which varied from light to a somewhat heavy character. The previous crop was oats. This land received a light coating of barn-yard manure in the spring of 1895, about 12 tons to the acre. It was ploughed in the autumn of 1894, about 8 inches deep and ploughed again lightly in the spring, after the manure was spread and harrowed before sowing. The corn on all these plots was sown with a seed drill in rows three feet apart, on the 30th May, it came up on the 6th June, and was cut on the 12th September and following days.

Rural thorough-bred White Flint.—2½ acres. Yield per acre, 16 tons 1105 lbs.
Sanford Flint.—½ acre. Yield per acre, 16 tons 780 lbs.
Extra Early Huron Dent.—½ acre. Yield per acre, 13 tons 1,000 lbs.
Canadian Dent.—½ acre. Yield per acre, 15 tons 1,540 lbs.
Canadian White Flint.—½ acre. Yield per acre, 17 tons 1,460 lbs.
Champion White Pearl.—½ acre. Yield per acre 17 tons, 862 lbs.
New White Cap Yellow Dent.—½ acre. Yield per acre, 17 tons 1,800 lbs.

EXPERIMENTS WITH HORSE BEANS.

Two acres of horse beans were sown, with the variety known as "tick"; on one acre the seed was of Canadian growth having been produced at the Central Experimental Farm last year, the other acre was sown with imported seed. The soil was a sandy loam of rather poor quality which had received no fertilizer since the spring of 1892, when it had a dressing of barn-yard manure. The land was ploughed in the autumn of 1894, about 8 inches deep and gang-ploughed in the spring of 1895, and harrowed with the smoothing harrow before sowing. The seed was put in with the drill in rows three feet apart, about 45 lbs. of seed being used per acre. Sown 11th May, came up 27th May, and was cut green for the silo on 11th September. The yield per acre from the seed of Canadian growth was 6 tons 162 lbs., while the crop grown from the imported seed gave a return of 8 tons 390 lbs. The plants from the Canadian grown seed grew to a height of 48 to 50 inches, and were well podded with beans nearly ripe when the crop was cut, the leaves however were badly blighted. Those grown from imported seed attained a height of 50 to 60 inches, there was less blight on the leaves, the stems were well podded, but the crop was not so far advanced towards maturity at the time of cutting.

EXPERIMENTS WITH BUCKWHEAT.

One variety of buckwheat only has been tested this season, viz., the common black hulled buckwheat.

Three plots were sown at intervals. The first of these measuring one acre was sown on the 16th June, one peck of seed per acre, came up 23rd June, was in bloom 18th July and ripe on 29th August. The time to mature was 74 days. Yield per acre 27 bushels 16 lbs., growth strong and even.

The second plot which measured 1¾ acres was sown on 6th July, one peck per acre, came up 13th July, and was in bloom 12th August. When about two-thirds ripe a heavy frost occurred on 14th September, which discoloured the unripe seed and prevented further growth. This materially lessened the yield which was 21 bushels 37 lbs. per acre.

The third plot which occupied about one acre was sown on 16th July. It came up 21st July and was in bloom 20th August. but was cut by frost 14th September before any of the seed had ripened. This was ploughed under as a green manure. The main object in view in sowing these plots at successive periods was to ascertain their value when in blossom for honey production. This is reported on in connection with experiments carried on in the Apiary.

EXPERIMENTS WITH TURNIPS.

Thirteen varieties of turnips were tested on plots adjoining each other, all having similar treatment. The soil was sandy loam, the previous crop was oats. This land was manured in 1893 with about 18 tons of barn-yard manure per acre, followed by a crop of pease. It was gang-ploughed shallow early in the autumn of 1894 to cover and germinate weed seeds and ploughed again later in the season about 8 inches deep. In the spring of 1895 it was gang-ploughed and harrowed with the smoothing harrow and rolled before sowing The seed was sown on the flat in rows 2½ feet apart and the yield of the crop in each case has been calculated from the quantity obtained from two rows, each 66 feet long, two sowings were made of each sort of seed, the 1st on 25th May, the second on 12th June, and the roots on both were pulled on the 8th October.

TURNIPS—TEST OF VARIETIES.

Name of Variety.	Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
	Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
Lord Derby	12	1,080	418		13	1,720	462	
From John Killam, Kingston, N.S.	12	288	404	48	17	1,112	585	12
Imperial Swede	9	480	308		14	908	481	48
Giant King	8	38	267	18	12	288	404	48
Hartley's Bronze Top	7	1,312	255	12	5	1,088	184	48
Elephant's Master	5	1,352	189	12	15	624	510	24
Carter's Elephant	5	890	181	30	13	1,984	466	24
Jumbo or Monarch	4	1,042	150	42	10	64	334	24
Purple Top Swede	4	778	146	18	12	24	400	24
East Lothian	3	1,656	127	36	6	1,728	228	48
Skirving's Swede	3	1,194	119	54	14	776	479	36
Champion Purple Top	3	1,128	118	48	17	1,904	598	24
Rennie's Prize Purple Top	3	864	114	24	8	1,160	286	

Most of the varieties of turnips in the above tests were more or less affected with rot, some of them very badly. This disease has been disastrous to the turnip crop in many instances in the Ottawa district for some years past, and the very small yields reported from some varieties especially those from the first sowing were largely the result of this disease. In some instances the yield was further lessened by the destruction of many of the young plants by insects.

FIELD CROP OF TURNIPS.

Elephant's Master.—One acre. Soil partly sandy loam mixed with clay and partly peat. The previous crop was oats. This land received a dressing of barn-yard manure in 1892. It was ploughed in the autumn of 1894 about 8 inches deep and gang-ploughed in the spring of 1895, and harrowed with the smoothing harrow before sowing. Sown 13th June on drills 2½ feet apart, about 3 lbs. of seed per acre, came up 18th June, and were pulled 18th October. Yield per acre, 15 tons 1425 lbs., made a fairly even growth, there was no rot but the plants were troubled more or less with the turnip aphis.

EXPERIMENTS WITH MANGELS.

Thirteen varieties of mangels were tested side by side. The land on which they were grown was adjoining that used in the test of varieties of turnips, and the soil and treatment was the same. The previous crop was oats. The seed was sown on the flat in rows 2½ feet apart in the proportion of 3 to 4 lbs. per acre. Two sowings were made in each case, the first on the 11th May, the second on 25th May, and both were pulled on 8th October.

The earliest sown plots have again given much the largest yields. The returns given have been calculated from the weight of roots obtained from two rows each 66 feet long.

MANGELS—TEST OF VARIETIES.

Name of Variety.	Yield per acre. 1st Plot.		Yield per acre. 1st Plot.		Yield per acre. 2nd Plot.		Yield per acre. 2nd Plot.	
	Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
Mammoth Long Red (Evans)	37	976	1249	36	22	880	748	
Red Fleshed Tankard	33	528	1108	48	19	1336	655	36
Mammoth Long Red (Sharpe)	32	1208	1086	48	19	1666	661	6
Giant Yellow Intermediate	31	634	1043	54	19	1600	660	0
Champion Yellow Globe	29	1400	990		19	16	633	36
Mammoth Long Red (Webb)	29	146	969	6	16	1066	551	6
Canadian Giant	28	1288	954	48	23	1520	792	0
Conqueror Yellow Globe	28	1090	951	30	17	848	580	48
Mammoth Long Red (Steele)	27	1176	919	36	17	56	567	36
Gate Post	27	1176	919	36	17	1376	589	36
Red Fleshed Globe	24	1896	831	36	22	880	748	0
Warden Orange Globe	24	1368	822	48	16	208	536	48
Golden Tankard	22	682	744	42	17	1640	594	

FIELD CROPS OF MANGELS.

Two varieties of mangels were grown on plots of one acre each. These were sown adjoining the field crops of turnips, and the land was similar in character, but a little more peaty. The treatment and preparation of the land was the same.

Mammoth Long Red (Evans).—One acre, sown May 13th, 3 to 4 lbs. per acre on drills 2½ feet apart, came up 26th May, and were pulled 10th October. Yield per acre 15 tons 260 lbs. Growth strong, but uneven, owing to many of the young plants having been eaten by insects.

Mammoth Long Red (Sharpe.) .One acre, sown 13th May, 3 to 4 lbs. per acre on drills 2½ feet apart, came up 26th May, and were pulled 11th October. Yield per acre, 14 tons 1,500 lbs. Growth strong, but uneven, as many of the young plants in this instance also were eaten by insects.

EXPERIMENTS WITH CARROTS.

Twelve varieties of carrots were sown side by side adjoining the plots used for test of varieties of turnips. The soil and treatment of the land was the same. The carrots were sown on the flat in rows two feet apart, 3 to 4 lbs. of seed being used per acres Two plots of each sort were sown, the first on the 11th May, and the second on 25th May, and the roots on both were pulled on 8th October. The yield in each instance has been calculated from the weight of crop gathered from two rows, each 66 feet long. In this case also the earlier sown plots have averaged a considerably larger yield than those sown later.

CARROTS—TEST OF VARIETIES.

Name of Variety.	Yield per Acre. 1st Pilot.		Yield per Acre. 1st Pilot.		Yield per Acre. 2nd Pilot.		Yield per Acre. 2nd Pilot.	
	Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
Mammoth White Intermediate	29	1,400	990		25	820	847	
Improved Half Long White	27	1,935	932	15	23	1,520	792	
Iverson's Champion	26	1,130	885	30	26	1,295	888	15
Early Gem	24	262	804	22	14	1,782	496	22
White Belgian	23	530	775	30	14	50	467	30
Carter's Orange Giant	23	282	771	22				
Giant Short White Vosges	22	1,870	764	30	20	260	671	
Improved Short White	22	880	748		20	1,580	693	
Yellow Intermediate	21	570	709	30				
Long Scarlet Altringham	15	1,020	517		9	1,140	319	
Long Orange or Surrey	11	1,100	385		7	932	248	52
Scarlet Altringham (Webb)					10	790	346	30

Three of the plots of carrots are not reported on. The seed of the Scarlet Altringham in the first sowing was not received in time to be sown with the others, and two of the plots in the second sowing were almost an entire failure either from lack of germination of the seed or the destruction of the young plants from some unknown cause, so that they were of no value for comparison.

FIELD CROP OF CARROTS.

One acre only was sown as a field crop. The variety used was the Improved Short White. The soil was a mixture of sandy and clay loam, which had received no fertilizer since the spring of 1892. The land was ploughed in the autumn of 1894 about 8 inches deep, and gang-ploughed in the spring following and harrowed with the smoothing harrow before sowing. Sown 13th May; 3 to 4 lbs. of seed per acre; on drills 2½ feet apart; came up 27th and 28th May, and were pulled 18th October. Yield per acre, 18 tons 1525 lbs. Growth medium, but even in character.

EXPERIMENTS WITH POTATOES.

Ninety-one varieties of potatoes have been tested during the past season side by side, for the purpose of gaining information as to their relative yield, earliness and quality. The soil in which they were planted was sandy loam, adjoining that used for the tests of varieties of Indian corn. The land was similar in character, and had the same treatment.

The potatoes for planting were cut into pieces with from two to three eyes in each, and were planted in rows 2½ feet apart, with the sets about a foot apart in the rows. They were all planted from the 22nd to the 25th of May, and were dug October 2nd. The yield per acre has been calculated from the weight of tubers obtained from one row, 132 feet long. It will be seen that rot prevailed to a greater or less extent in nearly all the varieties tested.

All the varieties were sprayed once with Bordeaux mixture during the first week in August, probably the heavy rains which occurred about that time may have prevented this useful fungicide from exercising its usual beneficial action on this formidable disease.

POTATOES—TEST OF VARIETIES.

Name of Variety.	Total Yield per Acre.		Yield per Acre of Sound.		Yield per Acre of Rotten.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Colour.
	Bsh.	Lbs.	Bsh.	Lbs.	Bsh.	Lbs.	Bsh.	Lbs.	Bsh.	Lbs.	
American Wonder	385		341	..	44	..	299	12	41	48	White.
Rochester Rose	381	8	315	48	65	20	283	8	32	40	Pink.
Early Norther	378	24	354	12	24	12	303	36	50	36	Pink and white.
Irish Daisy	366	37	366	37	.....		319	26	47	11	White.
General Gordon	365	12	341	..	24	12	301	24	39	36	Pink.
Early White Prize	363	..	328	58	34	2	297	12	31	46	White.
New Queen	363	..	331	14	31	46	304	1	27	13	Pink and white.
Hale's Champion	358	36	352	..	6	36	310	12	41	48	White.
Henderson's Late Puritan	355	44	355	44	.....		304	55	50	49	"
Early Harvest	353	55	308	33	45	22	267	43	40	50	"
Thorburn	352	..	327	48	24	12	281	36	46	12	Pink and white.
Queen of the Valley	347	36	242	..	105	36	235	24	6	36	Pink.
I. X. L	347	36	283	48	63	48	255	12	28	36	Pink and white.
Empire State	347	36	310	12	37	24	286	..	24	12	White.
Reading Giant	347	36	344	18	3	18	308	..	36	18	"
Clarke's No. 1	341	..	305	48	35	12	272	48	33	..	Pink.
Early Rose	327	48	312	24	15	24	272	48	39	36	"
Burnaby Seedling	323	24	288	12	35	12	257	24	30	48	Pink and white.
Everett	323	24	268	24	55	..	239	48	28	36	Rose.
Monroe County	321	12	281	36	39	36	235	24	46	12	Pink.
White Beauty	312	24	297	..	15	24	279	24	17	36	White.
American Giant	312	24	235	24	77	..	209	..	26	24	"
Maggie Murphy	312	10	261	21	50	49	246	50	14	31	Bright pink.
Early Six Weeks	310	48	256	21	54	27	229	8	27	13	Pink.

POTATOES—TEST OF VARIETIES—*Continued.*

Name of Variety.	Total Yield per Acre.		Yield per Acre of Sound.		Yield per Acre of Rotten.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Colour.
	Bsh.	Lbs.	Bsh.	Lbs.	Bsh.	Lbs.	Bsh.	Lbs.	Bsh.	Lbs.	
Prize Taker	297	12	276	57	20	25	235	57	40	50	Pink.
Earliest of All	297	..	290	24	6	36	244	12	46	12	Pink and white.
Vick's Extra Early	294	48	242	..	52	48	215	36	26	24	"
Daisy	290	24	264	..	26	24	226	36	37	24	"
Burpee's Extra Early	290	24	255	12	35	12	209	..	46	12	"
Early Puritan	290	23	263	10	27	13	222	20	40	50	White.
Sharpe's Seedling	283	48	264	..	19	48	231	..	33	..	Pink and white.
Flemish Beauty Seedling	283	48	257	24	26	24	224	24	33	..	Bright pink.
Polaris	281	36	259	36	22	..	228	48	30	48	White.
Russell's Seedling	279	24	231	..	48	24	181	30	49	30	White.
Pride of the Market	279	24	231	..	48	24	200	12	30	48	"
Pearce's Extra Early	279	24	255	12	24	12	211	12	44	..	Pink and white.
Russell's Seedling	277	12	253	..	24	12	171	36	81	24	White.
Seedling No. 230	277	12	261	48	15	24	204	36	57	12	"
Lee's Favourite	275	..	242	..	33	..	215	36	26	24	Pink.
Delaware	275	..	261	48	13	12	235	24	26	24	White.
Brown's Rot Proof	273	54	259	36	14	18	226	36	33	..	Pink.
Seedling No. 2, R. Edwards	268	24	268	24	.....		226	36	41	48	White.
Troy Seedling	267	42	240	29	27	13	204	11	36	18	
Holborn Abundance	264	..	253	..	11	..	217	48	35	12	"
McKenzie	261	48	253	..	8	48	217	48	35	12	"
Seattle	261	48	237	36	24	12	206	48	30	48	"
Pride of the Table	261	48	167	12	94	36	143	..	24	12	Pink.
State of Maine	259	36	236	30	23	6	215	36	20	54	White.
Seedling No. 214	259	36	255	12	4	24	211	12	44	..	"
Great Divide	258	38	224	36	34	2	183	46	40	50	"
Money Maker	256	22	233	41	22	41	220	4	13	37	"
Chicago Market	255	12	215	36	39	36	187	..	28	36	Pink
Crown Jewel	250	48	224	24	26	24	178	12	46	12	Pink and white.
Ideal	249	33	158	48	90	45	149	44	9	4	Pink.
Early Ohio	244	12	204	36	39	36	193	36	11	..	"
Algoma No. 1	244	12	206	48	37	24	184	48	22	..	"
Early Sunrise	239	48	193	36	46	12	165	..	28	36	"
Lizzie's Pride	239	48	182	36	57	12	158	24	24	12	Pink, red eye.
Harbinger	233	12	228	48	4	24	184	48	44	..	Pale pink.
London	231	..	220	..	11	..	178	12	41	48	Pink.
Freeman	231	..	231	..	.....		165	..	66	..	White.
Rural Blush	229	54	210	6	19	48	190	18	19	48	Pink.
Brownell's Winner	226	52	199	39	27	13	181	30	18	9	Red.
Dreer's Standard	226	36	213	24	13	12	180	24	33	..	White.
Early Thorburn	226	36	202	24	24	12	173	48	28	36	Pink and white.
Satisfaction	225	30	218	54	6	36	194	42	24	12	White.
Seedling No. 3, R. Edwards	223	18	220	..	3	18	194	42	25	18	"
Dakota Red	220	..	220	..	.....		200	12	19	48	Red.
Carman No. 1	220	4	204	11	15	53	183	46	20	25	White.
Blue Cup	220	..	209	..	11	..	193	36	15	24	Purple and white
Northern Spy	217	48	211	12	6	36	167	12	44	..	Bright pink.
Beauty of Hebron	209	..	191	24	17	36	154	..	37	24	Pink and white.
Vanier	209	..	209	..	..	..	167	12	41	48	Red.
Green Mountain	204	36	187	..	17	36	176	..	11	..	White.
Table King	200	12	198	..	2	12	167	12	30	48	"
Early Gem	199	6	173	48	25	18	145	12	28	36	Pink.
Hopeful	198	..	193	36	4	24	167	12	26	24	White.
Peerless Junior	196	2	174	15	21	47	152	28	21	47	"
Victor Rose	195	7	140	40	54	27	127	3	13	37	Pink.
Clay Rose	195	7	190	35	4	32	156	33	34	2	"
Chas. Downing	194	42	178	12	16	30	134	12	44	..	White.
New Variety No. 1	187	..	179	18	7	42	166	6	13	12	"
Orphan's	177	39	173	7	4	32	120	15	52	52	Purple and white
Bras d'Or Seedling	176	..	158	24	17	36	124	12	24	12	Purple.
E. Lortie, from	162	48	160	36	2	12	110	..	50	36	
Martin's	155	6	146	18	8	48	103	24	42	54	Purple.
Seedling from T. McMurray, North Bay	154	..	125	24	28	36	94	36	30	48	Pink.
Record	149	44	.....		.....		.....		.....		White.
World's Fair	144	6	124	18	19	48	89	6	35	12	"
Pearce's Prize Winner	138	36	127	36	11	..	110	.	17	36	Pink.
Stourbridge Glory	133	51	.....		.....		.....		.....		White.

FIELD CROPS OF POTATOES.

The following varieties of potatoes have been planted side by side, all on the same soil. The soil was a light sandy loam, which was manured in the spring of 1893, with about 18 to 20 tons of barn-yard manure per acre. The previous crop was corn. The land was ploughed in the autumn of 1894, about eight inches deep, and gang-ploughed and harrowed with the smoothing harrow in 1895 before sowing. The potatoes were all planted in drills, 2½ feet apart, with the sets containing from two to three eyes each, 12 to 14 inches apart. The growth of all the varieties was fairly even and there was very little rot in any of them. They were all planted 25th May, came up 7th June, and were dug 27th September.

	Acres.	Yield per acre.
Daisy	1/16	239 bushels 40 pounds.
Northern Spy	1/10	236 " 56 "
Dakota Red	1/11	232 " .. "
New Variety No. 1	1/11	225 " 18 "
Empire State	1/13	222 " 28 "
Everett	1/7	214 " 39 "
Rural Blush	1/14	200 " 41 "
Early Rose	1/18	199 " 37 "
Pearce's Extra Early	1/12	196 " 9 "
McKenzie	1/16	194 " 20 "
Clarke's No. 1	1/17	192 " 28 "
Early Sunrise	1/13	191 " 54 "
London	1/8	183 " 55 "
Chicago Market	1/9	179 " 55 "
Early Ohio	1/14	155 " 47 "

EXPERIMENTS WITH SUGAR BEETS.

Four varieties of sugar beets were sown in plots of ¼th acre each, adjoining the field crop of carrots, on similar land, with the same treatment. These were all sown on drills 2½ feet apart, and the quantity of seed used in each case was from 3 to 4 lbs. per acre.

Vilmorin's Improved.—¼ acre. Sown 13th May; came up 26th May, and were pulled 21st October. Yield per acre, 9 tons 1810 lbs.

French White.—¼ acre. Sown 13th May; came up 26th May, and were pulled 21st October. Yield per acre, 10 tons 1170 lbs.

German White.—¼ acre. Sown 13th May, came up 26th May, and were pulled 21st October. Yield per acre, 9 tons 1406 lbs.

Klein Wanzleben.—¼ acre. Sown 13th May, came up 26th May, and were pulled 21st October. Yield per acre, 12 tons 810 lbs.

SUMMARY of Crops grown on the Central Experimental Farm during the year 1895.

—	Tons.	Lbs.	—	Bush.	Lbs.
Hay	149	.....	Wheat	219	43
Indian corn cut for ensilage	274	1154	Rye	241	.....
Indian corn cut when cobs were nearly ripe and cured in stooks for winter feeding	25	544	Oats	2,478	14
			Barley	667	25
			Pease	250	59
Indian corn and horse beans grown together and cut for ensilage	74	1769	Buckwheat	67	14
			Potatoes	762	10
Horse beans grown separately and cut for ensilage	44	1367	English horse beans	26	50
Mixed crop cut and cured as hay	33	385		4,713	35
Sunflower heads	16	791			
Turnips	24	808			
Carrots	74	1219			
Mangels	95	747			
Sugar beets	10	1279			
	823	18			

EXPERIMENTS WITH CLOVERS.

The different varieties of clover have long been held in high esteem by practical farmers in all parts of the world as most useful plants to plough under as green manure for the benefit of future crops. Much interest has of late been awakened in this subject, it having been shown that clovers in common with most other leguminous plants have the power of taking nitrogen—the most expensive of all fertilizers to buy—from the air and of storing it up in their tissues. Some experiments have recently been tried at the Central Experimental Farm to determine approximately the quantity of nitrogen which may be added to the soil per acre by ploughing under a crop of green clover.

A field which was sown with barley—a two-rowed variety (Canadian Thorpe)—in the spring of 1894, was at the same time seeded down with Mammoth Red Clover. After the barley was harvested the clover grew rapidly and made a good stand before winter. By the third week in May, about the time when such a crop should be ploughed under for corn or potatoes, the clover was quite heavy. On the 25th of May, a box a foot square inside and four feet deep was sunk to its full depth into the crop, and by lifting it carefully a fair sample of clover with roots to the depth named was obtained. On washing away the earth some of the roots were found to extend down fully four feet and had thus been able to feed on stores of fertility in the lower depths of the subsoil, beyond the reach of other crops with a less extensive root system, and to transfer these to the leaves and stalks. In this crop of one year's growth, the green leaves and stems were separated from the partly decayed leaves about the base, and also from the roots, and each weighed and analysed separately by the Chemist of the Experimental Farms. The proportion of nitrogen in pounds per acre found in these different parts of the crop was as follows:—

Green leaves and stems	101·3	lbs. per acre.
Semi-decayed material on surface	22·5	"
Roots to a depth of four feet	48·5	"
Total	172·3	"

A similar test was also made on a crop of two years' growth on 25th May, with the following results:—

Green leaves and stems	50·0	lbs. per acre.
Semi-decayed material on surface	5·1	"
Roots to a depth of four feet	61·5	"
Total	116·6	"

In both these fields timothy had been sown with the clover in the proportion of 12 lbs. of the former to 8 lbs. of the latter. In the field of one year's growth, the timothy plants were quite small and formed a very small percentage of the whole, but in the crop of the second year the timothy plants were much stronger and larger, and formed a much larger proportion of the green growth. The fact that the timothy plants formed so large a part of the crop explains why the total quantity of nitrogen was so much less in the crop of the second year than it was in that of the first.

Experiments have been carried on with clover and other legumes for some years past at the Connecticut Experiment Station at Storrs, Conn., and the following figures give the results from four analyses made there of red clover in which the proportions of the two other important fertilizing constituents, phosphoric acid and potash are given also in pounds per acre:—

	Nitrogen.	Phos. Acid.	Potash.
Green leaves and stems	114·0	23·0	123·0
Stubble and roots	44·3	12·5	32·2
Total	158·3	35·5	155·2

While some of the nitrogen stored up is no doubt taken from the soil, a large proportion of it is gathered from the air in which unlimited stores exist. It must be borne in mind that the phosphoric acid and potash are taken by clovers entirely from the soil, but as the root system extends deep and wide, stores are gathered which other plants do not reach, and these are laid up in the tissues, and when ploughed under are soon converted into plant food available for succeeding crops.

In the Annual Report of the Experimental Farms for 1893, page 7, the quantities of these three important elements of fertility, which are taken from the soil by some of the more important agricultural crops, have been given in lbs. per acre, others are added here.

	Nitrogen.	Phos. Acid.	Potash.
A wheat crop of 25 bushels per acre with 2,200 lbs. of straw takes about.....	40·53	17·64	19·11
A barley crop of 35 bushels per acre with 2,000 lbs. of straw takes	45·48	17·14	28·25
A crop of oats of 50 bushels per acre with 2,200 lbs. of straw takes.....	46·3	15·22	32·88
A crop of Indian corn grown for fodder to the period when the ears are in the late milk or glazing stage of 15 tons per acre takes..	87·	44·40	98·10
Turnips, roots only 15 tons per acre	49·50	27·90	82·50
Mangels, roots only 15 tons per acre	45·45	27·60	114·90
Carrots, roots only 15 tons per acre.....	35·25	33·30	97·95
Sugar beets, roots only 15 tons per acre.....	71·85	28·80	135·90
Potatoes, tubers only, 200 bushs. per acre.....	25·20	8·40	*34·80
Hay, average of many analyses, two tons per acre.....	62·	16·40	52·80

From these figures the importance of the clover crop as a fertilizer will be readily seen.

GREEN CLOVER AS A FERTILIZER COMPARED WITH BARN-YARD MANURE.

The question naturally arises in this connection: How does a crop of green clover with such weight of roots and stems as those referred to compare with a dressing of barn-yard manure?

Manure from the barn-yard varies so much in quality that it is not possible to give exact information in reply. The results of a large number of analyses show that manure of good quality usually contains per ton from 10 to 12 lbs. of nitrogen, 5 to 15 lbs. of phosphoric acid, and 7 to 15 lbs. of potash. The average of a very large number of determinations as given in a "Handbook of Experiment Station Work," published by the U.S. Department of Agriculture, is nitrogen 9·80 lbs. per ton, phosphoric acid 6·40 lbs. and potash 8·60 lbs. Calculated on the basis of these latter figures the average crop of clover had at the Connecticut Experiment Station, with tops and roots both ploughed under, would provide in the soil more nitrogen and potash than 15 tons of barn-yard manure, and more phosphoric acid than 5 tons of such manure.

* The figures here given have been taken from the "Handbook of Experiment Stations Work" of the U. S. Department of Agriculture, 1893. Some other authorities give the proportion of potash as much larger. The New York Experimental Station in Bulletin 94, Oct., 1895, gives 60 lbs. of potash as the quantity taken up by 200 bushels of potatoes.

DOES CLOVER SOWN WITH GRAIN LESSEN THE YIELD.

A further important question suggests itself, can clover be grown to advantage with grain from year to year without materially lessening the crop? If this can be done, the clover will also serve as an excellent catch crop, absorbing and appropriating the nitrogenous fertilizers brought down by the rain during the late months of autumn, and may be ploughed under at the close of the season, with great advantage to the land. Should this course be adopted, what quantity of clover seed should be sown per acre and what kinds of clover are best for the purpose.

A course of experiments has been planned and carried out during the past season, to gain information on these points. A field of nearly two acres was selected for this purpose, the soil was a sandy loam which appeared to be fairly uniform, but was of poor quality. It was sown with wheat in 1894 and gave a light crop. It was ploughed in the autumn of 1894, and received a dressing of wood ashes, about 150 bushels per acre, during the following winter, applied when the ground was bare. The land was gang-ploughed in the spring of 1895, and harrowed with the smoothing harrow before sowing. This area was divided into 18 plots of one-tenth acre each, with three feet of space all around each plot, and the whole sown on 3rd May, with two-rowed barley, Canadian Thorpe, two bushels per acre. This came up on the 8th of May and was harvested 5th August, ripened evenly, all standing well. On the 9th of May the clover was sown and the land rolled. The quantities and kinds of clover seed used were as follows and the several plots gave the following yields of barley :—

	Yields of Barley per acre. Bush.	Lbs.
No. 1—2 lbs. Mammoth Red Clover per acre	16	37
" 2—Was a check plot, had no clover	19	18
" 3—4 lbs. Mammoth Red Clover per acre	19	23
" 4—6 " " " "	19	8
" 5—8 " " " "	18	21
" 6—10 " " " "	18	41
" 7—A check plot, no clover sown	19	8
" 8—12 lbs. Mammoth Red Clover per acre	21	7
" 9—14 lbs. " " "	26	22
" 10—16 lbs. " " "	22	14
" 11—A check plot no clover sown	19	13
" 12—8 lbs. Lucerne Clover	18	21
" 13—8 lbs. Alsike Clover	23	16
" 14—8 lbs. Crimson Clover	16	2
" 15—8 lbs. Cow Grass	15	30
" 16—8 lbs. Mammoth Red Clover	16	22
" 17—A check plot, no clover sown	18	26
" 18—8 lbs. Mammoth Red Clover	16	32

In most instances those plots which gave the lesser yields of grain were a little lower than the others which as there was an unusual rainfall at Ottawa during the growing season may account for this falling off. Taking the results of all the plots into consideration it does not appear that the yield of barley was materially influenced by the sowing of the clover with it. Part of the following notes were taken on the 4th of October, after which the land was ploughed 8 inches deep and a square block of the turned furrow cut out and the plants washed clean of earth, when further particulars were taken on the development of the roots; these combined notes are here submitted.

No. 1, 2 lbs. Mammoth Red Clover seed per acre. Growth very thin and bunchy, height of plants 4 to 6 inches, the roots in this plot were strong and well developed.

No. 2, 4 lbs. Mammoth Red Clover seed per acre. Very bunchy and uneven, height 4 to 6 inches, roots strong and well developed with a larger proportion of small fibres than in No. 1.

No. 4, 6 lbs. Mammoth Red Clover seed per acre. Plants very much thicker and more even in growth and distribution than Nos. 1 and 2 but not thick enough to make good meadow, height 4 to 6 inches. Roots strong and well developed with a large proportion of small fibres.

No. 5, 8 lbs. Mammoth Red Clover seed per acre. A good even growth, ground fairly well covered with plants, thick enough to make a good meadow, but should be thicker for ploughing under first season. Roots strong and well developed with a large proportion of small fibres.

No. 6, 10 lbs. Mammoth Red Clover seed per acre. A good even growth, ground well covered forming an excellent mat 4 to 7 inches high, in good condition for ploughing under. Roots strong and well developed, many of them thick, with a large proportion of small fibres.

No. 8, 12 lbs. Mammoth Red Clover seed per acre. A very thick and even growth, thicker than is needed to make good meadow, a fine mat for ploughing under, height 4 to 7 inches. Roots strong and well developed, soil well filled with small fibres.

No. 9, 14 lbs. Mammoth Red Clover seed per acre. Growth very thick and even 5 to 8 inches high, suitable for fall feeding or ploughing under, too thick for meadow. Roots strong and well developed, soil very well filled with fine fibres.

No. 10, 16 lbs. Mammoth Red Clover seed per acre. Made a very thick mat of growth 5 to 8 inches high, excellent for fall feeding or ploughing under, too thick for meadow. Roots strong and well developed, the soil very well filled with fibres.

No. 12, 8 lbs. Lucerne per acre. Made a thin and uneven growth in bunches, not thick enough for meadow, stalks somewhat woody. Roots thick and strong with comparatively few fibres.

No. 13, 8 lbs. Alsike Clover per acre. The seeds of this variety of clover are small, and this quantity of seed was sufficient to produce a very thick and even growth, too thick a mat for meadow, in good condition for ploughing under, height 5 to 8 inches. A considerable part of this was in flower on 4th October, and bees were working on the flowers at that date. Root growth very strong, roots white, are thicker and more branching than other varieties and are well provided with fibres.

No. 14, 8 lbs. Crimson Clover. The seeds of this clover are large and the quantity sown was not sufficient to make a good stand. The growth was very uneven and weak, much too thin for ploughing under. Many of the plants were in flower on 4th October and bees were working among them. The roots were fairly well developed for an annual plant, they were not as strong as those of the other clovers, but were well provided with fibres, many of them extending down to the full depth of the furrow.

No. 15, 8 lbs. Cow Grass or Perennial Red Clover per acre. The seed of this clover is somewhat larger than that of the Mammoth Red, but the plants resemble this variety closely. In this case the seed did not germinate well and the growth was uneven, weak and patchy, not thick enough for meadow. As the yield of barley was less on this plot the land was probably poorer which may partly account for the weaker growth.

No. 16, 8 lbs. Mammoth Red Clover, Ewing's No. 1 per acre. This produced a very thick, even growth, height 4 to 7 inches, with a considerable quantity of bloom, in first-class condition for meadow or for ploughing under. This growth was thicker than No. 5 where the same quantity of seed was used; probably the seed in this instance was of better quality. Roots, strong and well developed with a very large proportion of fibres.

No. 17, 8 lbs. Mammoth Red Clover, Ewing's No. 2, produced a very thick and even growth, 4 to 7 inches high. A larger proportion of the plants in bloom than in No. 16, in very good condition for meadow or for ploughing under. Roots of medium size, well developed with a large proportion of fibres.

On a careful examination of the seeds of the different varieties of clover used in these experiments it was found that they varied more in size than was at first anticipated. In order to ascertain the approximate number of seeds in each pound, 20 grains of each

sort was accurately weighed on a chemical balance and the seeds counted. Taking 7,000 grains as equal to 1 lb. avoirdupois we find the approximate number of seeds of the different varieties referred to, in each pound to be as follows :—

	Number of seeds per lb.
Alsike Clover	693,350
Common Red Clover	282,800
Mammoth Red Clover, Ewing's No. 1	281,750
Mammoth Red Clover, Ewing's No. 2	281,400
Mammoth Red Clover	259,350
Cow Grass (Perennial Red Clover)	227,150
Lucerne or Alfalfa	194,600
Crimson Clover	115,850
Timothy	1,020,950

Presuming these seeds all to have the same percentage of vitality or germinating power it will be seen that 1 lb. of Alsike would produce nearly as many plants as $2\frac{1}{2}$ lbs. of Red Clover and more than $3\frac{1}{2}$ lbs. of Lucerne or Alfalfa and more than would be produced by 5 lbs. of Crimson Clover. It would appear that in sowing clovers the quantity of seed used should be proportionate to the size of the seed in each case. On this basis presuming that 10 lbs of red clover per acre would be a proper quantity to sow with grain to produce a good mat of foliage to plough under in the autumn or following spring 5 lbs. of Alsike should be enough for a similar area, whereas sufficient seed to produce the same number of plants of Lucerne or Alfalfa would require about 14 lbs. and of Crimson Clover about 24 lbs. This subject is worthy of more general attention and careful test by farmers in all parts of the country.

TESTS OF THE ACTION OF FERTILIZERS ON SOME CROPS.

In the Annual Report of the Experimental Farms for 1893, details were given on pages 8 to 24 of the results of a series of tests which were carried on during the previous five or six years with the object of gaining information regarding the effects which follow the application of certain fertilizers and combinations of fertilizers on the more important crops. The particulars there given covered the results of six years' experience with crops of wheat and Indian corn, and five years' experience with crops of oats, barley, turnips and mangels. The results of similar tests conducted for three years with carrots and one year with sugar beets were also given.

These experiments have been continned ; and as explanatory regarding the preparations made and the general plan, together with the way in which they have been carried on the following paragraphs are quoted from the report of 1893 :

"A piece of sandy loam, more or less mixed with clay, which was originally covered with heavy timber, chiefly white pine, was chosen for these tests. The timber was cut many years ago, and among the stumps still remaining when the land was purchased, there had sprung up a thick second growth of trees, chiefly poplar, birch and maple, few of which exceeded six inches in diameter at the base. Early in 1887, this land was cleared by rooting up the young trees and stumps and burning them in piles on the ground from which they were taken, the ashes being afterwards distributed over the soil as evenly as possible, and the land ploughed and thoroughly harrowed. Later in the season it was again ploughed and harrowed, and most of it got into fair condition for cropping."

"The plots laid out for the experimental work with fertilizers were one-tenth of an acre each, 21 of which were devoted to experiments with wheat, 21 to barley, 21 to oats, 21 to Indian corn or maize, and 21 to experiments with turnips and mangels. Owing to the difficulty and unavoidable delay attending the draining of some wet places, it was not practicable to undertake work on all the plots the first season. The tests were begun in 1888 with 20 plots of wheat and 16 of Indian corn ; and in 1889 all the

series were completed excepting six plots of roots, Nos. 16 to 21 inclusive, which were available for the work in 1890." In all cases the plots in each series have been sown on the same day.

"In 1890 it was found that all the grain plots had become so weedy that the growth of the crops was much interfered with, and with the view of cleaning the land one-half of each of the wheat and oat plots was sown with carrots in 1891, and one-half of each of the barley plots with sugar beets. In 1892 the other half of each plot in each of these series was sown with carrots. In 1893 it was thought desirable to continue this cleaning process, and carrots were again sown on the half of the wheat and oat plots occupied with this crop in 1891, and also on the half of the barley plots cropped with sugar beets that year." In 1894 and 1895, the one-half of the oat plots were sown again with carrots and the half of the plots devoted to wheat and barley were planted with potatoes.

"TREATMENT OF SOIL.

"The treatment of the soil on all the grain plots has been to gang-plough soon after harvest, and after the shed grain and weeds have well started to plough again about 7 inches deep. In spring the plots have been disc-harrowed twice or gang-ploughed once before applying the fertilizers, and again harrowed with the toothed or smoothing harrow before sowing. On those plots where barn-yard manure has been used, the manure has been lightly ploughed under as soon as possible after it has been spread on the land and harrowed with the smoothing harrow before sowing. Wherever barn-yard manure is spoken of, it is understood to be a mixture of horse and cow manure in about equal proportions."

It is proposed to give each year in the annual report a summary of these permanent fertilizer plots, taking the average yield of the whole of the previous period, adding the results of the current year, and then giving the average yield for the full time. The experience of each year will add materially to the value and reliability of the tests for the whole period.

WHEAT PLOTS.

The seed sown on each of these plots from the beginning has been in the proportion of 1½ bushels per acre, excepting in 1894; and the varieties used were as follows. In 1888-89 and '91 White Russian, and in 1892-93 Campbell's White Chaff. In 1894 the Rio Grande wheat was used, and shortly before sowing, it was tested as to vitality and found to be very deficient in germinating power, less than half the kernels sprouted. As it was not practicable then to secure better seed, double the usual quantity of seed was sown, namely: three bushels per acre, which gave a proportion of growth on each plot of about the usual thickness. In 1895 the Red Fife wheat was used in the usual quantity of 1½ bushels per acre.

The season of 1895 at Ottawa has been favourable for the growing of spring wheat, and has given crops considerably above the average. This year the plot on which the rotted manure was used has yielded at the rate of 2 bushels 20 lbs. per acre more than that on which the fresh manure was used. This gain is a little more than sufficient to offset the previous gains of the fresh manure plot and the rotted manure plot now averages a little higher than any other plot in the series.

EXPERIMENTS with Fertilizers on Plots of Wheat $\frac{1}{10}$th acre each.

No. of Plot.	Fertilizers applied each Year.	Average Yield for Seven Years.		8th Season, 1895. Variety, Red Fife.		Average Yield for Eight Years.	
		Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.
		Per acre.	Per acre	Per acre.	Per acre	Per acre.	Per acre
		Bush. lbs.	Lbs.	Bush. lbs.	Lbs.	Bush. lbs.	Lbs.
1	Barn-yard manure (mixed horse and cow manure) well rotted, 12 tons per acre in 1888; 15 tons per acre each year since.	17 24⅞	3,316	27 40	4,520	18 41⅜	3,466
2	Barn-yard manure (mixed horse and cow manure) fresh, 12 tons per acre in 1888; 15 tons per acre each year since.....	17 33	3,265	25 20	4,800	18 31⅜	3,457
3	Unmanured.....	10 7¼	1,851	8 50	1,870	9 57⅛	1,853
4	Mineral phosphate, untreated, finely ground, 500 lbs. per acre.....	10 19⅞	1,743	8 20	2,110	10 4⅜	1,789
5	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs. per acre.....	12 12⅞	2,898	11 20	2,800	12 6⅜	2,886
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre; mineral phosphate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed, and allowed to heat for several days before using.	15 19⅞	2,787	21	4,120	16 1⅞	2,954
7	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre.	11 19¼	2,494	19 20	4,370	12 19⅜	2,728
8	Mineral phosphate, untreated, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre.....	9 56⅜	1,627	12	2,320	10 11⅞	1,714
9	Mineral superphosphate, No. 1, 500 lbs. per acre.....	10 52¼	1,613	15 30	2,230	11 26⅞	1,690
10	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs. per acre.....	12 24⅞	2,944	12	3,040	12 21⅜	2,956
11	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,500 lbs. per acre.....	12 38¼	2,353	11 10	3,530	12 27⅛	2,500
12	Unmanured.....	9 52⅜	1,547	6 30	1,770	9 27⅛	1,575
13	Bone finely ground, 500 lbs. per acre..	10 17⅞	1,673	11 40	2,260	10 27⅛	1,746
14	Bone finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre.....	12 37⅝	1,924	18 40	3,320	13 23½	2,098
15	Nitrate of soda, 200 lbs. per acre.....	13 9⅜	2,272	13 40	2,810	13 13½	2,339
16	Muriate of potash, 150 lbs. per acre.....	13 26¼	1,816	22 20	2,480	14 33⅛	1,899
17	Sulphate of ammonia, 300 lbs. per acre....	11 14½	2,409	9 40	2,980	11 2⅜	2,480
18	Sulphate of iron, 60 lbs. per acre.....	11 53¼	1,946	12 40	1,820	11 59⅜	1,930
19	Common salt (Sodium chloride) 300 lbs. per acre.....	11 1⅜	1,585	16 00	2,200	11 38⅛	1,662
20	Land plaster or gypsum (Calcium sulphate) 300 lbs. per acre.....	11 35⅝	1,848	16 40	2,510	12 13⅛	1,931
21	Unmanured in 1889, mineral superphosphate, No. 2, 500 lbs. per acre, each year since.....	11 41¼	1,726	18 00	2,420	12 28⅛	1,813

It will be observed that the yield of wheat on plot 17 where sulphate of ammonia is used as the fertilizer is relatively small. This is probably due to the very heavy growth of straw which causes early and very bad lodging. Similar lodging (although it does not affect the grain quite so badly) usually takes place both in oats and barley in plot 17, with much the same result.

BARLEY PLOTS.

The quantity of seed sown per acre on the barley plots was 2 bushels in 1889, 1890 and 1891, 1½ bushels in 1892 and 1893, and 2 bushels in 1894 and 1895. Two-rowed barley has been used for seed throughout the whole period. The varieties used were as follows: 1889, 1890 and 1891, Saale; 1892, Goldthorpe; 1893, Duck-bill; and in 1894 and 1895 Canadian Thorpe, a selected form of the Duck-bill. In 1895 the Canadian Thorpe was sown 2nd May, came up 9th May and was harvested 9th August, requiring from the date of sowing to maturity a period of 99 days.

In 1895 the yield of the barley plots, Nos. 1, 2 and 10, were considerably higher than the average of past seasons. No. 19 has given exactly the same yield as the average of the previous six years, but all the other plots have fallen below the average. The plot fertilized with rotted barn-yard manure has given a slightly better yield than the plot where the manure was used fresh; not enough, however, to offset the previous gains of the fresh manure plot, which still averages 1 bush. 23 lbs. higher than that of the rotted manure for the seven years these tests have been continued.

EXPERIMENTS with Fertilizers on Plots of Barley, $\frac{1}{10}$th acre.

No. of Plot.	Fertilizers applied each Year.	Average Yield for Six Years.		7th Season, 1895, Variety Canadian Thorpe.		Average Yield for Seven Years.	
		Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.
		Per acre.	Per acre	Per acre.	Per acre	Per acre.	Per acre
		Bush. lbs.	Lbs.	Bush. lbs.	Lbs.	Bush. lbs.	Lbs.
1	Barn-yard manure, well rotted, 15 tons per acre	29 20⅘	2,770	39 8	3,740	30 39⅘	2,909
2	Barn-yard manure, fresh, 15 tons per acre.	31 13	3,047	38 46	4,200	32 17⅘	3,212
3	Unmanured	14 5⅗	1,548	11 32	1,550	13 36⅘	1,548
4	Mineral phosphate, untreated, finely ground, 500 lbs. per acre	14 1⅗	1,418	12 14	1,620	13 37⅘	1,447
5	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs. per acre	19 22⅗	2,245	16 2	2,310	18 47	2,254
6	Barn-yard manure, partly rotted, and actively fermenting, 6 tons per acre; mineral phosphate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using	25 2⅗	2,362	24 28	2,640	24 47⅘	2,402
7	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre.	22 2⅗	2,421	14 8	2,710	20 44⅘	2,462
8	Mineral phosphate, untreated, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre	16 46⅕	1,647	16 22	2,010	16 42⅘	1,699
9	Mineral superphosphate No. 1, 500 lbs. per acre	19 44⅘	2,132	18 36	1,510	19 36⅘	2,043
10	Mineral superphosphate No. 1, 350 lbs.; nitrate of soda, 200 lbs. per acre	23 25⅕	2,387	27 4	2,780	24 1⅘	2,443
11	Mineral superphosphate No. 1, 350 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,500 lbs. per acre	22 21⅗	2,552	23 16	2,150	22 27⅘	2,495
12	Unmanured	13 6⅗	1,296	7 34	1,030	12 17⅘	1,258
13	Bone, finely ground, 500 lbs. per acre	14 8	1,291	10	1,520	13 27⅗	1,324
14	Bone, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre	20 5⅘	1,950	16 32	2,160	19 30⅘	1,980
15	Nitrate of soda, 200 lbs. per acre	22 22⅗	2,688	14 28	2,340	21 16⅘	2,638
16	Muriate of potash, 150 lbs. per acre	21 25⅗	2,037	20 20	2,070	21 17⅘	2,042
17	Sulphate of ammonia, 300 lbs. per acre	19 ⅘	2,257	9 28	1,960	17 31⅘	2,215
18	Sulphate of iron, 60 lbs. per acre	18 35⅕	1,926	13 16	1,720	17 46⅗	1,897
19	Common salt (Sodium chloride) 300 lbs. per acre	26 12	2,022	26 12	2,380	26 12	2,073
20	Land plaster or gypsum (Calcium sulphate), 300 lbs. per acre	21 29⅗	1,837	12 44	1,870	20 17⅘	1,842
21	Mineral superphosphate No. 2, 500 lbs. per acre	20 31⅘	1,774	18 16	1,680	20 15⅘	1,761

OAT PLOTS.

The quantity of seed sown per acre on the oat plots was 2 bushels in 1889 and 1890; 1½ bushels in 1891 1892 and 1893, and 2 bushels in 1894 and 1895. The varieties used were as follows: In 1889, Early English; 1890, 1891, 1892, 1893, Prize Cluster; and in 1894 and 1895 Banner. In 1895 the Banner was sown 2nd May, came up the 9th May, and was harvested August 13, requiring from the date of sowing to maturity a period of 103 days. In every instance this year the yield of oats has been very much above the average of the previous six years.

EXPERIMENTS with Fertilizers on plots of Oats, $\frac{1}{10}$th acre.

No. of Plot.	Fertilizers applied each Year.	Average Yield for Six Years.		7th Season, 1895. Variety—Banner.		Average Yield for Seven Years.	
		Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.
		Per acre.	Per acre	Per acre.	Per acre	Per acre.	Per acre
		Bush. lbs.	Lbs.	Bush. lbs.	Lbs.	Bush. lbs.	Lbs.
1	Barn-yard manure, well rotted, 15 tons per acre	35 21⅘	2,776	51 6	3,060	37 29⅕	2,817
2	Barn-yard manure, fresh, 15 tons per acre.	39 15⅘	3,010	71 26	4,080	44 2⅘	3,163
3	Unmanured	26 11⅗	1,507	31 16	1,750	27 2⅖	1,542
4	Mineral phosphate, untreated, finely ground, 500 lbs. per acre	26 27⅘	1,850	28 28	1,600	27 3⅕	1,814
5	Mineral phosphate, untreated, finely ground; 500 lbs., nitrate of soda, 200 lbs. per acre	39 27⅘	2,724	64 14	3,410	43 10⅘	2,822
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre; mineral phosphate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using	34 19	2,591	47 22	2,380	36 14⅘	2,561
7	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre	35 10⅗	3,256	56 16	3,400	38 11⅘	3,277
8	Mineral phosphate, untreated, finely ground, 500 lbs., wood ashes, unleached, 1,500 lbs. per acre	32 9⅗	2,426	39 14	2,240	33 10⅕	2,399
9	Mineral superphosphate, No. 1, 500 lbs. per acre	27 7⅗	1,986	48 8	2,300	30 7⅘	2,031
10	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs. per acre	36 14⅗	2,856	62 12	3,520	40 4⅘	2,951
11	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,500 lbs. per acre	30 18⅗	2,488	50	3,000	33 11	2,561
12	Unmanured	22 10⅗	1,677	26 16	1,660	22 30⅘	1,675
13	Bone, finely ground, 500 lbs. per acre	26 21	1,964	41 26	2,340	28 26⅕	2,018
14	Bone, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre	27 24⅗	1,887	46 16	3,180	30 13⅕	2,072
15	Nitrate of soda, 200 lbs. per acre	37 11⅕	2,567	56 6	3,370	40 ⅘	2,682
16	Muriate of potash, 150 lbs. per acre	29 19	2,242	38 28	2,280	30 30	2,247
17	Sulphate of ammonia, 300 lbs. per acre	34 9⅗	3,236	63 8	3,340	38 15⅘	3,251
18	Sulphate of iron, 60 lbs. per acre	29 19	2,152	33 18	2,270	30 4⅗	2,169
19	Common salt (Sodium chloride) 300 lbs. per acre	27 23⅘	2,055	36 26	1,910	28 33⅗	2,034
20	Land plaster or gypsum (Calcium sulphate) 300 lbs. per acre	27 25⅗	2,217	37 22	2,000	29 5⅗	2,186
21	Mineral superphosphate, No. 2, 500 lbs. per acre	26 5⅕	1,912	31 16	1,970	26 31	1,920

CORN PLOTS.

The experiments with the plots of Indian corn have been conducted with the object of obtaining the largest weight of well matured green fodder for the silo and to have the corn so far advanced when cut that the ears shall be in the late milk or glazed condition. Each plot has been divided from the outset into two equal parts, on one of which—known as No. 1—one of the stronger growing and somewhat later ripening sorts has been tried, and on the other, marked No. 2, one of the earlier maturing varieties. During the first four years one of the dent varieties was tested under No. 1. The Mammoth Southern Sweet was tried in 1888, 1889 and 1890. In 1891 the Red Cob Ensilage was used, and in 1892, 1893, 1894 and 1895 a free growing flint variety, the Rural Thoroughbred White Flint, was tested. On the other half of the plot (No. 2) the Canada Yellow Flint was used in 1888, 1889 and 1890, the Thoroughbred White Flint in 1891, Pearce's Prolific in 1892, 1893 and 1894, and the Mammoth Eight Rowed Flint in 1895. For the first four years the No. 1 series was planted in drills three feet apart, using about 24 pounds of seed to the acre and thinning the plants, when up, to 6 or 8 inches apart, and the No. 2 in hills 3 feet apart each way and 4 or 5 kernels in a hill. During the past four years both sorts have been grown in hills. The corn in both series of plots was planted in 1895 on 23rd May, and cut 11th and 12th September. The yield of fodder on these plots during the past season has been considerably below the average of past years.

EXPERIMENTS with Fertilizers, on plots of Indian Corn, $\frac{1}{10}$th acre each, cut green for Ensilage.

No. of Plot.	Fertilizers applied each year.	Average Yield for Seven Years.		8th Season, 1895		Average Yield for Eight Years.	
		½ Plot No. 1—weight of green fodder.	½ Plot No. 2—weight of green fodder.	½ Plot No. 1—Thoroughbred White Flint, weight of green fodder.	½ Plot No. 2—Mamm. 8 rowed, weight of green fodder.	½ Plot No. 1—weight of green fodder.	½ Plot No. 2—weight of green foder.
		Per acre.	Per acre	Per acre.	Per acre	Per acre.	Per acre
		Tons. Lbs.	Tons lbs	Tons. Lbs.	Tons lbs	Tons. Lbs.	Tons lbs
1	Barn-yard manure, well rotted, 12 tons per acre	15 1,568	11 1,109	13 1,380	13 780	15 1,044	11 1,568
2	Barn-yard manure, fresh, 12 tons per acre.	18 1,446	10 1,939	13 1,680	13 1,560	18 225	11 642
3	Unmanured	10 1	6 1,328	4 400	3 1,680	9 551	6 622
4	Mineral phosphate untreated, finely ground, 500 lbs. per acre in 1888—800 lbs. per acre each year since	8 691	5 1,123	4 100	3 660	7 1,617	5 565
5	Mineral phosphate untreated, finely ground, 500 lbs. per acre in 1888—800 lbs. per acre each year since; nitrate of soda, 200 lbs. per acre	12 550	8 1,079	9 1,840	7 1,300	11 1,961	8 857
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre; mineral phosphate, untreated, finely ground, 500 lbs. per acre; composted together, intimately mixed and allowed to heat for several days before using	17 743	11 1,566	13 200	11 900	16 1,675	11 1,483
7	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre	15 1,983	10 1,164	13 80	10 1,440	15 1,245	10 1,198
8	Mineral phosphate, untreated, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre	12 1,381	8 1,570	8 1,400	6 1,900	12 383	8 1,111
9	Mineral superphosphate, No. 1, 500 lbs. per acre	11 1,609	8 940	8 1,060	6 1,440	11 790	8 502
10	Mineral superphosphate No. 1, 350 lbs.; nitrate of soda, 200 lbs. per acre	14 1,460	10 1,307	10 1,900	10 100	14 515	10 1,156
11	Mineral superphosphate No. 1, 350 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,500 lbs. per acre	16 1,510	12 903	13 1,420	12	16 749	12 790

EXPERIMENTS with Fertilizers, on plots of Indian Corn, $\frac{1}{10}$th acre each, &c.—*Continued.*

No. of Plot.	Fertilizers applied each year.	Average Yield for Seven Years.		8th Season, 1895.		Average Yield for Eight Years.	
		½ Plot No. 1—weight of green fodder.	½ Plot No. 2—weight of green fodder.	½ Plot No. 1—Thoroughbred White Flint, weight of green fodder.	½ Plot No. 2—Mamm. 8row-ed, weight of green fodder.	½ Plot No. 1—weight of green fodder.	½ Plot No. 2—weight of green fodder.
		Per acre.	Per acre	Per acre.	Per acre	Per acre.	Per acre
		Tons. lbs.	Tons lbs	Tons. lbs.	Tons lbs	Tons. lbs.	Tons lbs
12	Unmanured	12 144	9 1,509	8 1,660	7 1,180	11 1,333	9 968
13	Bone, finely ground, 500 lbs. per acre	12 473	9 460	10 700	7 100	12 1	8 1,915
14	Bone, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre	12 1,887	8 1,914	8	8 300	12 651	8 1,712
15	Nitrate of soda, 200 lbs. per acre	14 644	10 1,357	10 300	8 360	13 1,601	10 732
16	Sulphate of ammonia, 300 lbs. per acre	14 1,115	10 1,164	11 1,000	7 600	14 351	10 343
17	Mineral superphosphate No. 1, 600 lbs.; muriate of potash, 200 lbs.; sulphate of ammonia, 150 lbs. per acre	13 1,164	9 656	9 1,580	9 100	13 216	9 586
18	Muriate of potash, 300 lbs. per acre	9 1,781	6 231	7 900	4 1,800	9 1,171	5 1,927
19	Double sulphate of potash and magnesia, 300 lbs. per acre in 1889 and '90; (muriate of potash, 200 lbs., substituted each year since;) dried blood, 300 lbs.; mineral superphosphate No. 1, 500 lbs. per acre.	11 1,359	7 856	10 1,180	10 600	11 1,087	7 1,574
20	Wood ashes, unleached, 1,900 lbs. per acre.	10 1,686	6 1,961	7 1,000	6	10 850	6 1,716
21	Bone, finely ground, 500 lbs.; sulphate of ammonia, 200 lbs.; muriate of potash, 200 lbs. per acre	13 247	8 1,388	15 150	9 1,050	13 735	8 1,596

PLOTS OF MANGELS AND TURNIPS.

In conducting these experiments the roots only have been taken from the land, the tops have always been cut off and left on the ground to be ploughed under so that the plant food they have taken from the soil may be returned to it. One-half of each one-tenth acre plot in the series has been devoted to the growth of mangels, and the other half to turnips. The preparation of the land has been the same for both these roots. It has been ploughed in the autumn after the crop is gathered, disc-harrowed or gang-ploughed once in the spring, harrowed with smoothing harrow once, then ridged and sown.

In 1889, the variety of mangel used was the Mammoth Long Red. In 1890, three varieties were sown: 15 rows of Mammoth Long Red, 6 of Mammoth Long Yellow, and 6 of Golden Intermediate on each plot. In 1891, each plot again had three varieties: 18 rows of Mammoth Long Red, 3 of Yellow Fleshed Tankard, and 6 of Golden Tankard. In 1892, 1893, 1894 and 1895, one variety only has been used, namely, the Mammoth Long Red. From 4 to 6 lbs. of seed have been sown per acre, each year, in rows 2½ feet apart. In 1895 the mangels were sown May 10, came up May 26th, and were pulled October 10th.

Two varieties of turnips were sown on the half plots devoted to these roots in 1889: 25 rows of Carter's Prize Winner, and 2 rows of Carter's Queen of Swedes; and in 1890, a single variety: Carter's Elephant Swede. In 1891, six varieties were sown: 6 rows of Lord Derby Swede, 4 of New Giant King, 3 of Imperial Swede, 6 of Champion Swede, 4 of Purple Top Swede, and 4 of East Lothian Swede. In 1892, the Improved Purple Top Swede only was sown, in 1893 and 1894 the Prize Purple Top Swede, and in 1895 the Imperial Swede. The land used for the turnips, which are usually sown later than the mangels, is allowed to stand after disc-harrowing or gang-ploughing, then cultivated once and ridged immediately before sowing. In 1895, the turnips were sown June 2, came up June 18, and were pulled October 9. The plots of both mangels and turnips have yielded, during the past season, a little better than the average of previous years.

EXPERIMENTS with Fertilizers on Roots; Plots of Mangels and Turnips $\frac{1}{10}$th acre each.

No. of Plot.	Fertilizers applied each Year.	Average Yield for Six Years.		7th Season, 1895. Varieties.		Average Yield for Seven Years.	
				East Half Plot.	West Half Plot.		
		Mangels, Weight of Roots.	Turnips, Weight of Roots.	Mangels, Mammoth Long Red; Weight of Roots.	Turnips, Imperial Swede; Weight of Roots.	Mangels, Weight of Roots.	Turnips, Weight of Roots.
		Per Acre.	Per Acre.	Per Acre.	Per Acre.	Per Acre.	Per Acre.
		Tons. lbs.	Tons. lbs.	Tons. lbs.	Tons. lbs.	Tons. lbs.	Tons. lbs.
1	Barn-yard manure, well rotted, 20 tons per acre	21 1,257	11 1,090	22 1,560	15 420	21 1,586	12 137
2	Barn-yard manure, fresh, 20 tons p. ac.	20 1,492	12 1,573	24 1,830	14 1,630	21 683	13 153
3	Unmanured	9 1,955	7 92	6 900	2 1,680	9 947	6 890
4	Mineral phosphate, untreated, finely ground, 1,000 lbs. per acre	9 285	7 945	7 300	2 620	8 1,716	6 1,470
5	Mineral phosphate, untreated, finely ground, 1,000 lbs.; nitrate of soda, 250 lbs.; wood ashes, unleached, 1,000 lbs. per acre	13 985	8 2	13 1,720	2 1,220	13 1,090	7 462
6	Barn-yard manure, partly rotted and actively fermenting, 12 tons per acre; mineral phosphate, untreated, finely ground, 1,000 lbs., composted together, intimately mixed and allowed to heat for several days before using	17 1,480	11 1,405	18 1,010	7 1,700	17 1,699	11 304
7	Mineral phosphate, untreated, finely ground, 1,000 lbs.; sulphate of potash, 200 lbs. in 1889 and 1890, (substituted by muriate of potash, 250 lbs. in 1891 and subsequent years;) nitrate of soda, 200 lbs. per acre	10 381	8 1,671	10 1,260	2 790	10 507	7 1,831
8	Mineral superphosphate, No. 1, 500 lbs.; sulphate of potash, 200 lbs. in 1889 and 1890, (substituted by muriate of potash, 250 lbs. in 1891 and subsequent years;) nitrate of soda, 200 lbs. per acre	15 33	11 685	12 1,650	9 1,900	14 1,407	11 287
9	Mineral superphosphate, No. 1, 500 lbs. per acre	10 118	8 462	7 170	7 1,760	9 1,268	8 362
10	Nitrate of soda, 300 lbs. per acre	14 831	8 750	12 1,970	3 240	14 422	7 1,250
11	Sulphate of ammonia, 300 lbs. per ac.	10 1,477	9 868	12 1,140	5 510	11	8 1,674
12	Unmanured	7 1,752	7 365	4 1,630	3 390	7 877	6 1,226
13	Bone, finely ground, 500 lbs.; wood ashes, unleached, 1,000 lbs. per acre	10 1,022	7 797	9 580	5 740	10 673	7 217
14	Wood ashes, unleached, 2,000 lbs. p. ac	11 1,893	7 1,272	11 1,170	5 120	11 1,790	7 536
15	Common salt (Sodium chloride) 400 lbs. per acre	11 8	7 1,808	7 1,470	2 180	10 1,074	7 147
16	Mineral superphosphate, No. 1, 500 lbs.; nitrate of soda, 200 lbs. per ac.	14 1,061	10 475	10 390	9 420	13 1,822	10 181
17	Mineral superphosphate, No. 1, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre	12 1,948	9 286	10 1,880	7 100	12 1,367	8 1,688
18	Mineral superphosphate, No. 1, 500 lbs.; muriate of potash, 200 lbs. p. ac.	12 1,898	10 391	10 1,620	6 1,580	12 1,287	9 1,418
19	Double sulphate of potash and magnesia, 300 lbs. per acre in 1889 and 1890; (muriate of potash, 200 lbs., substituted each year since;) dried blood, 250 lbs.; mineral superphosphate, No. 1, 500 lbs. per acre	14 478	9 1,821	15 1,860	12 280	14 961	10 458
20	Wood ashes, unleached, 1,500 lbs.; common salt (Sodium chloride) 300 lbs. per acre	14 1,969	9 1,922	14 1,730	8 300	14 1,935	9 1,405
21	Mineral superphosphate, No. 2, 500 lbs. per acre	16 169	10 71	13 1,870	7 1,360	15 1,555	9 1,398

CARROT PLOTS.

Carrots have been sown on alternate halves of the oat plots for the past five years, for the purpose of cleaning the land from weeds. This work was begun in 1891, and the plots have been sown each year with the variety known as the Improved Short White. In 1895, carrots occupied the east half of the plots. The seed was sown May 10, came up May 27. The plants came up so very thin that the land was ploughed again on June 12th and resown. The young carrots came up June 24th and made rapid growth and the roots were pulled October 21. The crop, this year, sown so late was considerably below the average of the three preceding years.

EXPERIMENTS with Fertilizers on half plots (one-twentieth acre) of Carrots (Improved Short White), after Oats.

No. of Plot.	Fertilizers applied each Year.	Average Yield for four years. Weight of roots per acre.		5th Season Improved Short White. Weight of roots per acre.		Average Yield for five years. Weight of roots per acre.	
		Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.
1	Barn-yard manure, well rotted, 15 tons per acre	20	1,520½	9	570	18	930
2	Barn-yard manure, fresh, 15 tons per acre	23	675¼	9	1,360	20	1,212
3	Unmanured	16	590	5	720	14	216
4	Mineral phosphate, untreated, finely ground, 500 lbs. per acre	16	102½	4	1,350	13	1,552
5	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs. per acre	19	269¾	6	10	16	1,018
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre; mineral phosphate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed, and allowed to heat for several days before using	21	925¼	11	80	19	756
7	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs., per acre	16	1,492¾	10	100	15	814
8	Mineral phosphate, untreated, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre	13	1,095	8	320	12	940
9	Mineral superphosphate, No. 1 500 lbs. per acre	11	850¼	5	930	10	466
10	Mineral superphosphate, No. 1 350 lbs.; nitrate of soda, 200 lbs. per acre	14	432¼	5	1,020	12	950
11	Mineral superphosphate, No. 1 350 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,500 lbs. per acre	18	1,852¾	6	910	16	864
12	Unmanured	15	1,470¼	1	140	12	1,604
13	Bone, finely ground, 500 lbs. per acre	15	1,855	3	860	13	856
14	Bone, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre	20	495	10	1,720	18	740
15	Nitrate of soda, 200 lbs. per acre	18	1,783½	7	40	16	1,035
16	Muriate of potash, 150 lbs. per acre	19	914¾	8	1,460	17	624
17	Sulphate of ammonia, 300 lbs. per acre	14	922¼	3	1,250	12	588
18	Sulphate of iron, 60 lbs. per acre	15	958	4	210	13	408
19	Common salt (Sodium chloride), 300 lbs. per acre	17	842½	5	1,050	15	84
20	Land plaster or gypsum (Calcium sulphate) 300 lbs. per acre	17	1,730	3	510	14	1,886
21	Mineral superphosphate, No. 2 500 lbs. per acre	14	1,557½	4	.....	12	1,246

POTATO PLOTS.

The alternate halves of the wheat and barley plots which were occupied by carrots and sugar beets in 1891, 1892 and 1893, as explained in the annual report for 1893, were planted with potatoes in 1894 and 1895. These were planted in rows, $2\frac{1}{2}$ feet apart, with the sets about one foot apart in the rows.

Those after wheat were planted May 21st, came up June 8th and were dug October 2nd. On each of these plots there were seven rows of Early Rose, five Queen of the Valley, five Daisy, five Early Sunrise and five rows of May Queen Early.

Those after barley were planted May 23rd, came up June 8th and were dug September 30th. On each of these plots, there were seven rows of Wonder of the World, seven Thorburn, seven Beauty of Hebron and six rows of Lee's Favourite. In the table the yield of each variety for each plot is given, also the total yield in bushels per acre.

The average yield of the different varieties per row, putting the 21 plots all together, is as follows—the conditions, as far as they can be determined, being about equal :—

Queen of the Valley	$461\frac{4}{5}$
Early Rose	$426\frac{5}{7}$
Early Sunrise	$407\frac{1}{5}$
Daisy	376
Wonder of the World	$344\frac{2}{7}$
Thorburn	$329\frac{1}{7}$
Lee's Favourite	284
May Queen Early	$268\frac{3}{5}$
Beauty of Hebron	$256\frac{4}{7}$

By comparing these figures with the results obtained on the same plots last year it will be seen that the Beauty of Hebron, which was then at the head of the list with a yield of $406\frac{1}{3}$ lbs. per row, is this year at the foot, with a return of $256\frac{4}{7}$ lbs. The Early Rose, which in 1894 stood at the bottom of the list, with a yield of $235\frac{1}{2}$ lbs. per row, is this year second, with $426\frac{5}{7}$ lbs. No explanations are offered for these wide differences in results under apparently similar circumstances. They do, however, serve to show the importance of avoiding hasty conclusions and the necessity of continuing such experiments for a series of years, when more reliable inferences may be drawn from the average results obtained.

EXPERIMENTS with Fertilizers on half plots ($\frac{1}{20}$ acre) of Potatoes after Wheat.

No. of Plot.	Fertilizers Applied Each Year.	East Half of Plots.					
		Yield of 7 rows Early Rose.	Yield of 5 rows Queen of the Valley.	Yield of 5 rows Daisy.	Yield of 5 rows Early Sunrise.	Yield of 5 rows May Queen, Early.	Total Yield per Acre.
		Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Bush. Lbs.
1	Barn-yard manure (mixed horse and cow manure) well rotted, 12 tons per acre in 1888; 15 tons per acre each year since	206	193	179½	189½	151	306 20
2	Barn-yard manure (mixed horse and cow manure) fresh, 12 tons per acre in 1888; 15 tons per acre each year since	287	213½	221	213½	163	366
3	Unmanured	120	93	82	85	54	144 40
4	Mineral phosphate, untreated, finely ground, 500 lbs. per acre	125	105	54½	60	39	127 50
5	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs. per acre	142	95	80	96	60	157 40
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre; mineral phosphate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed, and allowed to heat for several days before using	258	179	185	183	147	317 20
7	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre	178	130	132	125	74	213
8	Mineral phosphate, untreated, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre	180	99	90	80	74	174 20
9	Mineral superphosphate, No. 1, 500 lbs. per acre	149	103	81	86½	88	169 10
10	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs. per acre	162	80	92½	101½	72½	169 30
11	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,500 lbs. per acre	227	153½	156	160	127	274 30
12	Unmanured	81	94	55	85½	44	119 50
13	Bone, finely ground, 500 lbs. per acre	116	85	29	50½	28	102 50
14	Bone, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre	174	139	96	128	76	204 20
15	Nitrate of soda, 200 lbs. per acre	52	71	43½	93	40	99 50
16	Muriate of potash, 150 lbs. per acre	99	103	106	101	35	148
17	Sulphate of ammonia, 300 lbs. per acre	89	78	47½	57½	15½	95 50
18	Sulphate of iron, 60 lbs. per acre	91	99	53	58	9	103 20
19	Common salt (Sodium chloride), 300 lbs. per acre	94½	76	37	10½	1	73
20	Land plaster or gypsum (Calcium sulphate), 300 lbs. per acre	75	56	19½	24	7½	60 40
21	Unmanured in 1889, mineral superphosphate, No. 2, 500 lbs. per acre each year since	82	64	39	48	38	90 20

The very low yields obtained on parts of plots 16, 17, 18, 19, were due to a hollow place in the land where the water resulting from a heavy rain flooded it soon after the plants appeared above ground. This was followed by a very hot sun, which destroyed most of the young growth before the drains could carry off the accumulated water.

EXPERIMENTS with Fertilizers on Half-Plots ($\frac{1}{20}$ acre) of Potatoes after Barley.

No. of Plot.	Fertilizers applied each Year.	WEST HALF OF PLOTS.					
		Yield of 7 rows Wonder of the World.	Yield of 7 rows Thorburn.	Yield of 7 rows Beauty of Hebron.	Yield of 6 rows Lee's Favourite.	Total Yield per Acre.	
		Lbs.	Lbs.	Lbs.	Lbs.	Bush.	lbs.
1	Barn-yard manure, well rotted, 15 tons per acre	223	225	174	103	241	40
2	Barn-yard manure, fresh, 15 tons per acre	212	225	181	131½	249	50
3	Unmanured	80	87	79	58½	101	30
4	Mineral phosphate, untreated, finely ground, 500 lbs. per acre	96	91	50	44	93	40
5	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs. per acre	113	73	55½	54	98	30
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre; mineral phosphate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using	207	226	155½	143	243	50
7	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre	144	128½	94	87½	151	20
8	Mineral phosphate, untreated, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre	166	117	80	89	150	40
9	Mineral superphosphate, No. 1, 500 lbs. per acre	137½	103	101	115	152	10
10	Mineral superphosphate No. 1, 350 lbs.; nitrate of soda, 200 lbs. per acre	92	113	83	83	123	40
11	Mineral superphosphate No. 1, 350 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,500 lbs. per acre	112	150½	110	116½	163	
12	Unmanured	79	64	28	43	71	20
13	Bone, finely ground, 500 lbs. per acre	85	54	56	52½	82	30
14	Bone, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre	144	148	138	114	181	20
15	Nitrate of soda, 200 lbs. per acre	67	61	57	59	81	20
16	Muriate of potash, 150 lbs. per acre	112	103	88	96	133	
17	Sulphate of ammonia, 300 lbs. per acre	80	82	50	70	94	
18	Sulphate of iron, 60 lbs. per acre	77	74	58	82½	97	10
19	Common salt (Sodium chloride) 300 lbs. per acre	44	55	35	43	59	
20	Land plaster or gypsum (Calcium sulphate) 300 lbs. per acre	42	36½	36	34½	49	40
21	Mineral superphosphate No. 2, 500 lbs. per acre	98	88	87	84½	119	10

LOSS IN WEIGHT OF BARN-YARD MANURE DURING THE PROCESS OF ROTTING.

Since much difference of opinion exists among farmers as to the actual loss which takes place in the weight of manure during the process of rotting, the following test was made at the Central Experimental Farm at Ottawa, during the past season for the purpose of gaining further information on this subject.

On the 7th of March, 1895, two tons (4,000 lbs.) of horse manure and two tons (4,000 lbs.) of cow manure were taken fresh from the barn-yard and placed ina shed on boards laid close together on the ground. It was thus preserved from leaching by exposure to rain. This manure has been turned and weighed once a month and the pile carefully watched to see that proper conditions of moisture were preserved. The following is the result of the several weighings :—

	Weight of Manure in lbs.
March 7, when test was begun	8,000
April 6, reduced in weight to	5,530
May 7, " " "	4,278
June 7, " " "	3,947
July 6, " " "	3,480
August 7, " " "	3,142
Sept. 7, " " "	3,053
October 7, " " "	2,812
Nov. 7, " " "	2,685
Dec. 7, " " "	2,600

On the 6th of July, that is at the end of four months when the 8,000 lbs. of fresh manure originally placed in the shed was reduced to 3,480 lbs., the manure was then in what would be considered first-class condition, having that pasty character which would admit of its being cut easily with a spade and mix readily with the soil. Subsequently it became more friable and when weighed on September 7th, it was found to break up easily, almost like soil. By December 7th, it had frozen quite solid and had to be broken up with a pick. It is proposed to continue these monthly weighings to the end of the year and to repeat the experiment again with similar quantities next season. The results of the test of nine months has been to reduce the weight of the manure under experiment from 8,000 lbs. to 2,600 lbs. showing a loss of more than two-thirds of the original weight.

From the results obtained from tests which have been made during the past eight years as to the action of fertilizers on crops, the particulars of which are given in the foregoing pages, it would appear that the action of fresh manure is almost equally beneficial ton per ton to that of rotted manure in the growing of nearly all the staple crops. The question of the best and most economical methods of handling barn-yard manure is one of the greatest importance to farmers everywhere, since animal manures form one of their most valuable assets. As a result of many analyses, it is estimated that twenty tons of good barn-yard manure contain about 196 lbs. of nitrogen, 128 lbs. of phosphoric acid and 172 lbs. of potash, which if estimated by their cost as obtainable from the cheapest artificial sources represents a sum of not less than $45. When we consider that there are in the Dominion over four millions of horned cattle, and nearly 1½ millions of horses, besides sheep and swine, it is of the highest importance that the manure given by this vast number of animals should be economically handled so that the best possible use may be made of the fertilizers it contains.

DISTRIBUTION OF SEED GRAIN.

The efforts which have been made during the past seven years to improve the quality and character of the different varieties of grain and other staple agricultural products grown in Canada by distributing samples of the most promising sorts to farmers for test, have been continued with gratifying results. The demand for these

samples has been unusually large, more than 31,000 applications having been received, while the total quantity of material available was only sufficient to supply 26,036. These samples were forwarded to 25,932 applicants, one sample only being sent to each, except in a few special cases where the applicants lived in very remote districts, from which the applications were few. In these exceptional cases two samples were sent.

Preparations are being made for the distribution for 1896, which will consist of some of the most promising sorts of oats, barley, wheat, pease, corn and potatoes. The several branch farms will also distribute as heretofore samples to farmers residing in the provinces and territories where these institutions have been established.

The samples sent out from the Central Experimental Farm at Ottawa during the early months of 1895, were distributed as follows:—

Prince Edward Island.

Oats	240
Wheat	145
Barley	126
Pease	48
Potatoes	109
Corn	117
	785

Number of applicants supplied, 778.

Nova Scotia.

Oats	680
Barley	538
Wheat	311
Pease	235
Potatoes	250
Corn	155
	2,169

Number of applicants supplied, 2,120.

New Brunswick.

Oats	581
Wheat	221
Barley	180
Pease	156
Potatoes	317
Corn	232
	1,687

Number of applicants supplied, 1,682.

Ontario.

Oats	2,160
Wheat	516
Barley	571
Pease	579
Potatoes	1,313
Corn	675
	5,814

Number of applicants supplied, 5,794.

Quebec.

Oats	6,068
Wheat	1,859
Barley	3,060
Pease	943
Potatoes	1,817
Corn	462
	14,209

Number of applicants supplied, 14,189.

Manitoba.

Oats	159
Wheat	86
Barley	67
Pease	64
Potatoes	100
Corn	21
	497

Number of applicants supplied, 497.

North-west Territories.

Oats	243
Wheat	90
Barley	114
Pease	74
Potatoes	146
Corn	25
	692

Number of applicants supplied, 689.

British Columbia.

Oats	55
Wheat	23
Barley	13
Pease	24
Potatoes	48
Corn	20
	183

Number of applicants supplied, 183.

The following list shows the number of three-pound packages of the different varieties which have been distributed :—

Oats.

Banner	3,432
Prize Cluster	2,274
Wallis	1,578
Early Gothland	511
Poland White	716
Bonanza	459
Rosedale	394
Abundance	351
Winter Grey	195
Welcome	208
English White	68
	10,186

Barley, Two-Rowed.

Canadian Thorpe	1,849
Kinver Chevalier	317
Prize Prolific	338
	2,504

Barley, Six-Rowed.

Odessa	2,165

Wheat.

Red Fife	2,622
White Fife	133
Johnson	135
White Connell	126
Ladoga	119
Red Fern	116
	3,251

Pease.

Mummy	1,665
Large White Marrowfat	201
New Potter	101
Prussian Blue	156
	2,123

Potatoes.

Lee's Favourite	1,261
Thorburn	927
Beauty of Hebron	901
Wonder of the World	766
White Beauty	55
Vanier	23

Potatoes—Concluded.

Russell's Seedling	22
Queen of the Valley	17
Polaris	18
Lizzie's Pride	16
Crown Jewel	14
Monroe County	15
State of Maine	17
Pride of the Market	12
Early Gem	12
Burpee's Extra Early	9
Early Norther	5
Earliest of all	4
I. X. L	4
Daisy	2
	4,100

Corn.

Rural Thoroughbred White Flint	847
Mammoth Yellow Flint	833
Longfellow	27
	1,707

Total number of samples distributed	26,036
Number of applicants supplied	25,932

A few samples of fall wheat were also sent out for test, as follows:—

Ontario	44
Manitoba	1
North-west Territories	6
British Columbia	5
	56

Number of applicants supplied 54.

DISTRIBUTION OF CROSS-BRED AND HYBRID CEREALS.

A new feature in the distribution made during the past season from the Central Farm was the sending out for test, samples of some of the more promising of the hybrid and cross-bred cereals which have been produced on the experimental farms. These were put up in bags containing one pound each and were sent to some of those farmers in different sections of the Dominion who have shown a special interest in this part of the experimental work. In most instances two samples were sent to each farmer. One of wheat and one of barley. They have been distributed as follows:—

Prince Edward Island.

Cross-bred wheats	43
Hybrid barleys	43
	86

New Brunswick.

Cross-bred wheats	107
Hybrid barleys	107
	214

Nova Scotia.

Cross-bred wheats	66
Hybrid barleys	66
	132

Quebec.

Cross-bred wheats	191
Hybrid barleys	202
	393

Ontario.

Cross-bred wheats	356
Hybrid barleys	356
	712

Manitoba.

Cross-bred wheats	97
Hybrid barleys	93
	190

North-west Territories.

Cross-bred wheats	55
Hybrid barleys	55
	110

British Columbia.

Cross-bred wheats	31
Hybrid barleys	31
	62

This makes a total of 1,899 samples which have been sent to 955 farmers.

The total number of samples distributed from the Central Experimental Farm for test during 1895 was 27,991; number of applicants supplied, 26,941.

Samples were also distributed from the branch experimental farms as follows :—

Experimental Farm, Nappan, N.S.

Oats	302
Barley	121
Wheat	76
Rye	9
Pease	52
Potatoes	198
	758

Number of applicants supplied, 341.

Experimental Farm, Brandon, Man.

Grain of all kinds in 3 lb bags	149
Potatoes	48
	197

Experimental Farm, Indian Head, N.W.T.

Oats	244
Barley	165
Wheat	186
Rye	38
Pease	164
Potatoes	340
	1,137

Experimental Farm Agassiz, B.C.

Oats	62
Barley	58
Fall wheat	31
Spring wheat	54
Pease	138
Potatoes	127
	470

This makes a total of 2,562 samples supplied to about 1,341 applicants by the branch experimental farms, which, added to the distribution made at the Central Farm, gives a total of 30,553 samples to about 28,282 applicants.

As indicating the success of this work and the appreciation in which it is held by farmers throughout the Dominion the following extracts are submitted from reports and letters recently received :—

W. Bryden, Cardigan Bridge, P.E.I., received a sample of 3 lbs. of Banner oats from which he harvested 177 lbs. of grain. He says :—"This is the best yield I ever saw or heard of. Can any one in the Dominion beat it?"

E. Larkins, jr., of Darnley, P.E.I., had 173 lbs. of grain from 3 lbs. of Banner oats, and says :—"In my opinion this grain suits the country well."

T. C. Newman, of Lower Derby, N.B., writes:—"I received last year from you 3 lbs. of White Fife seed wheat which I sowed and raised 35 lbs, 34lbs of which I sowed this spring on a little over ¼ acre of ordinary wheat land, and threshed this fall 812 lbs. of good clean wheat which is something over 50 bushels per acre. I think that pretty good in this part of the Dominion. I also received 3 lbs. of Ligowo oats at the same time I got the wheat; it yielded last year 54 lbs. which I sowed this spring on ⅛ of an acre of ordinary oat land, and threshed this fall 967 lbs. clean oats, upwards of 85 bushels per acre. I think the Dominion government is doing a good thing for the farmers in giving them improved seed which was much needed in this section of the country."

T. H. Estey, of Wicklow, N.B., reports a yield of 60 lbs. from 3 lbs. of Mummy pease, and says:—"The government deserve much credit for taking so good a way to distribute good seed grain all over the Dominion."

Alex. Johnson, of Lower Woodstock, N.B., received a 3-lb. sample of Mammoth Yellow Flint corn, and speaking of the crop, says:—"The weight per square rod was 359 lbs. This variety of corn is the best we have ever tried for fodder."

W. Ewing, of Apohaqui, N.B., raised 190 lbs. of Banner oats from 3 lbs. of seed, and says: "I am well pleased with the oats, it is the first sample of grain I have received from the Experimental Farm, but I hope it will not be the last."

J. T. Hobbah, of Walton, N.S., received a 3-lb. sample of Wonder of the World potatoes. He says "they are so satisfactory that I shall plant the whole of their produce next spring."

D. A. McIver, of Milan, Que., reports a yield of 140 lbs. from 3 lbs. of Red Fife wheat, and says: "I am very well pleased with it."

Thomas White, of River Joseph, Que., harvested 108 lbs. of Prize Cluster oats from 3 lbs. of seed, and says of this variety: "it compares favourably with other grain and ripens earlier."

Thos. Moses, of Brachen, Ont., had a yield of 92 lbs. from 3 lbs. of Abundance oats, and says: "We consider them a very fine quality of oats, a good yielder, and a splendid sample."

Thos. Dawson, jr., of Barrie, Ont., had 3 bushels 28 lbs. from 3 lbs. of Early Gothland oats. He says: "These oats compare favourably with other sorts, give more straw and more grain. I think the idea of sending out samples of grain a good one, as it will afford farmers the opportunity of getting good sorts of seeds without paying fancy prices."

P. M. Stewart, of Boulter, Ont., reports a yield of 200 lbs. of Early Gothland oats from 3 lbs. of seed and says: "I am well satisfied with the oats, they ripen earlier and give a heavier crop than other sorts."

C. F. Horn, of Orillia, Ont., received for trial 3 lbs. of Mammoth Yellow Flint corn. He says: "I have grown corn for the last 25 years, and I think the Mammoth Yellow Flint the best all round field corn I ever raised. I intend giving one acre a fair trial next year."

W. F. Sutherland, of Holiday, Ont., raised 178 lbs. from 3 lbs. of Wallis oats, and says: "We are well pleased with the yield."

James Reed, of Carman, Man., had a yield of 90 lbs. from 3 lbs. of Odessa barley, and says "it ripens as early as other six-rowed barley of this province, and the straw is stiffer and the grain plumper and heavier."

John Miller, of Bridge Creek, Man., had 157 lbs. from 3 lbs. of Banner oats, weighing 42¼ lbs. per bushel, and says: "I consider the Banner oats the best I have tried."

R. Hargest, of Qu'Appelle, N.W.T., reports a yield of 1 bushel 3 pecks from a 3-lb. sample of New Potter pease. He says: "This is a splendid pea for this part, it has long pods, well filled, and I think could hardly be beat for this climate."

P. J. Power, of Bathurst village, N.B., when acknowledging a sample of grain, says: "Farmers have reason to be thankful for those samples, some of us are now able to sow our full crop with good seed obtained in this way a few years ago." Such quotations might be indefinitely extended.

CROSS-BRED AND HYBRID CEREALS.

Many gratifying reports of the results of the tests of these new varieties have been received of which the following will serve as examples.

D. H. Ross of Douglas, N.B., received a sample of 1 lb. of Surprise barley, a six-rowed sort produced at the central farm by crossing a two-rowed barley with a six-rowed, from which he raised 35 lbs. He says, "This is the finest barley I ever saw grow; it grew heavier and ripened earlier than any other sort. I had it to a show, and it took first prize away ahead of all other barley," the sample returned weighed 52¾ lbs. per bushel.

W. Cronkite, of Lower Southampton, N. B., reports a crop of 30 lbs. from 1 lb. of Huron wheat (a cross between Ladoga and White Fife), and says, "I consider the Huron the best variety of wheat I ever grew." The sample returned weighed 62¾ lbs. per bushel.

Henry King, of Victoria, B.C., received a 1-lb. sample of Advance wheat, another cross between Ladoga and White Fife, from which he raised 46 lbs. He says, "I got the second prize at the Victoria Exhibition with it, it looked the prettiest grain there. I hope to do better with it next season; many thanks for sending it to me." The sample returned weighed 64 lbs. per bushel.

W. Brown, of Somenos, B.C., reports a yield of 109 lbs. from 1 lb. of seed of Advance wheat. He says, "It is the best variety I have ever tested."

TESTS OF THE VITALITY OF GRAIN AND OTHER SEEDS.

The number of samples of seed grain, and other seeds tested during the season of 1895, was 1,776. The average vitality of the important cereals was lower than in 1894, but higher than in 1893. The following figures show the variations in the averages for the years named:

	1893.	1894.	1895.
Wheat.....	81·8	90·5	88
Barley.....	84·9	89	85·7
Oats.....	93	95·5	93·3

The fact that there were samples of wheat and oats sent for test during the past season which showed only 22 per cent of germinating power and samples of barley 24 per cent points to the necessity of having all doubtful samples tested. Suitable arrangements have been made for carrying on these tests at the Central Experimental Farm, Ottawa, where every farmer in the Dominion may send samples for examination and report. No charge is made for this work and samples of seed may be sent to the Central Farm free through the mail. The tests of vitality can usually be completed and reported on within a fortnight after they are received. All samples should be sent in early in the season so as to admit of this work being completed before spring opens.

The building in which these tests are conducted and from which the distribution of samples of seed grain is made is shown in Fig. 2

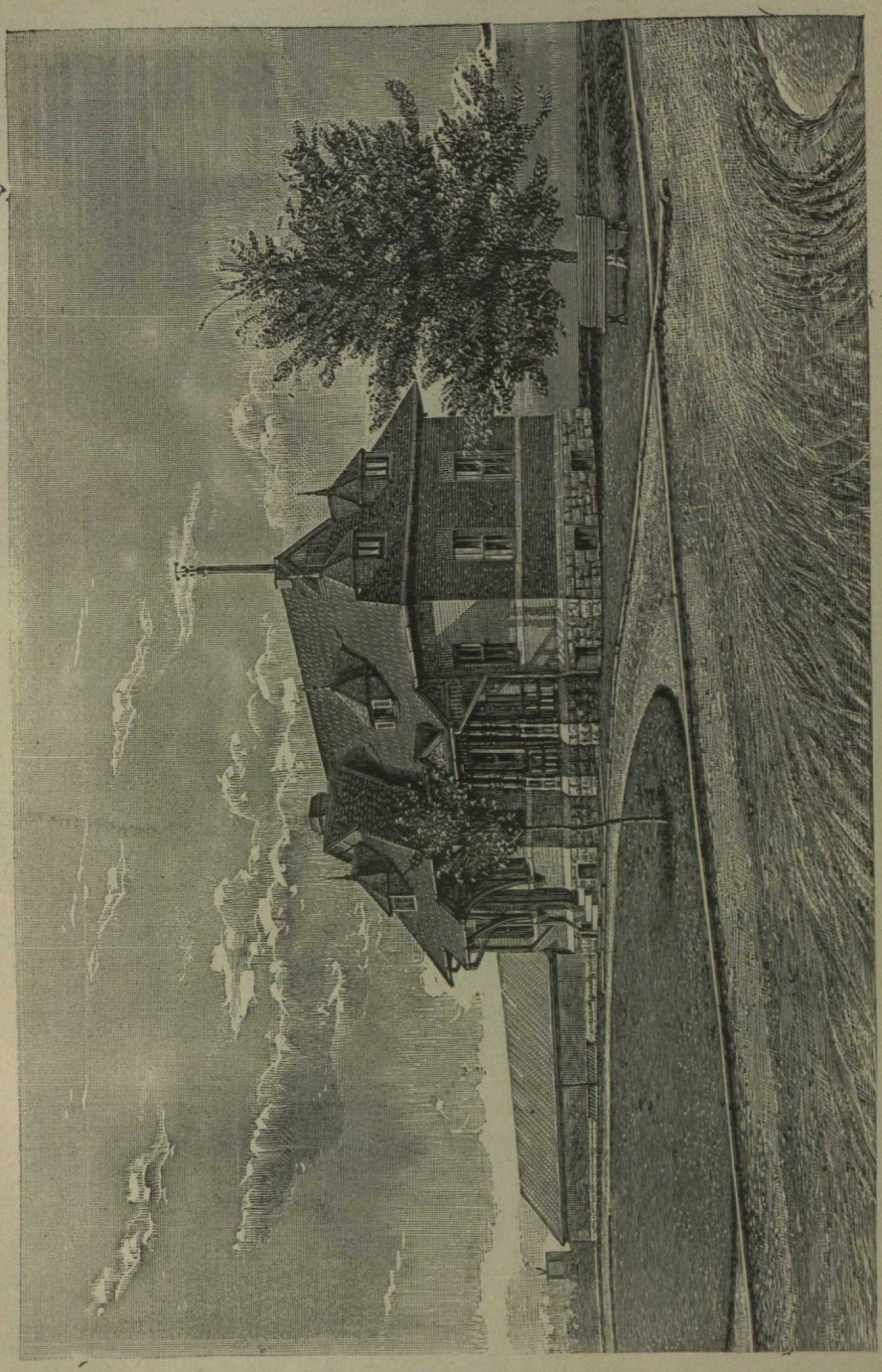


FIG. 2.—BUILDING FOR TESTING THE VITALITY OF SEEDS AND FOR THE DISTRIBUTION OF SEED GRAIN.

RESULT of Tests of Seeds for Vitality, 1894–95.

Kind of seeds.	Number of tests.	Highest percentage.	Lowest percentage.	Percentage of strong growth.	Percentage of weak growth.	Average vitality.
Wheat	459	100·0	22·0	82·1	5·9	88·0
Barley	397	100·0	24·0	70·8	14·9	85·7
Oats	587	100·0	22·0	87·1	6·2	93·3
Rye	2	70·0	16·0			43·0
Pease	56	100·0	6·0			63·3
Corn	45	100·0	0·0			74·3
Clover	5	83·0	42·0			64·4
Grass	64	94·0	0·0			45 5
Beans	4	80·0	30·0			61·0
Mangels	18	96·0	10·0			55·4
Turnips	11	100·0	7·0			72·0
Carrots	23	82·0	2·0			49·9
Sugar Beet	8	94·0	22·0			49·2
Sunflowers	16	96·0	62 0			78·2
Tares	2	92·0	84·0			88·0
Flax	1	88·0	88·0			88 0
Tomatoes	9	70·0	20·0			46·5
Radish	6	100·0	78·0			93·0
Asparagus	2	56·0	50·0			53·0
Cabbage	3	95·0	64·0			81·3
Cauliflower	2	52·0	49·0			50 5
Onions	8	88·0	22·0			57·1
Lettuce	5	100·0	0·0			41·0
Melons	3	36·0	4·0			17·3
Squash	2	67·0	36·0			51·5
Cucumbers	4	76·0	26·0			58·0
Salsify	1	53·0	53·0			53·0
Parsnips	1	1·0	1·0			1·0
Summer Savory	1	39·0	39·0			39·0
Flowers	32	100·0	0·0			34·5
Pepper	1	0·0	0·0			0·0
Total number of samples tested, highest and lowest percentage	1,776	100·0	0·0			

The following table shows the results of the tests of the more important cereals made for each province. From the figures given it will be seen that the samples from Manitoba give the highest percentage of vitality, closely followed by the North-west Territories.

TABLE showing Results of Grain Tests for each Province.

Kind of Seed.	Number of tests.	Highest percentage.	Lowest percentage.	Percentage of strong growth.	Percentage of weak growth.	Average vitality.
Ontario—						
Wheat	174	100·0	41·0	75·0	7·3	82·3
Barley	116	100·0	24·0	55·4	22·1	77·5
Oats	178	100·0	22·0	88·7	5·8	94·5
Quebec—						
Wheat	135	100·0	22·0	83·2	6·4	89·6
Barley	164	100·0	24·0	68·9	16·6	85·5
Oats	191	100·0	42·0	86·4	5·8	92·2
Manitoba—						
Wheat	56	100·0	75·0	90·1	4·3	94·4
Barley	41	100·0	89·0	94·3	3·2	97·5
Oats	56	100·0	72·0	93·1	4·2	97·3

TABLE showing Results of Grain Tests for each Province—*Concluded.*

Kind of Seed.	Number of tests.	Highest percentage.	Lowest percentage.	Percentage of strong growth.	Percentage of weak growth.	Average vitality.
North-west Territories—						
Wheat	45	100·0	85·0	90·6	3·1	93·7
Barley	36	100·0	86·0	91·2	3·6	94·8
Oats	75	100·0	76·0	83·2	9·6	92·8
Nova Scotia—						
Wheat	17	100·0	58·0	88·1	4·3	92·4
Barley	17	98·0	73·0	81·8	6·2	88·0
Oats	31	100·0	53.0	86·2	7·0	93·2
New Brunswick—						
Wheat	21	100·0	68·0	88·6	2·8	91·4
Barley	16	100·0	78·0	78·4	12·1	90·5
Oats	42	100·0	28·0	87·4	5·3	92·7
Prince Edward Island—						
Wheat	6	99·0	80·0	84·5	5·3	89·8
Barley	4	95·0	88·0	82·7	8·0	90·7
Oats	9	100·0	25·0	73·1	8·2	81·3
British Columbia—						
Wheat	3	95·0	84·0	83·3	4·3	87·6
Barley	3	92 0	88·0	83·3	7·0	90·3
Oats	5	100·0	87·0	88·6	5·2	93·8

METEOROLOGICAL OBSERVATIONS.

Table of Meteorological Observations taken at the Central Experimental Farm, Ottawa, 1895; maximum, minimum and mean temperature for each month, with date of occurrence; also rainfall and snowfall:—

—	Maximum.	Date.	Minimum.	Date.	Mean.	Rainfall.	Snowfall.
	°		°			in.	in.
January	37·9	11	—19·4	5	12·8	0·18	38·50
February	38·0	27	—23·0	6	13·5	.....	19·50
March	41·9	25	—11·5	12	20·3	0·09	13·00
April	71·0	29	15·3	11	42·6	2·58	.....
May	93·5	30	27·5	22	59·1	2·86	.....
June	91·8	2	48·0	7	69·6	6·33	.....
July	91 2	8	46·0	11	66·0	3·24	.....
August	86·8	17	45·5	23	65·1	4·66	.....
September	90 3	22	34·0	16	60·1	1·64	.....
October	64·0	6 & 13	16·5	30	40·5	0·38	2·00
November	60·0	5	1·5	30	32·2	2·01	7·00
December	52·8	26	—17 5	13	20·7	3·04	7·50
						27·01	87·50

Rain or snow fell on 142 days during 12 months.

Heaviest rainfall in 24 hours, 2·27 inches on June 27.

Heaviest snowfall in 24 hours, 12 inches on February 12.

During April, May and July, rain fell on 11 days each month and on 13 days in August.

February and March show the lowest number of days on which rain fell during the season, viz., 2 days and 1 day respectively.

B. NOTHNAGEL.

RESULTS OF EXPERIMENTS WITH ROSES.

The rose has been justly designated the "Queen of flowers" and its beauty of form and colouring and delicious fragrance make it attractive to all. It has been immortalized by authors and poets in all countries from the most ancient times, and this charming flower has long been the national emblem of England. The majestic and perfectly formed varieties cultivated in modern times are a great advance on the single or semi-double forms grown in earlier ages, and these triumphs are the special products of man's genius and perseverance. To no group of flowers has the art of hybridizing and cross fertilizing been more extensively and persistently applied than to the rose and gardeners everywhere have also been on the watch to take advantage by selection and careful cultivation of such accidental sports as occur from time to time under the ordinary processes of nature.

Having been grown with great care for many centuries and crossed and recrossed so often it is sometimes a difficult matter to refer the cultivated forms of the rose to their wild originals. Roses are usually divided into two groups, viz., summer roses and perpetual or autumnal roses, and these are subdivided into a number of different classes.

The first division of the summer roses includes the Ayrshire and prairie roses, the second the Austrian or Yellow roses, the third the Moss roses, and the fourth miscellaneous roses among which the well known cabbage or Provence rose is a worthy member. None of these summer roses bloom more than once in the season and their period of flowering in the climate of Ottawa usually covers the latter half of June and the early days of July.

The second division comprising the perpetual or autumnal roses includes among many others the Teas, Hybrid Teas and Hybrid Remontants or Perpetuals. Many of the finest roses in cultivation are not sufficiently hardy to endure the winter climate of Ottawa and the losses which lovers of the rose have experienced from having selected tender varieties for cultivation have had the result of discouraging many, and roses although rapidly growing in favour are not so generally cultivated with us as they should be. There are however among the hardier classes, many excellent roses which with some protection in winter can be successfully grown in the open ground in most parts of Canada.

To gain information on this point many varieties of roses have been under test at the Central Experimental Farm at Ottawa, during the past two or three years. The climate here is fairly representative of the colder sections of Eastern Ontario and of most of the settled portions of the province of Quebec, and any varieties which succeed in this district can probably be grown with greater advantage in more favorable climates in Western Ontario, the Maritime Provinces and British Columbia.

Among the summer roses, all the varieties of moss roses have been found quite hardy, also the Prairie roses and the Persian yellow. Among the miscellaneous varieties in this class Madame Plantier deserves a place in the front rank for hardiness, vigour of growth and abundance of bloom. The flowers are white, double and very fragrant. As already stated none of these roses bloom in the autumn, but they flower profusely during their period of blooming which usually lasts from two to three weeks.

Of the roses belonging to the second class the Teas or ever-blooming sorts are all too tender for outdoor culture in Ottawa unless they are taken up in the autumn, packed in sand and stored in a cool cellar during the winter. Several of the Hybrid Teas have proven fairly hardy, notably La France and Captain Christy, but of all roses for outdoor culture the Hybrid Perpetuals are by far the most useful and satisfactory, many of them with a little protection are quite hardy, and reward the cultivator with a wealth of bloom which is highly gratifying. The principal part of the crop of flowers is borne from the middle of June to the middle of July, but many of the most esteemed varieties continue to bloom at intervals until late in the autumn.

PLANTING AND TREATMENT.

The rose needs a rich soil, a good garden loam enriched with well rotted manure dug to a depth of twelve inches or more will suit it well. A more or less sheltered but

sunny location is also advantageous, but roses will not thrive in the immediate vicinity of large trees whose foliage interferes with the free access of sunlight and whose spreading roots monopolise the available plant food in the soil. In selecting roses for planting it is a great advantage to have them on *their own roots*, notwithstanding that some of the varieties thus propagated are poor growers, otherwise one is continually troubled with strong growing suckers from the wild stocks, which if not early noticed and promptly removed will often weaken and eventually smother out the graft. In planting spread the roots carefully so as to give them their natural positions, set the plant a little deeper than as grown in the nursery, and press the soil firmly about the roots.

INJURIOUS INSECTS.

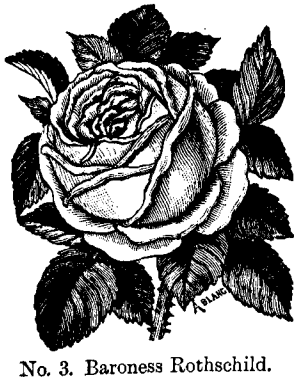
To prevent injury from insects spray or syringe the bushes just as they are coming into leaf with Paris green and water in the proportion of a teaspoonful of the poison to three gallons of water stirring frequently while using, and repeat this application whenever leaf-eating insects appear. If thrip is troublesome, spray the foliage while the insects are still young with kerosene emulsion or a strong decoction of tobacco stems, 4 to 8 ounces, boiled for 10 minutes in a gallon of water to which ¼ lb. of soap may be added. The latter is also a useful application for the green aphis.

WINTER PROTECTION.

For winter protection the plan which has been most successful at the Experimental Farm—where the bushes are planted three feet apart each way with six feet of space between every third row—is to dig between the rows and throw the earth about the rose bushes, covering them up to a depth of 8 to 10 inches. Fill the trenches made by the removal of the earth with fresh manure and loosely cover the earth around the plants with two or three inches of the same material. The stems are usually cut back to about one foot in height before covering. In the spring remove the earth from about the roses, and bury up in the soil as much of the manure as is practicable, and as soon as the buds start, remove any dead wood with a sharp knife or pruning shears. Under such treatment the rose beds at Ottawa have been very successful and have given much pleasure to the visiting public throughout the season.

LIST OF DESIRABLE ROSES.

The following list contains only a small proportion of the roses which are being tested at Ottawa, it does however contain a large proportion of those sorts which are the most promising and desirable. Only those are included which have been tested for two or three winters and found hardy. Among the varieties more recently received there are quite a number of very fine roses which may prove quite as hardy as any of the following. In the meantime, however, the list given offers sufficient material for a very fine selection.



No. 3. Baroness Rothschild.

1. Baron Haussman.—This is a strong grower and a free bloomer. The flowers are of medium size, fine form and fairly double; colour, deep carmine crimson. A desirable rose which blooms well through the autumn.

2. Baron Prevost.—A very vigorous grower and free bloomer. The flowers are of medium size, good form, of a deep rose colour and very fragrant. A free autumn bloomer.

3. Baroness Rothschild.—Fig. 3 shows this rose on a reduced scale. A fair grower and free bloomer. The flowers are large, elegantly formed of a rich pale rose colour and faintly fragrant. A free bloomer during autumn.

4. Blanche Moreau.—A vigorous grower but not a very free bloomer. The flowers are of medium size, well formed, fairly compact, white and very fragrant. A very good autumn bloomer.

5. Caroline de Sansal.—A free grower and a free bloomer. The flowers are large of good form, pale silvery rose in colour and very fragrant. This variety blooms fairly well throughout the autumn.

6. Comte de Montmart.—A strong grower and very free bloomer. The flowers are large, of good form, of a deep rose colour and fragrant. A free bloomer during autumn.

7. Comtesse de Serenye.—A good grower and free bloomer, but later than some others in flowering. The flowers are large, full and of elegant form, colour deep rose, paler on the edges of the petals, slightly fragrant. This is an excellent late bloomer flowering freely to nearly the end of the season.

Crimson Queen.—A fair grower and free bloomer. The flowers are of medium size, good form, of a reddish velvety crimson colour and very fragrant. A fair autumn bloomer, but does not flower so freely as some other sorts.

9. *Duchesse de Morny.*—A fair grower and a free bloomer. The flowers are large of fair form, deep bright rose in colour and slightly fragrant. A good autumn bloomer.

10. Earl of Dufferin.—This is a strong grower and a good bloomer. The flowers are of medium size, fine form, full and compact of a deep rich reddish crimson and are fragrant. Blooms freely throughout the autumn.

11. Etienne Levet.—A strong grower and very free bloomer. The flower is of medium size, compact and full, of a carmine red colour and fragrant. This variety blooms well during the autumn.

12. Eugene Furst.—This is a very strong grower and fair bloomer. The flowers are of medium size and elegant form, of a brilliant dark crimson colour and very fragrant, one of the best; flowers fairly well during autumn.

13. François Levet.—A vigorous grower and very free bloomer. The flower is of medium size, very double and compact, of a deep cherry red colour and fragrant. Blooms fairly well in the autumn.

14. Gabriel Fournier.—A fair grower and a free bloomer. The flower is of medium size, fair form, of a deep red rose colour, and fragrant. A free bloomer during the autumn.

15. Horace Vernet. —This is a vigorous grower and free bloomer bearing its flowers in clusters. The flowers are large, of good form, not very double of a reddish crimson colour and slightly fragrant. A fair autumn bloomer.

16. Hyppolyte Jamain. —A strong grower and a free bloomer. The flowers are of medium size, good form, of a deep carmine red colour and slightly fragrant. Blooms fairly well during the autumn.

17. John Hopper.—This is an old and well known variety, a fair grower and a free bloomer. The flowers are from medium to large, very full and compact, of a deep reddish rose colour and fairly fragrant. A good autumn bloomer. In Fig. 4

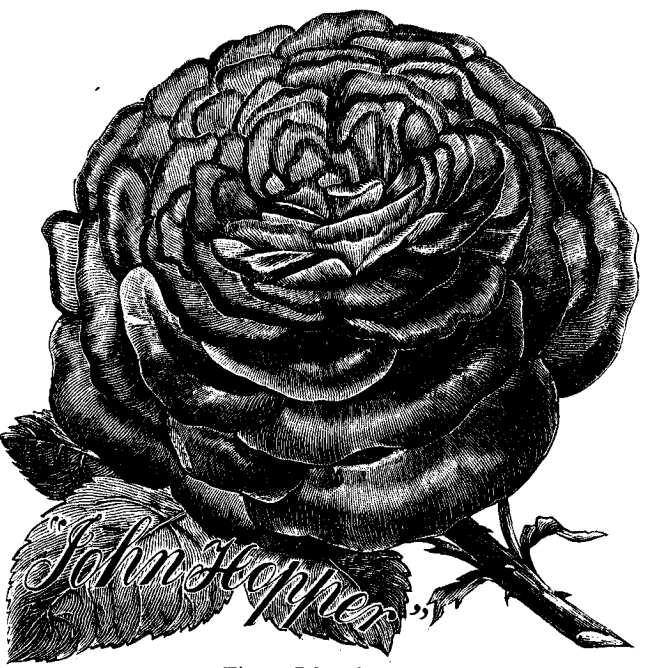


Fig. 4. John Hopper.

we have a good representation, full size, of this fine rose. We are indebted to the kindness of the Dingee & Conard Co., the well known rose growers of West Grove, Pa., for the use of this cut.

18. Lady Helen Stewart.—A strong grower and a free bloomer. The flowers arelarge, of good form fairly compact, of a deep crimson scarlet colour with a faint purplish hue, and fragrant. Blooms sparingly during the autumn.

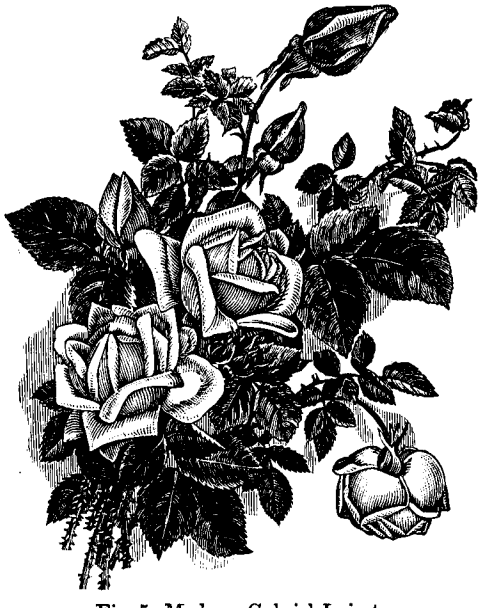


Fig. 5. Madame Gabriel Luizet.

19. Louis Van Houtte.—A fair grower and a free bloomer. The flowers are of medium size, fine form, of a deep crimson colour and very fragrant. Flowers freely during autumn.

20. Madame Eugene Verdier.—A medium grower and a free bloomer. The flowers are large of a very fine globular form, creamy rose colour and tea-like fragrance. A free bloomer in the autumn.

21. Madame Gabriel Luizet.—Fig. 5 represents this rose on a reduced scale. A very strong grower and an abundant bloomer. The flowers are very large, cup-shaped, compact, very handsome, of a creamy rose colour, and slightly fragrant. One of the finest roses in the collection and a fair bloomer during the autumn.

22. Madame Joly.—A strong grower and an abundant bloomer. The flowers are from medium to large, of good form, compact, of a pale rose, deepening in colour towards the centre, fragrant. A very satisfactory rose, which blooms well during the autumn.

23. Madame Victor Verdier.—A very strong grower and a very free bloomer. The flower is large, full and of fine form, the colour is a bright carmine crimson at first, becoming somewhat paler after exposure; fragrant. This is a free bloomer during the autumn.

24. Mad'lle Eugene Verdier —A medium grower and a free bloomer. The flowers are large, of very fine form, a creamy rose in colour, with a tea-like fragrance. A good bloomer during the autumn.

25. Marchioness of Lorne.—A vigorous grower and a good bloomer. The flowers are of medium size, fairly compact, of a crimson rose colour and very fragrant. A fairly good autumn bloomer.

26. Margaret Dickson.—This handsome rose is a very strong grower, with large foliage and a medium bloomer. The flower is large, of elegant form, white with a flesh-coloured centre and fragrant. A very desirable and promising rose, only a medium bloomer during autumn.

27. Marie Kady.—A strong grower and a free bloomer. The flower is of medium size, full and compact, colour at first bright reddish crimson which becomes paler after exposure, fragrant. This is rather a shy bloomer inthe autumn.

28. Marshall P. Wilder.—A strong grower anda free bloomer. The flowers are large, semi-globular in form, full, compact, of a cherry crimson colour and very fragrant. This variety is one of the hardiest and best in the collection. A medium bloomer during autumn.

29. Merveille de Lyon.—A fair grower and a free bloomer. The flowers are large double, but not very compact, of a waxy white colour, with a faint tinge of pink and slightly fragrant. A very fine rose, only a medium bloomer during autumn.

30. Mons. Francois Michelon.—A strong grower and a very free bloomer. The flower is of medium size, good form, a deep but bright rose colour and slightly fragrant. blooms freely during the autumn.

31. Princess Beatrice.—A strong grower and a very free bloomer. The flowers are large, of fine form, fairly compact, the petals deep rosy pink, with a bluish margin, not fragrant. A good bloomer during the autumn.

32. Queen of Queens.—A fair grower and a free bloomer. The flowers are large, of fine form of a creamy rose colour and faintly fragrant. This is a very free bloomer during the autumn.

33. Rev. J. B. M. Camm.—A medium grower and a free bloomer. The flowers are of medium size, form semi-globular, colour carmine rose, and very fragrant. A fair autumn bloomer.

34. Silver Queen.—A vigorous grower and a very free bloomer. The flowers are of medium size, good form, of a silvery rose colour and fragrant. A free bloomer during the autumn.

35. Victor Verdier.—A medium grower and a very free bloomer. The flowers are large and full, of a bright rose colour with carmine centre, slightly fragrant. A free bloomer during the autumn. This rose is said to be tender but it has proven hardy here with the same protection as that given to other varieties.

36. White Baroness.—A strong grower but not a free bloomer. The flowers are large, of beautiful form, white, but without fragrance. This is a white sport from the Baroness Rothschild, and like the parent is a good autumn bloomer.

REPORT OF THE FOREMAN OF FORESTRY.

A winter of average severity and abundant snowfall was followed, in the spring, by warm, bright weather; the frost soon left the soil, and outside work was begun in the division of forestry and ornamental grounds, at a very early date.

On examination, it was found that the trees and shrubs in the forest belts, arboretum, avenues, ornamental grounds and hedges had, for the most part, wintered well, and were in good condition to begin the season's growth. The grass of the lawns, also, was found to be quite uninjured.

TIMBER TREES—FOREST BELTS.

In the report of the director for the year 1893 will be found the various objects in view in planting the trees in the forest belts at the Central Experimental Farms. These belts of trees have now become a prominent feature of the farm at Ottawa, and, as information regarding the growth of timber trees has of late become a subject of much inquiry, it is thought best at this time to publish some details regarding the growth of some of the average trees in these respective plantations.

The soil in the location where these trees are planted is, most of it, of poor quality and has had no manure. It will be seen by consulting the following table and notes that, notwithstanding these disadvantages, they have done very well indeed, which is no doubt due in some measure to the cultivation which the soil regularly received until the trees were sufficiently grown to shade the ground, and thus retain moisture and smother weeds. It would appear also from the vigorous growth the trees have made that good soil is not always essential to rapid tree growth.

A few of the species planted have not succeeded well; some because they were not sufficiently hardy to endure the climate, and others owing to unsuitability of soil. In this report notes and measurements are given of the most important timber trees which have done well here. Several average trees were measured in each plantation, and the average growth calculated from these measurements.

MIXED FOREST BELTS.

The forest trees in the mixed belt, where a number of varieties are grown together which were planted in the spring of 1893, have made good growth, and now cover the ground in many places. For this reason cultivation was only necessary in the spring of 1895, before growth had begun. The trees in that portion of the mixed belt planted in the autumn of 1894 have also done well. During the autumn of the present year, the trees were examined individually, and it was found that of the 3,442 planted, 347 had died. Nearly half of these were Thuya occidentalis, Larix americana, and Betula papyrifera, which had been trans-planted from a neighbouring swamp to this forest belt, and these trees thus taken from the woods had only a small proportion of roots.

Name of Species.	Character of Soil.	When Planted.	Distance Apart.	Age or Height When Planted.	Average Height, Autumn of 1895.	Average Growth in				Circumference 1 Foot from Ground.	
						1892.	1893.	1894.	1895.	1893.	1895.
			feet.		ft. in.	in.	in.	in.	in.	in.	in.
Black Walnut—Juglans nigra	Low sandy loam	1888..	5 x 5	1 year....	9 11½	26	23	21	18	5⅛	7⅜
do do	do	1888..	10 x 10	1 do ..	5 5	12	17½	11	9	3	5
do do	Sandy loam with small stones.	1889..	5 x 5	2 do ..	12 8	37½	28	36	19	.....	8½
do do	do do	1889..	10 x 10	2 do ..	8 4½	15	25	28	15	.....	7⅝
do do	Clay loam	1888..	10 x 5	1 do ..	12 5	31	31	31	15½	.....	10¼
Butternut—Juglans cinerea	Low sandy loam	1888..	5 x 5	1 do ..	9 11	19	24	18	10½	.....	6½
do do	do	1888..	10 x 10	1 do ..	6 2⅓	18	15	15	16	.....	4⅜
European Alder—Alnus glutinosa	do	1889..	5 x 5	2 do ..	16 5	38	33	21	27	7½	10⅛
Silver-leaved Maple—Acer dasycarpum	Light sandy oam	1889..	5 x 5	3 do ..	23 2	37	40	33	29	.....	9¼
do do	do	1889.	10 x 10	3 do ..	22 6	53	38	33	20½	.....	13
European White Birch—Betula alba	do	1889..	5 x 5	3 do ..	23 1	58	18	17	14	.....	10⅛
do do	do	1889..	10 x 10	3 do ..	24 11	36	32	30	30	.....	13
Canoe Birch—Betula papyrifera	do	1889..	5 x 5	3 do ..	21 9	46	36	22	14	.....	9⅜
do do	do	1889..	10 x 10	3 do ..	21 2	34	24	33	28	.....	13
Yellow Birch—Betula lutea	Light sandy loam	1889..	5 x 5	3 do ..	16 6	47	30	35½	21	6⅜	8¼
do do	do	1889..	10 x 10	3 do ..	16 1	41	33	26	21	8	11½
White Elm—Ulmus americana	Sandy loam	1889..	5 x 5	3 do ..	14 5	33	38	27½	23	5½	6⅜
do do	do	1889.	10 x 10	3 do ..	13 9	44	31	25	18	6	9
Black Ash—Fraxinus sambucifolia	Black muck	1889..	5 x 5	2 do ..	12	38	26	32	8	5	6¼
do do	Low sandy loam	1889..	10 x 10	2 do ..	8 4	20	23	19	8	3½	5
Green Ash—Fraxinus viridis	Black muck	1889..	5 x 5	3 do ..	15	30	31	29	20	6¼	7⅜
do do	Low sandy loam	1889..	10 x 10	3 do ..	14 3	28	24	21½	21	7¼	8½
Red Ash—Fraxinus pubescens	Black muck	1889..	5 x 5	2 do ..	15 5	31	34	39	33	5	7
do do	Light sandy loam	1889..	10 x 10	2 do ..	12 5	26	32	27½	21	4⅛	6¼
White Ash—Fraxinus americana	Black muck	1889..	5 x 5	3 do ..	18 5	32	41	58	36	5¼	7
do do	Light sandy loam	1889..	10 x 10	3 do ..	15 9	38	38	37	25	5¾	8⅜
Black Cherry—Prunus serotina	Light sandy loam and gravel	1889..	5 x 5	3 do ..	16 7	29	21	22	19	.....	8¼
do do	do do	1889..	10 x 10	3 do ..	18 2	40	39	32	26	.....	11⅜
Box Elder—Negundo aceroides	Light sandy loam	1889..	5 x 5	2 do ..	19 1	38	38	39	29	8¼	10¼
Buttonwood—Platanus occidentalis	do	1889..	5 x 5	3 do ..	14 5	24	27	17	21	.....	7¼
Populus certinensis	do	1889..	5 x 5	2 do ..	26 7	57	72	54	52	.....	11⅜
Bolle's Poplar—Populus alba Bolleana	do	1890..	5 x 5	1 do ..	24 2	46	68	63	70	.....	11¼
do do	do	1890..	10 x 10	1 do ..	22 11	40	55	70	74	.....	12½
Scotch Pine—Pinus sylvestris	Sandy loam with gravel	1888..	5 x 5	18 inches..	14 4	29	28	35½	31	7⅜	10
do do	do do	1888..	10 x 10	18 do ..	11	15	22	28½	29	9½	12
do do	Low sandy loam with gravel	1888..	5 x 5	18 do ..	13 4	26	29	32½	29	7⅜	9½

do do	Low sandy loam	1888..	10 x 10	18	do ..	11 6	20	23	29	29	8¾	13¼
do do	.....	1888..	10 x 5	18	do ..	14 10	25	31	35	34	.....	15½
do do	Clay loam..	1888..	10 x 5	18	do ..	11 11	20	23	32	31	.....	12¼
do do	Light sandy loam and gravel.	1888..	10 x 5	18	do ..	14 11	29	30	36	33	.....	15
do do	do do ..	1887..	3 x 3	9	do ..	14 3	22	23	26	28	5½	8¼
Austrian Pine—Pinus austriaca	Light sandy loam.....	1889..	5 x 5	18	do ..	8 1	12½	18	23	22½	.....	9
do do	do	1889..	10 x 10	18	do ..	7 9½	12	16	22	24	.....	10⅛
do do	do	1888..	10 x 5	15	do ..	8 11	18	21	24	24	.....	9¼
do do	Clay loam	1888..	10 x 5	15	do ..	9 2½	17	19	24½	22	.....	9½
do do	Light sandy loam and gravel.	1888..	10 x 5	15	do ..	10 5	22	22	26	25	.....	10¾
do do	do	1887..	3 x 3	15	do ..	10 6	21	19	22	21	.....	8½
White Spruce—Picea alba.	Light sandy loam.....	1889..	5 x 5	15	do .	8 5	12	21	21½	21	.....	6¼
do do	do	1889..	10 x 10	15	do ..	7 8	10	18	22	19	.....	6½
Norway Spruce—Picea excelsa.....	do	1889..	5 x 5	18	do ..	10 8	19	29	29	18	6	8¼
do do	do	1889..	10 x 10	18	do ..	10 1	16	23	25	27	5	8¼
do do	do	1888..	10 x 5	15	do ..	10 10	19	25	23	28	.....	8
do do	Clay loam.....	1888..	10 x 5	15	do ..	11 4	18	20	31	32	....	8⅛
American Arbor-vitæ—Thuya occidentalis	Low sandy loam and black muck	1889..	5 x 5	18	do ..	9 1	21	23	15	15	.....	7¾
do do	Low sandy loam	1889..	10 x 10	18	do ..	8	20	18	15	15	....	7¼
European Larch—Larix europæa.....	do	1888..	5 x 5	2	feet....	19 3	35	41	45	31	8	11
do do	do	1888..	10 x 10	2	do	17 9	33	37	42	40	7½	12
White Pine—Pinus Strobus	Light sandy loam with gravel	1889..	5 x 5	8 to 10	in.	10 11	19½	27⅜	27½	27½	4½	8
do do	do do ..	1889..	10 x 10	8 to 10	in.	10 1⅛	16	24½	24	27	5	9¼

NOTES ON TIMBER TREES IN FOREST BELTS.

BLACK WALNUT (*Juglans nigra*).

Trees 5 x 5 feet apart—all Black Walnut.

Owing to the unsuitability of the soil and lack of prompt drainage these did not make very good growth at first, but they are now doing well. Another block on higher land is doing better. No cultivation was needed in either of these blocks after 1893.

Trees 10 x 10 feet apart—all Black Walnut. Very few of the trees first planted now remain, as most of them either died or became stunted from excess of moisture before the land was properly drained. The trees used to replace those originally planted are not yet making as satisfactory growth as those on higher ground.

Trees 10 x 5 feet apart—Mixed Forest Belt. The black walnut trees in this belt are doing very well and are making rapid growth.

BUTTERNUT (*Juglans cinerea*).

Trees 5 x 5 feet apart—all Butternut. These trees have made rapid and fairly uniform growth. No cultivation was needed after 1892.

Trees 10 x 10 feet apart—all Butternut. Some of the trees of the first planting died owing to excessive moisture before the soil was properly drained, hence there is a lack of uniformity in the growth of the trees in this block, and cultivation is still necessary.

EUROPEAN ALDER (*Alnus glutinosa*).

Trees 5 x 5 feet apart—all European Alder. These have made rapid and fairly uniform growth. No cultivation was necessary after 1892.

Trees 10 x 10 feet apart—all European Alder. The trees planted as above have not done as well as where planted 5 feet apart. Quite a number have lost their leaders and others, from some unknown cause, have died during the past two years.

SILVER-LEAVED MAPLE (*Acer dasycarpum*).

Trees 5 x 5 feet apart—all Maple. These have made rapid and fairly uniform growth. No cultivation was needed after 1892.

Trees 10 x 10 feet apart—all Maple. The trees in this block have also made rapid and fairly uniform growth. No cultivation was needed after 1892.

EUROPEAN WHITE BIRCH (*Betula alba*).

Trees 5 x 5 feet apart—all White Birch. These have made rapid and fairly uniform growth. No cultivation was needed after 1892.

Trees 10 x 10 feet apart—all White Birch. In this block the trees have also made rapid and fairly uniform growth. No cultivation was needed after 1894.

PAPERY OR CANOE BIRCH (*Betula papyrifera.*)

Trees 5 x 5 feet apart—all Canoe Birch. These have made rapid and fairly uniform growth. No cultivation was needed after 1892.

Trees 10 x 10 feet apart—all Canoe Birch. The trees in this block have also made rapid and fairly uniform growth. No cultivation was needed after 1893.

YELLOW BIRCH (*Betula lutea.*)

Trees 5 x 5 feet apart—all Yellow Birch. These have made rapid and fairly uniform growth, and have not needed any cultivation since 1892.

Trees 10 x 10 feet apart—all Yellow Birch. The trees in this block have also made rapid and fairly uniform growth, and have not needed any cultivation since 1894.

AMERICAN ELM (*Ulmus americana.*)

Trees 5 x 5 feet apart—all American Elm. These have made rapid and fairly uniform growth. No cultivation was needed after 1893.

Trees 10 x 10 feet apart—all American Elm. The elms in this block have also made rapid and fairly uniform growth. No cultivation will be necessary after this season.

BLACK ASH (*Fraxinus sambucifolia*).

Trees 5 x 5 feet apart—all Black Ash. These have made medium and fairly uniform growth, and have not needed cultivation since 1893.

Trees 10 x 10 feet apart—all Black Ash. The soil where these trees were planted, though adjacent, is not so suitable for the ash as that in the block of trees 5 feet apart. These trees have made scarcely medium growth, and are not so uniform in size as the others. Close planting also seems to be more favourable to vigorous growth.

GREEN ASH (*Fraxinus viridis*).

Trees 5 x 5 feet apart—all Green Ash. These trees have made rapid and fairly uniform growth, and have not required cultivation since 1892.

Trees 10 x 10 feet apart—all Green Ash. The soil differs from that where the trees are 5 feet apart, and does not seem so suitable. The trees not having made so rapid or uniform growth as others. No cultivation will be necessary after this season.

RED ASH (*Fraxinus pubescens*).

Trees 5 x 5 feet apart—all Red Ash. These have made rapid and fairly uniform growth, and have not required cultivation since 1892.

Trees 10 x 10 feet apart—all Red Ash. The trees in this block have not made so rapid or uniform growth as where planted 5 feet apart. The soil is different and does not seem so suitable. Close planting also seems to be more favourable to vigorous growth.

WHITE ASH (*Fraxinus americana*).

Trees 5 x 5 feet apart—all White Ash. The white ash in this block have made the most rapid growth of all the species of ash. The trees are fairly uniform in height and have not required cultivation since 1892.

Trees 10 x 10 feet apart—all White Ash. These trees have not made so rapid or uniform growth as when planted 5 feet apart. The soil is different and does not seem so suitable. Wider planting seems also to be disadvantageous.

BLACK CHERRY (*Prunus serotina*).

Trees 5 x 5 feet apart—all Black Cherry. The trees in this block have made rapid and fairly uniform growth and have not required cultivation since 1892.

Trees 10 x 10 feet apart—all Black Cherry These trees have also made rapid and fairly uniform growth and have not needed cultivation since 1892.

BOX ELDER (*Negundo aceroides*).

Trees 5 x 5 feet apart—all Box Elder. The trees in this block have made rapid and fairly uniform growth. No cultivation was required after 1892. A number of the trees in this block have died from some unknown cause during the past two seasons.

Trees 10 x 10 feet apart—all Box Elder. The trees in this block made rapid and fairly uniform growth until 1894. Since that time a large proportion of them have died back, owing to what appears to be a sort of dry rot, and have broken off about 3 feet, from the ground. No cultivation was required after 1892.

BUTTONWOOD (*Platanus occidentalis*).

Trees 5 x 5 feet apart—all Buttonwood. No cultivation was needed in this block of trees after 1892. The trees have made rapid and fairly uniform growth.

Trees 10 x 10 feet apart—all Buttonwood. Most of the trees planted as above have had their leaders injured and are making shrubby rather than tree-like growth. For this reason no measurements were taken.

Populus certinensis.

Trees 5 x 5 feet apart—all Poplar.

The trees in this block have made very rapid and fairly uniform growth. The trees of the outside rows being much larger in circumference than those further in. They would average 17½ inches in circumference one foot from the ground. Some of the trees have died apparently from a dry rot of some kind. No cultivation was needed after 1892. None of these poplars were planted 10 x 10 feet apart.

BOLLE'S POPLAR (*Populus alba Bolleana*).

Trees 5 x 5 feet apart—all Bolle's Poplar. These have made very rapid and fairly uniform growth, and have not needed cultivation since 1893.

Trees 10 x 10 feet apart—all Bolle's Poplar. The trees planted as above have also made very rapid and fairly uniform growth. Owing to their upright habit of growth cultivation is still necessary.

SCOTCH PINE (*Pinus sylvestris*).

Trees 5 x 5 feet apart—all Scotch Pine. These trees have made rapid and fairly uniform growth. No cultivation was needed after 1892.

Trees 10 x 10 feet apart—all Scotch Pine. These have also made rapid and fairly uniform growth, but are shorter, though larger in circumference than those planted 5 feet apart. They are now interlacing in places.

Trees 10 x 5 feet apart—Mixed Forest Belt. The Scotch pine in the mixed belt have also done well. They seem to do best on the lighter soils.

Trees 3 x 3 feet apart—all Scotch Pine. These trees were planted i nursery rows in 1887, the rows being 3 feet apart, and the trees about 6 to 8 inches apart in the rows. In 1893 they were thinned out until they were about 3 feet apart each way. They have made rapid and fairly uniform growth, but their circumference is not so great as when planted further apart.

EUROPEAN LARCH (*Larix europœa*).

Trees 5 x 5 feet apart—all European Larch. A very fine block of trees which have made rapid and fairly uniform growth. No cultivation was needed after 1892.

Trees 10 x 10 feet apart—all European Larch. These trees have not made so strong or uniform growth as those planted 5 feet apart; more tops have been broken and the trees are not so straight.

Trees 10 x 5 feet apart—Mixed Forest Belt. The European larch in the mixed belt, though few in number, have done very well. The land where these trees are planted is high and dry. These larches have done well on both clay and sandy loam.

WHITE SPRUCE (*Picea alba.*)

Trees 5 x 5 feet apart—all White Spruce. The soil in this block is a light sandy loam but the trees have made medium growth and are fairly uniform in height. No cultivation was needed after 1894.

Trees 10 x 10 feet apart,—all White Spruce. On smilar soil these have also made medium growth but are not so uniform in height as those in rows 5 feet apart. Cultivation is still necessary.

FIG. 6.—VIEW OF SOME OF THE SAMPLE HEDGES, ON THE CENTRAL EXPERIMENTAL FARM.

AMERICAN ARBOR-VITÆ (*Thuya occidentalis.*)

Trees 5 x 5 feet apart,—all Arbor-Vitæ. These trees have made rapid and fairly uniform growth, and appear to be well adapted to the soil of peat and sand in which hey are growing. No cultivation was required after 1894.

Trees 10 x 10 feet apart,—all Arbor-Vitæ. The trees in this block have also made rapid and fairly uniform growth. Cultivation is still necessary.

AUSTRIAN PINE (*Pinus austriaca.*)

Trees 5 x 5 feet apart—all Austrian Pine. These have made medium growth and are fairly uniform in height. No cultivation was required after 1894.

Trees 10 x 10 feet apart—all Austrian Pine. The trees in this block have also made medium and fairly uniform growth. Cultivation is still necessary.

Trees 10 x 5 feet apart,—Mixed Forest Belt. The trees in this belt have done better than when planted in blocks by themselves; one reason probably being that the land is higher. Those planted in sandy loam seem to do somewhat better than those on clay loam.

Trees 3 x 3 feet apart—all Austrian Pine. These trees were planted in nursery rows in 1887, the rows being 3 feet apart and the trees from 6 to 8 inches apart in the rows. In 1893 they were thinned out until they were about three feet apart each way. They have made rapid and fairly uniform growth, but their circumference is not so great as where planted further apart.

NORWAY SPRUCE (*Picea excelsa.*)

Trees 5 x 5 feet apart,—all Norway Spruce. The trees in this block have made rapid and fairly uniform growth and have not needed cultivation since 1894.

Trees 10 x 10 feet apart,—all Norway Spruce. These trees have also made strong and fairly uniform growth, but still need cultivation.

Trees 10 x 5 feet apart,—Mixed Forest Belt. The Norway spruce in the mixed forest belt have done well on the lighter soils. On clay loam they have not grown so well.

WHITE PINE (*Pinus Strobus.*)

Trees 5 x 5 feet apart,—all White Pine. The light sandy loam soil, mixed with gravel where these trees are growing seems very suitable; they have made rapid and fairly uniform growth and no cultivation was required after 1894.

Trees 10 x 10 feet apart,—all White Pine. These trees have also made rapid and uniform growth but still need occasional cultivation.

AVENUES.

The trees composing the avenues on the farm made good growth during the past season and at no time seemed to suffer from lack of moisture. The caterpillars of the Camberwell Beauty Butterfly *(Vanessa Antiopa)* were very troublesome on the elms during the month of June, but the trees were examined at intervals and the insects destroyed before they had done much injury. The surface soil was kept loose about the trees during the summer to retain moisture and kill weeds.

HEDGES.

The Arbor-vitæ and Norway spruce hedges bordering the east and south boundaries of the farm have again made vigorous growth. After being trimmed the past season the Arbor-vitæ was as high as the top of the fence in most places, and the Norway spruce, though not trimmed this year, is about as high.

The 46 sample hedges, of which an account was given last year in the report of the Director, are all doing well. In Fig. 6, a view is given of some of these from a photograph. Twenty additional hedges were added to the list during the spring of 1895, making 66 in all. The following are the names of those planted this year :—

ADDITIONS TO SAMPLE HEDGES.

Acer glabrum.—Smooth Maple.
Acer monspessulanum.—Montpellier Maple.
Betula lutea.—Yellow birch
Betula papyrifera.—Papery or Canoe Birch.
Cornus sibirica variegata.—Variegated Siberian Cornus.
Cotoneaster buxifolia.—Box-leaved Cotoneaster.
Cotoneaster microphylla.—Small-leaved Cotoneaster.
Cotoneaster nepalensis.—Nepaul Cotoneaster.
Cotoneaster Simonsii.—Simons's Cotoneaster.
Calycanthus floridus.—Carolina Allspice.
Fagus sylvatica.—European Beech.
Hippophae rhamnoides.—S Buckthorn.
Larix americana.—American Larch.
Pinus ponderosa.—Heavy-wooded or Bull Pine.
Quercus Robur.—Black or common Oak.
Quercus palustris.—Pin Oak.
Rhamnus catharticus.—Cathartic Buckthorn.
Rhamnus Frangula.—Breaking Buckthorn (dense form)
Thuya occidentalis globosa.—Globose Arbor-vitæ.
Thuya tatarica.—Tartarian Arbor-vitæ.

ORNAMENTAL CLUMPS OF TREES AND SHRUBS.

The trees and shrubs in the ornamental clumps are becoming more attractive every year and by their beauty of form, foliage and flower, prove of much interest to visitors.

During the past season the circles cut in the grass around the trees and shrubs were enlarged, which has given them a better opportunity of making satisfactory growth. The surface soil about the trees was kept cultivated and free from weeds and, where necessary, the trees were sprayed to prevent the depredations of plant lice and caterpillars. Owing to the cold weather which followed the warm days in the early part of May, the flower buds on some of the trees and shrubs were injured and the bloom this season was not so good as last year.

LABELS.

During part of last winter indelible labels were provided for most of the trees and shrubs on the ornamental grounds. These are zinc labels fastened to a wire rod about 18 inches long, which is pushed into the soil to about three fourths its depth, leaving the label so that it may be easily read. The writing is done with a mixture in the proportion of 1 ounce copper sulphate, $\frac{1}{2}$ ounce lamp black, and $\frac{1}{2}$ pint rain water. This mixture corrodes the zinc slightly and the writing does not wash off. In addition to the zinc labels, 491 white enamelled labels with black letters were received from England; these have the advantage of being larger and more prominent and are lettered with both common and scientific names, also the name of the country of which the specimens are native. In this way good facilities are now given visitors for obtaining the name of any tree or shrub in which they may be interested.

ADDITIONS TO TREES AND SHRUBS ON ORNAMENTAL GROUNDS.

Many additions were made to the trees and shrubs on the ornamental grounds during the spring of 1895, and in the autumn new clumps were planted, especially north of the poultry buildings and from that point on both sides of the road to the northern boundary of the farm. The additions made this year number 192 trees and shrubs, making a total of 2,398 trees and shrubs on the ornamental grounds.

LAWNS, FLOWER BORDERS AND BEDS.

Owing to the plentiful rainfall the grass of the lawns grew rapidly all summer, and the pony lawn mower was kept in use almost constantly from the 9th of May until September, in keeping the grass on the ornamental grounds and in the Arboretum in order. Very little work is now required with the hand mower as the enlarged circles about the trees and shrubs admits of the work being economically done with the horse mower.

Several small areas were seeded down during the season and the grass had formed fairly good sod before growth had ceased in the autumn.

The flower borders containing many species and varieties of annual and perennial plants had a splendid show of bloom all season and the special beds prepared for pansies, pæonies, geraniums, roses, irises, lilies, and clematis were a source of great delight to those who visited the farm, and the succession of bloom in the different beds, the varied colours of the flowers, and the continuity of the bloom added much to the attractiveness of the grounds. The keeping of the surface soil of the borders and beds loose and free from weeds entailed almost constant work; fungous diseases and injurious insects also were more or less troublesome and needed frequent attention to keep them in check.

During the autumn, eleven new flower beds were made on the large lawn, west of the office building and more or less planting was done in them before winter set in. Six of these have been especially set apart for the most attractive wild flowers found in the different provinces and territories of the Dominion. These will, it is believed, prove of special interest to those visiting the farm from different parts of Canada.

ARBORETUM.

The Arboretum at the Central Experimental Farm now contains a collection of trees, shrubs, and perennial plants of great value embracing not only our native species but a very large number from foreign countries.

During the spring 246 species and varieties of trees and shrubs were added to the number recorded last year, making a total of 935 living in the autumn of the present year. The perennial flower border was extended in the autumn from the main entrance to the northern gate and the greater part of this was planted with 735 additional species and varieties, making a total of 863 now in the Arboretum.

DONATIONS.

While visiting the Central Experimental Farm last summer, Prof. Sargent, Director of the Arnold Arboretum at Boston, Mass., expressed his willingness to assist in making the collection here more complete, and to supply, from that institution, many trees and shrubs, new to the collection at Ottawa. At his suggestion, I visited the Arnold Arboretum in the autumn, and under Prof. Sargent's kind instructions, all the nursery stock of the Arboretum was shown me. A list was taken of such trees and shrubs as could be sent, and late in the autumn, a box containing 179 species and varieties was received, also cuttings of 24 species of willows. This donation will prove a most useful and valuable addition to the Arboretum at Ottawa.

A package containing six species of trees has also been received from Professor Max Sivers, of Roemershof, Russia, also some tree seeds. Two of the species sent are new to the collection here, namely: the Russian Larch (Larix Ledebourii), and Siberian Spruce (Abies sibirica).

PROGRESS OF THE WORK.

The trees and shrubs in the Arboretum have made very satisfactory growth this year, and the good effects produced by the improved system of drainage recently

carried out, were very noticeable. The losses from winter-killing were but few, notwithstanding the exposure to which many of the trees and shrubs are subjected to in the more elevated and open locations of the Arboretum.

The circles cut in the grass around the trees and shrubs were all enlarged this year, and the surface soil kept loose and free from weeds throughout the season. Very little work was required with the hand-mower, as the pony mower, which does the work most economically, cut the grass to the edge of the enlarged circles without injuring the trees.

The perennial flower-border required considerable attention, but as the rows of plants are wide enough apart to admit of cultivation with the horse cultivator, the work is reduced to a minimum.

During the autumn a wind-break was planted along part of the eastern boundary of the Arboretum, consisting of 62 heavy-wooded or Bull Pine (*Pinus ponderosa*), 64 Riga Pine (*Pinus sylvestris Rigaensis*), and 65 Norway Spruce (*Picea excelsa*), the trees being planted 5 feet apart each way.

The trees and shrubs in the Arboretum have been labelled similarly to those on the lawns and ornamental grounds, using as large a proportion of enamelled labels as practicable so as to make this section of the work as useful to the public as possible. The trees and shrubs are each numbered, so that an accurate record may be kept of each individual.

Notes have been taken during the past season on the hardiness, growth and time of blooming of some of the different species and varieties. This work will be continued, and it is hoped that by this means valuable data will be accumulated.

The following is a partial list of the trees and shrubs with the date when in full bloom. Fuller details may be presented in future.

TREES AND SHRUBS—DATE OF BLOOMING.

May 4th.—*Forsythia intermedia.* Intermediate Forsythia.

May 8th.—*Forsythia viridissima,* very green Forsythia; *Pyrus japonica,* Japanese Quince.

May 9th.—*Prunus Pissardii,* purple-leaved plum; *Ribes alpinum,* Mountain currant.

May 10th.—*Pyrus baccata aurantiaca,* Siberian Pyrus; *Berberis Aquifolium,* Oregon grape; *Amelanchier canadensis nana,* Dwarf june berry.

May 11th.—*Caragana arborescens,* Siberian pea tree; *Sambucus racemosa,* Red-berried elder.

May 12th.—*Spiræa oblongifolia.*

May 13th.—*Syringa vulgaris hyacinthiflora,* Hyacinth-flowered lilac.

May 14th.—*Spiræa tenuissima. Spiræa salicifolia,* Common meadow sweet; *Daphne Cneorum,* Garland flower; *Syringa vulgaris Lemoinei,* Lemoine's lilac.

May 18th.—*Syringa vulgaris alba,* white lilac; *Berberis Thunbergii,* Thunberg's barberry.

May 22nd.—*Viburnum Lantana,* Pliant viburnum; *Amygdalus nana flore pleno,* Double flowering almond.

May 24th.—*Cytisus elongatus.*

May 26th.—*Lonicera tatarica grandiflora,* Large-flowered bush honeysuckle.

May 29th.—*Spiraea Van Houttei,* Van Houtte's spiraea; *Pyrus Aucuparia,* European mountain ash.

May 30th.—*Cornus sanguinea*—Blood-coloured dogwood.

May 31st.—*Berberis vulgaris purpurea,* Purple-leaved barberry; *Weillia amurensis,* Amur spiraea.

June 1st.—*Pyrus americana,* American mountain ash.

June 2nd.—*Viburnum Opulus sterilis,* Snowball.

June 3rd.—*Acer spicatum,* Mountain maple; *Diervilla rosea,* Rosy weigelia.

June 4th.—*Robinia Pseudacacia,* Common locust.

June 5th.—*Acer Ginnala,,* Ginnalian maple; *Rosa rugosa,* Japanese rose.

June 6th.—*Viburnum Opulus*, High bush cranberry; *Syringa Josikœa*, Josika's, lilac; *Lonicera Alberti*, Albert's honeysuckle.

June 7th.—*Lonicera Periclymenum*, English honeysuckle.

June 10th.—*Philadelphus coronarius*, Mock orange; *Spiraea media rotundifolia*, Round-leaved spiraea.

June 12th.—*Lonicera hirsuta*, Hairy honeysuckle; *Philadelphus grandiflorus laxus* Large loose flowering mock orange.

June 13th.—*Philadelphus primuliflorus*, Primula-flowered mock orange.

June 14th.—*Philadelphus coronarius flore pleno*, Double flowering mock orange or "Syringa."

June 17th.—*Genista tinctoria*, Dyers' Green weed; *Philadelphus nivalis*.

June 18th.—*Philadelphus Lemoinei erectus*, Lemoine's erect mock orange.

June 19th.—*Philadelphus Gordonianus*, Gordon's mock orange; *Philadelphus Yokohamœ*, Yokohama mock orange.

June 20th.—*Philadelphus pubescens*, Downy mock orange, *Ceanothus americanus*, New Jersey Tea; *Dentzia crenata flore pleno*, Double crenate deutzia; *Philadelphus grandiflorus*, Large flowered mock orange; *Catalpa speciosa*, Hardy western catalpa; *Catalpa speciosa variegata*, Variegated western catalpa.

June 21st.—*Sambucus nigra aurea*, Golden-leaved elder; *Sambucus nigra laciniata*, Cut-leaved elder.

June 22nd.—*Philadelphus cordifolius*, Heart-leaved mock orange; *Philadelphus inodorus*, Odourless mock orange.

June 23rd.—*Syringa japonica*, Japanese lilac; *Spiraea decumbens*, Decumbent spiraea.

July 2nd.—*Catalpa hybrida*, Tea's hybrid catalpa.

July 3rd.—*Catalpa Kœmpferi*, Japanese catalpa.

W. T MACOUN.
Foreman of Forestry.

VISITS TO THE BRANCH EXPERIMENTAL FARMS.

VISIT TO AGASSIZ.

On the 20th of July, 1895, I left Ottawa on my annual visit of inspection to the branch farms in the western parts of the Dominion. The journey was made to Agassiz without a break in order to be present at some important meetings which had been planned to take place at Agassiz during the latter part of July. These meetings consisted of gatherings of the Associations of Farmers' Institutes, and of the Fruit Growers and Dairymen of British Columbia. and were well attended by representative men from the different parts of the province, from Vancouver Island as well as from the main land. The Lieutenant-Governor was present and presided over the meetings, while the local government was represented by the Minister of Education and the Deputy Minister of Agriculture. The Experimental Farms were represented by the Director, the Entomologist and Botanist, Mr. James Fletcher, and by the Superintendent of the branch Experimental Farm at Agassiz, Mr. Thos. A. Sharpe. During the sessions of these important gatherings addresses were given by each of the representatives from the farms, on topics of interest to those present, and during the intervals between the sessions many of the visitors devoted their time to the inspection of the various branches of experimental work in progress at this branch farm.

Nearly two weeks were spent on the Experimental Farm at Agassiz, examining into the results of the work of the year with the grain crops, and in taking notes on the progress of the various fruit plantations both in the valley and at different heights on the bench lands on the mountain side. The orchards in the valley had made strong growth and a large number of the trees were well laden with fruit. The crop of some of the later varieties of cherries was still on the trees and presented a very fine appearance, while the plum crop was so heavy that the trees had to be supported in all directions to prevent the limbs from breaking with the weight of the fruit.

The orchards on the bench lands more recently planted were also making fine growth and some of the young trees were bearing well, notably the plums and a few of the peaches. These orchards on the broken bench lands on the mountain side, occupying as they do, land which is of no value for general agricultural purposes, are attracting much attention from the fruit growers of British Columbia and the degree of health and vigour manifested by these trees was very gratifying. The total number of varieties of fruits now under test on the Experimental Farm at Agassiz is 1,600, of which 1,204 are large fruits. Nearly 500 varieties of ornamental trees and shrubs are also under test. A large number of varieties of grain and other agricultural crops were also growing there, all of which were subject to careful examination, and the new work for the coming year was planned.

VISITS TO OTHER PARTS OF BRITISH COLUMBIA.

Visits were paid to Victoria, Vancouver and New Westminster, also to the newly erected creamery near Ladner's Landing on the Delta lands of the Fraser, the first co-operative creamery built in British Columbia, where about 300 lbs. of butter per day was being made. A visit was also paid to one of the salmon canneries in that district, this being the time when the run of the much esteemed Sock-eye salmon was at its height. It was an interesting scene. About 200 Chinamen and Indian women were busily engaged in cleaning, cutting up and canning the fish, in which many of them showed great dexterity, and considering the inevitable handling of so much offal, the operations were conducted with commendable cleanliness and care. Fully 1,800 boats were at that time engaged on the Fraser River in fishing, which continued day and night and the deliveries to the canneries were very heavy.

The grain crops throughout the province were fairly good, and the hay in some districts especially heavy. Fruit growing is making rapid progress and the crop of fruit, especially of plums, was a most abundant one; cherries also had yielded well. The crop of pears was below the average, but apple trees, especially those in the younger orchards, were giving satisfactory returns.

THE OKANAGON VALLEY.

Journeying eastward, a trip was made south from Shuswap Lake into the Okanagon valley and down the lake—which is about 75 miles long—to its base at Penticton. Opportunity was thus given for visiting a number of farms and several large orchards, including those of His Excellency the Governor General. Most of the orchards planted in this valley are making good growth, and in some of them many of the young trees have begun to bear. The fruits grown throughout this district are remarkably clean, free from spot and bright in colour, the dry atmosphere preventing fungous growth. In many parts of this valley irrigation to a greater or less extent is needed in order to ensure success. This adds to the expense of working the land, and as the supply of water is limited, the area which can be brought under successful cultivation is necessarily restricted.

AT CALGARY.

Two days were spent at Calgary where some inquiries were made in reference to the progress of irrigation in Alberta and in examining the crops grown on land to which water had been applied during the past season. These crops were found to be remarkably luxuriant in growth, showing the fertile character of the soil. During the past five years 76 irrigation ditches have been constructed or are now under construction, largely through private enterprise in Alberta measuring in all more than 200 miles. These when completed and in operation will it is estimated irrigate about 135,000 acres of land. The energy manifested in this direction by the settlers in that country deserves the highest commendation and shows the very great interest taken in this subject, and that those who have the best opportunity of judging are firmly convinced that the artificial application of water to growing crops will so far increase the average

production as to warrant the large expenditures which are being made in providing these water supplies. On a ranch a few miles from Calgary owned by Mr. Hull some extraordinary fodder crops were seen growing under irrigation. Among them was a large field of awnless brome grass (*Bromus inermis*) which had been grown as hay and had produced a very heavy yield.

VISIT TO INDIAN HEAD.

The branch experimental farm at Indian Head was next visited, where several days were spent in examining the grain crops, which were remarkably heavy, noticing the progress of various plantations of forest trees, shrubs, small fruits and vegetables, and in planning work for the future. A large proportion of all the crops on the farm were found to be very promising, and the horses, cattle, swine and poultry all appeared to be in a healthy and thrifty condition. The forest trees planted in the shelter belts, clumps, avenues and hedges on this farm now number over 100,000. During the past year they have made remarkable growth, and are so distributed throughout the farm that they are having a favourable effect on many of the crops, by breaking the force of the winds and adding moisture to the soil by collecting and holding the snow during the winter months. Further, through this means the whole aspect of the farm is rapidly improving, and from this time forward many of the trees earliest planted are expected to begin to bear seed, and, in a comparatively short time, an abundant supply of tree seeds will be available from year to year for extending this good work. Up to the time of my departure from Indian Head, on the 24th of August, no frost had occurred in that district and more than half of the wheat was cut. About a week later a temperature of five degrees of frost was recorded, which considerably injured the late crops still standing or recently cut.

VISIT TO BRANDON.

A week was spent at Brandon inspecting the work in progress on the branch farm there. The crops, like those at Indian Head, were very heavy, and a large proportion of the grain was cut. The corn had not made so strong a growth as in 1894, but the roots were very thrifty, and gave promise of an abundant yield. Many of the small fruits had made excellent growth, but on account of heavy spring frosts the crops had been light. The tree belts, avenues, hedges and ornamental plantations had all made strong growth, they add much to the beauty of the place, and afford in many parts excellent protection. Wild plum trees are succeeding very well here, and several specimens were fruiting nicely. It is hoped that by careful selection the quality of this fruit may be gradually improved and its usefulness much extended. Neither here nor at Indian Head have any of the hardiest sorts of apples or pears succeeded, nor any of the better varieties of plums or cherries. The sand cherry, *Prunus pumila*, is doing well and is quite hardy and some of the selected forms of this fruit are of very fair size and quality. All the live stock appeared to be in a thriving condition and gave evidence of good care. Frost visited this farm earlier than at Indian Head and injured some of the grain, especially in the lower spots in the valley. On the whole, however, the returns were remarkably good and much of the grain has since turned out well and of very satisfactory quality.

TRIP THROUGH SOUTHERN MANITOBA.

In company with the superientendent of the Brandon experimental farm, Mr. S. A. Bedford, a drive was taken covering about 220 miles through some of the more important grain districts in southern Manitoba. The route taken was from Brandon south 70 miles to Killarney, thence eastward to Morris and through the Mennonite settlement to Gretna. Ninety samples of grain were taken from the fields en route and carefully examined. The effect of frost was detected in some of these samples and a few were seriously injured, but the injury appeared to be confined to a few districts where the quantity of wheat grown is comparatively small. Of the larger areas visited

where the bulk of the wheat crop of southern Manitoba is harvested, most of the samples taken were free from injury by frost, and at that time the grain was nearly all cut. The crops of all the cereals were very heavy; a considerable area of flax was seen, most of which promised a good return.

VISIT TO THE EXPERIMENTAL FARM FOR THE MARITIME PROVINCES.

As soon as practicable after returning from the west, a visit was paid to the branch experimental farm at Nappan, Nova Scotia. At the time of my arrival there all the varieties of grain and fodder crops had been harvested and the roots of which there were some very fine fields notwithstanding the drought which prevailed, were about ready to gather in. The yields of grain during the early part of the season had been good, and as the harvest weather had been favourable, the crops were well saved. Hay on the uplands has given an average crop, but on the marsh lands the yield has been somewhat below the average. This farm is improving much from year to year, a considerable proportion of the land now under cultivation has been thoroughly under-drained which has relieved it of surplus moisture and admits of early seeding in the spring.

The orchards and fruit plantations have been extended and now include 288 varieties of large fruits and 75 of small fruits. A large number of ornamental trees and shrubs have also been added to the collection, which now includes 280 species and varieties. Most of these have been planted in groups and clumps about the buildings, where they beautify the grounds and prove a constant source of pleasure to visitors.

MEETINGS ATTENDED.

In addition to the meetings already referred to, which were held at Agassiz in British Columbia, the following have been attended during the year:—

The annual meeting of the Dominion Swine Breeders' Association held at Guelph, Ontario, on the 12th and 13th of December, 1894, when an opportunity was afforded of presenting the results of the experiments which have been conducted for several years past, in the fattening of swine at the Experimental Farm.

On the 23rd to 25th of January, 1895, the annual meeting of the Western New York Horticultural Society was attended at Rochester, New York, where an address was given on "Ornamental Trees and shrubs which have proven hardy at Ottawa."

The annual meeting of the district of Bedford Dairy Association was held at Cowansville, on the 26th and 27th of February, where addresses were delivered on "The Fertilizing constituents taken from the soil by different crops" and "On natural and artificial Fertilizers.

An address was also delivered in Montreal, before the Central Canada Agricultural Association, on the 28th February, on "The effects of Fertilizers on the more important crops."

CORRESPONDENCE.

The following is a summary of the letters received and despatched at the Central Experimental Farm, from November 30th, 1894, to November 30th, 1895, also of the bulletins and reports sent out by mail during the same period:—

	Letters received.	Letters sent.
Director	22,389	7,378
Agriculturist and Dairy Commissioner	5,042	5,161
Horticulturist	2,056	2,500
Chemist	1,209	1,331
Entomologist and Botanist	1,896	1,268
Poultry Manager	1,600	1,366
Accountant	1,289	1,100
	35,481	20,104

The letters received by the Director include a considerable number of applications for samples of seed grain. Most of these are acknowledged by printed circulars, which are not entered among "letters sent," but are placed under the heading of "circular letters sent." This accounts for the difference between the number of letters received and the number of letters sent.

CIRCULAR LETTERS SENT.

The larger part of these are instructions sent with samples of seed-grain, tree seeds, &c., distributed	38,448
Number of reports and bulletins mailed	227,631

ACKNOWLEDGMENTS.

I desire to acknowledge gratefully the receipt of a large number of species and varieties of trees and shrubs, many of them rare, kindly forwarded by the director of the Arnold Arboretum, Prof. C. S. Sargent, of Jamaica Plains, Mass., for the Arboretum at the Central Experimental Farm, also, a number of packages of seeds of trees and shrubs from the same source.

A package containing trees and tree seeds from Prof. Max Sivers, of Roemershof, Russia; packages of seeds from the director of the Royal Gardens, Kew, England; from the director of the Botanic Gardens, Jamaica, West India Islands; from the Imperial Botanic Gardens, Sapporo, Japan; from the California Experiment Station at Berkeley, California; and from the Minnesota Experiment Station at Minneapolis, Minnesota.

My thanks are also due to Dr. G. M. Dawson, director of the Geological Survey, for his kind assistance in issuing instructions to members of the Survey staff engaged in exploring work to preserve and forward to the Experimental Farm seeds of trees, shrubs and plants obtained in remote districts in different parts of the Dominion. From this source many useful varieties, otherwise difficult to procure, have been obtained. Special service has thus been rendered by Prof. John Macoun, botanist of the Survey, and by Mr. J. M. Macoun, assistant botanist, from whom seeds of a large number of rare and useful species have been received, collected chiefly in the North-west provinces of the Dominion.

Again I desire to acknowledge the efficient service rendered me by all the officers of the Central and branch Experimental Farms and my obligations to them for their hearty co-operation, and diligence in carrying out the many and various experiments which have been planned in connection with the work. The results speak louder than words of the earnest efforts which have been made by all to do their work thoroughly and well.

A personal acknowledgment is specially due to those members of the staff who have so efficiently aided me in those branches of the work of which from the beginning I have assumed the personal charge, also for the valued assistance which has been given me in carrying on those portions of the agricultural work undertaken at the request of the agriculturist. To the farm foreman, Mr. John Fixter, who has managed and watched over the field experiments and made careful notes of the growth and development of the crops to maturity. To Mr. Macoun, the foreman of forestry, who in addition to his other duties has taken charge of all the smaller experimental plots and who has made regular and careful records of the progress at every step of the many varieties under test. I also desire to bear testimony to the faithful and accurate work performed by Mr. W. T. Ellis, who has had the care of the seed testing and propagating houses; and to Mr. J. Kirkpatrick, who has conducted the work of the distribution of samples of seed grain. The employees also, in every department of the work, have discharged their duties faithfully and well.

WM. SAUNDERS,
Director Dominion Experimental Farms.

REPORT OF THE HORTICULTURIST

(JOHN CRAIG.)

To WM. SAUNDERS, Esq.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit a report of some of the work carried on in the Division of Horticulture of the Central Experimental Farm for the year 1895.

The most striking feature of the year from the fruit growers' standpoint was the occurrence in May of destructive frosts throughout Central Canada. The Niagara district, in addition to the apple and pear growing districts to the North and East, suffered severe injury. Peaches in the belt btween Hamilton and Niagara Falls were not more than a quarter of a crop, and some sections a total failure.

The quality of autumn and winter apples of this year has not been excelled or equalled for a number of years past, owing in part to the increase of the practice of spraying and to the presence of unfavourable conditions for the growth of parasitic diseases.

The export of apples to the British market has been much less than last year, but the better quality has given shippers and growers higher prices.

The various provincial organizations for the advancement of the fruit growing interests have done excellent work and are usually well supported by their respective governments. The membership of these associations should be largely increased, as the benefits derived cannot be compared to the annual expenditure of one dollar which constitutes the membership fee of each.

SHIPMENT OF PERISHABLE FRUITS TO ENGLAND.

In response to a request made by the Fruit Growers' Association of Ontario, a trial shipment was made, using one of the chambers fitted up in the steamer "Mongolian" for carrying butter, for this purpose. Each specimen was wrapped in tissue paper and was carefully packed in specially prepared cases of small size. The fruit was collected at St. Catharines, Grimsby and Winona, and shipped from Montreal on September 5th. The shipment amounted to 610 packages composed of pears, peaches, plums, grapes, and tomatoes. It arrived in Liverpool in bad condition. The peaches, plums, and grapes suffered most. The shipment was unsuccessful owing to the refrigerator car being insufficiently iced while in transit between Hamilton and Montreal, thus bringing the fruit to Montreal in a warmed condition; also to the lack of cooling plant in the cold storage chamber on board the steamer. As the Government assumed the amount of the transportation charges, the growers suffered only the loss of the fruit, the returns from the sale of the fruit more than defraying the cost of the special packages made to order for this shipment. 40 bushel boxes of apples St. Lawrence, Alexander and Wealthy, shipped from Montreal in the same compartment arrived in good condition and were sold at remunerative prices. The net returns for these amounting to a little over $1.00 per box.

RAPID DEVELOPMENT OF THE FRUIT INTERESTS OF THE DOMINION.

The fruit interests of the country have been increasing with marvellous rapidity during the past ten years. The production, especially of summer and autumn fruit of a more or less perishable character, has long since passed the limits of profitable home consumption. This is the case in nearly, if not quite, all of the fruit growing provinces of the Dominion.

NOVA SCOTIA

is justly celebrated for the production of apples of fine quality, which have long since secured for themselves a reputation in the British markets. Her acreage devoted to apples is rapidly increasing and is being supplemented by an extension of similar work along the lines of pear, peach and plum culture. That many of these can be successfully produced in the Annapolis Valley has already been demonstrated by practical trial. The area devoted to the cultivation of pears is being widened each year. Plums are widely and successfully grown, and peaches give promise of success in favoured localities. Foreign markets in which to dispose of these fruits, will be a necessity before very long.

NEW BRUNSWICK.

The production of apples in this province probably is not at present more than sufficient to meet the domestic demand; at least, if the supply is judiciously distributed.

In small fruits, such as raspberries and strawberries, this province has, owing to her geographical and climatic position, the advantage of ripening these fruits at a period sufficiently late to enable her to ship them to Boston, and other markets to the south, at a time when there is little or no competition from the same class of fruits. Facilities for transportation, and knowledge of the best means of packing and shipping, are yet needed.

QUEBEC.

The area devoted to fruit-culture in this province has also increased rapidly. The climate in most portions precludes the successful cultivation of the best winter export apples of to-day; but large quantities of fine autumn and early winter apples are being produced annually in increasing quantities. The origination of suitable winter export varieties belongs to the work of the future. A large proportion of these autumn apples are at present wasted. I am confident that a profitable trade could be worked up in England by using small packages, and transporting them in adequately cooled chambers. In fact, some advances along this line have already been made by individual enterprise. Encouragement given by offering better means for transporting them, together with a knowledge of the desires of the British consumer, is needed to ensure success.

ONTARIO.

The Bureau of Statistics for this province gives the cultivated area devoted to fruits in 1892 as amounting to nearly 200,000 acres. In 1893, the value of peach trees in orchard, according to the same authority, represented a capital of over two and one-half million dollars.

The planting of pears, plums and grapes has been steadily on the increase, and the annual product of the fruit area is now greatly in excess of domestic consumption.

In addition to the fruits enumerated, it is safe to say that Ontario, as well as Quebec, possesses peculiar natural advantages for the cheap production of tomatoes. These can be successfully cultivated over the greater portion of these provinces, and at a profit, if they can be disposed of for even 25 cents per bushel. At this rate, the profits derived will greatly exceed those secured, at the present time from potato culture.

BRITISH COLUMBIA.

This province, which will undoubtedly lead all others in the production of plums, prunes and nuts, will probably be able for some years to come, to dispose of her surplus apples and pears in Manitoba and the North-west Territories.

FOREIGN MARKETS.

Britain and Germany are at the present time the most suitable shipping points. The methods of packing and handling and the means of transporting these products are undoubtedly the most important points connected with the project.

The failure of the trial shipment to reach its destination in sound condition gives rise to the query of how may they be successfully transported thither?

I believe that fruit may be carried in good condition by having a ventilated compartment with a moderately cool temperature of say 40 to 45 degrees, and fully supplied with an abundant amount of dry and pure air. It may also be carried successfully in a closed compartment, provided the temperature is only slightly above freezing. On the contrary, without thorough refrigeration the closed compartment offers the most favourable conditions for the propagation of the germs of fermentation and decay.

As a natural consequence following upon the successful introduction of pears, grapes and tomatoes, into the British markets, should come the erection in fruit districts of buildings artificially cooled, in which fruit might be stored sufficiently long to tide over a glutted market or a period of weak demand in home markets.

District cold storage warehouses supplemented by a refrigerator car and steamer service between home and foreign markets would enable growers to market with increased profit a greater quantity of fruit, which would thus allow of the fruit area being increased without a corresponding falling off or lowering of prices.

CRANBERRY CULTURE.

A subject which has been attracting considerable attention, and which has called for a good deal of correspondence from this office during the past four or five years, has been Cranberry Culture.

In the Maritime Provinces and Prince Edward Island there are many sections, that on account of their alluvial and topographical character are particularly adapted to the cultivation of the cranberry. The principal expense in connection with this industry lies in the preparation of the ground, and the chief drawback is the occasional occurrences of a late spring frost, which destroys the blossoms and therefore the possibility of securing a good crop.

At the meeting of the Nova Scotia Fruit Growers' Association, held at Wolfville, N.S., January 29th, 30th and 31st, 1895, some exceedingly interesting information on "Cranberries and how to grow them" was submitted by Mr. Henry Shaw, a successful cranberry grower of Berwick, N.S. A report of his address may be found in the proceedings of the Fruit Growers' Association for 1895.

Without going into the details of Cranberry Culture, it might be well to outline briefly some of the requisites necessary to success in their cultivation. These are as follows:—

1. Alluvial soil composed of a mixture of muck and sand.
2. Surface drainage.
3. Annual flooding.

These in general are necessary to obtain the highest returns, but paying results are often secured without the fulfilment of all the above conditions. A sandy subsoil overlaid with muck is unsuitable unless some of the latter is removed and some of the sand is brought to the surface by deep ploughing or other means before it is ready for planting. A rich peaty soil causes too much growth of vine, and as the fruit sets on the ends of the shoots this rank growth throws out but few fruit buds, but if the surface is sanded over or mixed with sand, less growth is made with the result that a great many

more fruit buds are formed. In the case of very sandy soil it would be well to top dress it liberally with muck or swamp mud. In preparing the ground, if it be wet and spongy, it should be surface-drained so as to leave the water ten or twelve inches below the surface. The plants are usually set in rows two feet apart each way. Holes are made with a stick or dibble, the roots inserted into these and the earth pressed about them with the foot. The plant in each case is practically a cutting, as the roots are so fine and fibrous that they lose their vitality very quickly on exposure to the air, but it soon throws out new roots from the stem. The vines may also be sown in drills and covered about as deeply as corn; this method is more rapid, but the results are not always satisfactory. The best time for planting is in spring as early as possible, but the operation may be carried on up to June 1st with fair results. They may also be set out in autumn between September and the middle of October. Where plants are set out in autumn on soil liable to heave with frosts, the plantation should be flooded deeply in order to prevent the "sets" from being thrown out. Flooding is now considered by nearly all commercial growers to be indispensable to certain success. White, the authority on cranberry growing, says:—"Flooding not only prevents injury from the cold blasts of winter and destroys insects and their eggs, but the water has also an important fertilizing effect which is particularly valuable if the plantation is deficient in muck." Annual deposits of vegetable matter are also obtained in this way. The water is let on late in autumn and drained off after danger of hard frost in spring is over. Dressings of sand applied each year, or on alternate years will assist in keeping the weeds down and will aid the plants in rooting between the rows. The "Bugle" and "Cherry" cranberries are two of the most popular varieties in cultivation in the cranberry districts of New Jersey and Massachusetts. In Nova Scotia, the native species is preferred to New Jersey or Cape Cod varieties, in the belief that it is better suited to the climate and is freer from insect injury. Anyone who wishes to read up the subject more fully will find it treated in a small book called "Cranberry Culture," by J. J. White, and published by Orange Judd Co., New York, U.S.

Correspondence.—I am pleased to note that the interest manifested by the public and by fruit growers generally in this division of the farm work has not fallen off during the year, but on the contrary has increased. The large number of letters received and answers given on questions relating to definite and technical lines of investigation show that the usefulness of the division is appreciated throughout the Dominion.

Meetings Attended.—I was present by invitation and gave addresses at the following provincial organizations:—

Nova Scotia Fruit Growers' Association at Wolfville, N. S., January, 28th to 31st inclusive.

Pomological Society and Fruit Growers' Association of Quebec, at Como and Oka, August 20th and 21st.

Ontario Fruit Growers' Association at Woodstock, Ont., 10th, 11th and 12th December.

In addition to these, addresses were delivered at a number of county farmers' institute meetings throughout the country.

Acknowldgments.—I beg to again gratefully thank the secretaries and officers of the various provincial societies devoted to the fruit growing interest of the Dominion, for valuable assistance and kindly encouragement received during the year. I would especially thank those fruit growers in different parts of the Dominion who so effectively assisted me at considerable personal inconvenience in obtaining valuable and interesting records of the dates of the blossoming period of fruit trees. To Dr. B. D. Halsted, of New Brunswick, New Jersey, U. S., and Prof. Seymour, of Harvard University, I am particularly indebted for assistance in identifying parasitic fungi.

I have also to record with thanks the following donations:—

C. L. Stephens, Orillia, Ont.....Red currant seedlings.
M. G. Bruner, Olinda, Ont.....Apple scions.
J. M. Waters, Fernhill, Ont.....Raspberry seedlings.

E. C. Hale, Lennoxville, Que.....1 seedling plum tree; purple and English beech nuts.
J. Erwin Lord, Pampanoosuc, Windsor Co., Vt., U. S.....11 varieties of apple scions; 1 var. crab; late Victor grape cuttings.
J. Munro, Chesterville, Ont.....Scions of sdlg. crabs.
Mrs. Sarah Foster, Knowlton, Que....Apple scions.
W. J. Kerr, Chesterville, Ont.....Apple scions.
Wm. Pattison, Clarenceville, Que.....Apple scions.
F. L. Dery, Point Viau, Que.....Apple scions.
H. C. Sebean, New Market, N. S.....Apple scions.
Prof. L. C. Corbett, Brookings, S. D., U. S.....Yellow sand cherry scions.
A. Rose, Dixon Corners, Ont.....Apple scions.
E. W. Hartman, Clarksburg, Ont.....Apple scions.
B. Losee, Cobourg, Ont.....Apple scions.
A. P. Stevenson, Nelson, Man.....Seedling raspberry; Mountain currant.
J. P. Cockburn, Gravenhurst, Ont.....Muskoka Bell black raspberry.
E. B. Stevenson, Freeman, Ont.....Strawberry plants.
C. E. Brown, Yarmouth, N. S.....Apple scions.
G. A. Wright, Fort Covington, N. Y., U. S.....Apple tree.

Spraying pumps were received from:—

Toronto Wind Engine and Pump Co. Toronto, Ont.
Spramoter Co., London, Ont.
Goold, Shapley, Muir Co., Brantford, Ont.
Vermorel Knapsack Pump Co., France.
Holmes and Holladay, Clarksburg, Ont.

To Mr. Wm. Taylor, foreman in the Division of Horticulture, I am much indebted for valuable assistance in recording valuable data, used in preparing this report. Mr. J. F. Watson has also rendered effective service in the clerical work of the report.

I have the honour to be, sir,

Your obedient servant,

JOHN CRAIG,

Horticulturist.

THE APPLE.

The following pages on this subject are directed to beginners in fruit culture who are seeking information, elementary in character, but none the less necessary to successful orcharding. I may say that the article itself, as well as its didactic character, has been suggested by the numerous inquiries along this line which been have reached this office during the year.

Apple culture has advanced with rapid strides during the past twenty years. It is true that during the first half of that period greater attention was given to increasing the orchard area than to the necessity of good cultivation or the desirability of lessening the number of insects and fungous enemies by exercising preventive methods. Orchardists have been latterly reminded of this fact in an unpleasantly emphatic manner at harvesting time each year, and it is gratifying to note the improvement in cultural methods, which are plainly apparent in all fruit growing centres.

THE BOTANICAL POSITION OF THE APPLE.

The apple belongs to that large group of plants included in what is known as the Rose family, which embraces the more important fruit bearing plants indigenous to, or cultivated in the temperate regions of the globe. It is therefore closely related to the raspberry, blackberry and strawberry; the plum, peach and the cherry.

Our cultivated varieties have originated or have been developed from a wild type, *Pyrus malus*, L., indigenous to Europe. Our cultivated crabs are attributed to two sources: *Pyrus prunifolia*, Wild, which is the parent of the larger cultivated crabs, such as Transcendent and Hyslop; while the Yellow and Red Siberians are derived from the smaller Siberian crab—*Pyrus baccata*, L. In this essay we have only to consider the descendants of *Pyrus malus*, L., the wild apple or crab, as it is called in its uncultivated condition. It is said that the apple is of more use and benefit to the people of England than all the other fruits put together, that it is to fruits in general what good wheaten bread is to other accustomed food; while it satisfies, it never cloys.

There are those who claim that the apple was not indigenous to, but only naturalized in Europe at an early date, and that it originally came from Persia and North Eastern India. However, this may be, it certainly has made a home in Europe for many centuries, as evidenced by the variations in the original type, probably the result of climatic adaptation, as seen in different parts of Europe. At what period the improvement in the original type began and when variations began to appear must be left to conjecture, but without doubt it was at a remote period. Apple culture commenced in England with the advent of the Normans, and the progeny of these Norman introductions later found their way to Canada and the United States with the Pilgrim Fathers and the pioneer Acadians. It is interesting to trace the gradual dissemination of knowledge and the distribution of varieties from each of the early colonial settlements. Thus, we find in Acadia (Nova Scotia), Quebec, Montreal and Amherstburg, on the Detroit River, specimen trees, in some instances grown from seed planted by the first settlers, in other cases representing the second generation, but always interesting on account of their relative antiquity in this country of rapid developement. When we consider that the major portion of our apples came from, or are the product of those raised in the comparatively mild climate of the British Isles and the still milder climate of Normandy, it is remarkable that so many have been cultivated successfully in this climate; as examples of these, Ribston Pippin and Gravenstein may be mentioned, both of which reach a higher state of perfection in certain parts of the Dominion than in the countries of their nativity. It is, nevertheless, true that the bulk of the apples now shipped to England are the product of varieties originated in America, and the number of home productions usually increases as we go towards the North and the West, where climatic extremes preclude the possibility of cultivating the more tender varieties indigenous to West Europe.

With the introduction of the Duchess of Oldenburg and Alexander, two varieties most attractive in appearance, attention was directed to the apples of East Europe and Russia, from whence these came. In 1870, the United States Department of Agriculture, at Washington, imported from Russia, through Dr. Regel, Director of the Botanical Garden at St. Petersburg, scions of 252 varieties of apples. These were tested on the grounds at Washington, and distributed among nurserymen in the Eastern, Northern and Western States.

This importation was followed by systematic and self-denying efforts on the part of the late Charles Gibb, of Abbotsford, Que., and Prof. J. L. Budd, then and now of the Iowa Agricultural College, Ames, Ia., U.S. A great many varieties have been introduced, many have been discarded, some are undergoing further trial, a few have been taken up by nurserymen and have become commercial varieties, while others have been recommended to planters in the colder districts, but have not yet become commercial. (For further information on this subject, the reader is referred to the Report of the Horticulturist of the Experimental Farm for 1891.) That the Russian apples, as a class, are hardier than Eastern, American or Canadian apples, there is no question; that they are bearers of handsome fruit, but poorer in quality, considered as a whole, than our apples, must also be conceded; but, summing up the ultimate advantages derived from their introduction, every fair-minded person must admit that the benefits from them received, and expected, far out-weigh any imaginary or momentary inconvenience the commercial fraternity may have experienced by their introduction. Among some of the prominent American and Canadian fruit growers who have interested themselves in testing Russian apples, may be mentioned the late Charles Gibb, Abbotsford, Que.; John M. Fisk, Abbotsford, Que.; Robert Hamilton, Grenville, Que.; R. W. Shepherd, Como, Que.; Robert Brodie, St. Henry of Montreal, Que.; D. W. Beadle, late of St. Catharines, Ont.; Dr. T. H. Hoskins, Newport, Vt., U.S.; A. Webster, South Northfield, Vt., U.S.; A. G. Tuttle, Baraboo, Wis., U.S.; A. W. Sias, Rochester, Minn., U.S.; Prof. J. L. Budd, Ames, Ia., U.S.; J. M. Underwood, Lake City, Minn., U.S., and C. Perry, Beaver Dam, Wis., U.S.

THE APPLE BLOSSOM.

The apple blossom exhibits the characteristics peculiar to the pomaceous division of the Rose family. On making a vertical section of an apple blossom we find the organs arranged as follows:—Beginning at the outside; 1st. A calyx or enveloping sheath composed of five parts or sepals. 2nd. The delicately coloured corolla, also of five parts, called petals. These two series serve to protect the delicate organs within from heat and cold, and to attract to the blossom insects, which serve an important mission in the distribution of pollen. The stamens or pollen-bearing organs, 15 to 20 in number, are arranged next in order on the top of the closed receptacle. In the centre are found the pistils or carpels, five in number and corresponding to the five divisions in the core of an apple. An elementary knowledge of the parts of the blossom is necessary to the intelligent application of the best practices in orcharding. The results of recent investigations with pears and grapes have been in accordance with the principle enunciated by Darwin, viz.: That cross fertilization among varieties was favourable to the production of vital seed, and therefore strong offsprings. These investigations also brought out the fact that some varieties of grapes, pears and apples are self-sterile.

INTERMINGLING VARIETIES.

The remedy for this is obvious, viz., in planting the orchard, to exercise care in arranging the varieties so that those which bloom at the same period should occupy contiguous positions, and to refrain from planting large blocks of single varieties on account of the possibility of imperfect fertilization, and consequent light crops. It is a safe practice in all large orchards to mingle varieties with a view of securing this end. In small fruits, plums and pears, its advantages have been abundantly manifested. With apples, experience teaches that the orchard with the varieties judiciously mingled usually gives the best returns.

PROPAGATION.

Apples are propagated by grafting or budding up on seedling roots. To do this, apple seed is collected from the pomace at cider mills. It may be stored in damp sand in a cold cellar during winter, or sown in seed beds or in drills in the autumn. In practice nurserymen take the seedlings up at the close of the first growing season and grade them according to size. The largest are usually stored for root grafting during winter, the smaller are packed away with a view of setting them in nursery row with the intention of budding those of suitable size the following August.

ROOT GRAFTING.

The operation of root grafting is a very simple one. Having strong one-year old seedling roots, the next thing is to secure scions. These are cut from well ripened wood of the current season's growth. They are tied in bundles and keep well when packed tightly in boxes with dry forest leaves. There are several methods of joining the root and scion. The principal thing to remember is that the inner bark of scion and of root must be in direct apposition, at least on one side. In order to hold the two pieces together and make a good splice, a tongue is necessary. The operation involved in whip grafting briefly described then consists in cutting both scion and root diagonally and making a cleft in both of them. The two are then joined by forcing the tongue of the scion into the cleft of the sock; a bandage of waxed thread holds the parts together, and the operation is complete. This is an economical method inasmuch as one seedling root always makes two and sometimes three grafts, the practice being to cut it into three or four inch lengths which are joined to the six-inch scions in the manner above indicated.

CROWN GRAFTING.

This method may be practised in the graft house during winter, or upon the stocks in nursery row. It is also a desirable way of top grafting, especially when working upon small trees. With large trees, the old, simple cleft graft method makes a better union. Crown grafting was fully described and figured in Bulletin No. 17 of the Experimental Farm. It may be described briefly as follows:—The scion is inserted in the crown or collar of the stock, at or a little below the surface of the ground. This may also be done in winter, using stocks which have been stored for the purpose; or early in spring upon stocks already established in nursery row by a season's growth. In out-door work a strong growth is obtained the first year. The difference, however, between the crown graft and the ordinary root graft at the end of four or five years is less perceptible. This method presents special advantages to the amateur. In this locality, the best season for crown grafting out of doors is usually during the first half of April.

The scion is cut wedge shape, the stock with a slanting cleft is made in the stock for the reception of the scion, the scion is held in position by being firmly bound with waxed thread, and the joint is completed by a covering of grafting-wax to exclude the air.

In the case of out door work the process is essentially the same, except in the manner of tying. Instead of binding first, and waxing afterwards, a firmer joint is made by applying the wax first, and covering this with a cotton bandage which adheres to the wax, and holds the scion in position. It must be remembered in the case of stocks which are in the ground, that the whole top is cut off as soon as the scion is inserted, after a little practice this is easily removed by an upward cut, which can be made without disturbing the scion.

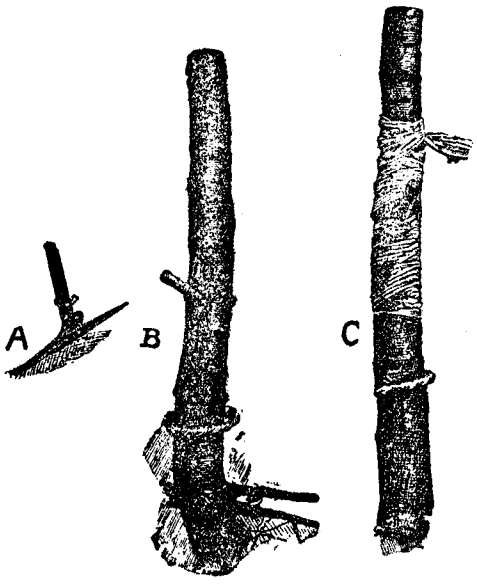
TOP GRAFTING.

This method of changing varieties or of multiplying certain kinds is more frequently adapted to the conditions and needs of the orchardist than the nurseryman. It is a common experience with orchardists to find after their trees come into bearing that it is

desirable to change the varieties. This may be brought about by top grafting. Every man who owns an orchard should be able, when it is necessary, to do this work. Where large trees are to be grafted, care should be taken in placing the scions so that the new top may develop symmetrically; nor should it all be removed the same season. The best plan is to take two or three years in making the change. In this way the injurious results arising from cutting off the whole top in one season is avoided. The best time to perform top grafting is in early spring. The work may be commenced three weeks before the appearance of leaves and carried on till they are full grown, or even later. Late grafting is usually unsatisfactory. The scions should be cut in the autumn and stored as previously described. The branches should be carefully sawed off and the roughened wood surface smoothly pared. The stub is then split by the use of a mallet and a heavy bladed knife. A wedge is used to keep the cleft open till the scions are inserted. These are prepared the same as in crown grafting. Two scions to each stub are used, one being placed at each extremity of the cleft. Care should be taken to place opposite each other in stock and scion, the two lines on the inner bark representing the points of growth. All the cut surface is then covered with grafting wax. Some growers wrap the joints with strips of cotton, which adhere readily to the warm wax. Trees so grafted usually produce specimen apples the third season, and are often very profitable for many years. As a method of introducing a desirable variety of apple into an orchad for the purpose of securing better cross fertilization, top grafting is to be commended. It has also another feature of usefulness; by this means new and unknown varieties may be brought into bearing earlier than if allowed to fruit on their own stocks.

BUDDING.

This operation is performed in August upon stocks which have been set in nursery row the previous spring. The operation may be described as follows:—



With a sharp knife slice the bud smoothly from the adhering wood, by entering about half an inch above the bud, and coming out the same distance below, making the portion which is removed from the bud-stick an inch to an inch and a quarter in length. (See A). The bud is then ready for insertion beneath the bark of the stock. This is accomplished by making a perpendicular slit through the bark of the stock, about an inch in length, with the point of the knife blade and another with the blade of the knife across this cut at the upper end. The whole incision will thus represent the letter T. (See B.)

The bark at the corners of the incision is then raised with the blade of the knife, and the bud taken between the finger and thumb holding it by the leaf stem which serves as a handle, and is inserted into the cleft pressing it down until it is firmly placed beneath the bark. The operation is completed by binding the bud firmly in place by means of woollen or cotton yarn, bass wood bark or raffia—a tying material much used by nurserymen. It is necessary to bind firmly and tightly in order to exclude rain and air as far as possible. (See C.)

In cases where the stocks are growing vigorously, it will be necessary to look them over two or three weeks after budding and loosen the bandages.

To obtain successful results from budding, the bark should be in a condition so that it can be easily raised from the wood; on the other hand, if there is too much sap beneath the bark, union will not take place and the bud as nurserymen say is "drowned out."

Buds set in August unite but remain perfectly dormant till the following spring. The stock is then cut off about half an inch above the bud. The whole strength of the stock thus being directed into this channel, the growth of the bud is very rapid; and in some cases it needs staking to prevent it being broken off, or bent by winds.

Buds are inserted also in the stems or branches of trees at the same time that stock budding is performed. It is often convenient to do this when other stocks are not available.

THE ORCHARD.

The Site.—The particular aspect of an orchard, especially in northern regions, has in recent years assumed a phase of considerable importance. The bark injuries so often noticed on the south and west sides of the trunks and main branches of trees have been pointed out by fruit growers to be most prevalent in orchards having warm southern exposures. As this injury, "Sun-scalding" as it is called, has generally been attributed to the effect of sudden cold in spring following upon the heels of abnormal heat, it is readily seen that the conditions offered by a southern slope are more favourable for injuries of this kind than those prevailing upon a northern incline. It is also true that a variety which is being grown towards the limit of its range northward is more likely to be injured in this way that one which is perfectly adapted to its environments. This leads me to say that as a general rule, other things being equal, a northern slope is preferable to a southern one; at the same time, it must be remembered that planting a tender tree on a northern slope will by no means make it hardy, although it may assist in prolonging life. Another important factor affecting the fruitfulness of apple orchards is what may be termed *air-drainage*. All observant farmers soon learn to look for the first effects of frost on certain portions of their farms. It will be noted that these parts are so situated as to allow the cold air to fall without disturbance. When these currents of moving air prevail, the liability of injury from spring frosts is much lessened. The effect of last spring's frost in many sections of the country was disastrous. Not only were entire crops destroyed, but curious malformations of the fruit which developed were apparent. Bartlett pears were received from half a dozen points in Ontario, exhibiting a heavy coat of russet covering half of the pear, including the calyx end. In other cases, the russetting was confined to a ring encircling the pear at or near its greatest diameter. In the Experimental Farm orchard, Wealthy was affected more than any other variety of apple. About twenty per cent of the apples which developed as a result were either deeply russetted (in some cases cracked) around the calyx, or had developed a growth of corky tissue in the same region. Many of the affected apples did not reach more than half their normal size, which materially added to the quantity of "culls" at harvesting. The russet patches on the pears were at first attributed to the effect of Bordeaux mixture, but as they were found on pears sprayed and unsprayed, but only in frosted sections, there is no doubt as to the real cause.

Preparation of Land.—It is a very bad policy and a very bad practice to plant the orchard first and prepare the land afterwards—as time admits. Time usually does not admit, and the result is that the young trees begin their orchard career badly handicapped.

When a person is seized with the idea of planting fruit trees, they are often so much carried away with it and are in such haste to put it into practice as to forget in this, as in many other instances, that thorough preparation is half the battle.

Such cultivation previous to planting as will bring the soil into a mellow friable condition is extremely desirable. If the surface soil is shallow and the sub-soil stiff and impervious, the use of a sub-soil plough is to be recommended. The idea of sub-soiling is not to turn a furrow of extraordinary depth, but to loosen the lower stratum of soil, by following the furrow of the ordinary plough with the sub-soiler, which stirs it up five or six inches deeper without turning it over. The effect of this aerating process is beneficial to the plant, and assists in securing from the soil the fullest amount of nutrition.

With regard to the kind of soil suitable for an apple orchard, it may be well to state that this fruit will accommodate itself to a great variety of soils, provided that adequate cultivation—meaning thorough drainage and sufficient manuring—be given.

Many orchards succeed in maintaining an unhappy and unprofitable existence on undrained soils, but their stunted and moss grown appearance tells the story of uncongenial surroundings. It will always pay to prepare the orchard area by thorough drainage and by supplying it with an abundance of plant food. A clover sod ploughed under followed by a hoed crop, such as potatoes, roots or corn, will leave the ground in good condition to receive the young trees the following spring. The advice is occasionally given to plant the trees first in order to save time, and bring the land into condition afterwards by good cultivation, but this must be regarded as dangerous counsel in the majority of cases.

TIME OF PLANTING.

Opinions are divided upon this question, some advocate spring, while others are in favour of autumn. My own preference is strongly in favour of spring as the most suitable season. This opinion is also borne out by experience in all the colder sections. In the vicinity of Ottawa fall planting is usually unsuccessful, and nearly always, even with the hardiest varieties, results in winter killing to a considerable extent. It is probable that trees are also injured by the drying out which must of necessity take place during winter when the tops are fully exposed to varying temperatures and the roots are as yet unconnected with the soil. Among the advantages of fall planting which may be noted, are that it is done at a season of greater leisure with the farmer than the spring, the work of planting may, therefore, be accomplished with greater care. It is also a fact that apple and other trees may be planted sufficiently early in the autumn to allow of some root growth taking place, so that the tree may in a measure become established. When this can be done with trees which have thoroughly ripened their wood, fall planting obviously has the advantage, especially in the milder portions of the country. It frequently happens, however, that nurserymen, in order to overtake their work, are obliged to dig their stock while the leaves are yet green, which does not allow of the autumn ripening process to take place as fully as is desirable, and consequently the chances of failure in fall planting with such trees are multiplied. All things considered therefore, the safest plan to follow, is to purchase the stock in the autumn, trim the roots and tops, and "heel in" for spring planting. All bruised root ends should be smoothly cut off with a sharp knife, which is a much better instrument for this purpose than pruning shears. The cut should be made in a slanting direction outwards. To "heel in" means to set the trees in a trench at such an angle that their tops will nearly, if not quite, rest upon the ground. Not only the roots but part of the stems should be covered with soil. A generous amount of protecting material should be laid over them again after frost comes for their better protection. Care should be exercised in selecting a place in which to winter them. The soil should be dry and mellow, and in a location which will not encourage the visits of such destructive rodents as mice or rabbits. I would say, therefore, purchase the trees in the fall, stipulating that the wood shall be well ripened, "heel in" and plant in well prepared ground in spring.

DISTANCE APART AND HOW TO PLANT.

The first consideration which arises is the distance apart at which the trees should be set. It is safe to say that the trees in nine-tenths of the orchards over thirty years of age in the province of Quebec and in Eastern Ontario are found at the present time to be crowding each other, and as a consequence are suffering individual injury. Now that the practice of spraying has come to be recognized as an annual necessity, trees ought, therefore, to be planted sufficiently far apart to allow of the convenient passage of cultivating implements and of spraying outfits. Then again, the distance should in a measure be governed by the locality and by the varieties planted. Thus, in districts where a temperature of 30 degrees below zero Fahr. is expected and where severe cold is continuous throughout winter, only the hardiest varieties are suitable. The hardiest varieties of which Duchess, Tetofsky and Whitney are types, do not attain the size of such kinds as Golden Russet, King, and Spy. While 30 feet apart each way is too close for trees of the latter type it is quite far enough apart for the former, so that the question of distance apart must be a matter for the consideration of the planter, who should be guided, to a certain extent by locality and by variety.

Whether the trees shall be planted in squares, rectangles or triangles is a matter of individual preference. When planted in squares they offer better facilities for complete cultivation, than if either of the other systems is employed. The principal point in favour of the latter two is that more trees can be planted to the acre. Some orchardists, more particularly those in the Western States, are advocating placing the rows twice the distance apart one way that they are the other. For instance, if planted 18 x 36 feet apart :—The trees are planted 18 feet apart in the north and south rows, thus allowing a distance of 36 feet between each tree in the rows running east and west. The disadvantages of this plan are that cultivating and spraying will be in a few years have to be done in the wider openings only. This will naturally militate against the thoroughness of the work. Of course by removing every alternate tree in the 18 feet rows, they can all be brought equal distances apart. The rectangular and quincunx forms allow of one-eighth more trees being set on a given area than if they are simply planted in squares.

Laying out and planting.—Crooked lines of trees in the orchard are very objectionable, and such care should be exercised as will ensure straight lines and right angles. A good way is to measure the opposite boundaries, placing tall stakes at the proper distances of the proposed rows. Several sighting stakes are then set in the lines of the rows between these boundaries. The holes for the trees may then be found by measurement—by using a tape-line or chain; or by marking the correct intervals upon a stout garden-line—one that will not stretch. In lieu of the line, galvanized wire may be used. Sighting posts set in the line of the rows, both ways, are very desirable and convenient while planting the trees. The work of digging the holes may be lightened by opening deep furrows in the lines of the rows; where the ground is in good state of tilth this is hardly necessary. The holes should be dug some inches deeper than it is desired to plant the trees, the subsoil well softened with a spade, and enough surface soil thrown in to leave the tree when planted a couple of inches deeper than it stood in the nursery row. Trees should be planted deeper in light sandy soils than in heavier clay or clay loam. Place the tree in the hole so that its roots will follow their natural bent, and see that it is sufficiently large to admit them without crowding. In filling the hole, fine earth should be carefully sifted and worked in among the roots, with a view of having all the roots in close contact with the soil, thereby obviating the possibility of leaving air spaces beneath the crown. The soil should be well tramped in when the hole has been half-filled, and this firming should be continued till it is level with the surface. It is advisable, especially in clay soils, to leave the last couple of inches unpacked and loosely laid on, as in this condition the evaporation of the soil's moisture is largely prevented. It is a mistake to plant trees in soil which is wet and sticky. It is also a mistake to water the roots when planting in soil of this character, as the tendency is for it to harden and become inhospitable alike to the advance of the growing rootlet, and impervious to the action of rain.

Trimming the Trees.—The advisability of trimming the roots before planting has already been mentioned. It is equally essential to success that the tops should be pruned to balance the amount of root branches removed in the process of digging the trees. In connection with this operation the shaping of the future head should be kept in mind, and only the requisite number of leading branches allowed to remain. The ideal shape, is a central ascending leader with side branches disposed at intervals. This ideal, however, is rarely secured in fruit trees. Each variety has its own habit of growth and the pruning must therefore conform to natural characteristics. It is a safe rule to shorten the length of the last annual growth one-third or one-half, taking care to cut back to a bud which should be on the outside in the case of a pyramidal grower and on the inside when we are dealing with a variety of spreading habit. By pruning the top and by firmly packing the earth about the roots the necessity of staking is usually obviated.

What kind of Trees to Buy.—Much discouragement and many failures result from buying large trees. The belief that large trees can be transplanted as successfully as small ones, and that they will bring forth fruit sooner is a mistaken one frequently resulting in serious loss to the planter. Not only are they more difficult to pack and

ship but also much more difficult to transplant successfully. Strong two-year old trees from the bud or graft are in most instances the best trees to select, but well grown three year olds are equally desirable. In the colder sections moderately low heads are preferable to tall standards. The low headed tree frequently escapes injury from sun-scalding when the tree with 6 or 7 feet of bare stem suffers severely. A good rule in buying trees is to purchase from the nearest reliable nurseryman having soil and climatic conditions similar to those found in the locality in which it is to be planted. The question is often asked are southern grown nursery trees suitable for planting in the north. In answer, it is safe to say the hardiness is not lessened by being propagated in the south, if the wood is well matured before digging; in other words, the constitution or individuality of the tree is more or less fixed and constant, and will not be changed much in the life time of a single individual, therefore very little in the two or three years necessary to produce a suitable nursery tree. Given a thrifty tree of the Duchess variety with its wood well ripened, its hardiness would be little affected by being grown either in the Niagara Peninsula or at Ottawa. When the trees are grown in the south and have been dug before thorough maturation of the wood has taken place, of course the injury following a removal to a colder climate will be intensified. Planters will save money by purchasing *good stock* as near home as possible. A stunted nursery tree cannot be expected to make a strong tree in orchard. Buy "number one" trees; they are the cheapest in the long run.

Mulching may occasionally be practised with advantage, but it is not generally to be commended. As a general rule, the best mulch consists of two or three inches of mellow surface earth, which prevents evaporation quite as effectively as twice the amount of strawy manure, sawdust or other litter. Mulching has also the tendency, if practised year after year, to encourage the growth of surface roots, to the detriment of the lower system of roots. These upper roots are, on account of their position, sometimes injured by severe frosts coming in advance of snow in early winter.

Care of the Orchard.—The orchard should be cultivated continuously at least six or eight years after planting the trees. The practice of sowing grain in the young orchard is an injurious one. All cereals draw heavily upon the moisture of the soil at the same time as the trees are making their annual growth, and consequently act as a serious check upon the latter. When apple trees are planted, they should be regarded as the crop, and they alone ought to have possession of the soil which they occupy. When, owing to pressure of circumstances, it is found necessary to grow grain crops in the orchard—as has been the case at the Central Farm—strips, five or six feet wide, should be left on each side of the tree-rows for the passage of the cultivator. This is a good plan to follow at all times without reference to the crop cultivated, whether it be roots or cereals. The best crop is one which needs cultivation during the early part of the season, and is removed about the middle of July or the first of August. Early potatoes will be found to fill these requirements, but other hoed crops, such as corn, beans or early vegetables, may also be grown satisfactorily. Clean culture is at all times desirable and will always pay. Weeds and rubbish attract and afford shelter for mice and insects. Cultivation should be clean and thorough each year, but should not be continued throughout the summer. In this vicinity, the annual growth takes place previous to July first. After that period, the function of the leaves is to elaborate the nourishment drawn from the soil and the air. This material is stored in the buds and young wood tissue, and the process goes on to, or approaching the period of the fall of the leaves. Everything that the cultivator can do to facilitate this process should be done, Cultivation of the soil tends to render available, for the use of plants, the food stored up in it. This is why stirring the soil frequently, so materially assists the growth of such plants as corn and cabbage. Cultivation, therefore, promotes and encourages growth. In order for trees in cold climates to successfully withstand the frost, the wood must be in a well-ripened condition, that is, the liquids or partial liquids must have changed to solids, such as starch and its allied forms, in order to assist growth the following spring. The best rule, therefore, is to cease cultivating about the middle of July or the first of August. If the orchard is then seeded with Mammoth clover, Lucerne or some other legume, a fair growth will be obtained the same season, which

will act as a cover to the soil in addition to keeping down weeds. This may be ploughed under early the following spring. Buckwheat is occasionally sown, but is rather objectionable on account of the seed resting in the ground. After six or seven years of cultivation it may be found convenient, and it is also a good plan, to seed down to clover. Some pear growers follow the practice of allowing the clover to lie on the ground after cutting it. This acts as a manurial mulch and saves to the soil all the extracted plant food in addition to the nitrogen collected by the clover roots (see chapters on soil in the Chemist's report for 1893-4-5). The practice which many farmers follow of taking a crop of hay from the orchard land each year is not a good one, and should not be encouraged. In every instance, as before stated, it should be remembered that the trees are a sufficient crop and that any other crop that may be grown should be especially provided for by extra manuring. Manuring and cultivation will always pay. Early mistakes in the management of an orchard are not easily remedied.

Pasturing the Orchard.—I have seen orchards situated on side hills or upon rocky ground, such as could not well be cultivated, kept in good condition by pasturing with sheep. If the sheep are supplied with water and allowed a half pound of meal each per day they are not likely to molest the trees. On the contrary if the trees are headed low, the grass scanty and dry, they will certainly browse the lower branches and attack the bark of the younger trees. If the habit is once acquired it does not readily leave them. The advantages of sheep pasturing the orchard over keeping it in meadow are obvious. The fertility of the soil is strengthened rather than depleted, the wormy apples are effectually disposed of; noxious weeds are kept down in addition to the suckers which occasionally rise from the roots of budded trees. Pasturing the orchard with sheep possesses many advantages over keeping it in meadow or allowing it to care for itself in company with a crop of grass and weeds.

Manures.—The reader has already been referred to the report of the Chemist for information on soil, and I would again refer him to the same authority for reliable data regarding the use of manures in the apple orchard (see page 168, report 1894). Mr. Shutt's investigations show that of the principal elements of soil fertility, potash is drawn upon most heavily by the apple tree in the production of foliage and fruit. Among the natural fertilizers furnishing potash in a cheap form wood ashes undoubtedly takes first place. The chief value of these lies in the potash which they contain. The potash being in a readily soluble form and care should be taken to keep the ashes under cover and away from the leaching effect of rain. The soluble character of the most important fertilizing constituent in wood ashes gives a hint as to the best time and way to apply them, as well as other fertilizers equally soluble, viz., at that period when the plant is in a growing condition, therefore prepared to take up plant food. Bone meal is one of the commonest and easiest procured forms in which phosphoric acid may be secured. In barn-yard manure the third important fertilizing constituent, nitrogen, is to be found in excess of the two already mentioned. In soils which contain naturally a large amount of vegetable matter there is danger of applying barn-yard manure freely. On such soils better results may be looked for if wood ashes and lime are applied alternately. Thirty or forty loads of barn-yard manure every third year would likely give a sufficient quantity of nitrogen. Wood ashes can be advantageously applied at the rate of 50 to 75 bushels per acre. Bone meal may be used at the rate of 150 to 200 lbs. with good results. No general rule can be safely laid down in the matter of manuring owing to the varying character of soils. What might be good treatment to one might be wasteful expenditure in another. Each grower should study his trees. If they are making plenty of growth each year the nitrogenous element is probably present in sufficient quantity. If they are bearing well or if it is the desire to encourage the production of fruit, the phosphates and potash should be applied with the exercise of care and judgment.

Pruning—The primary objects of pruning a tree are to so shape the heads as to bring it to maturity, strong, symmetrical and well balanced—to prevent the formation of matted and bushy tops made up of interlacing branches—to encourage the production of fruit of good quality. Fruit borne on the inner branches of a bushy topped tree is neither as handsome in appearance nor as good in quality as that grown on better developed branches supplied with plenty of sunlight.

When to Prune—One of the greatest mistakes made by a fruit grower is to allow orchard trees to follow the bent of their own inclination for some years and then suddenly to arrive at the conclusion that he must make a "job" of pruning them. This sometimes means that the trees are attacked with a saw, or still worse, an axe. The mutilation that usually follows is almost certain to act injuriously on the health of the tree. A certain amount of pruning should be done each year after the tree is set in the orchard. The wounds made by cutting away the small branches soon heal over and the tree does not receive the shock consequent upon removing a large portion of the top at one time.

The time to prune seems to me to be at that period when the wound made will be repaired by nature with least delay. This is at the beginning of the growing season, in this vicinity from May 15th to June 15th. As this is usually a busy season the work may be done before sap starts in the spring. Heavy pruning can usually be most advantageously done at this time.

How to Prune.—Use a sharp knife and a fine toothed saw. Pruners nearly always leave bruised twig ends. They are convenient in pruning tall trees, for shortening lateral branches, cutting scions, or work of this kind, but are not equal to the knife for convenience or effectiveness. Always cut close up to the base in removing a branch. Long stubs die back gradually and carry decay to the body of the tree. All wounds over an inch in diameter made by the removal of branches should immediately be covered with mineral paint or grafting wax. When heavy pruning has taken place during winter a considerable amount of summer pruning the same year will as a natural consequence follow, owing to the number of shoots thrown out near the base of each branch removed. These, if taken in time early in June, may be removed without the use of a knife by merely running the hand quickly over the branches. Sometimes the fruitfulness of trees may be increased by summer pruning. This consists in shortening by pinching in, the growing twigs during the month of June. The theory is that in thus checking wood formation, the production of fruit buds is encouraged.

CARE OF THE FRUIT.

Thinning.—There production of its kind in the case of the apple, as in other plants is the primary object of its existence. This is accomplished in nature by means of the seeds. Man has largely increased the relative amount of pulp which surrounds these to serve his own ends. It is the production of seeds which makes the heaviest drain upon the vitality and vigour of the tree. Some varieties, if allowed to follow their natural bent, will produce more apples year after year than the health of the tree can withstand. This, if allowed to go on, will result in a weak growth and the production of undersized fruit. It is therefore incumbent upon the owner of such trees to reduce the amount of apples early in the season to such a quantity as may in his judgment be perfectly developed without weakening the tree. This may mean removing as much as one-third or even one-half of the crop which has set. The work of thinning is often overlooked, but its importance should not be forgotten. The best time to do it is soon after the fruit has set, and the prospective crop seems fairly well assured. It is work that must of necessity be done by hand, but it may be carried on in conjunction with light pruning at that season of the year. If thinning is perseveringly practised each year, it will have a tendency to bring about annual crops instead of heavy crops on alternate years.

Picking.—The keeping qualities of many varieties are seriously impaired by allowing them to hang on the trees too long. Especially is this true of the summer and autumn varieties. As a general rule, all varieties should be gathered when the apple readily separates on turning it upwards from the spur to which it is attached. Picking as soon as the seeds have coloured, is also a more or less correct rule generally considered. Early maturing varieties like Tetofsky, Yellow Transparent and Red Astrachan, need particularly careful and expeditious handling, as their period of edible maturity is of short duration. These white skinned varieties readily show bruises, and in picking them the greatest care should be exercised. Pickers frequently show but slight discrimination in the methods of handling apples and potatoes, much to the detriment of

the former. Shaking apples from the tree, carrying them away from the orchard to the market in bags, are customs that belong to the old days of cider making, and applied to products whose quality was not affected appreciably by bruises or codling worm. The fruit-grower of to-day must exercise every possible precaution and devices in order to place his products upon the market in the best condition, as well as the most attractive form. It is a good plan in marketing apples like Duchess and Yellow Transparent, not to remove all the fruit at one picking, but to go over the trees two or three times, each time taking the largest and best coloured specimens. This method is one to be commended, inasmuch as it allows of a greater proportion of the fruit reaching perfect maturity than would be otherwise obtained. In the case of winter apples the methods are inapplicable and unnecessary, the whole crop being allowed to hang on the tree and harvested at the same time. The keeping season of Wealthy apples may be considerably extended by picking rather early in the season.

Picking Receptacles.—For ordinary use a strong splint basket with swinging handle is most satisfactory and serviceable. It allows of the apples being deposited upon the grading table or into barrels without injury. It also lends itself to a variety of circumstances with advantage. Among other devices for picking which I have found of great service is a modification of a strong grain sack. This is prepared by sewing in the mouth of the sack a strong barrel hoop; then attach a strap, provided with a snap at the free end, to one of the lower corners of the bag. A ring is fixed to the hoop to which the snap is attached, when the bag is ready for use. When used it is suspended by means of the strap from the picker's shoulder after the manner of sowing grain by hand. This allows of the use of both hands and also permits of the bag being emptied with ease into a barrel when conveniently filled, by merely detaching the snap. In picking the early apples, on account of their tenderness, it is occasionally possible and desirable to pick directly into the barrel in which they are marketed. This is usually impracticable, however, as the grading cannot be done satisfactorily when the fruit is being picked.

Packing and Packages.—A prime requisite towards attaining ultimate success in marketing orchard products is that the layer of fruit shown on the top layer or upper specimens should be thoroughly and exactly representative of the quality of each package, whether this be basket, box or barrel. This *is honest packing*, and when carried into practice, having with it the packer's brand and name, with the name of the variety, will soon win for itself a favourable reputation in the market, to which it is consigned. The question of honest packing receives every year at the meetings of the different fruit growers' organizations of the Dominion, a good deal of consideration, but owing to the system in vogue, of selling to the dealer, and the difficulty of inspecting the stock when packed, the whole matter is yet in an undesirable and unsatisfactory condition. It is hoped that such a system of inspection will be devised and carried into operation as will result in guaranteeing that the quality of each barrel of apples shall be exactly represented by the brand and grade, which appears upon the end of the barrel—with regard to the kind of package. Soft and early apples should be put up in small packages. I would recommend the use of 10 and 20 lb. baskets as well as bushel boxes for marketing the finer grades of summer and autumn apples.

Grading.—In packing apples it is always desirable to make at least three grades. The first should consist of sound well-coloured specimens without blemish, uniformly of good size; the second grade should consist of sound specimens, smaller in size, less handsomely coloured, and possibly with slight blemishes. The third grade should consist of the small wormy, spotted or ill-formed specimens which could not properly be included in either of the preceding grades. This work is done more advantageously in the packing house than in the orchard. These houses are provided with sorting tables covered with carpeting or matting to prevent injury to the apples. The sorting tables, being provided with shallow sides and being inclined towards the sorter, who, stands at one end, offer a convenient method of rapidly separating the fruit into the three grades as above outlined. The first and second grades should be carefully placed by hand into separate baskets, while the third and remaining grade may be swept into a receptacle at the end of

the table. In packing or filling barrels, the end which is to be opened is placed downwards It should be lined with a sheet of paper. On this a row of apples is placed with stems turned down. If another layer is ranged over this, so much the better. This is called "facing" the barrel and is an important part of the packing of a barrel of apples, inasmuch as the layer exposed to view after the head is removed should fairly represent the contents of the barrel throughout. The remainder of the barrel is filled by gently emptying into it the baskets as filled on the grading table. During this process the apples should be settled down firmly by cautiously shaking the barrel once or twice. The last layer of apples should come slightly above the heading groove, so that when pressed down every apple is held firmly in place, but without being crushed. There is a move being made towards the introduction of a smaller package for winter apples than the barrel. This is a wooden box holding about a bushel of apples, neatly made of light and strong wood. These boxes are more easily handled than barrels, take up less space on board ship and may be "headed" without bruising the fruit. They also admit of the grower's name, with grade and name of fruit being neatly printed upon the end. While to the writer this box appears to be a most desirable kind of package for the English and other foreign markets, yet the reports of commission merchants received this autumn discourage their use. These reports may be coloured by the lack of desire on the part of the Liverpool commission houses to introduce innovations which call for changes in their present methods of doing business. It is my opinion that there is a future for this kind of package.

For marketing early varieties of apples, strong, leno covered baskets holding about 20 pounds of fruit, are undoubtedly the most suitable and profitable packages. This class of apples is bought in small quantities from the retailer and also requires quick handling. There is each year much loss resulting from the use of barrels in transporting early apples which might be greatly reduced by the use of smaller packages.

Storing.—Apples will keep best in a moderately damp atmosphere with the temperature slightly above the freezing point. It should always be remembered, more particularly in connection with winter apples, which are frequently barrelled in the orchard and then hauled to the storing room in large quantities, that a sudden change of temperature will cause a condensation of moisture upon the surface of the apple. This nearly always follows the deposition of the apples in the cool storing cellar. Wet surfaces present favourable conditions for the development of fungi causing decay. These extremes of temperature may be avoided by allowing the apples to remain in unheaded barrels in the orchard packing shed over night and hauling them to the cool cellar—which has also been open to the cooling influence of night air—in the morning, when the doors and windows should be closed. In this way, aided by early harvesting, the season of autumn apples like Wealthy and Longfield may be much extended.

VARIETIES TO PLANT.

Upon this question it is impossible to give definite lists. One of the first things to do is to study the conditions surrounding the proposed orchard site; then find out what varieties have succeeded best in the immediate neighbourhood. If there is no data available on the latter question, it is advisable to plant a limited number of the most generally approved sorts and watch their behaviour before extending the plantation. It may be also pointed out here that this division of the Experimental Farm is always pleased to aid the farmer with such information as may have been acquired with regard to the most suitable varieties for planting in whatever locality the applicant may reside. The grower living in Quebec is also recommended to consult the Experimental Farms Report for 1893, in which lists are given of varieties of fruits adapted to the various fruit districts of this province. If residing in Ontario, he cannot do better than consult the Report of the Provincial Fruit Growers' Association, in which information similar in character is found.

ENEMIES.

These have been fully treated in special bulletins issued from time to time by the Entomological and Horticultural Divisions, which are available to all who may apply for them. Special reference may be drawn to Bulletin No. 23, which contains in concise form instructions for the treatment of injurious diseases as well as insect pests.

To sum up this matter briefly, the principal fungous diseases and insect foes attacking the apple may be kept in check by the timely application of Bordeaux mixture and Paris green. These are diluted with water and applied to the trees in the form of a spray. A good formula to use is 4 pounds each of copper sulphate and lime, 4 ounces of Paris green diluted with 40 to 50 gallons of water. The mixture should at least be applied three times each season ; once before the flower buds open, again after blossoms fall, and a third time two or three weeks later. Special cases may call for additional treatment ; it will at any rate fully repay every grower of apples to set down this much at least on his yearly programme of cultural operations. The main features governing successful apple growing may be summarized as follows :—

1. Select a favourable soil, drain and prepare it thoroughly.

2. Buy good trees, plant with care, prune and cultivate adequately and with judgment.

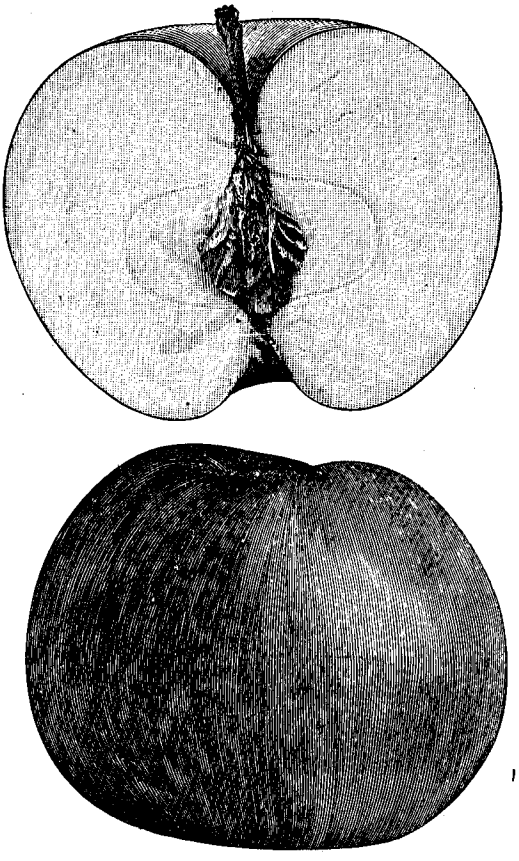
3. Pick the fruit carefully in season, pack it honestly, using suitable packages, market it judiciously.

4. Protect the tree from enemies by spraying, and keep it in health by manuring.

5. Always remember that the land occupied by the trees is for them alone, and should not with impunity and without compensation be robbed of its fertility by growing upon it other crops.

HARDY APPLES OF MERIT.

Scott's Winter.—Introduced by Dr. T. H. Hoskins, of Newport, Vermont. It has already been widely planted and the object of mentioning it here, is not so much to recommend it unqualifiedly, as to draw attention to some points to be borne in mind in connection with its cultivation.

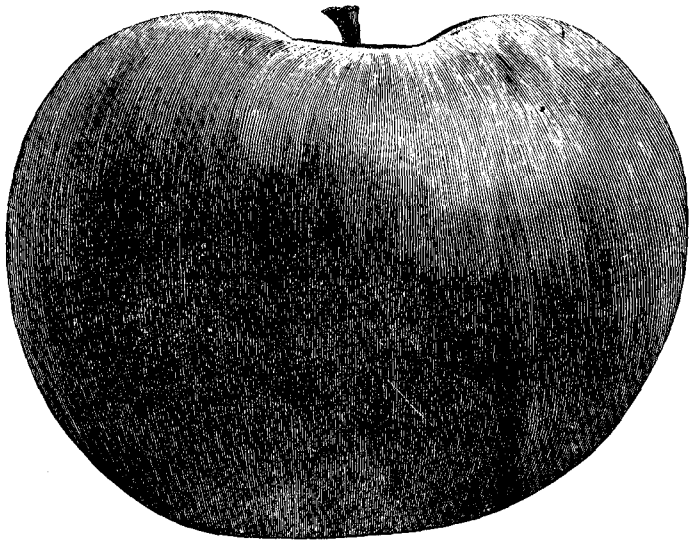


SCOTT'S WINTER.

In the first place this is an apple belonging essentially to the same class as Gideon and McMahan, in regard to the locality in which it should be cultivated. Secondly, it should not be grown in sod or without high manuring and clean cultivation, on account of the size of fruit, which is naturally small, and without good treatment becomes unprofitably so. At Grenville, P.Q., Mr. Robert Hamilton reports it "not quite hardy." At other points in Quebec, as well as Ottawa, there has been no complaint along this line. The fruit when well grown is of medium size and handsomely striped and splashed with dark red. It does not reach good eating condition until after mid-winter when its sharp acidity becomes less pronounced. As a keeping apple it certainly excels, being in its best condition from February till May. Its principal value is for culinary purposes.

McMahan White.—Introduced by A. L. Hatch, Ithaca, Wis., U.S. This variety has already been noted in the report of this division of the Central Experimental Farm, but attention is again drawn to some of its merits as an apple of value for regions where Northern Spy, Ribston Pippin and Rhode Island Greening cannot be grown profitably on account of their inability to withstand the severity of the climate. It has proved so

far a remarkably vigorous and healthy grower, making probably more well matured wood growth than any other variety in the orchard, and is free from many of the defects characteristic to varieties unadapted to this climate. It has borne moderately heavy crops for the past two years. The fruit is of the largest size, smooth and handsome, though lacking in colour as grown in this vicinity and somewhat soft in texture.



McMAHAN WHITE.

Description.—Fruit, large to very large, round, regular. Skin, green or waxy yellow with a delicate pink blush. Cavity, deep, narrow and lined with dark russetting. Stem, short, swollen at base. Basin of medium depth, slightly wrinkled. Flesh, white, rather coarse, crisp, juicy. Quality, fair. Season, November to January.

FRUIT GROWING ON THE LOWER ST. LAWRENCE.

The Island of Orleans, the counties of L'Islet and Kamouraska in Quebec, have long been noted for their production of fine plums and cherries. These and other fruits were brought out by the early colonists from France, and have up to the present time been mainly reproduced from seed. In this way and by the workings of the law of *natural selection*, a race of plums and cherries, is now growing in that rigorous climate, which annually yield heavy crops of good fruit, when kept free from black knot. It is interesting to note the dwarfing effect the climate has undoubtedly exercised upon the form and habit of these trees. In old orchards, trees of blue and yellow Orleans plums, may be seen, with the lower branches resting upon the ground, the diameter of the tree being 15 to 20 feet, while its height would not exceed 10 feet. The heavy snow fall and equable temperature furnish conditions favourable to the longevity of these trees. The following interesting report presented by Mr. J. C. Chapais, Assistant Dairy Commissioner, gives valuable information to intending planters in lower Quebec.

A NORTHERN ORCHARD.

Owner—J. C. Chapais.

Locality—St. Denis, county of Kamouraska, province of Quebec, Canada.

Lowest temperature—30° below zero Fahrenheit, experienced only twice in thirty-two years.

Highest temperature—94° Fahrenheit.

Rainfall—Average for 17 years, 29 inches per year

Snow—Average, three feet deep in open country.

Exposure—Ground gently sloping to the north.

Predominant wind—North-eastern damp wind, with salt emanations coming from the Gulf of St. Lawrence.

Soil—Sandy clay, well drained.

Trees planted.	When planted.	Growth and condition.	Season.	Giving fruit.	Number for reference.
Apples.					
Alexander	1891	Very good	Late fall	Yes	1
Antonovka	1889	do	do	do	2
Arabka (Ell B.)	1889	do	Late winter	do	3
do (summer)	1889	do	Early fall	do	4
Astrachan Red	1889	do	Late summer	do	5
Bubushkino (grandmother)	1889	do	Late winter	do	6
Blushed Calville	1892	do	Early winter	No.	7
Bode	1892	Good		do	8
Charlottenthaler	1889	do	Early summer	Yes	9
Duchess	1889	Very good	Early fall	do	10
Fameuse	1889	do	Early winter	do	11
General Grant	1884	do	Summer crab	No.	12
Gipsy Girl	1892	Good	Fall	do	13
Golden Russet (English)	1891	Very good	Late winter	Yes	14
Golden White	1891	Good	Fall	No.	15
Grand Duke Constantine	1889	do	do	do	16
Hare Pipka	1892	do	Early winter	do	17
Hyslop	1889	Very good	Early fall crab	Yes	18
Longfield	1889	do	Late winter	do	19
Louis Favourite	1891	do	Early winter crab	do	20
McIntosh Red	1891	do	Early winter	do	21
Orel, No. 1	1894	do		No.	22
Peach	1891	do	Late summer	Yes	23
Princess Louise	1891	Good	Early winter	No.	24
Red Beitigheimer	1894	Very good	Early fall	do	25
Red Queen	1893	do	Winter	do	26
St. Lawrence	1889	Good	Late fall	Yes	27
Titovka	1889	do	do	do	28
Transcendant	1889	Very good	Early fall crab	do	29
Wealthy	1889	do	Early winter	do	30
Whitney	1891	do	Late summer crab	do	31
Winter St. Lawrence	1891	do	Early winter	No.	32
Pears.					
Baba	1892	Very good		No.	33
Bessemianka	1892	do		do	34
Flemish Beauty	1895	Good		do	35
Apricot.					
Alexander	1895	Good		No.	36
Plums.					
Bradshaw	1889	Very good	Middle of Sept'r	Yes	37
Coe's Golden Drop	1889	do	End of October	do	38
Damson	1889	do	Beginning of Sept'r	do	39
Damson Yellow	1889	do	do	do	40
Early Yellow	1889	do	End of August	do	41

NORTHERN ORCHARD—*Concluded.*

Trees planted.	When planted.	Growth and condition.	Season.	Giving fruit.	Number for reference.
Plums—Con.					
Imperial Gage	1889	Very good	Beginning of Sept'r	Yes	42
John Trotter	1892	Good		No.	43
Lombard	1889	Very good	End of September.	Yes	44
Moore's Arctic	1891	Good		No.	45
Orleans Blue and Yellow	1889	Very good	Beginning of Sept'r	Yes	46
Reine Claude	1889	do	Middle of Sept'r	do	47
Shropshire Damson	1889	do	End of October	do	48
Smith's Orleans	1889	do	Middle of Sept'r	do	49
Trabische	1891	do	do	do	50
Cherries.					
Bessarabian	1892	Very good	August	Yes	51
Early Richmond	1889	do	July	do	52
Lutovka	1892	do	August	do	53
Montmorency	1889	do	July	do	54
Vladimir	1891	do	August	do	55
Gooseberries.					
Chatauqua	1895	Good		No.	56
Downing	1889	Very good		Yes	57
Houghton	1889	do		do	58
Industry	1895	Good		No.	59
Pearl	1891	Very good		Yes	60
Red Jacket	1895	Good		No.	61
Smith's Improved	1889	Very good		Yes	62
Whitesmith	1895	Good		No.	63
Currants.					
Black Naples	1889	Very good		Yes	64
Fay's Prolific	1889	do		do	65
Versaillaise	1889	do		do	66
White Grape	1891	do		do	67
Raspberries.					
Antwerp	1889	Very good		Yes	68
Marlboro	1891	do		do	69
Stone's Hardy (blackberry)	1891	Weak		do	70
White Framboise Blanc	1889	Very good		do	71
Japanese Wineberry	1895	Good		do	72
Lucretia Dewberry	1894	Weak		No.	73
Strawberries.					
Sharpless	1887	Very good		Yes	74
White Alpine	1889	do		do	75

REMARKS.

Among apples, Nos. 1, 2, 3, 4, 5, 6, 9, 10, 11, 14, 18, 19, 20, 21, 23, 27, 28, 29, 30, 31 have fruited. The season is indicated for these after they have fruited, and shows a tendency for all fruits to be a little later in ripening in this latitude than in western Quebec and Ontario, Grand Duke Constantine and an unknown tree, though planted since 1889 and being thrifty have not yet fruited. Duchess, Fameuse and Wealthy, give as nice and large fruit as trees of these varieties grown at Montreal. Most of the other varieties give fruit a little smaller in size, with less colour than western fruits.

I planted an Alexander Russian apricot in 1891 and it has passed two winters very well, but in the spring after the second year it was killed by an application of a strong Bordeaux mixture. It was very healthy when thus killed.

Amongst plums, Damson, Early Yellow, Reine Claude de Montmorency, Shropshire Damson, Orleans blue and yellow, are plums grown here from very early times. We have in our locality trees of these varieties over fifty years old.

The Early Richmond Cherry is the same as the variety called French Cherry (cerise de France) and is the best and hardiest cherry known here. I doubt that the Russian cherries, newly imported, will do better or even as well. So is the White or Orange Raspberry (framboise blanche) which was imported with the Early Richmond from France, by the first settlers who brought them here with the White Alpine Strawberry. Our cerise de France is called Early Richmond and sometimes Kentish, because the authorities in fruit growing cannot discover much, if any, difference between them.

There is no doubt that the deep layer of snow which covers the ground during winter, in our section of the province affords much protection to our fruit trees. We never bend down our raspberries for protection in autumn.

Up to date we have no blight on our apple trees, nor mildew on our gooseberries. But black knot and apple scab are very common. We have had very good results with spraying with Bordeaux mixture and Paris green (except on apricots.)

I append here a few notes on another orchard situated in a still more northern and eastern position than ours, of which I have seen the fruits:—

LOCALITY,—Rimouski, county of Rimouski, province of Quebec.

LATITUDE,—47° 45'.

TEMPERATURE.—Same as St. Denis, but a little more damp.

SOIL.—Rich sandy loam, ground sheltered around the orchard by a wind break of poplars and spruces.

OWNER OF THE ORCHARD.—Mr. D. Bégin.

VARIETIES OF FRUIT GROWN.—Apples:—Duchess, Yellow Transparent and four varieties of Crabs. Fine plum trees of the Damsen, Early Yellow, Orleans and Reine Claude type are also grown in the same orchard, with success. Fruit is of first class quality.

J. C. CHAPAIS.

SEEDLING APPLES.

During the past season a large number of seedling apples and other fruits of greater or less merit have been received at this office. It is always gratifying to know that growers take sufficient interest in this work and realize the interest which this department takes in the introduction of new fruits to such an extent as to forward those new and unknown varieties for examination. Many of them, however, have not been of sufficient value to warrant a detailed description. They have in each case been acknowledged, and a brief record entered upon the books of this division. Among the most prominent apples received the following varieties are noted:—

From A. McD. Allen, Goderich, Ont.—

Breckenridge.—Description: In a general way this resembles Northern Spy; size medium to large; form, approaching oblong, ribbing very obscure, sometimes wanting; skin, yellowish green, thick and tough, partly covered with stripes and splashes of red. Stem slender. Cavity deep and broad. Calyx open; basin shallow, almost wanting. Flesh white, flaky, juicy, sub-acid with a distinct Northern Spy flavour; promising and worthy further trial. Mr. Allen says: "Grown by John Breckenridge here (Goderich) it is a great bearer, long keeper and towards spring is of excellent quality."

Jordan.—Russet type; medium size, by measurement eight and three-quarter inches in circumference, by two and a half in length; form regular, roundish oval. Skin, greenish yellow, thinly covered with light russet, which is laid on in patches varying in density and sparsely sprinkled with gray dots. Stem three-quarters of an inch long, moderately stout. Cavity varies from broad and shallow to deep narrow and lipped. Calyx prominent and closed, occasionally open however, with broad segments. Basin shallow, smooth. Flesh a greenish yellow, fine grained, breaking, moderately juicy, mild sub-acid, rich, pleasant and of good quality. Season, late winter. This variety is also worthy of attention. Mr. Allen says that this is grown by F. Jordan, of Goderich, that it is a long keeper and of fine quality when ripe. Further, that it will easily keep till June.

From Franklin Crandell, Lindsay, Ont.

Empress—Seedling Apple.—Mr. Crandell says that the tree appeared on the spot where a Baldwin was once growing. "It is now fifteen years old, has been in bearing 10 years, bears every year. In 1894 the crop was 3 barrels; in 1895 it was 7 barrels. It is a free grower and extremely hardy. Description:—Fruit above medium size, varying from ten to eleven inches in circumference. Form oblate, flattened at both ends. Skin greenish yellow, with a solid carmine blush where exposed, splashed with deeper shade and thickly sprinkled with minute, dark brown specks margined with green. Stalk very short and stout. Cavity broad of moderate depth, slightly russetted around the base of the stalk, outline irregular with a slight lip. Calyx open, segments broad and short. Basin broad and deep, not wrinkled but somewhat irregular and precipitate. Flesh nearly white, almost fine in grain, mild sub-acid, juicy, pleasant flavour, quality very good. Core small.

From John Miller, Markham, Ont.

Seedling Apple—Mr. Miller says the tree is 40 years old and was growing on the farm when he came in possession of it 28 years ago. It is healthy, and a regular bearer. Description:—Medium size; form roundish oblate. Skin smooth, yellowish, red on one side, and splashed all over with bright red. Stem very short, moderately thick. Cavity deep, narrow, smooth, lightly russetted. Calyx closed, segments broad and short. Basin shallow and uneven. Flesh, greenish white, fine grain, juicy, mild sub-acid, in flavour and good in quality. Core of medium size, seed very plump. Season, December to January. An attractive apple, no better in quality perhaps than others of the season now in cultivation, but yet one which may prove valuable in some sections on account of the hardiness and productiveness of the tree.

From Harold Jones, Maitland, Ont.

Crimson Beauty.—This apple was exhibited by Mr. Jones at the meeting of the Ontario Fruit Growers Association, at Woodstock, last December, who reported it as having been cultivated in the vicinity of Brockville for a number of years past. Description:—Medium size, oblate, regular. Skin smooth, shiny, covered with bright red to dark crimson, interspersed with large dots. Cavity, broad, open, slightly russetted. Stem, three-quarters of an inch long, moderately stout; basin slightly irregular. Eye open. Flesh, white, firm, juicy, mildly sub-acid. Fameuse-like flavour, with a suggestion of astringency. Season, December to January. A handsome apple of good quality.

Herewith is appended a list of the most important samples of fruit received during the year. In addition to the list, a much larger number have been sent in for identification, all of which were examined with interest and pleasure and reported upon to the sender.

Sender.	Remarks.
F. L. Dery, Sault au Récollet, Que	Large, handsome, fall apple.
J. C. Bull, Weston, Ont	Six apples distinct from seed of Rambo.
W. H. Leef, Orillia, Ont	Fall apple ; worthy of trial.
A. W. Forfar, Ellesmere, Ont	Fall apple ; good quality, small.
Watson Griffin, Montreal, Que	Four varieties of apples ; fall.
C. H. Roberts, Paris, Ont	Apples, six seedlings ; too small.
A. McD. Allan, Goderich, Ont	Apples, two seedlings, winter . promising.
M. G. Bruner, Olinda, Ont	Apple seedling, early winter ; fair quality.
Thomas Connolly, Lindsay, Ont	Two seedling apples ; autumn ; fair quality.
J. Cuppage, Orillia, Ont	Four seedling apples ; early winter ; not promising.
G. H. Hale, Orillia, Ont	Seedling apple ; winter ; fair quality.
F. Crandall, Lindsay, Ont	Two promising seedling apples ; winter.
John Miller, Markham, Ont	Apple for name ; probably seedling.
S. C. Wilson, Whitby, Ont	Summer apple, of fair quality.
H. A. Bailey, Amherstburg, Ont	Peaches, two seedlings ; promising.
Allan Bros., Winona, Ont	Plum seedling, hardly promising.

NOTES ON THE BLOSSOMING OF FRUIT TREES IN CANADA.

The cause of the unfruitfulness of orchards has always, at horticultural conventions and elsewhere, been prolific of much surmise, conjecture, and, I may say, variation of opinion. The possibility of the trouble existing, at least in part, in the blossom has been mooted only in recent years. As a rule, I think we are prone to lay too much stress upon a single feature in the management of an orchard, and too little upon the collateral practices which make a harmonious and well-balanced programme in the life of the average apple orchard. Some orchardists pin their faith to varieties, others to location and cultivation, others again to manuring or pruning, and perhaps still others —though I have not yet heard of them—to spraying. Undoubtedly, we cannot expect orchards in which trees are so closely planted as to be fighting for nourishment and for living room at twenty years of age to continue long and of healthy and fruitful condition. In passing, I may say that in certain localities, with certain varieties, close planting is desirable, and may be practised with profit, but this is the exception. Nor is it reasonable to expect trees to continue to yield profitable crops of apples year after year, when year after year we are taking away from the soil and putting nothing back. But granted that the trees are planted at the proper distance apart, that they are cultivated, pruned and manured reasonably and rationally, we do not, in most cases, reap entire success, unless the good treatment has been followed up by judicious and well-directed efforts having in view the destruction of injurious and noxious insects. There are instances on record where, even after all this labour and all these various precautions have been taken, the orchard still remains obdurate, and refuses to bear, defying all attempts to coax it into fruitfulness. One says, root prune to stop superabundant growth ; another says, top prone to let in the light ; another says, give manure to stimulate ; another, seed down to check growth ; and still another, spray to induce fruitfulness. All these counsellors have been listened to, their advice acted upon, but still without success. We then begin to observe the conditions which surround orchards of a similar character. As a rule, these observations lead to the conclusion that varieties intermingled are more fruitful than those in which the varieties are

separated and planted in large blocks. Prof. Beach, in his admirable address on this subject, before the association at Orillia last year, cited a remarkable instance of this kind. The orchard was made up in part of Baldwins and of Greenings planted in blocks, and in part of Baldwins and Greenings mingled with other varieties. Where the two varieties mentioned were planted in blocks unmixed with other kinds they were unfruitful, but when mingled with other varieties the converse was true. This points at least to partial infertility of the blossom with its own pollen and points to the desirability of intermingling varieties in the orchard. In the case of certain varieties of American plums, this belief has prevailed for some time, and is no doubt well founded. The valuable investigations of Professors Beach and Waite upon grapes and pears clearly set forth a similar condition of affairs in the case of these fruits. Similar experiments with apples have been commenced at Ottawa, but need further confirmation before they can be announced with authority.

BLOSSOMING RECORDS.

An effort has been made, with the kind assistance and co-operation of a large number of the leading fruit growers of the Dominion, to secure a record giving the blossoming period of our leading large and small fruits. To those who so kindly assisted in this work the writer is deeply indebted. Small pass books, ruled and headed, were sent out, accompanied by a request as follows:—

"DEAR SIR,—The cause of the unfruitfulness of some varieties of large and small fruits when planted in large blocks by themselves is now understood to be due to self sterility, complete or partial, causing imperfect pollination and fertilization. The remedy is the intermingling of varieties in the orchard for the purpose of securing cross-fertilization. To obtain the best results the varieties adjacent to each other should blossom at, or about the same time.

"Accurate information with regard to time of the blossoming of the different varieties of fruit is much needed. Will you assist in securing data on this important subject?

"Please observe and record dates as follows:—The time of the opening of the first blossoms; when the tree is in full bloom; also the date of the fall of the blossoms; and forward your records to me at the close of the season."

It is a matter of regret that the extreme and unusual heat of early spring, followed in Ontario by late May frosts, so disturbed the normal period of blossoming of fruit trees in most parts of the Dominion as to seriously impair the value of the records when their accuracy is considered from the standpoint of averages. The result of the abnormal heat was marked by a much shorter blossoming period than usual, with a hastening of all the later varieties. The records may be accepted as relatively indicative of the blossoming period of different varieties in the same locality, but more accurately correct of the same variety in different localities.

The records for British Columbia were kindly taken by Mr. Thos. A. Sharpe, Superintendent of the Agassiz Experimental Farm.

A TABLE OF AVERAGES, 1895.

SHOWING the Blossoming Period of some Leading Fruits throughout the Dominion.

Class.	Variety.	British Columbia.	Ontario.	Quebec.	Nova Scotia.	P. E. Island.
Apples	Alexander	May 7	May 19	May 16	June 5	
	Baldwin	do 5	do 15			June 5
	Ben Davis	do 1	do 12	May 15		do 9
	Duchess	Apl. 28	do 11	do 13	June 1	May 30
	Fameuse	May 4	do 11	do 14	do 2	do 31
	Golden Russet		do 16	do 12	May 30	June 6
	Maiden's Blush	May 8	do 18		June 3	do 5
	McIntosh Red	do 3	do 12	May 14	do 4	do 3
	Northern Spy	do 8	do 22		do 8	
	Pewaukee	Apl. 30	do 17		do 3	
	Ribston Pippin	do 30	do 23			
	Rox. Russet		do 21			
	Talman Sweet	May 10	do 21		June 7	June 10
	Wealthy		do 16	May 12	do 5	do 3
	Wagener		do 15		do 4	do 6
	Yellow Transparent	May 3	do 15	May 13	do 2	do 2
Pears	Anjou		May 10			May 30
	Bartlett		do 14	May 13	May 28	
	Clapp		do 12		do 25	June 3
	Duchess		do 13		do 30	
	Flemish Beauty		do 12	May 20	do 29	May 22
	Howell		do 8			June 1
	Keiffer		do 9		May 25	do 1
	Seckel		do 10			do 4
	Sheldon		do 10		May 30	do 3
Plums	Burbank		May 8	May 10		
	Bradshaw	Apl. 22	do 9	do 8	May 22	May 30
	Duane's Purple	do 18	do 8			
	German Prune	do 22	do 11			June 3
	Imperial Gage		do 12		May 23	do 3
	Lombard		do 7	May 13	do 22	
	Moore's Arctic	Apl. 21	do 11		do 20	June 3
	Pond's Seedling	do 23			June 3	
	Reine Claude	do 17	May 13		May 28	
Cherries	Early Richmond	Apl. 28	May 10	May 9	May 22	
	Governor Wood	do 21	do 9		do 29	
	Montmorency	do 28	do 10		June 1	
	Windsor	do 17	do 8		May 29	
	Yellow Spanish	do 18	do 8			

SHOWING the Blossoming Period of some leading apples in Ontario, in 1895.

Variety.	Windsor.	Burlington.	Grimsby.	Winona.	Niagara S.	Cataraqui.	Lindsay.	Graven-hurst.	Ottawa.
Alexander			May 18.			May 23.	May 19.		
Baldwin	May 9.	May 22.			May 9.				
Ben Davis	do 10.							May 12.	May 16.
Blenheim Orange		May 20.	May 20.						
Canada Baldwin		do 25.							May 16.
Cranberry Pippin		do 25.							
Duchess		do 12.		May 20.			May 13.		May 12.
Early Harvest	May 20.	do 17.					do 13.		
Fameuse	do 8.	do 20.		May 20.		May 15.	do 18.		May 13.
Greening	do 10.	do 23.		do 21.	May 12.	do 24.			
Golden Russet		do 25.		do 19.			May 17.	May 11.	May 20.
Haas							do 14.		do 13.
Longfield		May 22.							
McIntosh Red								May 10.	May 13.
Northern Spy	May 10.	May 27.		May 24.		May 28	May 24.		do 25.
Ontario							do 22.		do 25.
Pewaukee							do 18.		
Ribston Pippin		May 22.							May 20.
Roxbury Russet		do 25.					May 21.		do 22.
Red Astrachan	May 6.	do 17.		May 15.		May 16.	do 13.	May 10.	do 20.
St. Lawrence	do 8.	do 22.				do 25.	do 20.		do 13.
Talman Sweet		do 25.	May 17.						do 20.
Tetofsky						May 16.	May 13.	May 8.	do 11.
Wagener		May 13.							do 17.
Yellow Transparent		do 18.					May 18.	May 10	do 16.

SHOWING the Blossoming Period of some leading Pears and Plums in Ontario in 1895.

PEARS.

Varieties.	LOCALITY AND DATE.				
	Windsor.	Winona.	South Niagara.	Lindsay.	Gravenhurst.
Anjou		May 12			May 12
Bartlett	May 8	do 11	May 16	May 13	
Clapp	do 7	do 12-17		do 12	
Duchess	do 9		May 16	do 13	
Flemish Beauty	do 7	May 12		no 11	May 24
Howell	do 5	do 11			
Keiffer	do 7	do 11-13			
Seckel	do 9	do 12			
Sheldon		do 11			

PLUMS.

Varieties.	Windsor.	Winona.	South Niagara.	Gravenhurst.
Burbank		May 7	May 9	
Bradshaw		do 10		
Duane's Purple		do 8	May 8	
German Prune		do 11		
Imperial Gage		do 10	May 8	
Lombard	May 4	do 10	do 8	
Moore's Arctic		do 11		
Reine Claude		do 11	May 8	May 9

BLOSSOMING Period of some leading Apples in Quebec in 1895.

Varieties.	LOCALITY AND DATE OF BLOOMING.		
	Abbotsford.	Montreal.	Knowlton.
Alexander	May 12	May 15	
Ben Davis	do 12	do 20	
Canada Baldwin	do 11		May 19
Duchess of Oldenburg	do 10	May 13	do 15
Fameuse	do 11	do 18	
Golden Russet	do 11	do 14	
Haas	do 12	do 15	
Longfield	do 10		May 16
McIntosh Red	do 11		do 17
Red Astrachan	do 11		
Winter St. Lawrence	do 10		
Wealthy	do 12		
Yellow Transparent	do 8	May 6	

As may be seen from the preceding records, observations covering a great many points, from Prince Edward Island to British Columbia, were made. These are in no slight degree interesting merely from the standpoint of statistical record, showing as they do the great climatic variation discovered in travelling from west to east. If it is imperative to the fullest success, that varieties should be intermingled, then we should know the most suitable varieties to plant adjacent to each other, and this we can only ascertain by accurate observations extending over several seasons. These records also impress us with a fuller knowledge of the climatic variation found in the comparatively limited area of the fruit belt of Ontario. We find that Red Astrachan came into bloom at Windsor on May 3rd, South Niagara on the 8th, Burlington May 10th, Lindsay, 12th and Ottawa on the 15th May. Northern Spy opened its flowers at Windsor on May 8, South Niagara May 10, Burlington May 20, Lindsay 16th and Ottawa on 24th, being a difference of twelve days in one case and sixteen in the other. These two varieties also illustrate the comparatively wide differences in the habits of trees with regard to their blossoming periods. The difference would be much more strongly marked did Red Astrachan bloom with the earliest of its class. As a preliminary result of these investigations, the following groups may be arranged for Ontario according to the dates on which they were in full bloom :—

1. *Earliest Group*—Duchess, Fameuse, McIntosh Red, Ben Davis.
2. *Middle Group*—Baldwin, Golden Russet, Wealthy, Wagener, Yellow Transparent and Astrachan.
3. *Last Group*—Alexander, Maiden's Blush, Northern Spy, Ribston Pippin, Roxbury Russet, Talman Sweet.

The pears easily fall into two groups as recorded the past season. It is probable that during the normal season the blossoming period of some will be much longer and probably considerably modified in many cases. They stand this year as follows :—

1. *1st Group*—Howell, Keifer, Seckel, Sheldon, Anjou.
2. *2nd Group*—Bartlett, Clapp, Duchess, Flemish Beauty.

PLUMS.

1. *1st Group*—Burbank, Duane's Purple, Lombard, Bradshaw.
2. *2nd Group*—German Prune, Imperial Gage, Moore's Arctic, Reine Claude.

CHERRIES.

In Ontario there was practically no difference in the blossoming period of different varieties last season.

These notes are offered only in a suggestive way to horticultural observers who may be and, I may say, should be interested in this subject. Success will come to the fruit grower of the present and of the future very much in the proportion in which hard thinking enters into details of horticultural operations. Allow me to submit this subject as one of the details which will bear some thinking, and upon which I make bold to ask the co-operation of my friends, the professional fruit growers of Canada.

It is the intention to carry on the work again next year with the kind assistance of the fruit growers of the Dominion.

COOKING QUALITIES OF NATIVE PLUMS.

At present the principal value of native plums lies in their usefulness for culinary purposes—canning and preserving. One of the difficulties in the way of making a highly palatable preserve or canned product from some of these varieties is found in the peculiar astringent quality which seems to be a property of the skin and to some extent of the stone. Some of them while quite pleasant at first taste develop this astringent or "puckery" quality on chewing the skin. Again the astringency may not be marked when the fruit is eaten raw but when cooked it may become unpleasantly pronounced. The size of the stone has also an important bearing upon its value as a cooking variety, With a view of obtaining some information upon the relative astringency of the different varieties, and the proportion by weight of pit to flesh and skin, twelve average sized specimens of the following varieties were selected at as near the same degree of ripeness as possible. They were weighed, each plum cut in half and the varieties placed separately in porcelain bowls. Sugar was added to each, to the amount of half its weight, and water to the amount of one-tenth its weight, which was usually sufficient to moisten the sugar. The dishes were covered and placed over water baths where the fruit was cooked for an hour and twenty minutes. This of course was much longer than necessary, if intended for canning. The following notes were made after cooking and tasting, and are the combined opinions of a number of critical judges:—

Variety.	Weight of 12 plums in ounces.	Percentage weight of pits.	Astringency scale, 1-10.	Remarks on Cooked Product.
De Soto	6·5	7·5	3	Light-coloured preserve.
Hawkeye	10·6	7·6	2	Skin dissolving, good.
Rollingston	6·5	8·6	4	Flavour pleasant.
Voronesh (seedling)	5·7	11·8	4	Skin tough.
Van Buren	8·3	9·7	1	Quality, best.
Wolf	7·6	7·0	5	Preserve dark, watery.
Wyant	8·1	8·2	10	Skin tough, astringent.
Yosemite Purple	7·5	9·3	6	Attractive, bright-coloured.
Yosemite Yellow	7·0	12·5	6	Not attractive when cooked.

OBSERVATIONS ON VARIETIES.

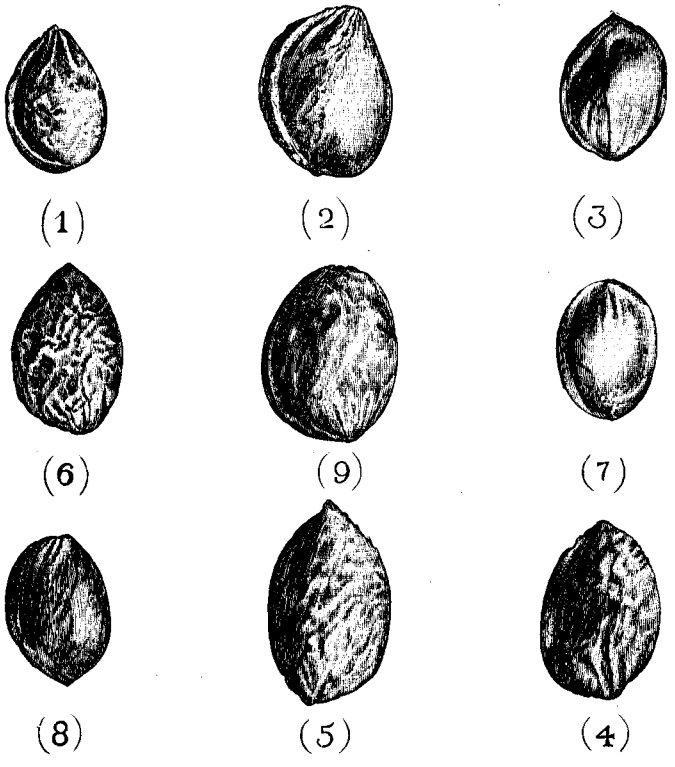
De Soto.—Sauce amber coloured, becoming lighter in colour with continued cooking. Cooks easily. Skin moderately tough. On the whole it may be said to be a good cooking variety. In quality it ranks among the best. It will be seen by reference to the table that by weight it has relatively a greater proportion of pit to flesh than the next, but a glance at the illustration will show that the weight is made up by greater thickness in the shell and decrease in size of cavity in the pit rather than increased size of

pit. The De Soto has many good points in its favour and is one of the most valuable of the American plums.

Hawkeye.—This is an exceedingly handsome fruit, covered as it is when mature with a beautiful lilac-purple bloom. It cooks easily, giving a deeply coloured sauce. The skin breaks up readily. A very desirable sort. Stone large but flat and thin, with prominent ridges and a tendency to develop wings on front edge.

Rollingston.—The appearance of this sauce was evidently impaired by too much cooking. Flavour pleasant, skin moderately melting. Stone roundish, rather large. This variety ripens a little earlier than De Soto. It is very productive and therefore should be included in plantations, where these varieties are found to be useful.

Voronesh.—(Seedling). As will be seen by a glance at the table, this has altogether too large a proportion of stone to flesh. This variety, as its name would seem to indicate, is not a Russian kind but a seedling of the *P. Americana* type.



(1) Wolf. (2) Van Buren. (3) Voronesh Seedling. (4) Wyant. (5) Yosemite Yellow. (6) Yosemite Purple. (7) De Soto. (8) Rollingston. (9) Hawkeye.

Van Buren.—An exceedingly handsome variety. Crimson and golden yellow in colour, a perfect free stone. When cooked, entirely free from astringency. The stone is however among the largest, there being over 10 pounds to each hundred pounds of fruit. The tree is neither as hardy nor as productive as Hawkeye.

Wolf.—This is usually rated as a free stone, but on cooking the stone clings quite firmly to the flesh. Skin dissolves readily in the mouth. Sauce is dark colour and inclined to be watery; rather astringent. Stone circular in outline, tapering towards the apex, with a prominent border. The percentage of stone to flesh is lower in this instance than in the last.

Wyant.—A curious fact about this variety is that when it is eaten raw the astringency is not prominent, but when cooked it becomes objectionably pronounced. Cooks easily, juice highly coloured, perfectly free. Stone medium size, oval ridge at margin.

Yosemite Purple.—Flesh does not break upon cooking but retains form, colour light amber, attractive. Skin astringent. Stone large, oval, sharply pointed. An attractive plum, somewhat lacking in quality.

Yosemite Yellow.—This variety does not cook readily. Sauce of a dark amber, somewhat muddy appearance. Skin breaks up readily but is quite astringent. Stone large rough oval, strongly clinging. On account of size of pit and astringency, this variety cannot be commended, although the tree is a profuse bearer.

As cooking plums, Hawkeye, De Soto and Van Buren are certainly the most desirable.

DWARF JUNEBERRY *(Amelanchier canadensis; var. Oblongifolia,* Torrey & Gray.)

The common Juneberry or shadbush *(Amelanchier canadensis)* grows wild over a large area of the country. Under ordinary conditions it reaches a height of fifteen to twenty-five feet. In the North-western States and in Western Canada dwarf varieties appear bearing fruit of edible size, and sufficiently good in quality to make it appreciated by the residents of those sections. Three or four varieties have been named and introduced. Among them we have "Improved dwarf," "Success," "Osage," and "Gardner." Thus far, there has been very little difference in the size or appearance of the fruit from these bushes, although the fruit is generally larger than the uncultivated types. This illustration is from a photograph taken of fruit produced by a plant in nursery row, at the Central Farm.

DWARF JUNEBERRY.

The fruit is very attractive in appearance, and quite palatable. Its resemblance to huckleberries applies to the flavour as well as the appearance. Large, well-ripened berries are richer and sweeter than blueberries.

In season, the fruit follows strawberries, coming in with currants. It ripens unevenly in the cluster, which in my opinion, is one of its chief weaknesses, as in

picking it is not so easy to select only the ripest berries, as may be done with raspberries, nor can the whole raceme be picked at once as may be done with currants.

It seems more than probable that for the North-west and Manitoba these improved dwarf forms will be much appreciated, and it is not improbable that they may be found useful in eastern Ontario and Quebec. It should be said that the birds appreciate juneberries quite as much as they do cherries, so that unless grown in large quantities or protected with bird netting, the owner is likely to have his returns considerably lowered by these robbers.

RASPBERRIES.

Some interesting results were obtained from the treatment of the rows in different ways during the year. Of the following 17 varieties of red raspberries, each is made up of two rows of plants 165 feet in length. As soon as the fruit was harvested in 1894, one row which had previously been cut back or summer pruned, had the old wood taken out in addition to some top pruning which took place at the same time. The other row was untouched. In the autumn, half of each row was laid on the ground, having only sufficient soil laid upon the ends of the canes to hold them down. Records are submitted of the yield obtained from each row together with the relative amount of injury sustained during winter. It will be seen that the estimated yield per acre for these varieties averages higher than those in the next table, not so treated.

—	Length of row in feet.	Protected.		Un-protected.		Date of first picking.	Date of last picking.	Yield of pruned row.	Yield of unpruned row.	Total yield in boxes.	Estimated yield in boxes per acre.
		Pruned scale of injury.	Unpruned scale of injury.	Pruned scale of injury.	Unpruned scale of injury.						
		1-10	1-10	1-10	1-10						
Heebner	330	10	10	7	7	July 8	Aug. 5	90¼	96¾	187	3,527
Springfield	330	10	10	8	8	June 26	do 1	32½	49½	82¼	1,550
Royal Church	330	9	9	7	7	July 8	do 8	31½	37½	69¼	1,262
Carman	330	10	10	9	9	June 26	do 8	25½	41¾	67¼	1,268
Thompson's E'y Prolific	330	10	10	8	9	do 26	July 29	36½	68½	104¾	1,975
Herstine	330	10	10	8	8	July 8	Aug. 8	32½	49½	82	1,546
Parnell	330	10	10	7	7	do 4	do 1	32¾	37½	70½	1,329
Golden Queen	330	9	9	6	6	do 6	do 8	40½	59½	100¼	1,889
Reeder	330	10	10	5	5	do 8	do 8	19½	16½	36	679
Brandywine	330	10	10	7	7	do 4	do 8	43¼	64	107¼	2,022
Niagara	330	9	10	7	8	do 2	do 8	22	46½	78½	1,480
Marlboro	330	10	10	6	7	do 2	July 29	23¼	27	50¼	947
Hansell	330	9	9	7	7	June 26	do 23	31½	47	78½	1,480
Clark	330	8	9	7	8	July 4	do 29	20¼	37¾	58	1,093
Cuthbert	330	10	9	6	8	do 13	Aug. 8	35	70½	105½	1,989
Turner		8	9	6	8	do 2	do 1	23¼	50¼	73¾	1,390
Caroline		10	10	7	7	do 8	do 8	47	64¾	111¾	2,108

It will be seen (1) that the protected plants came through the winter in nearly every instance without injury—10 representing immunity; the descending scale indicating increased injury; (2) the yields from the pruned and unpruned rows show a balance in favour of the latter in almost every instance. This may seem contrary to what might have been expected, but is exactly in accordance with the actual returns.

In the following table data covering the length of the picking season, amount of injury sustained during the winter, the actual yield from the plants under test and the estimated yield per acre, is given. It will be seen that Kenyon and Columbian in this list lead for productiveness.

OTHER VARIETIES OF RED AND PURPLE RASPBERRIES.

Name.	Length of Row in feet.	Date of First Picking.	Date of Last Picking.	Yield in Boxes.	Estimated Yield in Boxes Per Acre.	Showing injury from Winter 1894-1895 Scale, 1 to 10.
Carter's Prolific (red)	156	July 6..	Aug. 8..	47¾	1,194	7
Seedling of Biggar's (red)	120	" 6..	" 5..	28¼	1,465	6
Gregg, with Cuthbert & Snyder (hybrid)	150	" 15..	" 1..	11¾	487	7
Stayman's No. 5 (red)	120	June 29..	July 23..	11¼	583	9
Highland Hardy do	330	July 2..	" 15..	5	94	8
Superlative do	114	" 8..	" 22..	3½	189	5
No. 7, R. B. Whyte do	18	" 8..	" 15..	4½	1,555	9
Kenyon do	130	" 4..	Aug. 1..	60¾	2,916	10
Knevetts do	144	" 6..	July 26..	5¼	226	7
Columbian (purple)	12	" 15..	Aug. 5..	59⅞	2,852	6
Hiram (red)	50	" 10..	July 29..	5¾	715	9
Shaffers (purple)	330	" 8..	Aug. 8..	91¼	1,720	6
Hornet (red)	175	" 10..	" 1..	12½	444	4
Champlain (white)	112	" 6..	July 1..	8	444	5

YIELD OF BLACK CAP RASPBERRIES.

Smith's Prolific	45	July 8..	Aug. 1..	16	2,212	4
Souhegan	165	" 8..	July 20..	5	188	5
Babbit	87	" 4..	" 15..	10	715	9
Smith's Giant	120	" 8..	" 18..	1½	77	5
Hilborn	400	" 6..	Aug. 1..	25½	794	6
Older	325	" 6..	" 1..	99¾	1,999	10
Palmer	39	" 4..	July 8..	4¼	678	6
Progress	300	" 4..	" 29..	123¼	2,556	9
Ada	36	" 8..	" 18..	4¾	648	5

Black Caps, with few exceptions, have not been successful in the test plots. The amount of care they require to prevent the canes being broken in cultivating the plantation, together with their liability to be affected by disease, renders them often unsatisfactory and unremunerative.

The above table shows that Progress, Older, and Smith's Prolific were the most productive. The first named is somewhat dry and seedy and is not equal in many respects to the second.

BLACKBERRIES.

During the past five years about thirty varieties of Blackberries have been tested at Ottawa. The great majority have not proved hardy, being killed nearly to the ground each year. In accordance with the nature of the plant strong shoots are thrown up in the spring, but these, of course, only bear a limited amount of fruit. If treated like tender varieties of raspberries, they may be grown with a comparative degree of success by either of the following methods :—

SNYDER.

1. By allowing the canes to grow four or five feet high before trimming them, which makes them a foot higher when the growth has been completed. If grown in

this way in hills, and the canes tied to supporting wires, they should be laid down and covered in the autumn. This is accomplished by bending the canes to the ground in the line of the row and laying on sufficient soil to hold them down.

AGAWAM.

2. By growing them in hedge row form, pinching the young wood when it has attained a height of 15 inches. The laterals thrown out should be again cut back two or three weeks later. The varieties here reported upon have been grown in this way. The method is unreliable in the vicinity of Ottawa. Occasionally during winters of early and heavy snow fall, the yield is fairly satisfactory, but usually the plants are so severely injured as to cause a light yield.

The effect of mulching the ground with litter at the time of the ripening of the fruit, was tried. The results will be found in the tabular statement appended. A heavy mulch of green rye was applied when the berries began to colour. It was allowed to

ANCIENT BRITON.

remain on the ground throughout the remainder of the season. It will be seen that there was a slight increase in yield from the rows so mulched. As a means of adding humus to the soil and of retaining the much needed moisture in dry seasons mulching with some cheap material—or if nitrogen is needed with clover—is worth trying.

VARIETIES.

Agawam, Snyder and Ancient Briton (see illustrations) have proved the hardiest and most productive in this locality. In milder districts the larger fruited sorts are more profitable. Early Cluster gave very fair returns in comparison with hardier kinds. This variety fruits heavily on the young wood. Ancient Briton was the earliest variety in the collection, while Agawam was about twice as productive as any other.

BLACKBERRIES, YIELD, EFFECT OF MULCHING.

—	Length of Row in feet	Dare of First Picking.	Date of Last Picking.	Mulched. — Yield in Boxes.	Not Mulched. — Yield in Boxes.	Estimated Yield in Boxes Per Acre.	Showing Injury From Winter 1894-1895. Scale, 1 to 10.
Ancient Briton	97	July 5..	Aug. 10..	11..	9½	1315	7
Agawam	165	do 26..	do 8..	16¾..	15⅝	2452	8
Kittatinny	210	do 26..	do 8..	.....	9	266	7
Snyder	165	do 22..	do 8..	8¼..	3½	443	6
Early Cluster	170	do 22..	do 8..	.....	22	805	7
Taylor's Prolific	330	Aug. 5..	do 8..	.....	1	18	3
Wilson's Junior	50	July 26..	July 26..	.....	⅛	15	1
Wachusetts Thornless	330	do 26..	Aug. 8..	.. ..	4½	85	6

STRAWBERRIES.

Owing to late spring frosts the yield of strawberries was greatly lessened in this vicinity. Dry weather prevailing during the picking season also diminished the crops perceptibly. Many varieties, as will be seen by the tabular statement of yields, failed altogether, others gave half a crop, while a few gave nearly a full return. The fruit, too, was of poor quality, the percentage of "button," or imperfect berries, being very large. Medium early varieties gave the best returns, which would seem to indicate that the fertilized blossoms were less affected by the frost than those which had not yet been fertilized. This strawberry plot was set out in the spring of 1893, in sandy loam, well manured. The treatment given it, up to date, is as follows:—The rows are 3½ feet apart, with the plants grown in matted form. The ground was cultivated and the runners kept down until midsummer, when the interspaces were mulched with manure. Any weeds appearing after this were pulled by hand or cut out with a hoe. After the ground was frozen in the autumn the whole bed was covered with a coating of oats straw, the lightest covering being given to the rows.

1894.

The plants came through in fine condition. The straw was removed before growth commenced, and the ground cultivated till the fruit began to ripen, when the straw was returned to the rows. Each variety was made up of two parallel rows, 30 feet in length. In order to test the effect of burning the leaves as a "rust" preventive after harvesting the fruit, as is often recommended, the foliage on one row of each variety was mowed off and burned, without removing it from the crowns of the plants. Where there was an extra amount of litter about the plants the crowns were somewhat injured, which in some cases had the effect of materially thinning the plants in the row so treated. The resulting growth was at first luxuriant and healthy, but rust soon appeared and made rapid headway, developing so quickly that there was little difference noticeable from a casual examination made in the autumn between the two series. On close examination however, a considerable improvement in favour of the burned rows was found to exist. In the autumn the plants were again covered with straw as previously described.

1895.

The plants came up through the winter as strong and healthy as in 1894, and would undoubtedly have given a heavy yield but for occurrence of the frost already noted. The treatment of the plot was the same this season as the year previous. There was no appreciable difference in the health of the two rows of plants—one of which had been burned

over in 1894 and the other untouched. An experiment with Bordeaux mixture to check this disease—strawberry leaf rust—gave more definite results. The plants were sprayed once before fruiting and twice afterwards. The results were most satisfactory, and now that this fungicide is so commonly used for other diseases, it will probably prove the best means of keeping the leaf rust in check. It should be remembered, however, that in burning the leaves the spores of the fungus are largely destroyed, and if this treatment is followed by the use of Bordeaux mixture there should be no difficulty in controlling the disease.

The course of treatment subsequent to picking the fruit was similar to that followed in 1896, the interspaces being manured during the summer. Another crop of fruit will be taken from these plants after which they will be ploughed under. The tabular statement which follows give interesting information regarding the date of blossoming, the period of ripening and the yield of ninety-five varieties tested this year.

STRAWBERRIES.

Variety.	Sex.	When Planted.	Date of Blossoming.	Date of First Picking.	Date of Last Picking.	Length of Row.	Yield in Boxes.
						ft.	
Auburn	P	Sept. 1893	May 30..	June 20..	July 2..	60	9
Belmont	B	do 1893	do 29..	do 29..	.....	60	2¼
Black Giant	B	do 1893	do 28..	do 29..	.....	....	1
Boynton	P	do 1893	do 25..	do 18..	do 4..	60	38
Beder Wood	B	do 1893	do 25..	do 18..	June 29..	60	8½
Beverly	B	do 1893	do 25..	do 22..	July 2..	60	9¼
Barton's	P	do 1893	do 27..	do 20..	do 9..	60	11
Bubach	B	do 1893	do 23..	do 22..	do 2..	60	3¼
Cohansick	B	do 1893	do 27..	do 29..	do 9..	60	7
Crescent	P	do 1893	do 25 .	do 20..	do 9..	60	31½
Cameronian	B	do 1893	do 27..	do 29..	.....	60	1¼
Captain Jack	B	do 1893	do 27..	do 18..	July 9..	60	17¼
Crawford	B	do 1893	do 29..	do 28..	.....	60	¾
Chair's		do 1894	.....	do 26..	July 2..	30	3¼
Charlie	P	do 1894	.....	do 20..	do 4..	60	10¾
Clark's Early		do 1894	.....	do 24..	June 26..	60	¼
Daisy	P	do 1893	May 29..	do 20..	July 2..	60	9
Dayton	B	do 1893	do 27..	do 26..	.....	60	3
Daniel Boone	P	do 1893	.. . .	do 20..	July 2..	60	5¼
Dew		do 1894	.....	July 9..	.....	30	¼
Early Canada	B	do 1893	do 23..	June 26..	.....	60	¾
Edward's Favorite		do 1894	....	do 26..	July 9..	30	1¾
Gandy	B	do 1893	June 1..	do 22..	do 9..	60	9¼
Green Prolific	P	do 1893	May 28..	do 18..	June 29..	60	7¾
Garibaldi	P	do 1893	June 1..	do 29..	July 2..	60	4½
Hoffman's Seedling	B	do 1893	May 27..	do 29..	.....	60	¼
Haverland	B	do 1893	do 25..	do 20..	July 9..	60	5¾
Itasca	B	do 1893	do 29..	do 26..	do 4..	60	5¾
Iowa Beauty	B	do 1893	do 20..	do 26..	do 9..	60	2¾
John Little	B	do 1893	do 25..	do 18..	do 9..	60	22
James Vick	B	do 1893	do 28..	do 20 .	do 9..	60	
King of the North	B	do 1893	do 25..	do 26..	.....	....	2¼
Logan	B	do 1893	do 28..	do 29..	.....	60	¼
Leader	B	do 1893	do 27..	do 20..	July 2..	60	2¼
Mammoth	B	do 1893	do 27..	do 26..	June 29..	60	¾
Miller's Seedling, O. 2	B	do 1893	do 27..	do 26..	July 2..	60	2¾
Miller's Seedling, H. 11	P	do 1893	do 20..	do 22..	do 2..	60	8
Mrs. Cleveland	P	do 1893	do 27..	do 20..	do 4..	60	10¼
Martha	P	do 1893	do 27..	do 22..	do 2..	60	10¼
Nicanor	B	do 1893	do 20..	do 29..	do 2..	60	1¼
Norman	B	do 1893	do 25..	do 24..	do 4.	60	3
New Dominion	B	do 1893	do 25..	do 22..	do 9..	60	19¼
Osceola	B	do 1893	do 25..	do 18..	do 26..	60	2¼
Pearl	B	do 1893	do 25..	do 18..	do 2..	60	12½
Pine Apple	B	do 1893	do 27..	do 20..	do 9..	60	5
Prince of Berries	B	do 1893	June 1..	July 2..	... .	....	¾

STRAWBERRIES—*Concluded.*

Varieties.	Sex.	When Planted.	Date of Blossoming.	Date of First Picking.	Date of Last Picking.	Length of Row.	Yield in boxes.
						ft.	
Parker Earle	B	Sp. 1893..	May 25..	June 22..	July 9..	60	21¼
Princess	P	do 1893..	do 27..	do 24..	June 29.	60	4½
Rio		do 1894..	.....	do 18..	July 9..	30	2¼
Robinson		do 1894..	.....	do 18..	do 9..	30	6¼
Stayman's No. 1	P	do 1893..	May 27..	June 18..	July 9..	60	20¼
Seneca Queen	B	do 1893..	do 25..	do 18..	do 9..	60	6
Shirts	B	do 1893..	do 29..	do 26..	do 2..	60	4½
Standard	B	do 1893..	do 28..	do 20..	do 9..	60	14¾
Sharpless	B	do 1893..	do 27..	do 20..	do 9..	60	5¾
Shuckless	B	do 1893..	do 30..	do 24..	do 2..	60	2¾
Swindle	B	do 1894..	.....	do 22..	do 9..	30	5¾
Sandoval	B	do 1894..	.....	do 26..	do 4..	30	2¾
Surprise	B	do 1893..	May 27..	do 22..	do 4..	60	12¾
Tennessee Prolific	.....	do 1894..	.....	do 18..	do 9..	30	7½
Thompson's 66, late	P	do 1894..	.....	do 20..	do 9..	30	7¼
Turner's Beauty	B	do 1893..	May 27..	do 20..	June 29..	60	1¼
Van Deman	B	do 1893..	do 25..	do 20..	July 9..	60	8¼
Warfield No. 2	P	do 1893..	do 29..	do 18..	do 4..	60	23¼
Windsor Chief	P	do 1893..	do 27..	do 18..	do 9..	60	33½
Wonderful	P	do 1893..	do 27..	do 18..	do 9..	60	15¾
West Brook	P	do 1893..	do 27..	do 18..	do 9..	60	4¾
Westlawn	P	do 1893..	do 29..	do 20..	do 2..	60	13¾
Williams	B	do 1893..	do 29..	do 22..	do 9..	60	17⅞
Wilson	B	do 1893..	do 27..	do 18..	do 9..	60	17
Woolverton	B	do 1893..	June 4..	do 26..	June 29..	60	3¼
Yale	B	do 1893..	May 29..	do 24..	July 9..	60	5¾
1001	B	do 1893..	do 27..	do 22..	do 4..	60	11½
SEEDLINGS.							
77/×	P	do 1893..	do 30..	do 26..	do 4..	60	8
297/×	P	do 1893..	do 27..	do 20..	do 9..	60	24
288/×	P	do 1893..	do 28..	do 20..	do 2..	60	8¾
66/×	P	do 1893..	do 25..	do 18..	do 4..	60	8
189/×	P	do 1893..	do 25..	do 20..	do 9..	60	12¼
134/×	B	do 1893..	do 25..	do 20..	June 29..	....	6¼
272/×	B	do 1893..	do 26..	do 18..	do 29..	60	7¾
95/×	P	do 1893..	do 25..	do 18..	July 9..	60	7½
164/×	B	do 1893..	do 20..	do 22..	do 2..	60	2¾
175/×	P	do 1893..	do 25..	do 20..	do 2..	60	13½
346/×	P	do 1893..	do 29..	do 22..	do 9..	60	7¾
86/×	B	do 1893..	do 27..	do 18..	June 29..	60	9½
357/×	B	do 1893	do 25..	do 18..	July 9..	60	10¼
161/×	B	do 1893..	do 27..	do 20..	do 2..	60	12
103/×	B	do 1893..	do 27..	do 20..	do 2..	60	8¼
1/×	B	do 1893..	do 28..	do 26..	do 4..	60	2½
341/×	B	do 1893..	do 27..	do 18..	June 29..	60	11½
119/×	B	do 1893..	do 27..	do 22..	July 2..	60	4½
146/×	B	do 1893..	do 27..	do 20..	do 4..	60	8
369/×	P	do 1893..	do 30..	do 20..	June 29..	60	4¾
6-G	B	do 1893..	do 28..	do 18..	do 29..	60	7¼

DEDUCTIONS FROM TABULAR STATEMENT.

The three most productive varieties were three pistillate sorts, viz., Boynton, Windsor Chief and Crescent. Two additional varieties giving good returns are Stayman's No. 1 and Warfield.

While 38 boxes were obtained as the highest yield from a pistillate variety (Boynton), 22 boxes was the greatest yield of a bisexual sort in this instance called John Little. Of other bisexual kinds giving fair yields—it may be said large from a comparative standpoint—are Parker Earle, Williams, Capt. Jack, New Dominion and Wilson. It should be noted that these varieties were all included in a table appearing in the report of last year "showing 25 varieties giving largest yields."

Seedlings.—A large number of these have been produced and tested. Last year No. 297X ranked with the most productive of the named varieties. Again this year it has given excellent returns, so that it will be thoroughly tested at the branch farms the coming season in order to give it a more extended trial.

General Remarks.—Among the many errors which beginners in strawberry growing may fall into, none is attended with more serious consequences than that of limiting the plantation to a single variety, and that one not bisexual. At the beginning of the picking season this year I was requested by a young strawberry grower in this vicinity to visit and examine his grounds for the purpose of investigating the cause of the unproductiveness of his thrifty plants. As the plants were in flower it required only a glance to arrive at a solution of the problem. The plants were nearly, if not quite all of a pronounced pistillate type. Therefore the unfruitfulness was due to the inability of the blossom to fertilize itself. He was advised to at once replace every third or fourth row with a strong growing free producer of pollen like Capt. Jack, New Dominion, Beder Wood or Williams. It is well known that the pistillate varieties under favourable circumstances are the most productive, and the mistake came about in this instance, by the grower making up his new plantation entirely of the variety] which had been most productive in the old. Another point which it is well to remember in commercial berry growing, is that the early berries are by far the most profitable. It is not here meant to convey the idea that the earliest varieties bring the most money because these are often comparatively unproductive but rather that the plantation furnishing the bulk of its berries in the fore part of the season is far more profitable than another field which may perhaps produce a greater quantity but which covers a longer and later fruiting period. In choosing a location for strawberries it is therefore extremely desirable that a piece of land be chosen which is warm and early, though well drained, yet not dry in nature, because this plant needs a good deal of moisture at fruiting time. Some growers continue the plantation for three years in the same place on account of the habit of the old plants ripening their fruit earlier than young plants. A difference of two or three days in time of ripening affects the financial result quite appreciably.

THE SAND CHERRY AS A STOCK.

A good deal has been said for and against the Sand Cherry (*Prunus pumilla*) as a suitable dwarfing stock for Morello cherries.

Some experiments along this line are delineated in the accompaning tabular arrangement. It will be seen that both in grafting and budding they were unsatisfactory.

When the Sand Cherry was crown and stem grafted upon American plum stocks the union secured and growth made were all that could be desired.

Some of the improved varieties are so sprawling and drooping in habit as to make it necessary to graft them upon an upright stem. For this purpose the native plum will be most useful.

THE SAND CHERRY AS A PROPAGATING STOCK FOR MORELLO CHERRIES.

THE SAND CHERRY ON PLUM STOCKS.

	Number of buds inserted.	Number which grew.	Remarks.
Budded on Sand Cherry Stocks in 1893.			
Strauss cherry	58	3	Many grew for some time, but then died.
Riga 18 do	51	1	Union imperfect.
Amarelle Hative, cherry	71	1	do
Minnesota Ostheim, cherry	93	.....	do
Russian No. 3, plum	24	12	Fairly good union, moderate growth.
De Soto plum	25	13	Fairly good union, moderate growth.
May 2nd, 1894, root grafted on Sand cherry and planted out Cherry buds beginning to open—			
Spate Amarelle cherry	10	.....	Leafed out, but did not unite.
Lutovka cherry	10	.....	do do
Bessarabian cherry	10	.....	do do
Wolf plum	10	6	Weak growth, poor union.
Glass Seedling plum	10	2	do do
De Soto plum	10	1	do do
Yellow fruited Sand cherry grafted on stems of American plum, 19th April, 1895	14	10	Good union, strong growth.
Yellow fruited Sand cherry grafted on stem of Canadian Seedlings, 19th April, 1895	15	11	do do
Sand cherry, large fruited, Crown grafted on American plum, 19th April, 1895	12	9	do do
Sand cherry, large fruited, Crown grafted on Canadian plum Seedling, 19th April, 1895	31	24	do do

SPRAYING EXPERIMENTS.

Fungous diseases affecting fruits were much less prevalent, and therefore less injurious the past season than in previous years. The quality of the winter apples being much better than growers have had the good fortune to see for a number of years past. The improvement in quality may also in part be credited to the greater care now being exercised by orchardists in carrying out fully those operations which contribute to the health and vigour of a fruit tree, viz., manuring, cultivating, pruning and spraying. To the latter practice should be credited in the best fruit districts a generous share of the improvement noted in the quality of the fruit.

It is pleasing to note the efforts put forth and interest manifested not only by the individual, but by the legislative bodies of the fruit growing provinces.

I would draw special attention to the good work done by the Department of Agriculture of the province of Ontario the past season in carrying on under the efficient superintendency of Mr. A. H. Pettit, of Grimsby—but on a much more extended scale —the co-operative spraying experiments instituted by this division last year in conjunction with the Provincial Fruit Growers Association, the convincing results of which are given in the Annual Report for 1894, in addition to Bulletin No. 23.

With a view of encouraging the practice of spraying and demonstrating its beneficial effects meetings were held, by instruction of the Minister of Agriculture, at two points in the province of Quebec, viz., At Notre Dame de Grace near the city of Montreal and at St. Jean Port Joli, L'Islet County, province of Quebec. The first locality has long been noted for its large production of fine Fameuse apples; the latter for producing in considerable quantity Damson and Orleans plums. At these meetings addresses were given by myself explaining the why and wherefore of spraying; the

addresses were followed by a practical demonstration of how to prepare, and apply Bordeaux mixture. The owners of the trees which were treated in each case agreed to continue the spraying under my direction, as long as necessary and to report the results of their work in the autumn. This agreement they faithfully carried out. I append the reports of Messrs. Descarries and Verreault, which speak in satisfactory terms of the results of the experiments.

NOTRE DAME DE GRACE, QUE., September 20th, 1895.

JOHN CRAIG, Esq.,
Horticulturist, Experimental Farm,
Ottawa.

DEAR SIR,—I may be late in sending my report on the condition of the trees treated by you for the prevention of apple spot last spring, but I was anxious to ascertain, at the different periods of apple growth the results of spraying, both on the trees and on the fruit.

In order to ascertain the effects, special observations have been made on the trees upon which you conducted your experiments. These trees were selected amidst an old orchard that had given a very poor return the previous year. I was thus better able to notice the change obtained by spraying. The trees selected for the experiments were of two different kinds; three large trees of "Fameuse" and one of "Peach Apple." The first spraying was done by yourself some time before the blossoms had opened; then I sprayed again three times, as you advised me to do; one just before the blossoms opened, the second after that time, the third some time later.

For the three sprayings I did myself, the Bordeaux mixture was used as recommended in your circular in April, 1895:—

Sulphate of copper	4 lbs.
Lime	4 lbs.
Paris green	4 ozs.
Water	50 gls.

Following is a statement showing the effect on the trees treated by you, also on those treated by myself, as I operated on all my trees with the Bordeaux mixture, except on 40 that I reserved to find out the difference between the sprayed and the unsprayed trees. The trees which were sprayed as above are now very healthy, the foliage is luxuriant and very green, a condition that I never observed in preceding years.

With regard to the fruit, there is a great improvement. The effects are more clearly shown on the "Fameuse" than on the other sorts, especially on the "Peach Apple," on which I noticed but slight change. The "Fameuse" apples are much less spotted than in preceding years; they are larger and better coloured. I regret not to be able to report as good results for the quantity as for the quality, for my trees bore but little this year; but I think the frost we had at the time of blossom opening was the cause of such a small crop.

The 40 trees I kept unsprayed did not bear a larger crop than the sprayed ones, and their apples are certainly inferior to the latter. I have even noticed the benefit of spraying on the same trees, that either on account of wind or their position I was not able to spray fully on both sides. In such cases there was a considerable difference between the fruit of the sprayed sides and that of the unsprayed side.

The greatest number of the orchard owners of Notre Dame de Grace and its surroundings, after hearing your instructive lecture of last April on the spraying of apple trees, have followed your advice and are altogether satisfied with the beneficial results they have obtained.

In closing this report, allow me, sir, to express my gratitude for the services rendered by the Experimental Farm in teaching the way of saving our valuable apple crop by destroying the pests of our orchard.

Very truly yours,

D. J. DESCARRIES.

St. Jean Port Joli, Que., 15th October, 1895.

John Craig, Esq.,
Horticulturist, Experimental Farm,
Ottawa.

Dear Sir,—I should have reported to you sooner concerning the spring and summer spraying of my orchards.

Following your visit to St. Jean Port Joli, authorized by the Department of Agriculture, the spraying of my orchard began under your direction, and was continued the next day, using the same composition, the Bordeaux mixture, which I think is:

Sulphate of copper	4 lbs.
Lime	4 lbs.
Paris green	4 ozs.
Water	1 bbl.

The whole being dissolved according to the instructions given in your bulletins.

The spraying was repeated under my care a second and a third time, on the dates mentioned in your instructions. I used, for the spraying, the pump you furnished; but my orchard being irregularly planted (it is an old orchard) rendered it difficult to spray with advantage. A lighter pump, perhaps, would have answered better—a pump that could have been carried by hand on a small truck. Notwithstanding this disadvantage, the good effect of the treatment was clearly apparent. I remarked a cleaner foliage, that the caterpillars had disappeared, and that the crop of plums was of fine quality and very satisfactory.

Now the people of this locality who are interested in horticulture have an idea of the importance of spraying—a method unknown so far in this district—and will, I hope, try it in future.

It should be said that all those interested in horticulture are thankful to the Department of Agriculture and to yourself for the interest shown in making the experiments, and sending you to operate and explain, in the way you have done.

Yours very truly,
P. G. VERREAULT.

In Ontario Messrs. A. H. Pettit & Son, of Grimsby, again carried on spraying experiments in continuation of those begun the year previous. The same apple trees were sprayed in the same manner and with the same mixtures (Bordeaux mixture, five applications with Paris green) as in 1894. Mr. W. H. Pettit writes as follows:—

Grimsby, Ont., 7th January, 1896.

"I inclose you a statement of the results secured this year from the trees which have been sprayed with Bordeaux mixture the past two years. I am sure that you will think with me, the number of barrels shipped this year compared with other years speaks well for the benefits of spraying.

1 tree Blenheim Pippin, sprayed, 1 barrel good apples.
1 do do not sprayed, none.
1 do Baldwin, sprayed, 1 barrel good apples.
1 do do not sprayed, 1 barrel good apples.
3 do Greening, sprayed, 2 barrels good apples.
3 do do not sprayed, 1 barrel good, 1 barrel seconds, 1 barrel third.
3 do Red Astrachan, sprayed, 5 barrels good apples.
3 do do not sprayed, 15 barrels good apples.
1 do A. G. Russet, sprayed, none,
1 do do not sprayed, none.
1 do Coopers Mkt., sprayed, 2 barrels good apples.
1 do do not sprayed, none.
1 do Cranberry Pippin, sprayed, 1 barrel good apples.
1 do do not sprayed, none.

The three Greening trees (sprayed for two years) on one side only, averaged about six barrels per tree, mostly good fruit. All the sprayed trees bore heavily last year, consequently they gave a light crop this year. I might also add that from our orchard, which was sprayed from three to five times last year and the same this year, we shipped the present season nearly 700 barrels of apples; other years not more than 100 to 175 barrels.

W. H. PETTIT.

At Winona, experiments were again kindly undertaken by Mr. Murray Pettit. The work here was also a continuation of the experiments inaugurated the year previous, and had for its main object the prevention of scab and spot on pears. The definiteness of the results was very much marred, however, by the severe and unexpected frosts of early May. Mr. Pettit, writing on June 6th, states that the "show of pears is very fine, but they seem to be affected by a fungus causing a russetting of the fruit near the calyx." Specimens accompanied this letter which showed very plainly the effect of the frost. Nearly all varieties were injured so severely as to cause them to drop prematurely, resulting eventually in a very slight crop.

WINONA, ONT., 3rd January, 1896.

In reference to the spraying experiments carried on this year, I have very little to report on account of the almost entire absence of fungous diseases the past season. I could, however, see the results of the previous year's experiments conducted under your instructions on Greening apples and on Flemish Beauty pear trees.

The apple trees sprayed, both this year and last, showed much larger and healthier leaves, and during the earlier part of the season the fruit appeared larger than those only sprayed this year. Two Flemish Beauty pear trees, in the row sprayed last year under your instructions, were left unsprayed this year as a check and showed some fungus, both on leaf and fruit, while those sprayed both seasons were perfectly clean. Again, the trees left unsprayed last season but carefully sprayed this year showed more fungus than the two pear trees referred to. My experiments on grapes and plums gave no results, as the entire crop was clean and good.

MURRAY PETTIT.

EFFICACY OF ARSENATE OF LEAD AND PARIS GREEN APPLIED WITH AND WITHOUT BORDEAUX MIXTURE.

At page 120 of the annual report for 1894 the results of an experiment are given, which go to prove that Paris green was sufficiently effective as an insecticide when applied with Bordeaux mixture to warrant the use of it in this way. The experiment was continued the past season along the same lines as last year, the same mixtures being used with the addition of arsenate of lead, a new insecticide already noticed in the report of the entomologist. A row of crab trees were used for the experiment, check trees being reserved for Bordeaux mixture alone, while other trees were not sprayed with a view of obtaining comparative results. Arsenate of lead was used at the rate of 1 pound to 150 gallons of water, Paris green at the rate of 1 pound to 200 gallons of water, and in the same proportion with Bordeaux mixture prepared by using 4 pounds each of copper sulphate and lime in 45 gallons of water. Four applications were given, commencing immediately after the blossoms had fallen. The results are given in detail in the following table. It will be seen that there is considerable variation in the results

obtained in the treatment of individual trees. The average percentage of wormy fruit, however, stands as follows:—

Arsenate of lead and Bordeaux mixture	2·15
Arsenate of lead	5·60
Paris green	6·38
Paris green and Bordeaux mixture	6·64
Bordeaux mixture	7·46
Unsprayed	14·45

Although the value of insecticides applied in the form of spray for the prevention of codling moth, has long been demonstrated by the entomological division, the additional evidence brought out thus incidentally affords some satisfaction.

SHOWING PERCENTAGE OF WORMY FRUIT.

Variety.	How treated.	Grade of fruit.	Percentage wormy.	Average.
Ball's Winter	Unsprayed	Handpicked	1·5	11·75
do	do	Fallen	22·0	
do	Bordeaux mixture	Handpicked	4·3	7·15
do	do	Fallen	10·0	
Chicago	Arsenate of lead and Bordeaux mixture	Handpicked	2·4	2·15
do	do	Fallen	1·9	
do	Paris green and Bordeaux mixture	Handpicked	·26	6·64
do	do	Fallen	13·3	
Dartmouth	Bordeaux mixture	Handpicked	3·1	3·50
do	do	Fallen	3·9	
Jumbo	do	Handpicked	3·3	9·35
do	do	Fallen	15·4	
do	Paris green	Handpicked	14·0	10·0
do	do	Fallen	6·0	
Hyslop	Unsprayed	Handpicked	11·0	17·15
do	do	Fallen	23·3	
Orion Crab	Paris green	Handpicked	5·9	5·9
Orange	Bordeaux mixture	do	4·1	5·4
do	do	Fallen	6·7	
do	Paris green	Handpicked	2·9	3·3
do	do	Fallen	3·7	
Quaker Beauty	do	Handpicked	12·6	13·1
do	do	Fallen	13·6	
do	Bordeaux mixture	Handpicked	11·8	12·15
do	do	Fallen	12·5	
Rose of Stanstead	Paris green	Handpicked	2·1	5·0
do	do	Fallen	7·9	
do	Bordeaux mixture	Handpicked	2·4	11·2
do	do	Fallen	20·0	
Transcendant	Paris green	Handpicked	3·0	3·95
do	do	Fallen	4·9	
do	Bordeaux mixture	Handpicked	4·0	4·3
do	do	Fallen	4·6	
Van Wyck	Arsenate of lead	Handpicked	1·8	5·6
do	do	Fallen	9·4	
do	Paris green	Handpicked	3·7	3·35
do	do	Fallen	3·0	

LYSOL—A NEW FUNGICIDE.

During the past two years a number of fungicides new to horticulturists have been brought forward. None perhaps attracted more attention, coming as it did, recommended by French and German fruit growers, than Lysol. Successful results have also been reported in the United States, in the treatment of fungous diseases affecting fruits, with this agent. It was particularly recommended as a remedy against peach curl.

With regard to the nature and composition of this substance Mr. Shutt, chemist, speaks as follows :—"There are many products obtained from the destructive distillation of coal-tar, differing in composition according to the nature of the process and the heat employed. Among them are several thick fluids possessing a strong odour akin to that of carbolic acid and having marked qualities as germicides. These are sold as disinfectants and antiseptics under various names, such as Cresol, Lysol, and Creoline." Of its manufacture and properties Mr. W. E. Saunders, of London, writes: "This is said to be a 50 % solution of cresols made by dissolving them in alcohol and then saponifying. It is soluble tolerably freely in water. These cresols (cresylic acid and its allies) are closely related to carbolic acid, coming out in the same process of manufacture, though at a different stage. Cresylic acid is said to be a more powerful germicide than carbolic acid and is non-crystallizable—at least at ordinary temperatures."

In order to ascertain the effect of lysol upon foliage some preliminary tests were made upon a variety of plants in the greenhouse. Solutions were made containing respectively one, two, three and four per cent of lysol. Two applications were given in bright sunshine to each of the following plants and with results as shown below :—

Plant.	Strength of Fungicide Effect.			
	1 per cent.	2 per cent.	3 per cent.	4 per cent.
Geranium	No injury	No injury	No injury	No injury.
Strawberry	do	do	do	do
Hibiscus	do	do	do	do
Abutilon	do	do	do	do
Streptosolen	Slight injury.	Some injury	Considerable injury.	Badly injured.
Heliotrope	do	do	do do	Leaves nearly killed.
Hydrangea	No injury	No injury	No injury	No injury.
Spiræa Japonica	do	do	do	do

It will be seen that with the exception of Streptoslen, a handsome greenhouse plant belonging to the order of *Solononcae* (potato and tomato family) and heliotrope, none of the species treated were injured. The effect of lysol of the strength above noted upon plant lice was very slight. Upon mealy bug (*Coccus*) two applications of a one-per cent solution materially decreased their members.

TO PREVENT PEACH CURL.

Comprehensive experiments were planned and carried out with the co-operation of Mr. W. W. Hilborn, Leamington, and Mr. R. B. Blake, Cedar Springs, both of Essex County, Ontario.

These experiments had for their object the determination of the following points :—

1. To determine the value of lysol as a fungicide.
2. To determine the proper strength to use.
3. To determine the number of application that would give the best results.

In addition, diluted Bordeaux mixture was used to learn its value in preventing peach leaf curl and soft rot of the fruit. A personal visit was made to Leamington and the first application was made in the orchard of Mr. Hilborn, on April 4th. The subsequent applications were made by Mr. Hilborn. The details of the experiments in Mr. Blake's orchard were arranged by correspondence, and the work was carried on by the owner. Unfortunately for the conclusiveness of the experiment, but fortunately for the fruit grower, peach curl did not appear, at least to an appreciable degree, in that vicinity this year, so that no information along that line was obtainable.

With regard to its effect on the foliage, no injurious effects were reported by Mr. Hilborn or Mr. Blake.

Specimens of the twigs and leaves treated were forwarded by Mr. Blake on June 18th, on which the following notes were made :—

"Lysol—1½ per cent solution. Leaves healthy, no apparent injury after four applications."

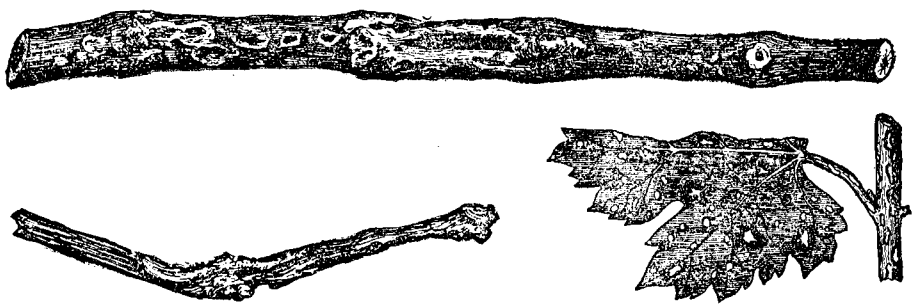
"Bordeaux mixture—three pounds each of copper, suphate and lime, and two ounces of paris green, to 45 gallons of water. Leaves badly scorched." Mr. Blake reports trees "badly damaged."

"Abundance and Bradshaw plums sprayed with mixture were not injured."

I have previously noted slight injury following the application of Bordeaux mixture, of this strength, to peach foliage; the augmented injurious effects in these cases would seem to be caused by the addition of paris green. Mr. Hilborn's experience did not corroborate this result, which renders the explanation more difficult. There is no doubt, however, that Bordeaux mixture and paris green should be applied to peach foliage with much caution, and when injury follows it will be advisable to apply the fungicide by itself, and follow with paris green and lime—two ounces of the former and one pound of the latter to each 50 gallons of water.

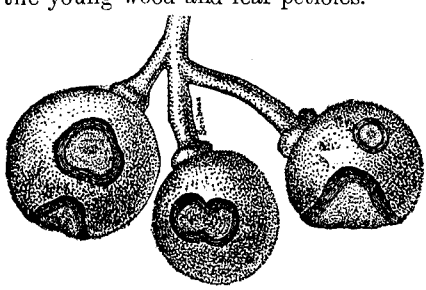
SOME INJURIOUS FUNGOUS DISEASES.

ANTHRACNOSE OF THE GRAPE (*Sphaceloma ampelinum*). This disease was described and its appearance figured in the Horticulturist's Report for 1893. Since that time it has continued to attract an increasing amount of attention in Eastern Ontario and Quebec. In the Experimental Farm vineyard it has been the most difficult to control of any of the parasitic diseases attacking the vines. Among the varieties most subject to attack are the Red Rogers, Norwood, Vergennes and Eldorado.



Showing Anthracnose on cane and foliage.

Only the most persistent spraying and frequent removal of diseased berries have kept it in check. The disease not only destroys the fruit, but defoliates the vines by attacking the young wood and leaf petioles.



Anthracnose on the fruit.

Infested vineyards should be sprayed before growth starts, with copper sulphate, one pound to twenty-five gallons of water. Great care should be exercised in making the application, so that every cane and spur is thoroughly covered. The subsequent sprayings should be made with Bordeaux mixture, which has proved the most effective agent in preventing its development. All diseased fruit and foliage, as far as possible, should be promptly removed and destroyed.

ANTHRACNOSE OF THE RASPBERRY *(Gleosporium venetum).*

The life-history of this disease is give n in Bulletin No. 22. A large number of samples of raspberry canes exhibiting the characteristic effects of the presence of this disease, have been received from various parts of the Dominion during the past year, showing that its presence is now wide-spread. Diseased plants are readily recognized.

a
Sac containing the spores enlarged.

b
An affected cane.

They have small buds and unhealthy looking leaves. The vegetative portion of the fungus penetrates the intercellular spaces of the tissue of the host plant and robs it of its food material. The disease reproduces itself by means of summer spores which are distributed by natural agencies, and it is probably carried through the winter by means of the vegetative portion or mycelium of the fungus, which is supposed to be of a perennial character.

Treatment.—Where plantations are badly infested, the best policy will be to root them up and burn the plants. Where the disease has not obtained a serious foothold, remedial measures may be instituted with success, as follows:—

1. Spray with Bordeaux mixture in the autumn as soon as the canes have been pruned, after harvesting the fruit.
2. Spray early in spring, before the leaves open.
3. Spray again when the young canes appear above ground.
4. Make another application just before blooming time, being careful to cover all the young wood and foliage.

Leaf Spot of the Violet (*Cereospora Violae Sacc.*)

Among florists this is regarded as a serious disease. Samples of injured foliage have been received from various sources. I am indebted to Dr. B. D. Halsted of the New Jersey Experimental Station for kind assistance in connection with the identification of diseases affecting specimens submitted. The disease manifests its presence at first by the appearance of small dark specks on the surface of the leaf. These dark centres soon become surrounded by a lighter coloured margin which increases in size till it attains the diameter of a quarter of an inch or more. A single violet leaf may have a dozen or more of these spots. The affected tissue dies away, and finally the whole leaf. The dark centres contain, as Dr. Halsted says, a "a multitude of spores." These propagate the disease.

Treatment.—While fungicides such as Bordeaux mixture, ammoniacal copper carbonate, and diluted copper sulphate, are beneficial preventives, yet florists do not as a rule begin using them till the disease has become established, when it is too late to expect the best results. Experiments conducted in the violet house of Mr. C. Scrim, of this city, indicate that Bordeaux mixture is the best preventive agent of the three mentioned. It is, however, objectionable on account of staining the foliage and flowers. Ammoniacal copper carbonate gave nearly as good results, and I am inclined to recommend it as preferable for florist's for use.

Dr. Halsted has pointed out that there is another disease (*Phyllostica voilae*, Desm.) which may be a form of this species, at any rate which much resembles it in its effect upon vislets, that may be treated in the same manner. Whether spraying is possible or not, the desirability of promptly removing all diseased foliage should be borne in mind.

Rust of the Carnation (*Uromyces Caryophyllinus*, Sar.)—This disease ranks easily among the most destructive parasites known to the grower of carnations. The following excellent description is given by Dr. Halsted.

"The rust is most easily distinguished of all. It is due to a fungus (*Uromyces caryophyllinus*, Sar.) that develops blister-like patches upon the leaves and stems, which afterwards produce a rusty powder in considerable abundance. This is one of the most recent and the most troublesome of the carnation diseases. Before the blisters appear upon the plant the fungus has grown for some time in the tissue of the infested part, and the advance sign of the blisters is a pale colour in patches several times larger than the blisters which are to follow. When the part is badly infested, the destruction of the green substance (*chlorophyll*) is quite general, so that the plant may have a decidedly sickly appearance."

Treatment.—Various experiments have proved that this disease may be prevented by spraying with the copper salt fungicides. Dr. Halsted recommends four ounces of copper sulphate to a barrel of fifty gallons of water. Bordeaux mixture may be used early in the season, before the flower buds form. Owing to the glaucus nature of the carnation leaf it is somewhat difficult to secure an even distribution of the fungicide upon its surface. By the addition of a gallon of molasses to each barrel of the spraying mixture and by using a vermorel nozzle, aided by a strong pump, a fine misty spray is formed, which effectually covers the plants. Early precautionary treatment is strongly advised. In propagating carnations great care should be exercised in selecting stock absolutely free from the disease from which to take cuttings.

EXPERIMENTS WITH SQUASHES.

Extended varietal tests with squashes have been carried on for the last two years, the detailed results of which are submitted in the accompanying tabular statement. All cultivated varieties of squashes have, according to the most eminent botanical authorities, been derived from three wild types, viz., *Cucurbita maxima*, Duch., *Cucurbita moschata*, Duch., and *Cucurbita pepo*, Linn. The assignment of each cultivated variety to its original progenitor results in a more or less arbitrary classification, on account of their wonderful variability; yet such has been accomplished with apparent success by M. M. Vilmorin & Andrieux, the noted seedsmen of Paris, in their excellent work on "The Vegetable Garden."

The squash, like the corn, tobacco and tomato plants, are natives of warm climates, therefore need for their best development, soil and treatment which will tend to hasten their natural period of maturity. While the majority of the cucurbits (squashes) will ripen their fruit within the limits of our summer season if in warm soil, it is desirable in order to forestall, or lengthen the out-door period by starting the garden varieties in a hotbed. The seed may be sown in pots, four to six in each pot, or planted in inverted sods placed in mild hotbed soon after the middle of April in this vicinity. Both methods were tried in these experiments with little if any difference in the plants so treated.

Where a large number are grown four or five inch pots are more easily and expeditiously handled than the squares of sod, which are apt to break apart in transplanting. When pots are not available and the number of plants required only sufficient to meet the needs of the average household, the sod method is to be commended. In this experiment the plants were set out early in June in sandy loam between rows of young apple trees. Good sized holes were dug twelve feet apart, and re-filled with good surface soil, adding about one-third of barn-yard manure. After setting the plants they were cultivated either by horse or hand once in 10 days till the runners began to take possession of the inter-spaces. No effort was made to prevent them rooting at the joints, although it may be said in passing that extra large specimens may be obtained by reducing the number of fruits upon a single runner, and at the same time encouraging the vine to root by covering it with soil at one of the joints. Among the most desirable forms of summer squashes for garden culture are the bush or non-running varieties, belonging to the vegetable marrow section (*C. pepo*). These are peculiarly adapted to garden culture or in limited areas. They are exceedingly productive and are a much appreciated addition to the list of summer vegetables by those who have grown them.

Interesting data are given in the following table regarding the period of maturity, the yield, size, appearance and productiveness of fifty-six varieties.

Variety.	When tested.	Seedsman.	Date of Sowing.	Date of Planting out.	No. of Hills Planted.	When Ready for use.	No. Matured before Frost.	Weight of two Specimens—lbs., ozs.	Size—diameter.	Depth of Flesh.	Size of Cavity—diameter.	Colour of Flesh.	Remarks on Vines and Fruit each year.
									in.	in.	in.		
Butman	1894	Thorburn ..	April 23..	June 11..	2	.....	9	31·4	10	1¾	6¾	Salmon.....	Resembles Hubbard quite closely, but is later.
"	1895	"	May 1..	" 6..	3	Aug. 19..	12	18·0	....	....	....	.....	
Bay State	1894	Currie.....	" 18..	" 11..	3	.....	17	19·0	8½	2	6	Dark yellow....	A strong grower; turban shaped, rough skinned; late.
Boston Marrow	1894	Thorburn ..	April 23..	" 11..	3	Aug. 28..	15	26·12	9¼	1½	6½	Bright yellow...	A weak grower; ovate, ribbed; early.
"	1895	"	May 1..	" 6..	3	July 31..	19	19·0	....	....	....	.....	Deep pink; turnip shaped.
Brazil Sugar	1894	"	April 23..	" 11..	1	.....	7	39·0	11¾	1¾	8¾	Cream	
"	1895	Johns & Stokes.	May 1..	" 6..	2	Aug. 18..	32	24·0	....	....	....	.....	Long, yellow, striped green half way up from stem.
Buckbee's New Sandwich Isl'd	1895	Buckbee....	" 1..	" 6..	3	Sept. 6..	15	45·4	....	....	....	.....	Long, ribbed green; about ten inches through.
Canada Crookneck	1894	Thorburn ..	April 23..	" 11..	3	Aug. 13..	41	11·0	6	¾	4¼	Bright yellow...	Vine a moderate grower; smooth greenish black; fairly early; productive.
"	1895	"	May 1..	" 11..	3	" 2..	29	16·0	....	....	....	.....	
Cocoanut	1894	"	April 23..	" 11..	3	" 28..	67	3·1	4¾	1	3	Light yellow....	Vine a free grower; cocoanut shaped; very prolific; mod. early.
"	1895	"	May 1.	" 6..	3	.....	....	.....	....	....	....	.....	
Cocozell Bush	1894	"	April 23..	" 11..	3	Aug. 28..	19	14·4	5	1¼	3	Yellowish white.	Vine of strictly bush habit; prolific.
"	1895	"	May 1..	" 6..	3	July 18..	18	12·8	....	....	....	.....	Fruit long green striped with yellow.
Cook's Favourite	1895	Dreer	" 18..	" 6..	3	" 18..	9	23·4	....	....	....	.....	Fruit dark pink, egg shaped; a good cooking variety.
Essex Hybrid	1894	Thorburn ..	April 23..	" 11 .	3	Aug. 6..	18	35·12	12¾	2¾	6½	Bright yellow ..	Resembles Turban quite closely.
"	1895	"	May 1..	" 6 .	3	" 2..	11	29·8	....	....	....	.....	Fruit dark pink, large round to flat.
Early White Scallop	1894	"	April 23..	" 11..	3	July 27..	47	11·2	9¾	2¼	5½	White.....	Vine half bush; fruit half turban shaped; early; productive.
"	1895	"	May 1..	" 6..	3	" 18..	23	11·8	....	....	....	.....	Fruit white, flat scalloped; a good early table variety.
Early Golden Bush	1894	"	April 23..	" 11..	3	" 21..	35	5·8	7	1¾	3½	Light yellow ...	A true bush variety, suitable for garden culture.
"	1895	"	May 1..	" 6..	3	" 15..	30	5 0	....	....	....	.....	Fruit deep orange, scalloped, of medium size.

Extra Early Orange Marrow.	1894	"	April 23..	"	11..	3	"	21..	16	24·0	9½	1⅞	3½	Orange yellow..	Makes few runners; early but unproductive.
" ..	1895	"	May 1..	"	6..	3	Aug.	2..	17	37·0	....	....	....	.....	Fruit deep orange, large, roundish oval in form.
Egg Plant, Bush	1894	"	April 23 .	"	11..	3	July	28..	9	29·4	8¾	1½	6¼	White	Fruit smooth, large; late.
"	1895	"	May 1..	"	6..	3	Aug.	24.	16	35·4	....	....	....	.....	Fruit green, turns yellow when ripe, oblong shaped; not bush, runs freely.
English Vegetable Marrow..	1894	"	April 23..	"	11..	3	July	28..	44	21·0	....	....	....	.....	Vine free grower; fruit oblong; early, productive.
" " ..	1894	Steele .. .	" 18..	"	11..	3	July	28..	28	44·0	8	2¼	4¼	Cream	A well known variety in England; medium.
" " ..	1895	Thorburn ..	May 1..	"	6..	3	Aug.	2 .	43	14·12	....	....	....	.....	do do
Early Sugar	1895	"	" 1..	"	6..	3	Aug.	28..	41	22·8	....	....	....	.....	Fruit dark orange, round like a small pumpkin.
Faxon.....	1894	"	April 23..	"	11..	3	"	6..	21	19·8	9	1½	6	Bright yellow...	Vine strong grower; fruit small, oblate, orange; late.
"	1895	"	May 1..	"	6..	3	"	17..	15	12·8	....	....	....	.....	Fruit creamy green, round to flat, variable in colour.
French Olive.....	1894	"	April 23..	"	11..	3	Sept.	7 .	14	25·0	7½	1¾	5	Deep yellow....	Vine strong grower, many runners; fruit medium size; late.
"	1895	"	May 1..	"	6..	3	"	4 .	9	30·4	....	....	....	.....	Fruit long green; late.
Fordhook	1895	"	" 1..	"	6..	3	Aug.	26..	39	5·8	....	....	....	.....	Fruit light yellow, about 10 inches long, ribbed, tapering to both ends.
Giant Summer Crookneck...	1894	"	April 23..	"	11..	3	July	21..	27	7·8	4	¾	2½	Light yellow....	Weak grower; fruit small, crooked, yellow; early, prolific.
" " ...	1895	"	May 1..	"	6 .	3	"	18.	29	10·12	....	....	....	.....	Fruit orange, long crook-necked and corrugated.
Golden Custard Bush.....	1894	"	April 23..	"	11..	6	"	21..	88	11·0	11¼	3¼	4¾	White.....	Deep yellow, scalloped and incurved; early, productive.
"	1895	"	May 1..	"	6..	3	"	15..	24	19·0	....	....	....	.....	Fruit deep yellow, flat and scalloped.
Hubbard	1894	"	April 23..	"	11..	5	Aug.	27..	30	28·12	11	2	7	Yellow.....	Indispensable for winter use; reliable.
"	1895	"	May 1..	"	6..	3	"	28..	16	31·0	....	....	....	.....	A well known variety; fruit green, oval shaped; late.
Italian Vegetable Marrow...	1894	"	April 23..	"	11..	3	July	28..	24	14·0	6½	1¼	4	Cream yellow...	A bush variety; late.
" " ...	1895	"	May 1..	"	6..	3	"	18..	19	14·8	....	....	....	.....	Fruit oblong, green striped with yellow.
Japan Red Turban.....	1894	"	April 23..	"	11..	3	"	28..	35	7·12	7¼	1	5¼	Pale yellow.....	Makes but few runners; fruit strongly ribbed.
"	1895	"	May 1..	"	6..	3	Aug.	2..	35	9·4	....	....	....	.....	Fruit red, flat or round.
Jumbo	1894	Steele.....	" 5..	"	11..	2	"	14..	10	144·8	21¾	2¾	16	Light yellow....	Strong grower, field pumpkin type; late.
Livingston's Pie	1895	Ewing	" 5..	"	6..	3	"	28..	9	21·0	....	....	....	.....	Fruit yellow, resembles a large musk melon; excellent for pies.
Low's Bay State.....	1894	Thorburn ..	April 4..	"	11..	3	"	13..	18	27·0	10½	2½	6½	Bright orange...	Vine strong grower; med. early; not prolific.

TEST OF SQUASHES, 1894-95.—*Concluded.*

Variety.	When tested.	Seedsman.	Date of Sowing.	Date of Planting out.	No. of Hills Planted.	When ready for use.	No. Matured before Frost.	Weight of two Specimens—lbs., ozs.	Transown—diameter.	Depth of Flesh.	Size of Cavity—diameter.	Colour of Flesh.	General Remarks.
									in.	in.	in.		
Low's Bay State	1895	Thorburn	May 1	April 6	3	Aug. 27	13	23·4	....	....	....	.....	Fruit slate colour, round to flat, large.
Long White Bush Marrow	1894	Steele	" 5	" 11	3	" 6	20	19·4	5¾	1¼	3¼	White	Bush in habit of growth, oblong; early and prolific.
Large Pumpkin from W. J. Kerr.	1895	.....	" 1	" 5	3	" 18	26	52·4	....	....	....	.....	Fruit orange yellow, oval shaped very large, mammoth type.
Mammoth Chili, Pumpkin	1894	Thorb	April 23	June 11	3	Aug. 8	10	79·12	16½	2¼	12½	Orange yellow	Long runners, variable orange yellow and mottled, mixed.
" "	1895	"	May 1	" 5	3	" 18	16	105·12	....	....	....	.....	Fruit light yellow, large, oval
Mammoth White Bush	1894	"	April 23	" 5	3	July 21	28	6·0	8½	2¾	4½	Creamy white	Moderate grower; fruit, yellow, flat, deeply scalloped, early productive.
Mammoth Whale	1894	Child	" 23	" 5	3	Aug. 10	12	98·0	17½	2¾	12¼	Cream	Strong growing variety of pumpkin type, fairly early.
" "	1895	"	May 1	" 5	3	Sept. 15	21	84·8	....	....	....	.....	Fruit long green, when ripe looks like rough sand stone.
Mammoth King	1894	Steele	" 18	" 5	2	" 8	3	55·0	12	2	8	Orange	
Metcalf	1895	Child	" 1	" 5	3	Aug. 8	7	9·0	....	....	....	.....	Fruit deep orange, round to oval; did not do very well.
New Pine Apple	1894	Thorb	April 23	" 5	3	July 28	38	13·0	6½	1¾	3¾	White	Vine a rampant grower, very early, productive, good.
" "	1895	"	May 1	" 5	3	Aug. 9	37	16·0	....	....	....	.....	Fruit, white, scalloped or pine, apple shaped, a good table variety.
New Marblehead	1894	"	April 23	" 5	3	Sept. 4	19	21·12	8¾	1¼	6	Pale yellow	Strong grower, moderately productive but late.
"	1895	"	May 1	" 5	3	Aug. 27	13	23·12	....	....	....	.....	Fruit, light slate colour, egg shaped without ribs.
New Long Bush or Cocozelle	1894	Rennie	" 1	" 5	2	" 18	71	8·0	..	....	....	.....	Fruit, cream colour, short oval, a strong running variety, not well selected.
Perfect Gem	1894	"	April 23	" 5	6	" 27	115	5·6	5½	1¼	3½	White	Vine, a very rank grower, remarkably productive, valuable.
"	1895	Thorb	May 1	" 5	3	" 2	104	3·9½	....	....	....	.....	Fruit, creamy white, a small round nutted variety, good for baking.

Red China	1894	Thorburn	April 23	June	5	3	July 28	28	10·8	8	1½	5¾	Bright Yellow	Identical with Japan Red Turban.
"	1895	"	May 1	"	5	3	Aug. 2	32	9·0					Fruit, the same as Japan Turban.
Salem Valparaiso	1894	"	April 23	"	5	3	" 4	13	83·8	13¾	2¼	9¼	Greenish Yellow	Vine, strong fine grower. Pumpkin type.
"	1895	Currie	May 1	"	5	3	Sept. 6	17	113·12					Fruit, light yellow, very large, nearly round, ribbed.
Summer Crookneck	1894	"	April 23	"	5	3	July 25	27	7·8	4	½	3	Pale Yellow	Moderate grower, very prolific, rather late.
"	1895	Thorb	May 1	"	5	3	" 18	50	7·12					Fruit, orange, long crooknecked and warted.
Summer Crookneck, long green striped	1894	"	April 23	"	5	3	Aug. 14	41	8·8	4½	1	2¾	White	Fruit, green crooknecked, warted a late variety.
Summer Crookneck, long green striped	1895	"	May 1	"	5	3	" 18	52	12·0					
Sugar Pumpkin	1894	Steele	" 18	"	5	2	Sept. 20	31	18·4	9½	1½	7¼	Orange	Vine, a fair grower, turban shaped, black turning orange, late.
Silver custard	1895	Thorb	" 1	"	5	3	July 18	33	10·8					Fruit, white scalloped and flat.
Turban	1894	"	April 23	"	5	3	Aug. 6	12	39·12	10	2¼	6¾	Bright Yellow	An old standard, summer and autumn variety.
"	1895	"	May 1	"	5	3	" 8	19	41·0					Fruit, deep pink, large round or flat, the same as Warren.
Warren	1894	"	April 23	"	5	3	" 13	14	30·0	9¾	2¼	7½	"	Vine a fair grower, moderately early, productive.
"	1895	"	May 1	"	5	3	" 9	19	29·8					Fruit, deep pink, large, round or flat.
Winter Crookneck	1894	"	April 23	"	5	3	" 27	16	29·2	8½	1¼	6½	Green Orange	Vine, moderate grower, large crookneck, black, green or marbled, late.
White Chestnut	1894	"	" 23	"	5	3	" 8	13	20.8	8½	1¼	6	Green Yellow	Strong grower, medium size, rough, late.
"	1895	"	May 1	"	5	3	" 19	13	20·12					Fruit, white oval or round.
Der Wing	1895	"	" 1	"	5	3	" 15	38	3·4					Fruit, cream, white from 7 to 8 inches long, warted.
Dunlap's Early	1895	Gregy	" 1	"	5	3	July 18	11	18·0					Fruit, deep pink turnip shaped, very early.
New Yokohama	1895	Joh'sn&Stok	" 1	"	5	2	Sept. 6	18	26·8					Fruit, dark green, round to flat, rough and netted.
Sweet Potato Pumpkin	1895	Thorb	" 1	"	5	3	Aug. 18	13	18·0					Fruit, white, egg shaped.
Sweet Nut	1895	Dreer	" 1	"	5	3	" 18	23	20·0					Fruit, white, large, oblate or round.
Sticklers Summer	1895	Gregy	" 1	"	5	3	July 18	32	12·0					Fruit, deep orange, long crooknecked and warted.
Pen-y-Byd	1895	Ewing	" 1	"	5	3	Aug. 18	50	12·12					Fruit, light yellow, small, nearly round.
Pikes Peak	1895	Thorb	" 1	"	5	2	Sept. 6	13	20·4					Fruit, light slate color, oblong.

VARIETIES RECOMMENDED.

Early Golden Bush.—This ripened fruit in from five to six weeks after setting. It occupies a small amount of space and is very productive.

English Vegetable Marrow.—Ripened in six to seven weeks after setting out. Productive: much prized for table use.

New Pine Apple.—This is an interesting early productive variety, requiring as much room as the Vegetable Marrow. The fruit is nearly flat and scalloped at base, but sharply conical, and considerably elongated towards the opposite end. Useful as well as curious.

Perfect Gem.—Vine a very strong grower, exceedingly productive. Fruit, small, round, about the size of a cocoanut, ribbed fleshy with small cavity, medium early. This is much valued as a baking squash by those who have tried it in this way. Halved and baked in a quick oven it approaches in flavour nicely cooked sweet potatoes.

Among others which have been commended for pies by those who have tried them, are *Cook's Favourite, Giant Summer Crookneck, Essex Hybrid, Dunlaps Early, Sweet Potato Pumpkin* and *Pen-y-byd.*

Of winter varieties, *Hubbard*, a well-known sort, it is safe to say, still takes the lead, although *Bay State* gives promise of being a useful variety.

Butman.—Proved to be a keeping variety of some merit.

TOBACCO.

Experiments with this crop have been continued each year since the work was commenced in 1893.

In accordance with results gained the first season the plants have always been transplanted in the hot-bed previous to setting in open ground. The plants were set out on June 5th. The soil was a gravelly loam, dressed with 30 loads of barn-yard manure per acre the previous year.

The plants were set in rows 3 x 4 feet apart. The ground was cultivated frequently with a Planet, Jr., cultivator, as long as it was possible to pass it between the rows, without injuring the leaves. The plants were "topped" and "suckered" as often as seemed necessary, and were harvested by the "single leaf method" between the 17th and 25th of September. The leaves were, at harvesting, separated into two grades, according to size and quality—that is colouring and freedom from injury. After drying for two months in a loft, where the conditions were not as suitable as could be desired, the leaves were again sorted and tied up in "hands." Three grades were made this time, according to size, colouring and soundness. In the tabular statement which follows, particulars regarding the yield of the different varieties are submitted. It will be noted that the estimated yields of green leaf are somewhat larger than in 1893, and that the dried leaf very much exceeds in weight the previous records. The latter fact may partly be accounted for by stating that the humid condition of the atmosphere prevailing through the autumn months prevented the leaves losing as much moisture as they otherwise would under ordinary atmospheric conditions. The quality of the leaf was better, as a rule, than in former years.

Experiments with Tobacco Plants.

Tobacco, 1895.	Seedsman.	Date of Sowing.	Date of Transplanting in Hot Bed.	Date of Planting out.	Number Planted out.	Date of Gathering.	Number of Plants Gathered of.	Weight of First Grade Green.	Weight of Second Grade Green.	Weight of First Grade when made into hands.	Weight of Second Grade in hands.	Weight of Third Grade in hands.	Estimated Weight per acre, Green.	Estimated Weight per acre, dry.
								lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs.	lbs.
Big Boston	Evans	April 5.	May 17.	June 5.	25	Sep. 23.	25	43 0	24 8	10 0	2 8	4 8	9,801	2,468
Canadian	"	"	" 9.	" 5.	98	" 25.	95	142 8	70 0	8 12	24 8	14 8	8,100	1,834
Cannelle	"	"	" 9.	" 5.	70	" 18.	69	63 0	44 8	7 0	3 8	4 0	5,629	789
Connecticut Seed Leaf	"	"	" 9.	" 5.	102	" 25.	101	382 0	86 10	51 0	19 0	16 0	16,988	3,091
Climax	Thorb	"	" 9.	" 5.	159	" 17.	144	423 8	122 8	80 8	26 0	31 12	13,440	3,479
Gold Leaved	Evans	"	" 9.	" 5.	91	" 26.	88	126 8	68 8	15 0	19 4	20 4	8,002	2,269
Hester	"	"	" 17.	" 5.	24	" 18.	23	58 0	12 8	8 8	5 8	2 12	10,965	2,683
Hartford (15)	"	"	" 9.	" 5.	108	" 19.	106	358 8	98 8	64 8	8 12	26 4	15,648	3,424
Maryland	"	"	" 17.	" 5.	68	" 18.	65	150 8	50 8	27 12	6 1	11 8	11,169	2,513
Sterling	"	"	" 9.	" 5.	151	" 25.	140	229 8	75 8	36 8	23 5	15 4	7,908	1,944
White Burley	"	"	" 17.	" 5.	85	" 17.	82	341 0	155 4	49 8	18 8	9 0	21,957	3,367
Yellow Pryor	"	"	" 9.	" 5.	105	" 18.	103	256 0	81 8	29 0	15 1	17 0	11,877	2,109
Penn. Seed Leaf	Thorb	"	" 9.	" 5.	135	" 17.	130	493 8	97 8	62 0	20 0	11 0	16,503	2,597
Yellow Mammoth	"	"	" 17.	" 5.	40	" 25.	40	158 8	46 8	33 0	7 0	5 8	18,604	4,174
Sweet Oronoko	Ragland	"	" 9.	" 5.	43	" 19.	43	95 4	41 0	17 12	3 4	8 0	11,480	2,448
Virgina Oak Hill	Thorb.	"	" 9.	" 5.	85	" 23.	82	211 0	63 0	48 4	3 4	14 0	12,154	2,922

Made into hands from the 26th Nov. to 11th Dec.

In order to gain a manufacturer's opinion of the special values and qualities of these tobaccos, 3-pound samples of the following varieties were submitted to Mr. J. M. Fortier, tobacconist, of Montreal, who made them up into the class of goods for which he deemed them best fitted. His report is as follows :—

REPORT of J. M. Fortier on Tobacco grown on the Experimental Farm, 1894, to the Horticulturist, Ottawa, Ont.

Name of Varieties.	Adapted for.	Amount manufactured.
Honduras	Chewing ; this variety does not burn	3
Muscat de Perse	Cut smoking, cigarettes	
Sumatra	No good now ; poorly cured ; leaf small	
Penn. Seed Leaf	Cigars, fair quality	
Stirling	Plug smoking	3
Tennesee, red	Cut smoking	2
Canadian (Evans)	Chewing plug, honey	6
Quesnel or Cannelle	Cut smoking, very fine for pipe and smoking plug	5
Connecticut Seed Leaf	Cigars	
Brazilian	Cigarettes	
Safrano	Cigarettes	
Pryor, Yellow	Plug, bright, smoking	6
Pryor, Blue	Cut, smoking	3
Hestor	Navy chewing	3
Oronoko, White stem	Navy chewing	3
Oronoko, yellow	Honey chewing	3
Havana Vuelta Abajo	Cigars, fillers and cut for pipe smoking ; seconds ; third crop may become better	
Imperial Havana Partidas	Bitter and requires to be fermented for cigars	
Persian Muscatellar	Cut tobacco ; poor	
White Burley	Plug, smoking ; yellow ; cigarettes, good all round ; best paying.	2
Tackahoe	Navy chewing	3
Virginia Oak	Cigarettes	
Yellow Mammoth	Mild cigarettes ; good ; plug and pipe smoking	1½
Climax	Plug smoking, same as White Burley, only superior in aroma	2½
Persian Rose	No use for smoking, poor aroma ; good for chewing	

In looking over the above report, it is seen that the collection of varieties may be sub-divided according to the form of the manufactured product for which they seem best fitted.

CIGARS.

Pennsylvania seed leaf.
Connectient seed leaf.

SMOKING.

Quesnel (Cannelle).
Pryor yellow.
White Burley.
Climax.

CHEWING.

Canadian.
Oronoko White.
" Yellow
Yellow mammoth.

CIGARETTES.

Brazilian.
Safrano.

The yield of the dried leaf of these varieties in 1893 was as follows:

Variety.	Estimated yield per acre, lbs.
Brazilian	1,107
Climax	1,636
Canadian	1,004
Connecticut Seed Leaf	1,826
Oronoko White Stem	1,185
" Yellow "	1,386
Pennsylvania Seed Leaf	1,736
Pryor Yellow	1,165
Safrano	1,747
White Burley	1,468
Yellow Mammoth	1,676
Quesnel	648

REMARKS.

Conn. Seed Leaf, Penn. Seed Leaf, Yellow Mammoth and Climax require careful handling here and in similar localities in order to bring them to maturity before autumn frosts. They should be started early in the spring in the hot-bed and transplanted in cold frames before setting out in the field. It is better to transplant on the late side than run the risk of injury by cold rains or low temperature.

Samples of dried leaf received from British Columbia have been of a high degree of excellence, showing good burning qualities. It would seem reasonable to suppose that it could be grown with success upon the more elevated plateaux when the summer heat is sufficient to bring it to maturity in full possession of its essential qualities.

REPORT

OF THE

ENTOMOLOGIST AND BOTANIST.

(JAMES FLETCHER, F.R.S.C., F.L.S.)

W. SAUNDERS, Esq.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to hand you herewith a report on some of the more important subjects which have been brought officially under my notice during the past season. In addition to those matters mentioned in the report there are many others which have either been already treated of at some length in previous reports or concerning which further investigation is necessary. The greater part of the inquiries during the past season, as has been the case in previous years, referred to insect injuries to fruits. Some of the well-known pests have appeared in unusual numbers in certain localities or have extended their previously recorded range. The Diamond-back Moth (*Plutella cruciferarum*, Zell.) was very abundant from Manitoba westward to the Pacific coast, occurring upon all cruciferous plants grown as crops, particularly turnips and cabbages, and also on many weeds belonging to the same family of plants. Cut-worms of two or three kinds gave trouble in Ontario and Manitoba; but inquiries on these injuries were this year fewer than usual. The Amputating Brocade Moth (*Hadena arctica*, Boisd.) occurred in the perfect form in enormous numbers in western Ontario, and many specimens were sent in for identification. The same thing was the case with the Clandestine Owlet Moth (*Agrotis clandestina*, Harris), in Manitoba and the North-west Territories as far west as Calgary.

The Cabbage and Turnip Aphis (*A. brassicæ*, Bouché) was abundant and injurious on cabbages in gardens in Victoria, B.C., on turnips in Ontario, Nova Scotia, and Prince Edward Island. The injuries, as far as I could obtain specimens, seemed all to be due to the same species. It is difficult to treat this insect in field crops, but much may be done by watching carefully in August when hoeing turnips, and by destroying all colonies found. At that time the colonies are generally small and few in number. On cabbages in gardens kerosene emulsion or tobacco wash may be used.

The black aphis of the horse bean was sent from Nappan, Nova Scotia, where it was sufficiently abundant to completely kill the beans in spots. Specimens of the aphis were sent to Prof. T. A. Williams, of South Dakota, for identification, and he replied:—"The bean lice are what has passed in America for *Aphis medicaginis*, Koch; I am not yet sure that our insect is identical with the European species, but it is quite likely to be so."

A rather severe outbreak of the Carrot-fly (*Psila rosæ*, Fab.), a very rare attack in Canada, occurred at Rothesay, N.B., and Mr. J. S. Armstrong gives some interesting data as to the immunity from injury of some late-sown carrots.

The two attacks most often mentioned by correspondents in the Maritime Provinces were of the Colorado Potato Beetle (*Doryphora 10-lineata*, Say) and the Horn-fly. It is satisfactory to learn of the general adoption both in Nova Scotia and Prince Edward Island, of the only practical remedy, viz., Paris green poisoning, for the former. The Rev. Father Burke, of Alberton, P.E.I., writes as follows:—

"November 10.—Potato Bug, Colorado Beetle.—As soon as the frost left the ground, great numbers of old beetles began to move about in their energetic way, all over the country. The wooden sidewalks of our towns and villages were literally swarming with them. Everybody began to fear for the potato crop, and, for the first time, a

general conviction forced itself upon the growers that they would have to be fought tooth and nail this year. The early season was dry, and the potato vine was scarcely up when the clusters of yellow eggs were everywhere discernible. Indeed, eggs were laid on blades of grass and everywhere. The general recourse was to Paris green; we were lucky in getting a fairly pure article. The havoc was fearful. Some farmers who still fear the Paris green, and a number of gullible people, bought "bug catchers" from enterprising agents. Of course, these people lost their time and money. A few applications of Paris green, however, thinned out the bug army very effectually. Towards the end of July we had copious rains. As you know, vegetation is very rapid here. The vines soon pushed forth such a growth that the few bugs left were not able to do any damage. We have had a grand crop of potatoes throughout the whole province—large and fine-looking and of superior quality."

The Horn-fly (*Hæmatobia serrata*, Rob.-Desv.) is now at its worst in Nova Scotia and Prince Edward Island. Father Burke says:—

"The Horn-fly appeared early in June this year, and soon so multiplied as to be a constant torment to cattle. All kind of oiling, spraying, etc., seemed almost useless. In August the milk supply was much reduced all over the country. Reliable dairymen computed their loss at 50 per cent. This fly also gave in many places much annoyance to horses, attacking them in the same way as the cows. Farmers used codfish oil, castorine, machine oil, emulsion of kerosene—anything they could get. The emulsion had little effect. Many must have injured their cows by daubing them with thick crude petroleum and castorine."

There is every reason to anticipate that the experience of the farmers in the Maritime Provinces will be the same as in all other parts of Canada, namely, that by the third year the Horn-fly attacks decrease in virulence and by four or five years they are hardly noticeable.

A new attack of much interest was widespread in pastures on Cape Breton Island last season. This was by the Cottony Grass-scale (*Eriopeltis festucæ*, Fonsc.). Little is known of the habits or extent of possible injuries by this insect; but as it winters on the old grass, firing this grass in winter or early spring would probably be an easy means of keeping the insect within due limits.

The subject of weeds has taken up much of my time during the year. Two weeds of special importance in the west are treated of and figured in the body of the report; but much other information is preserved for future publication in bulletin form.

As in the past, whenever my official duties would permit of my absence from Ottawa, every opportunity has been embraced of attending and delivering addresses at meetings of farmers and horticulturists. In this way, information has been given on many subjects coming within the scope of my department, and the utility of the department itself has been made known more widely.

By instruction of the Honourable Minister of Agriculture, I had the great advantage of visiting Manitoba, the North-west Territories and British Columbia during the past summer: this journey was of very great use to me in my work, and I trust may prove to be also to the various places visited. Large collections of plants, seeds and insects were secured in addition to the observations and notes which were made.

I have again gratefully to acknowledge much assistance from the specialists in Canada, the United States and Europe, whose names will be mentioned under the subjects which have been referred to them. Especial thanks are due to the United States Entomologist, Mr. L. O. Howard, and his staff for many favours, and to Prof. John Macoun and Mr. J. M. Macoun for assistance on very many occasions in identifying difficult plants.

Above all I wish publicly to acknowledge the great help I have received in all branches of my work from my assistant, Mr. J. A. Guignard, B.A., who by his assiduous attention has done very much to bring the department of the Entomologist and Botanist to such degree of efficiency as it has attained.

I am, sir,
Your obedient servant,
J. FLETCHER.

CEREALS.

Notwithstanding the prolonged drought which this year prevailed throughout the greater part of the grain growing districts of Ontario, Quebec and the Maritime Provinces, the crop of the whole Dominion is an enormous one and has been saved in good condition.

Wheat and oats in Manitoba and the North-west are the heaviest crops in the history of the country.

In referring to the slight damage by frost in the Manitoba *Crop Bulletin* No. 45, Dec. 10th, 1895, it is stated:—"The thermometer on the night of August 19 indicated a few degrees of frost in different parts of the province west of the Red River Valley. Damage is reported by some correspondents as "slight," by others as more serious. A more general cause of loss is reported to be the prevalence of smut. This is much to be regretted, as it is generally admitted that a preventive can be used." Of the subjects belonging to my department affecting grain crops in Manitoba, smut is the only one requiring mention. See page 141.

In the Ontario *Crop Bulletin*, November, 1895, it is stated:—"Oats: this is the big crop of the year. Increased acreage and the high average yield of 35·7 bushels per acre have given a total of 84,697,566 bushels for 1895."

In the Nova Scotia Government *Crop Report* for November, we find:—"No complaints of rust or other troubles have been made, so that we must conclude that, drought notwithstanding, the oat crop must have come nearly up to the expectations of the growers."

The reports received here of injuries to the grain crops have been usually few during the year. The HESSIAN FLY has only been sent in from two widely separated localities, one in North Ontario, the other in Prince Edward Island, where, however, it is stated by Mr. N. McPhee, of Heatherdale, that although the crop this year was only slightly affected, Russian wheat has been almost a total failure for the last few years owing to its depredations. The WHEAT MIDGE, which for many years caused the largest amount of injury to small grains in all parts of Eastern Canada, was not this year mentioned at all by correspondents, the only notice of it that I have seen being in the Nova Scotia *Crop Report* for November, 1895, where it is stated that it has entirely disappeared in one section. Specimens required for experiments were not obtainable in the Ottawa district nor in Manitoba, the North-west, nor British Columbia. A rather serious outbreak of the Joint-worm on wheat at Meaford, Ontario, is treated of at some length later.

The GRAIN PLANT-LOUSE (*Siphonophora avenæ*, Fab.) occurred more or less numerously on wheat, oats and rye in almost every province of the Dominion, and the fact may be pointed out that, although attacking oats in Nova Scotia and New Brunswick, it was particularly noticed that there was no occurrence this year of the curious disease spoken of in previous reports as "Red Leaf" of oats, which some had thought was caused by the attacks of this insect. It was noticed in some abundance at Agassiz, British Columbia, and on Vancouver Island; but, as is nearly always the case, its presence affected the yield very little, on account of its being in every instance kept well in check by parasites. A sample of infested oats sent by Mr. Wm. Bartlett, from Inholmes, Ontario, in the Muskoka district, had nearly every specimen of the plant-lice parasitized by a small Braconid, which Mr. L. O. Howard has identified for me as *Aphidius obscuripes*. About the middle of June Prof. J. H. Panton, of Guelph, reported damage to oat fields near Paisley and Fullarton, Ontario, by the GLASSY CUT-WORM (*Hadena devastatrix*, Brace). This caterpillar is frequently injurious to fall wheat and grasses of many kinds. The caterpillar is of a dirty greenish white with a reddish head and has on its body several small bristle-bearing warts arranged over the surface in the position usually found in this family of insects.

The PEA MOTH, treated of in my last report, still continues its ravages unchecked. I regret to say that so far every one has failed in breeding this pest, so that its identity is still in doubt, and no suggestions of practical value have been made as to remedies. Complaints of injury from Prince Edward Island to Manitoba have been received; the seeds of many wild members of the pea family in the woods were also found to be much attacked wherever examined, notably those of *Lathyrus venosus* at Brandon, Man., about half a gallon of pods giving only half a small tea-cupful of seed.

Fig. 1.—The Pea Weevil.

The PEA WEEVIL (*Bruchus pisi*, L.) is still very abundant, judging from samples of tested pease returned to the Experimental Farm, but it has seldom been mentioned in correspondence. On the whole, perhaps it has been slightly less destructive this year than last, although one correspondent writes from Prince Edward county, Ont.:—"Since the introduction of United States pease supplied by the seed companies, the weevil has been more plentiful in this country and is increasing, notwithstanding the efforts made by the companies." This increase, however, is not enough to affect the crop to any great extent. There is no doubt that the Pea Weevil has now become so established in some parts of Southern Ontario that it will take considerable time to reduce its numbers perceptibly. As, however, its habits are so well known, and, as by far the greater number of the beetles pass the winter inside the seed, there is no doubt that a great deal more might be done by the farmers and small growers, in either treating their seed before sowing or holding it over in tightly closed vessels or bags till the second year. From all I can learn, those merchants who do business on a large scale, systematically disinfect their seed before sending it out, with bisulphide of carbon. The injury to the crop is done by grubs from eggs laid by weevils which had either left the pease in the autumn and had wintered about barns or other buildings, or else from pease saved for seed in small quantities by farmers who took no steps to destroy the weevil before sowing time.

THE JOINT-WORM.

(*Isosoma hordei*, Harris.)

At the end of June, stems of fall wheat were received from Mr. Thomas Harris, of Meaford, Ont., on the Georgian Bay, bearing the galls of a Joint-worm, closely resembling those figured (Fig. 2), except that, where they occurred on the stem, in almost every instance it was bent abruptly at a right angle, away from the side of the stem where the gall occurred. Although the perfect insect of the Joint-worm (Fig. 2), which is a tiny black fly only about $\frac{1}{10}$ of an inch in length with clear transparent wings and pale legs, is by no means rare in some parts of Canada, where collections of insects have been made, its injuries to crops have been very rarely recorded or noticed. A very complete article, however, by the Rev. Dr. Bethune appeared in the *2nd Annual Report* of the Entomological Society of Ontario (1871). In this article, the insect and its habits are carefully described and mention is made of some excellent observations of Mr. Johnson Pettit, of Grimsby.

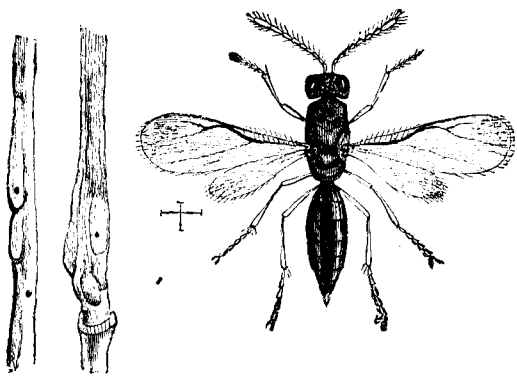


Fig. 2.—The Joint-worm: galls on wheat stems, natural size; fly, enlarged.

In Stoddart's *Encyclopædia Americana*, under the title "Agriculture," is a concise account of this insect by the late Dr. C. V. Riley, which reads as follows:—

"The Joint-worm (*Isosoma hordei*, Harr.). In years past the Joint-worm has done much damage to the wheat, oats, rye and barley crops of the more northern and eastern

states. It belongs to the only plant-feeding genus of the parasitic family *Chalcididæ*. The eggs are laid near the base of the stalks of grain in the latter part of May or the first of June. The young larvæ form slight gall-like swellings of the stalks, in which they feed, dwarfing the stalk and reducing the yield. Most of the larvæ winter in the stalks, but a few transform and appear as flies in late fall. They are destroyed by the chalcid parasite (*Semiotellus chalcidiphagus*, Walsh). Remedy: It is obvious that burning the stubble after harvest will prove an effective remedy."

The injured straw sent in by Mr. Harris bore galls which were undoubtedly caused by the Joint-worm or a closely allied species of the same genus, although the galls do not quite agree with any of the descriptions I have been able to consult. The following information accompanied the specimens or was given in reply to inquiries :—

" Meaford, Ont., June 24.—I send you a sample of fall wheat affected (as I suppose) with Hessian Fly. This is the first time I have seen anything like it on my farm. The wheat was sown about the middle of September last, on pea stubble after sod ; the ground was very clean and had borne no wheat crop for several years."

" July 27.—In reply to your inquiry as to the percentage of crop affected, since the crop has matured and is now cut, I would estimate the damage at about 5 per cent of the entire crop, although some spots seemed to be more affected than others. I have had no opportunity of investigating, but from conversation with other farmers I learn that it has appeared in other fields than my own. It is something quite new to me, as I have never observed anything just like it before. I have been on the watch for some years, expecting the Hessian Fly to make its appearance among us, and thought I had found it, when I sent you those specimens.* I now send you a fresh sample of the diseased heads and some of the sound heads from the same field selected on the same day, viz., 24th July, the day we cut the field of wheat. I thought it would be better to wait till the whole crop matured, so that I could form a better idea of the amount of damage done by this new pest."—THOMAS HARRIS.

Fig. 3. Hessian Fly : puparia.

Two parcels of injured wheat stems were received from Mr. Harris. In almost every instance, the galls which are conspicuous, elongated, irregular, many-celled excrescences, were situated at the very base of the topmost ear-bearing section of the stem, immediately above and in most cases also including the thickened joint.

The greater portion of the gall, which is about three-quarters of an inch in length by one-quarter of an inch at its widest part, is always above the joint in the tissue of the base of the leaf-sheath which becomes hard, woody and thick and presses so much on the stem inside it that this is squeezed and confined, and, therefore, can neither develop properly nor convey the necessary nourishment up to the forming grain. As a consequence, upon comparing the product of several ears from infested stems with those from uninjured ones, it was found that the grains of wheat had been reduced by about two-thirds, both in number and weight, from what they would have been.

A most interesting evidence of an effort made by the plant to repair the damage done by the Joint-worm, was the presence at the base of nearly every gall, of more or less developed true rootlets ; these were usually 3 or 4 in number and varied in length from one-eighth of an inch to four and a half inches. In the case of the longer rootlets, these had run down close to the stem inside the sheath of the leaf immediately below the joint from which they sprang. From their development and their copious covering of root-hairs, these rootlets must have obtained considerable moisture and have helped materially in bringing the grain to maturity.

The cells in the galls vary in number from about 5 to 12, and there are sometimes, besides, 1 or 2 detached cells separated a short distance from the main body of the gall and further away from the joint. In rare instances the galls run down a little below the joint, and in such cases (in the specimens examined by me) these 2 or 3 cells are not

* As a matter of fact, there were a few specimens of Hessian Fly larvæ infesting the stems sent by Mr. Harris, but, as may be seen from Fig. 3 above, the brown flax-seed-like puparia lie outside the stem beneath the sheath of the leaf, not inside the tissues as in the case of the Joint-worm.

in the leaf sheath like those above the joint, but in the tissues of the culm or stem proper.

In addition to the above galls at the base of the topmost ear-bearing joint, there were also, on one or two of the stems sent, other similar galls at the base of the same stems, and in one specimen the gall formed a rosette of short aborted leaves about an inch long having the bases of each leaf hard and swollen and containing 2 or 3 cells. This was at the summit of a short stem not more than two inches from the ground.

Judging from the many published accounts of the Joint-worm, the nature and mode of occurrence of the galls vary somewhat; nearly all observers have described the galls as occurring on the lower joints of the wheat stem, close to the ground. In the wheat sent to me from Meaford, on the other hand, they were almost invariably at the topmost joint, although judging from what is known of the habits in other places, it is very probable that there were in the field many stems injured at the base, which were not noticed by Mr. Harris. Many writers describe the larval cells as being in the stem, whereas this was most exceptional in all the specimens examined by me, they were mostly in the sheathing leaf. The descriptions which agree best with my own observations, are by Dr. Harris in his "*Insects Injurious to Vegetation.*" He says:—"Dr. Fitch found the disease of the wheat-straw to be situated immediately above the lower joint, in the sheathing base of the leaf, the substance of which, for a distance exceeding half an inch, was much swollen and was changed to a more solid and wood-like texture, while the surface exhibited several long pale spots, slightly elevated like a blister. The hollow of the stem was entirely obliterated, at some parts, by the pressure of the enlarged portion of the sheath, and was hardly visible at others. Each of the blistered spots covered an elongated cavity containing a footless worm or maggot about one-tenth of an inch long. * * * Upon examining my samples, I found that the disease was not invariably confined to the sheathing base of the leaf, but that, in many cases, it was seated in the joint itself, the whole substance of which became enlarged and distorted. In a smaller number of cases it was found to occupy the culm or stem, above the joint, which was swollen so as to form an irregular gall-like tumour, while the leaf-sheath remained unaffected. These woody tumours have several little cells in them, varying in number from six to ten or more; and every cell contained an insect."

Prof. F. M. Webster, in his bulletin on "*Insects which burrow in the Stems of Wheat,*" April, 1892, says:—

"Speaking of the effect on wheat straw in Virginia, in 1851, Dr. Fitch says that they might be like an enlarged tumour, or only slightly elevated and blister-like. Prof. Cook found that the insect affected the straw in much the same modified way or perhaps still less prominently. The location of the larvæ in the straw may vary from the vicinity of the second joint, as recorded by Dr. Harris; in the sheath or lower portion of the stem, as recorded by Glover; or in the vicinity of every joint, except the uppermost, as observed by Cook." To the above record we may now add that it does occur abundantly above the uppermost joint.

So far as known, the Joint-worm is single brooded in Canada, the perfect flies appearing in June, galls being well formed by the end of the month, and, normally, the winter is passed in the larval condition.

Remedies.—Under this head I cannot do better than quote the following from Dr. J. A. Lintner's *Fourth Report*:—

"It is fortunate that we have at our command means for controlling the depredations of this insect, which are simple, easy and inexpensive.

"Since its entire life, from its hatching to its emerging in its perfect state, is passed within the straw and in quite a limited locality therein, it is evident that if the straw be destroyed by burning or by any other as effectual a method, at any time prior to the emerging of the winged insect, the entire brood will be destroyed with it.

"If the grain is not cut unusually close, a large proportion of the larvæ will be left in the stubble. The stubble of an infested field should be burned over at any convenient time favourable for the burning."

(This refers to the usual mode of occurrence of the galls close to the ground. To facilitate the operation of burning, a little dry straw may be scattered lightly over the stubble.—J. F.)

"It is believed that a deep ploughing-under of the infested stubble would be fatal to the contained larvæ, and almost as effective as burning. An ordinary ploughing was found ineffective in Massachusetts, as the insects, having only been buried to a moderate depth, completed their transformation and made their way to the surface.

"The broken-off, hardened pieces of the straw observed in threshing and cleaning, should be carefully collected and burned. The grain should also be examined for these pieces and picked out by hand.

(Sometimes no galls are formed, the presence of the larvæ causing merely slight swellings and a hardened thickened condition of the straw: these portions break off in threshing, and are sometimes carried through with the grain.—J. F.)

"Examination should be made of the threshed straw, and, if the larvæ are found therein, it should be destroyed, either by feeding or some other consumption of it before the ensuing spring. Dr. Harris records an instance where so many of the insects infested a straw bed in Cambridge, Mass., that they proved troublesome to children sleeping in the bed—their bites or stings being followed by considerable inflammation and irritation, which lasted several days. So numerous were they, that it was found necessary to empty the bed-tick and burn the straw."

SMUT IN SMALL GRAIN.

As in 1891, so during the past season, a great deal of hard smut occurred in the enormous wheat crop of Manitoba and the North-west. The following letter from the Manitoba editor of the *Farmers' Advocate* and the reply thereto will, it is hoped, draw the attention of the farmers of Canada to this important subject:—

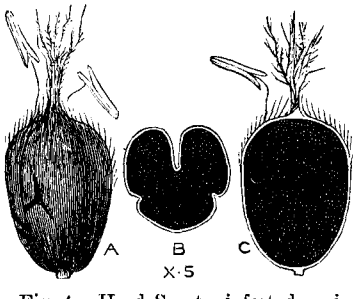


Fig. 4.—Hard Smut: infested grain enlarged.

"Winnipeg, Manitoba, 25th November, 1895.—As you are probably aware, there is a greater prevalence of smut through this western country this year than there ever was previously, and, in spite of all that has been said and written of the necessity of thoroughly bluestoning all seed wheat every year, still we find many farmers who have been careless in this respect. We also find a good many who claim that they did apply the bluestone treatment, and yet have their wheat more or less injured by this pest. Personally, I have every faith in the bluestone treatment, when thoroughly applied, as a preventive of ball smut in wheat and loose smut in oats and barley. I have read all the American and Canadian bulletins that I could get hold of on this subject, but failed to obtain any information that would help one to form a theory accounting for the great prevalence of smut in this country, or why it should be much worse this year than other years. The only thing that occurs to me that may have effected the prevalence this season was the long, cold spring, during which wheat plants remained in a fit condition to receive the attacks of the fungus for a longer period than usual."—GEORGE H. GREIG.

Reply—"In reply to your question, I think you have struck right at the root of the matter when you suggest that the cause of the prevalence of smut this year is the much longer period last spring than usual when, owing to the copious rains, the conditions were favourable for the spawn of the developing fungus to attack the young wheat plants. See page 8, of *C. E. F. Bulletin* No. 3, where the growth of the smut plant is described from the spore to the stage when it is ready to attack the young wheat plant. It is first of all a self-sustaining plant growing in the soil, but when it comes in contact with the wheat plant it becomes a parasite, living in the tissues of the latter, and the prevalence or otherwise of smut is largely due to the weather being favourable to its development before it reaches the wheat plant. In my 1891 report the subject is

treated at some length. On page 206 you will find an article which I prepared for the *Farmers' Advocate*. The matter of bluestoning or 'pickling' wheat is one of those in which wise and thrifty farmers will always succeed better than the lazy or shiftless. There is now not the slightest doubt of the advantage of this treatment, and yet year after year apparently sensible men will neglect this inexpensive and easy method of preventing so much loss. Upon the Experimental Farm at Indian Head last summer I was particularly struck with some plots which Mr. Mackay had growing, side by side, of treated and untreated wheat, showing very plainly the great advantage of attending carefully to this matter. One of the most remarkable features of this whole subject is the way in which farmers will try and excuse their laziness—for that is really what it is—by shaking their heads, looking wise, and pretending that their neglect is due to some doubt existing about the way in which smut develops. The life-history of this parasite, for all practical purposes, is perfectly well understood, and has been for fifty years.

"A treatise on the disease was written as long ago as 1755, and for a hundred years it has been known by common-sense farmers in Great Britain, that, if they treat their seed, the crop grown from that seed is so much cleaner from smut that it pays them many times over for the trouble and expense of the operation. Moreover, this has been universally the experience of farmers in Manitoba and the North-west and it does seem strange when everybody knows how much depends upon it that farmers will dispute and argue and waste time over the development of the disease, a subject that really is of no interest to them practically, and the same men will neglect what at any rate, whether they understand the reason of it or not, they know to be a fact, that, if they 'pickle' their seed wheat, they will have a clean crop, and, if they do not, they will in all probability have a smutty one."—J. F.

Under date 28th December, Mr. Greig wrote: "I found at our late meetings of the Farmers' Institutes, that every intelligent person was willing to admit that bluestoning is a satisfactory preventive for smut when properly applied."

Remedies.—For practical purposes, all the different kinds of smuts which attack the various small grains may be treated as being the same, for all can be overcome by the same remedy. Many remedies have been recommended. Of these I advise the following as the best, which I think will meet all requirements:—

1. Dissolve one pound of blue-stone (copper sulphate) in 20 gallons of water; soak and stir the grain well in it and leave to soak for 12 hours; then soak in lime water, (quick lime 1 lb. slaked in ten times its weight of water, *i. e.* 1 gallon) for 10 minutes. Spread out thinly to dry.

2. Dissolve blue-stone (copper sulphate) at the rate of one pound to 2 gallons of water; place this in some large receptacle and pour in grain until it almost reaches to the surface of the liquid; stir well and skim all "smut-balls" and rubbish from the top. Leave the grain to soak for a quarter of an hour; then pour off the liquid and spread the grain out thinly to dry, and sift dry quick lime over it.

Should the above be inconvenient, the following may be used:—

3. One pound of copper sulphate is dissolved in a pailful of hot water, which is then sprinkled by one person over 10 bushels of wheat placed in a wagon box, whilst some one else keeps the grain well stirred.

FODDER PLANTS.

GRASSHOPPERS (*Acrydiidæ*), or more accurately Locusts, of three kinds, viz., the common Red-legged locust (*Melanoplus femur-rubrum*, De G.), Fig. 5, the Lesser Migratory Locust (*Melanoplus atlanis*, Riley) and the Two-striped Locust (*Melanoplus bivittatus*, Say) committed great havoc throughout extensive districts in Canada this year. The injury was greatest in those sections where drought prevailed.

"Gaspereau, King's Co., N.S., June 25.—Our dykes are swarming with grasshoppers which threaten to destroy a great deal of hay, and the oats being tenderer are likely to be a total loss."—J. L. GETRIDGE.

Fig. 5.—The Red-legged Locust.

"Wolfville, N.S., November 12.—The champion pest of the year has been the grasshopper: he has had full swing, and the pastures and hay fields have suffered very much. The steady dry weather which continued into September, prolonged the season of their ravages; in many places they invaded the gardens and ate all before them like the locusts of the west. If they are as thick next year we must get some hopper-dozers at work."—R. W. STARR.

"Ormsby, Hastings Co., Ont.—This has been the worst season for grasses I have seen for 40 years and the grasshoppers were very bad; they did not leave one blade above ground of those new grasses you sent me."—H. BEAUMONT.

Locusts were exceptionally destructive again this year on Sable Island. Through the kindness of Mr. J. Hardie, Chief Clerk of the Department of Marine and Fisheries, I have been allowed to print a report of the superintendent of the lighthouse establishment on Sable Island from which it will be seen how serious this loss has been.

Mr. Hardie wrote:—"October 29.—I am sorry to say that the report in regard to the ravages of the locusts on Sable Island is correct. A letter was received from our agent on the 14th instant, in which he states that it was necessary to send 50 tons of hay to the island owing to the ravages of the locusts."

SABLE ISLAND, July 5th, 1895.

SIR,—I find it necessary to again call your attention to the destruction to the vegetables and grasses by the locusts, and how the provisions for the stock will be affected. At the present time, it is a question if we shall be able to dig one mess of new potatoes; all the other vegetables have been entirely destroyed. I have mowed all the cultivated hay and have secured less than one load; last season, off the same ground, I got 14 loads. Now, as the wild grass is being eaten by the locusts in the same proportion, you will easily see that it will be impossible to secure enough fodder for the stock during winter; already the cows are failing in their milk, caused by the destruction to pasture. As we winter on the island about 90 head of cattle and 30 horses, we have made in the past one ton for each head, and probably a little over. We may secure some hay, but I have no hesitation in stating now that we will not make anything like the quantity in former years. This, later, will need to be considered. It will also be easily seen what the effect will be on the wild ponies, and an almost wholesale removal suggests itself to me. I do not think I can exaggerate the destruction these pests have caused, and in another month the whole island will look as though fire had run over it. Sable Island has had a variety of pests, but this one is the most destructive and far-reaching. No cure occurs to me, and, if they increase in the same proportion in future years, where or what will the end be?

R. J. BOUTILIER, *Superintendent.*

J. PARSONS, Esq.,
Agent, Department of Marine & Fisheries.

The following interesting account of injuries in the section of the province of Quebec north of Montreal has been kindly furnished by Mr. Rémi Hénault:—

"Ste-Elisabeth, Que., Dec. 28.—On our clayey loam lands in this and the neighbouring parishes, the loss due to the grasshoppers has been in oats 10 per cent in the grain, and from 15 to 20 per cent in the straw; in hay 15 to 20 per cent; in mixed timothy and clover 25 to 30 per cent; pease were not affected, and wheat but little, but buckwheat and green fodders such as mixtures of pease, tares and oats much more, because sown later and quite tender when the grasshoppers appeared about the 20th of June. Pastures suffered more than anything else; the grass was scarcely out of the ground when it was devoured. In the parish of St. Thomas de Joliette, to the south, where the soil is nearly altogether or three-quarters sand, the damage was much greater, in oats at least 50 per cent, in hay from 25 to 30 per cent. The leaves of tobacco were quite riddled and cut up. Pease were the crop that suffered least."—RÉMI HÉNAULT.

Remedy.—Excellent results have followed the use of the implements called "Hopper-dozers," and, when young locusts are observed to occur abundantly in June, it certainly will repay all time, trouble and expense to use them, from the increased crop which will be saved. They must be used early in the season, because the locusts become full grown by the end of June and are then able to fly long distances from place to place. I give herewith a simple plan from which one of these implements can be easily made. The following extracts are from Prof. Herbert Osborn's writings and set forth plainly the advantages and the manner of making and using a hopper-dozer:—

Fig. 6.—Hopper-dozer.

"In meadows and pastures we believe the use of the hopper-dozer the most practical plan that can be recommended. In many cases it can be used to capture these and the leaf-hoppers at the same time, especially if used when grasshoppers are still quite small and can be held by a thin layer of coal tar used on the simple flat sheet of iron. When larger they need a deeper layer of coal tar, or a pan of water with a covering of coal oil on it. A cheap and simple plan for this purpose, costing but from $1.50 to $2, was described many years ago by Prof. Riley. It consists of a strip of sheet iron 8 or 10 feet long, turned up 1 inch in front and 1 foot behind, with pieces soldered in at the ends (or made of wood) and hooks placed in front at the ends for the attachment of ropes. If to run on rough ground it will be better to put runners 1½ or 2 inches high underneath. Into this put a layer of coal tar half an inch deep, or water and kerosene. It can be drawn by a boy at each end, or by horse power if preferred.

"To treat pastures and meadows for grasshoppers and leaf-hoppers, it would seem from present experience the best plan to run over all grass lands early in May with the simple dozer described for leaf-hoppers (a piece of sheet-iron 8½ feet long and 2 feet wide, was coated on the upper side with coal tar, and lying flat on the sod was dragged along by means of three cords, one fastened at each end and one in the middle.) Pastures should be treated a second time about the middle of June. For meadows, the second treatment may follow hay cutting, if insects are abundant, and then, if grasshoppers appear in July in numbers, resort to the deep hopper-dozer described above." (*Bull. 14, Iowa Ag. Exp. Station*, p. 176.)

Summarizing the results of his experiments with leaf-hoppers, the same writer says:—"Experiments with hopper-dozers for grass leaf-hoppers show that this method can be used very successfully in capturing the insects, that the simplest form, a flat sheet of sheet-iron was most satisfactory, that one application resulted in adding 34 per

cent to the crop of hay on a plot experimented on, and in one experiment leaf-hoppers were captured at the rate of 376,000 per acre."

These results are most striking, and one cannot but feel convinced that it would pay well to adopt systematically such a simple and cheap method of freeing pastures of the myriad insects which reduce the yield every year.

THE COTTONY GRASS-SCALE.

(*Eriopeltis festucæ*, Fonsc.)

Fig. 7.—The Cottony Grass-scale: egg-sacs on grass, natural size.

During August last specimens of the egg-sacs of the Cottony Grass-scale, well represented in Fig. 7, were sent to me from Cape Breton Island, Nova Scotia. In previous years I had occasionally received some from the same province. Upon specimens found this year being sent to Mr. L. O. Howard at Washington for identification, he writes: "The scale which you call *Rhizoccocus* is the same as we have received in former years from Nova Scotia. It is with little doubt *Eriopeltis festucæ*." In no case have I been able to learn that the presence of this scale-insect was observed to have brought about any serious diminution in the hay crop. This, however, must undoubtedly have been the case from the large number of egg-sacs which were found in some fields. The following letters refer to this subject:—

"Baddeck, Cape Breton, N.S., August 22, 1895.—I herewith inclose some objects which have appeared in unusual quantity this season on one of my neighbour's fields. I find very few on my own place."

"October 24.—The grass on the hill where I found the accompanying specimens, shrunk much before haying; but whether the Cottony Grass-scales were the cause or whether it was due to the dryness of the season, cannot be said. I do not find any of these insects on good grass land, but only, so far as I have seen, on land which is high and dry, and the grass poor, mostly brown top."—G. WHITLY.

"North Side, East Bay, C.B., N.S., August 26, 1895.—I send herewith some sprigs of grass bearing some insect deposit. It is very plentiful about here, being deposited on the butts of hay left after mowing or on other herbs. Please let me know what insect causes this deposit and if it is destructive to vegetation."

"September 26.—I send you as requested some more egg deposits. I cannot account for their abundance this year, unless the drought and the dry summers of the last three or four years have something to do with it. I noticed three years ago that grasshoppers were very plentiful after hay making, and was of the opinion that they were the cause of these white eggs; but this summer I changed my mind, on account of the scarcity of grasshoppers. These egg-sacs are not confined to my land, but are on all farms around, and I think they must be hurtful to cattle which eat them when feeding

on hay fields where they occur. The egg-sacs are found on about every fourth stem. I notice too that they are most numerous on run-out or poorly cultivated land. I believe also that they are more prevalent on heavy clay than any other kind of soil."—JAMES MCDONALD.

"Grand Narrows, C.B., N.S., December 27.—*Re* Cottony Grass-scale, I first noticed it July 28, then only a few, and after Aug. 10 did not observe any increase in numbers. The hay and grass were very short. The sacs were principally placed at the base of the leaves and varied in height from the ground from two to seven inches. From the size and strength of the sacs I looked for a comparatively large insect, not a scale, and from the lateness in the season when the sacs appeared, as well as from their strength and their firm attachment to the grass, I concluded that they would remain in the fields all the winter, and therefore was not in a hurry to write to you. I think a good plan would be to burn the grass on the ground in spring to destroy the eggs or young. If all the eggs in each sac hatch out, there will be an awful number next summer. I do not think that much damage was done last summer, all the best hay being cut before the sacs appeared."—D. G. CRAWFORD.

In reference to the above letters, it may be pointed out that the injury was probably going on all through the early part of the season and the insects would not be noticed until the conspicuously white egg-sacs were formed by the females. The occurrence of this insect in the past has been of an intermittent nature, and, moreover, a remarkable feature this year is that nearly every egg-sac examined was found to contain one or two parasitic larvæ which had devoured the greater part of the eggs. On page 385 of *Insect Life*, Vol. I., under the heading of "A Rhizococcus on Grass" will be found a record of another outbreak of this same Cottony Grass-scale which had been found in 1888 by Prof. A. H. Mackay in large numbers over an extensive marshy flat in Cumberland county N. S., every blade of dead grass having one or more egg-sacs attached. Several specimens of a parasitic fly belonging to the the genus *Leucopis* were bred from some of these sacs, and, as far as I can learn, there was no re-appearance of the insect in the locality the following year.

In view of the above facts it does not seem probable that this insect will ever develop into a serious pest. Should it do so, undoubtedly the measure of burning off the "old fog" or dead grass early in spring would be an easy and effectual remedy.

There is very little to be found in literature with regard to the division of scale insects to which the Cottony Grass-scale belongs. The following note has been very kindly sent me by Prof. T. D. A. Cockerell, of the New Mexico Agricultural Experiment Station, who has been making a special study of Canadian Coccidæ.

Note on Eriopeltis Festucæ.

The genus *Eriopeltis*, Signoret, consists of three species, hitherto known only from Europe. The first was described by Fonscolombe about 60 years ago as *Coccus festucæ*, and made by Signoret in 1871 the type of *Eriopeltis*. In 1876 Signoret described a second species, *E. Lichtensteinii*, found at Montpellier in France. This species is also found at Hyères, and in Holland, thus extending over about 8° of latitude. It has the sac very densely felted, whereas that of *E. festucæ* presents curled woolly filaments, almost squamose. *E. festucæ* extends at least as far north, having been recorded from Cheshire, England, by Mr. Newstead, *Ent. Mo. Mag.*, 1891, p. 165:—

"In 1893, Giard announced a third species, *E. brachypodii*, found on leaves of a grass, *Brachypodium pinnatum*, L., near Boulogne in France. (*Ann. Soc. Ent. France*, lxii., p. cxcix.) His account of it, like Signoret's original announcement of *E. Lichtensteinii*, is very short. It is, he says, very frequently parasitized by *Leucopis annulipes*, Zett. Mr. E. A. Butler in *Knowledge*, July 2, 1894, p. 148, gives a good popular description of *E. festucæ*, as follows:—

"This forms little compact oval tufts, like pieces of cotton wool, attached to the stems and blades of certain grasses, and there is certainly nothing whatever in their external appearance to suggest any connection with insects, unless, indeed, they might be cocoons of small ichneumon flies. But a close examination, revealing a number of separate threads standing out in all directions, would soon dispel this idea, and would

leave their real nature as problematical as ever. Though apparently not uncommon, they have not long been generally known in this country (England), having previously, no doubt, been overlooked, partly because of the little attention that was until recently paid to the Coccidæ, and partly because of the completeness of their disguise. They seem to have been first noticed in this country in 1856, when there is a reference to them in the *Proceedings of the Entomological Society of London;* but that was soon forgotten, and they passed out of knowledge till 1885, when Mr. Q. C. Bignell again called attention to them."

Eriopeltis may be defined as a genus of Lecaniine Coccidæ in which the female covers herself with a complete sac of cotton-like material. The nearest approach to it hitherto reported from North America is *Lichtensia* (*L. lycii*, Ckll., New Mexico; see *Psyche*, 1895), but that is very different.

FRUITS.

Owing to the late frosts followed by severe drought, in most of Ontario, parts of Quebec and the Maritime Provinces, the fruit crop has been very irregular this year, being very poor indeed in some parts, but well up to the average in other districts.

"Grimsby, Ont., Nov. 6.—During the season of 1895 there have been comparatively few insect enemies."—L. WOOLVERTON.

"Near the shores of lakes Erie and Ontario and in the counties along the St. Lawrence, apples and many other fruits have been abundant. Insects have done hardly as much damage as usual." *(Ontario Crop Report*, Nov. 15, 1895.)

In the Eastern Townships of Quebec good crops of apples were gathered. In Nova Scotia apples have been abundant and of a good quality, although considerable injury has been done by insects in some parts, Canker-worm, Shot-borer, Codling Moth and Cherry Slug all being complained of. The Hon. George Whitman, of Round Hill, Annapolis county, in *Nova Scotia Crop Report*, Nov., 1895, says:—"The apple crop in the district is the largest we have had for nine years and of exceptional quality."

Mr. S. C. Parker, Secretary of the Nova Scotia Fruit Growers' Association, writes:—

"Berwick, N.S., Nov. 25.—The past season has been very prolific in insect life, but, on the other hand, has not seemed favourable to the development of fungous diseases, and the apple crop is better in quality than usual."

"Wolfville, N.S., Nov. 12.—The caterpillar (*Clisiocampa*) and Canker-worms have been less troublesome this year than usual. Codling moth is also doing less damage. Some of the leaf-rollers and bud-eaters seem to increase in orchards where spraying is not practised. The Oyster-shell Bark-louse is complained of where trees are neglected, especially in the eastern part of the province. The Imported Currant Saw-fly seems to be less troublesome than usual. The White Cabbage Butterfly has not done much damage; but we still have to fight the Potato bug or lose the crop. Our worst pests this year have been the Pear-tree Slug, the Shot-borer and Grasshoppers."—R. W. STARR.

A remarkable exemption from insect injuries to fruit trees is reported by Mr. Charles E. Brown, of Yarmouth, N.S., who writes:—

"Nov. 16.—We are singularly exempt from insect visitations in this county, even the Potato bug, which has gradually spread over the province, has made no serious progress here. Fruit trees are not, so far, visited by any insect enemies in sufficient numbers to require the application of remedies. I doubt if any grower has ever tried the experiment of spraying."

In British Columbia, fruit crops of all kinds were enormous. Plums, as well as cherries, apples and pears, being so abundant that everywhere the trees had to be propped up. There was, generally speaking, little injury from insects observable in orchards of the interior. However, in the Okanagan valley, both at Penticton, in the garden of Mr. Ellis, and at Vernon, on the B. X. Ranch of Mr. F. Barnard, M.P., a few apple trees were seriously infested with the Apple Aphis, and plum trees with a grayish-green Aphis, at Kelowna and Vernon. Red Spider was also seen in great abundance on a raspberry

patch at the B. X. Ranch. Along the Fraser River and in the coast region, Apple Aphis, Woolly Aphis, and the same grayish-green Aphis on plum trees as was seen at Vernon were injuriously abundant. The energetic measures advised by the Provincial Deputy Minister of Agriculture and the Inspector of Fruit Pests are already showing good results, as is evidenced by the large number of fruit growers who are adopting the new methods of advanced horticulture by spraying and fertilizing their trees so as to enable them to withstand the attacks of their insect foes.

Most of the usual fruit pests of Canada were complained of to a certain extent last season, and some new points of interest have come out in correspondence or subsequent investigation. Some of these may be mentioned:—

The CODLING MOTH.—Mr. Murray Pettit, of Winona, Ont., again found this year that the second brood was extremely difficult to fight, and much harm was done in his apple and pear orchard. Mr. A. W. Peart, of Freeman, Ont., says that it holds its own, although in some sections it did but little harm this year.

Mr. L. Woolverton writes: "Grimsby, Nov. 6.—In the early part of the season the Codling Moth was very little seen; but later in the season it was very troublesome and caused a great loss to those growers who did not continue their spraying to the very end." Up to the present there has been no authentic instance of the occurrence of the Codling Moth in British Columbia.

The OYSTER-SHELL BARK-LOUSE now occurs throughout Canada, but less abundantly in British Columbia than in the east. Mr. T. A. Sharpe, Agassiz, B.C., sent specimens of this insect on the wild crab, *Pyrus rivularis*, and expressly states:—"We have no bark-louse in our apple or pear orchard."

Referring to the advantages of good cultivation, Mr. A. W. Peart, of Freeman, Ont., says: "It appears to be about driven out from this locality, so much so that I have difficulty in securing specimens. Improved cultivation of orchards and better general care probably lies at the bottom of this."

The EYE-SPOTTED BUD-MOTH.—Specimens were sent in from Nova Scotia, Ontario, about Lake Ontario, and from St. Elmo, B.C. These latter were the first specimens from British Columbia, and were from the orchard of Mr. C. F. Pound. While attending a meeting of fruit growers at Kelowna, in the Okanagan Valley, B.C., I was told by three or four of the fruit growers present of injuries by a bud moth which was probably this species.

The SCURFY BARK-LOUSE (*Chionaspis furfurus*, Fitch) occurred on a few trees in the orchard of Mr. W. W. Hilborn at Leamington, Ont. These were easily destroyed by treatment with kerosene emulsion.

The APPLE-LEAF SEWER (*Phoxopteris nubeculana*, Clem.) occurred abundantly at Walkerton, Ont. Specimens were sent by Mr. A. H. Pettit from the above place on September 18, with the following note: "I found Mr. David Smith's orchard here badly infested. I inclose you some leaves and a little twig, just to show you how numerous the caterpillars are. I did not find very many on the sprayed trees."

THE PEAR SLUG (*Eriocampa cerasi*, Peck) has again been a cause of rather considerable loss in Nova Scotia, Ontario, and British Columbia. Mr. R. W. Starr reports that pear trees in gardens in Wolfville, N.S., had their foliage all destroyed in June. The same insect was reported from St. Stephens, N.B., on a cherry tree, and from many places in Ontario and British Columbia on pear, plum, and cherry trees, as well as on mountain ash trees and hawthorn bushes. Mr. A. W. Peart, of Freeman, Ont., writes: "The Pear or Plum Slug has appeared in considerable force this year, during July and August. I noticed two broods. A section of my plum trees was severely attacked. Paris green in water, usual strength, appears to be of little use. It seems to me that dusting would do better."

I found the Pear Slug present in some numbers in almost every cherry and pear orchard in British Columbia.

I am unable to understand Mr. Peart's failure to control this insect with Paris green. I have found, as stated in my report of last year, that spraying with the ordinary strength (1 lb. Paris green, 1 lb. quicklime, and 200 gallons of water), or dusting with freshly slaked lime, or Paris green diluted with 50 times its weight of some dry powder, are always effective.

THE STRAWBERRY SLUG (*Harpiphorus maculatus*, Norton).—Mr. L. A. Woolverton sent me specimens of the larvæ of the Strawberry Saw-fly, found by Mr. Peter Breman, of Lakeside, Ont., in his plantations, where they were doing considerable damage. There are two broods of this insect in the season, the first in May, the second in July and August. Paris green (1 oz. in 10 gallons of water), or white hellebore (1 oz. in 2 gallons of water), are the best remedies. The first brood lasts almost until the fruit is ripe. For this brood white hellebore is the safest application.

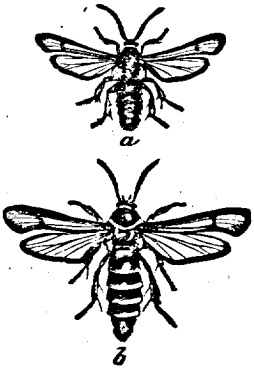


Fig. 8.—The Raspberry Root borer: *a*, male moth; *b*, female moth.

THE RASPBERRY ROOT-BORER (*Bembecia marginata*, Harr.).—This insect, which is occasionally troublesome in old raspberry plantations in Ontario and Quebec, appeared in large numbers in Vancouver Island during 1894. Many infested raspberry roots were sent to me by Mr. G. A. Knight last February, from which the moths emerged in July.

"VICTORIA, B.C., Feb. 15.—I mail you to-day some Raspberry Borers. I do not know if they are new to this country or not; I have never seen them before. I noticed last summer that the bed looked sick, and, being busy, I did not prune them until a few days ago, when I found that the roots were full of borers. I shall grub all of the plants up and burn them. I imported the original canes from New Jersey about seven years ago, and probably at the same time the first borers as well."—G. A. KNIGHT.

When visiting some of the old gardens and fruit plantations at Victoria last August, I found that this insect had done much harm, and many of the brown eggs were to be found on the leaves of raspberry canes.

In the *Fourth Report* of the British Columbian Department of Agriculture, Mr. Palmer says: "This pest has become very prevalent in the vicinity of Victoria, where it has wrought great damage to the raspberry canes. It is not reported from other parts of the province."

The perfect female insect of this borer is a black clear-winged moth with a body striped with yellow like a wasp. She lays her eggs on the leaves of raspberries in July and sometimes well on into August. The attacks of the larvæ on the roots are seldom recognized, and many raspberry canes thought to have been killed by winter have really been destroyed by this borer.

This is a difficult enemy to fight against. The chief means of lessening its attacks is to start new plantations in good soil and keep these well worked and cultivated. A liberal dressing with hardwood ashes to which some crude carbolic acid (1 oz. in a 2½ gallon pail) had been added, has given good results. There is, however, great difficulty in dressing a patch which has become badly infested.

CLICK BEETLES (*Corymbites caricinus*, Germ., etc.).—Again this year complaints have been received of serious injury to apple blossoms by the perfect beetles of an Elater. Specimens were sent from British Columbia, Sherbrooke, Que., and from the Annapolis Valley in Nova Scotia.

This attack on apple blossoms was first referred to in my report for 1892, when specimens were sent from the Nappan Experimental Farm, and since then every year reports of slight injury have been received. In the third report of the Department of Agriculture of British Columbia (1894), it is stated that one kind, *Corymbites caricinus*, "has been committing great ravages on the lower mainland, not only on apples, but on other fruit blossoms as well. It has not been reported from the upper country nor from any part of the islands. It has made its appearance in great numbers at Mission where during 1893 it completely denuded some orchards of blossoms, and this year it has appeared at the Delta, where Mr. E. Hutcherson found it doing great damage to the blossoms of fruit trees."

As a remedy nothing better has so far been suggested than beating the beetles from the trees over sheets or into beating nets, and then destroying them. They drop readily

from the trees when these are jarred and feign death for some time after falling; this time may be prolonged by shaking the sheets or nets, so that there is little difficulty in collecting them. Mr. Hutcherson tried this remedy, and found it successful.

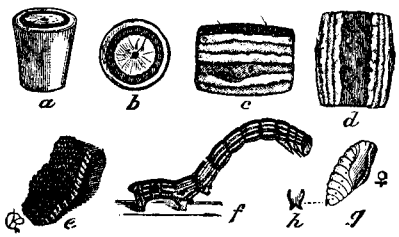


Fig. 9.—The Autumn Canker-worm: *a*, *b*, side and end views of egg; *e*, mass of eggs; *f*, caterpillar; *c*, *d*, segments of caterpillar; *g*, pupa.—*a*, *b*, *c*, *d*, enlarged; *e*, *f*, *g*, natural size.

Canker-worms (*Anisopteryx vernata*, Peck, and *A. pometaria*, Harris).—*Attack.*—There are two kinds of caterpillars which attack apple trees, and which are known as Canker-worms. Of one, the Spring Canker-worm, the wingless female moths appear chiefly in the spring and lay oval pearly-white eggs in irregular masses beneath flakes of bark, etc. Of the other, the Autumn Canker-worm, most of the moths appear late in the season and lay eggs which are flattened at the top (Fig. 9 *a*, *b*, *e*,) and laid regularly in clusters of about 100 or more on the outside of the bark. When full-grown the caterpillars of both are much alike, and are brownish-looking larvæ, about an inch in length. At Fig. 9 are shown the caterpillar and eggs of the Autumn Canker-worm. The females of both kinds are spider-like wingless creatures; but the males are delicate moths, with gauzy gray wings. (Fig. 10 *b* female, and *a* male.)

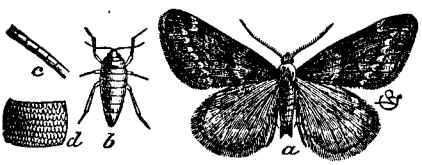


Fig. 10.—The Autumn Canker-worm: *a*, male moth; *b*, female moth; *c*, an autenna of female; *d*, an abdominal segment of female.

Remedy.—There are several mechanical contrivances for keeping the females from ascending the trees to lay their eggs; but under ordinary circumstances none of these can compare for efficacy with spraying the trees in the spring time with Paris green 1 pound and fresh lime 1 pound to 200 gallons of water. If this be done immediately after the flowers have fallen, both the Canker-worm and other leaf-eating insects, as well as the young larvæ of the Codling Moth, will be killed at the same time.

Injuries by Canker-worms have been reported from Nova Scotia, Quebec and Western Ontario. Most of my correspondents have had strikingly successful results from spraying with Paris green 1 lb. and quick lime 1 lb. in 200 gallons of water; but on the other hand, two or three, from special circumstances, have had better satisfaction with the old plan of banding the trees. As these circumstances may occur with others, I give the experience of some of the best observers.

"Berwick, N.S., Nov. 25.—Canker-worms were prevalent in several localities in Nova Scotia during the past season and did considerable injury. In some orchards that came under my notice, they did much harm before they were discovered, and the first application of Paris green had little effect, owing to the material being impure. Before a second application was made, the trees in a few orchards were completely defoliated."—S. C. Parker.

"Church Street, Cornwallis, N. S., December 7.—Our experience leads us to decide in favour of the ink, as, in the first place, it is a safe remedy, can be used by any person without injuring his crop of fruit or the trees, and, if carefully looked after, will certainly save his crop; in orchards that are tilled for other crops (as about all young orchards here are) it saves driving over them with a cart, cutting down potato rows and tramping out the seed; and again, the ink is applied in the fall and the spring, when the farmer or his boy are more at leisure and can attend to applying the ink, as the ink does not have to be applied until the first heavy frost in the fall, and as soon as the frost begins to break in the spring. At that time there is very little work to attend to; but later in the spring the farmer finds himself very much driven by his work and has very little time to attend to spraying. Of course the heaviest expense is the ink, which costs about 12 cents a pound; 20 pounds will answer for an orchard of five acres, say the trees are about 20 or 30 years' growth. The above amount of ink will require four gallons of fish oil—cost 50 cents per gallon—and, I suppose, about 15 pounds of paper at four cents per pound, which all told is not a very large outlay.

You take the roll of paper and a saw, cut off strips about six inches wide, then two men start out armed with a sharp knife, a tack hammer and two bunches of tacks. One man draws the paper around the tree, cuts it off with his knife, lets it drop and passes along to the next tree; the next man tacks it closely and firmly to the tree. Two men will go over an orchard of three acres in half a day. The paper is left on the trees ready for the next spring. After the second or third application of ink, a very little goes a long way. A smart boy can go over an orchard, of the above size in about two hours. With regard to spraying, we used a small pump and one dessert-spoonful of green to a bucket of water, or in that proportion. This did not at all the times destroy the Canker-worm, and in nearly every trial did more or less injure the crop of fruit. We kept it well stirred. I know of a number of cases where the large pump was used: the crop was injured, I think, quite as badly as though it bad been left to the Canker-worm. In a few cases I have heard persons claim that spraying had proved effectual, and in about all instances the same formula was used. I think it wants a man better posted on the subject of spraying than the majority of farmers are as to the time and manner of applying, and one who can give all attention to the business. My brother experimented with a band of wire netting, such as is used for fly screens, adjusted around the tree, funnel-shaped, and succeeded in capturing a large number of moths which crawled up under the netting. I think there has been a larger quantity of ink used this fall than previously, which strengthens me in my belief in ink as a destroyer of Canker-worms."—E. J. ARMSTRONG.

"Starr's Point, N.S., December 16.—Respecting spraying *versus* printer's ink for the destruction of the Canker-worm. It is possible that my reason for preferring the ink for spraying may not be as applicable to all sections of the Dominion as it certainly is here, where apple trees frequently grow a height of 25 to 30 feet and spread from 35 to 45 feet. Spraying such trees is quite another matter than for trees half that size. We find that spraying, to be effectual, must be done when the worms are small, and it frequently happens that the trees are in full bloom at that time. It has generally been conceded that spraying the bloom endangers the setting of the fruit, and to delay is equally fatal; for the worms get the start and usually so improve time as to defy all efforts to exterminate them, and between the heavy and oft-times repeated doses of the poison and the ravages of the worms, the crop suffers much, if it is not quite destroyed. I have in my mind several fine orchards that suffered in precisely this way during the past summer, the crop being almost an entire failure. Spraying with us has not been a success, chiefly because it has usually been delayed too long; and then, to kill the large worms, the dose is either too strong for the foliage, or, what has usually been much worse, the operation has been repeated, when the foliage has been most surely destroyed. I have tried spraying and found I could certainly kill the worms and not hurt the foliage if I paid no attention to the bloom; but, even then, when the trees were very large, completely covering the ground, I found the labour and expense nearly if not quite equal to the application of the ink. I think the application of the ink bands the safest for several reasons: first, it does not endanger the bloom; secondly, men are not so liable to injure the foliage by any error or indiscretion; and thirdly, the size of the tree is not a difficulty only to be overcome by the use of the best spraying apparatus and in conjunction with complete knowledge of the business. If you can determine that the bloom is not injured by the spraying, no matter what time it may be done—and if horticulturists obtain the best possible apparatus and all learn to use it with judgment and discretion and if the trees are of moderate dimensions, not one of these conditions being omitted,—then, but not till then do I think there can be any comparison between the two methods."—I. E. STARR.

"Burlington, Ont., January 14.—You particularly ask the formula for the preparation used to entrap the female Canker-worm moth. For autumn application or early spring when the weather is cold, use a mixture of castor oil 2 lbs. to common resin 3 lbs. For warmer weather castor oil 2 lbs., resin 4 lbs. The oil and resin should be heated slowly and no more than to thoroughly dissolve the resin; stir frequently to thoroughly mix; apply warm, not hot, directly on the trunk of the tree with a paint brush, making a band about 3 inches wide; of course, the loose and rough bark must be scraped off before

putting on the band. It is very important to use a non-drying oil for the mixture, castor oil being the best and not injurious to the trees. The work of banding in the above mentioned way is not so great as might be supposed at first; an active man can go over 250 trees in 10 hours if the mixture is ready for use. Should the mixture get too cold to spread readily, it may be easily and quickly brought to proper temperature by using a portable oil stove. It is best to put on the first coat plentifully so as to leave a good body of material, and care must be taken that all crevices and irregularities receive a coat. In this neighbourhood the female moth seldom appears before the last week in October or the first week in November, and never before the first frosts of autumn. If watched for, and the band is applied when the female first appears on the tree trunk (where it often remains for days awaiting the male, particularly if the weather should be cold), thousands are caught by the band and many of the males are also caught, as their delicate silky wings adhere on the slightest touch. Thus two ends are accomplished: the female is prevented from ascending, and the male from fertilizing the eggs. Where many fail in the successful use of the band, is in not removing the clusters of eggs and bodies of females from the trunk and burning them at the end of the season. In their determined efforts to perpetuate the species, the females deposit their eggs on the trunk below the band; if not removed, these will hatch in the spring following, and, as the band will by this time be hardened, the larvæ can ascend the tree. I had experience of this in the summer of 1893. I had the band applied in autumn of '92 and kept the insects below it, but neglected to remove the eggs before the following spring ('93). I did not renew the band in spring of '93 in time, so that much of the benefit of my labour of the previous autumn was lost and I had the worst dose of Canker-worm I ever saw; they were over my trees in millions and it was a clear case of fight or lose my trees. I commenced to spray with Paris green, which killed a large number and caused many others to spin to the ground (doubtless in search of more congenial quarters), where after a time they seemed to recover and again started for the trees; now at this time was when the band did its best work, I had it renewed on all the trees and not a caterpillar ever placed its foot above it; but they collected by thousands below and starved to death; they were so numerous that the trunks seemed alive, *this after spraying, be it remembered.* We destroyed them by sweeping with whisks into a pan made out of a sheet of zinc with a piece cut out of one side so as to fit the tree; after collecting in this way, a little coal oil sprinkled over the mass and fired finished their course. This meant work and plenty of it; but the result, as shown this year in the cleaning out of the enemy, has fully repaid my time and expense, parts of my orchards where the insects were in greatest force being now quite free from them. The band may need renewal once or twice after the first application; but the second does not require as much labour or material as the first. I believe that Paris green used in conjunction with the band in the manner described, will (if work is faithfully performed) clear any orchard of this troublesome pest in one season. The Climbing Cut-worm and many other creeping larvæ are deterred by the band from ascending the trunk."—O. T. SPRINGER.

The chief difficulties, then, which make spraying less popular than "banding" with the above observers, are as follows:—

1. In some seasons the young larvæ do not hatch until the apple trees are in blossom, when spraying with poisons *cannot* be allowed. The fruit grower must not spray when the flowers are open, because it would most probably injure their essential organs, thus reducing his crop; and, again, because he would certainly poison his valuable allies, the bees, either his own or his neighbour's highly prized possession.

In regard to this, if spraying with Paris green be practised just immediately before the buds of the blossoms expand, no injury will be done to either bees or blossoms, and any young caterpillars that have hatched will be killed. Those that hatch after this will be destroyed by the poison on the leaves, or by the next spraying ten days later.

As stated above, where spraying with Paris green has been carefully done, it has been found most effective. If an equal quantity of quick lime be mixed with the Paris green, and 200 gallons of water be used for each pound of Paris green, there will be no injury to the foliage, even if the spraying be repeated three or four times; this is frequently done for the Codling Moth, as well as for this pest.

2. With regard to the inconvenience of spraying large trees and of driving among them when other crops are cultivated in the orchard, little can be said. This will, of course, vary with the nature of the apparatus used and the circumstances of the operator. However, the elevation of a nozzle is not a very difficult matter, if a bamboo pole and some light brass or rubber tubing be obtainable.

3. If it be thought wise to grow potatoes or some other crop between the trees in an orchard, the width of the rows can with very little trouble be so arranged that the spraying pump can be driven between the trees without any injury to the crop beneath. This I have seen in very many instances in Ontario, Quebec and British Columbia. Most of the spraying which is necessary in orchards, is done early in the season before the secondary crop has made much growth. Another point of very great import in the case of Canker-worms is that the female moth is unable to fly, and, compared with that of other insects, the spread of Canker-worms is slow. If thorough work be done in clearing an orchard of this pest and there are no infested trees in close proximity, it will probably remain free of the caterpillar for many years.

Mr. A. W. Peart states that in an orchard where he has sprayed persistently for years the Canker-worm does little harm; and Prof. Bailey, of Cornell University, in a late bulletin, when treating of this subject, concludes :—

"The reader is familiar with the bandages of tar, printer's ink, cotton and other materials placed about the trees to prevent the female moth from climbing up. These devices are very serviceable for large shade trees; but, if the fruit grower keeps his orchard in cultivation and sprays honestly once or twice each year for Codling Moth and other insects, he need not fear the Canker-worm."

THE CIGAR CASE-BEARER.

(*Coleophora Fletcherella*, Fernald).

During the past year, there have been fewer complaints of injury by this insect than has been the case for the last two or three years. In the well established colonies mentioned in my report of last year, further experiments have been made with the view of discovering a practical remedy. In May last, an excellent and very complete account of the life-history of this insect, copiously illustrated with figures, appeared from the pen of Mr. M. V. Slingerland, of Cornell University. My correspondents, Mr. Edwin Worden, of Oshawa, and Mr. Harold Jones, of Maitland, have continued their experiments carefully. Taking into consideration the life habits of this insect, which have now been completely worked out, together with the experience of several practical fruit growers, I think we may come to the following conclusions :—

The Cigar Case-bearer, when numerous, is a serious pest of the apple tree, and occasionally also of the pear and plum. The most injury results from the young caterpillars early in spring attacking the unexpanded buds, and later the flower stems, the forming fruit, and the foliage.

The results of experiments show that this insect can be controlled by spraying with Paris green and kerosene emulsion; but very thorough and persistent work is necessary. The best results have followed spraying the infested trees very early in the spring with kerosene emulsion, and repeating the operation once or twice at short intervals, four or five days later. The first application may be made with the standard Riley-Hubbard emulsion reduced with only five parts of water. After the leaves expand, the emulsion should be diluted with nine parts of water. Good results have also been obtained by spraying with Paris green. Now that the operation of spraying fruit trees with different compounds for the destruction of injurious insects and fungi is getting to be generally adopted by the best fruit growers throughout Canada, the only change necessary in the advised methods will be to spray rather oftener where this insect is known to occur. In the spraying calendar, printed on page 16 of our *C.E.F. Bulletin 23*, it is advised to spray apple trees first of all with copper sulphate, 1 lb. to water, 25 gallons, before the buds start; to this solution I would add 4 ounces of Paris green, and would make the application *immediately* before the buds open, to be followed about three days after the bursting of the buds by a spraying either with kerosene emulsion (1 part to

9 of water), or Bordeaux mixture and Paris green, to be made as recommended in *Bulletin 23*, page 17, *i.e.*, copper sulphate, 4 lbs.; quicklime, 4 lbs.; Paris green, 4 ozs.; water, 1 barrel (about 45 gallons).

When the Case-bearer is abundant, it will be well to repeat the application a few days later, which will bring it, in the case of most varieties of apples, to just before the blossoms expand. The next spraying must not be made until the petals fall from the blossoms.

The above treatment will be found effective against several other insects, as the Codling Moth, the Eye-spotted Bud Moth, Canker-worm, Curculio, as well as against that very injurious disease, the Black Spot *(Fusicladium dendriticum)*.

Mr. Harold Jones, of Maitland, has experimented chiefly with kerosene emulsion, and he reports to me at the end of the season as follows:—

"Maitland, Ont.—In reply to your letter of the end of September, I now send you sample of apple tree twigs that were sprayed with kerosene emulsion for Case-bearer. On the whole, the results have been very satisfactory, though through press of time I was prevented from spraying quite as soon as I should have done. I sprayed the first week in October and at that time a number of the insects had left the foliage, but enough still remained to experiment on.

"On trees sprayed I find a great reduction in the numbers attached to the twigs, and they have not worked down to the body of the trees at all. On the leaves lying on the ground I find some insects still attached, that never left the foliage. In the sample I send, I was able to find a limb with leaves still on and you will notice there are insects on them. A mixture of one part of emulsion to five gallons of water gave the best results."

The twigs sent by Mr. Jones certainly bore very few specimens of the young hibernating larvæ of the Cigar Case-bearer. There were, however, several of the small pistol-shaped cases of another species of case-bearer, viz., the Apple-tree Case-bearer (*Coleophora malivorella*, Riley), Fig. 11, a species which has never been very injurious in Canada. The specimens upon the leaves referred to by Mr. Jones in the above extract were all empty summer cases from which the moths had emerged in July.

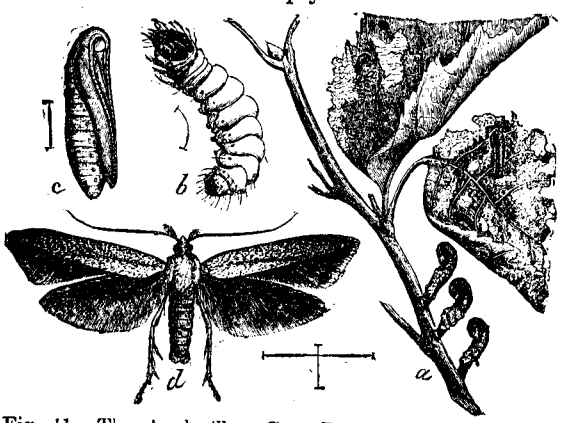


Fig. 11.—The Apple Tree Case Bearer: *a*, Pistol-shaped cases of the caterpillar; *b*, caterpillar; *c*, pupa; *d*, moth—*a*, natural size; *b*, *c*, *d*, enlarged.

Another method of fighting the Cigar Case-bearer has been successfully tried at Oshawa, Ont.

"Oshawa, Ont., Dec., 28, 1894.—One of my neighbours sprayed his orchards just after the blossom fell, with Paris green and concentrated lye. He says he cleaned his trees from the Cigar Case-bearer and bark-louse at one spraying. I tried the concentrated lye last spring, about the middle of May, without Paris green, just as the Cigar Case-bearer began to move; but I did not think it was more effectual than the Paris green."

"January 8, 1895.—It did not kill any Case-bearers, but it cleaned the trees from old moss and the bark-louse. My neighbour used three cans lye and ¼ pound Paris green. He had beautiful weather, dry for about ten days after the spraying."

"June 5.—I sprayed with kerosene emulsion, as you suggested, just as the leaves began to unfold and the young caterpillars began to eat. It killed a great many: but there are as many left. I am about discouraged. I have had good success spraying for the Codling Moth and the Spot on the apple; if these little pests of Case-bearers will only let the foliage alone, the trees promise a fair crop of apples in this section. I am now spraying for the Codling Moth and the bark-louse with Paris green and concentrated lye."

"December 10.—I used 3 lbs. of lye (if there is a pound in a can) to 45 gallons water. I had about 700 barrels of apples of the very best quality and shipped them to Simons, Shuttleworth and Co., Liverpool; and to use their own words, they showed all the rest a clean pair of heels and got me the top prices of the day. I inclose you an account sales of one car of apples. I am satisfied the spraying is doing my orchard good. I had very few culls: 700 barrels is not a very good crop from my orchard, but the Baldwins did not blossom this year. The lye did not injure the foliage in the least, not nearly so much as the kerosene emulsion. The lye is so easily mixed; but the kerosene emulsion seems to accumulate at the bottom of the barrel and the last few gallons will burn the foliage if one is not very careful. I am getting in one thousand bushels of wood ashes this winter and next June I am going to drive through the orchard in between the rows, the same as spraying and throw about a half bushel of ashes all through the tree early in the morning or on a damp day. I tried this on a few trees and it acts splendidly. The Cigar Case-bearer does not like ashes any more than coal oil. I think I have about conquered the case-bearers or they are getting tired of these parts.'—EDWIN WORDEN.

THE PEACH BARK-BORER.

(*Phlœotribus liminaris*, Harris.)

Attack:—Small cylindrical beetles, one-twelfth of an inch in length, of a brownish-black colour, covered with short hairs, which bore in the bark of peach trees, and, if numerous, cause the death of the tree in three or four years. The presence of these beetles is easily recognized in summer by a conspicuous red powder on the bark which is the borings cast out of the holes by them in their mining work, and, in the winter and spring, by enormous quantities of gum which oozes from the infested trees, thus greatly reducing their vitality.

This injurious little enemy of the peach tree has again been reported as the cause of much loss among peach trees in the Niagara district. Mr. J. C. McGuigan, of Cedar Springs, Ont., speaks of "finding the beetles mostly in old trees."

Mr. Alex. Muir writes from Niagara of serious injury to his peach trees. He first noticed the injury in 1893, and observed that the insect was spreading rapidly. As much as two quarts of gum had oozed from some of his old trees. He has found white-washing his trees of little use.

In my last report I gave an account of some careful experiments by Mr. C. E. Fisher, of Dulverton Farm, Queenston, Ont. I called on Mr. Fisher in the autumn of 1894; after discussing the matter he agreed to try experiments with a soapwash and carbolic acid, which had been omitted from his series of experiments in 1894. The following extracts will indicate that apparently a practical remedy for this beetle has been discovered.

"Queenston, Ont., March 14, 1895.—I suppose I had better start at those borers as soon as the weather moderates a little. It is only about 4 above zero this a.m., a drop of about 35° since yesterday. What shall I try? I thought of scrubbing off the gum as soon as it softens and then applying the 'Saunders Wash' with carbolic acid added. Don't you think the acid would kill the bugs? Will it injure the trees? What would you advise? I want to kill the present stock of bugs if possible."

"I have my stock emulsion ready and as soon as I get a favourable day will drench the trees. Would you do it twice before the leaves appear, or would once do?"

"May 27.—The Peach Bark-beetles were at work pretty actively during those hot days before the late severe frost."

"July 15.—Replying to your very kind letter *in re* the 'Saunders Wash' and carbolic acid for the Peach Bark-borer, I used five pounds of washing soda and three quarts of soft soap, to this was added enough water to make about six gallons; air slaked lime was then added—sufficient to make it of the consistency of thick paint; to all this were added three tablespoonfuls of Paris green and one ounce of carbolic acid. It was applied with a whitewash brush, thoroughly covering the entire trunk of the

tree and a few inches up on the limbs. More Paris green could probably be used to advantage. I think, were this applied early in the season just as the borers begin their work, and then a month or six weeks later, it would check them completely."

"Nov. 21.—In reply to your very kind letter of the 19th inst., I may say that the satisfactory state of affairs regarding the Peach Bark-borer, reported on the 15th of July last, continued to the end of the season. The soap and carbolic acid wash for the Peach Bark-borer I only applied once, and it was by far the most successful of any of my experiments against these troublesome little pests. I think two applications would effectually check them. I am very glad indeed to be able to report thus."—C. E. FISHER.

BLACK PEACH APHIS.

(Aphis persicæ-niger, E. F. Smith.)

Early in August last, the first Canadian specimens which have come under my notice of the Black Peach Aphis, were sent in from Leamington, Essex county, Ont.

"Leamington, Ont., August 6.—Minute black insects have been found feeding on the roots of some of our newly or recently planted peach trees. They are in every way, except size, similar to the black aphis common on the leaves of cherry trees. Is this the Peach Aphis which is said to attack both leaves and roots?"

"August 13.—I herewith mail you specimens of root lice as per request. Are they not the peach-tree Root Aphis (*A. persicæ-niger*)? There are numbers of ants and flies like winged ants swarming around the roots affected. The trees assume a sickly yellow appearance, the leaves turn yellow and then die."

"November 18.—In this portion of Essex county we are going largely into the cultivation of the peach. I have 1500 trees, and this season there has appeared what is called the Black Peach Aphis. I noticed it first last spring on the roots of some young trees that had died. There was a large number of young trees died last spring and they were mostly all affected on the roots with the aphis. I see they are now on the branches of the trees in small clusters here and there. The trees are now bare of leaves and the insects on the branches are dormant."—JOHN M. READE.

"December 16.—I to-day mail you a few twigs with the Black Peach Aphis clinging to them as found on my trees. They are not nearly so numerous as they were a few weeks ago, when they could be seen in small clusters on the lower side of the small twigs on a large proportion of my trees. I had some difficulty in procuring these now."—WM. SMITH.

This injurious insect has been experimented upon extensively by the United States entomologists, particularly by Dr. J. B. Smith, of New Jersey, who has reached very satisfactory results by treating the form which attacks the roots with heavy dressing of kainit. Dr. Smith writes me as follows:—"December 26, 1895.—In our state, on light soil I advise about 10 lbs. of kainit per tree, covering the probable extent of the root system—this for a tree 4-6 inches in diameter and in bearing, the application to be made in spring—when the trees are leafing out. In our orchards the kainit has proved successful wherever used. Dr. Erwin F. Smith recommends ground tobacco and so does Prof. Alwood, of Virginia."

In his annual report for 1890, where Prof. Smith treats of the Black Peach Aphis at some length, he gives the following under the head of remedies:—

"The dealing with this insect above ground is easy. It succumbs readily to either the kerosene emulsion or the fish-oil soap, and the application of the insecticides to peach trees is usually not difficult, because of their moderate size. The young trees suffering most can usually be reached with the power afforded by a knapsack sprayer. In nurseries where this insect is working on the roots, I should recommend liberal periodical dressings of kainit. This will not only act as an efficient fertilizer, but will also serve to destroy many of the lice. The application should be made just before a rain if possible, so that the salts can be at once dissolved and carried into the ground. Wherever the solution comes into contact with the aphides it will kill them, and the salts will

remain until taken up by the plant. The application should be made when injury to the tree is noticed, *i.e.*, when they look sickly, refuse to grow without apparent cause, or when an examination shows the presence of the lice in the orchard.

"I have talked with a number of peach-growers and I am convinced that much of the specific effect of kainit as a peach tree fertilizer is due to its insecticide qualities in killing off the infesting root aphides. It has been found that when young trees refused to grow in old peach ground, a heavy dressing of kainit has mended matters radically, and a healthy young tree has been successfully grown."

THE NEW YORK PLUM SCALE.

(*Lecanium cerasifex*, Fitch ?)

Attack.—When a tree is infested with this insect, large numbers of dark brown hemispherical, conspicuous scales, about $\frac{1}{6}$ of an inch long by $\frac{1}{8}$ of an inch wide and $\frac{1}{12}$ of an inch high, may be seen at all times of the year clustered along the small branches, particularly along the lower sides. The presence of this enemy upon a plum tree may be detected especially in July and August, and also in the spring, by the filthy black condition of the bark due to the growth of a fungus upon the copious deposit of honey dew which is emitted by the young scale insects during the time of their growth.

The first specimens sent to me of this insect came from Mr. W. J. Goodfellow, of Bramley, Simcoe Co., Ont., in April, 1894. Later in the same season its presence was detected in a few places in Niagara district. Prof. Panton writes: "Several specimens of Plum Lecanium have been sent to me this summer. It is rapidly spreading in Ontario, I have it from Niagara, Hamilton, Thornbury, Muskoka and on our own grounds." Mr. A. Lehmann sent specimens from Orillia of a Lecanium on apple, which is apparently the same thing, and I have recently received others from Mr. C. Newman, of Lachine, Que., who found these scales numerous on some of his plum trees. Early last spring a series of meetings was held at the request of the fruit-growers of Grimsby and Hamilton, and addresses were given at several points by Mr. Craig and myself upon the cultivation of fruit trees and their protection from injury by insects and fungi. I then found that this scale was much more widely distributed than had supposed, and specimens were brought to almost every meeting for information. Mr. L. Woolverton, the active Secretary of the Fruit Growers' Association of Ontario, who has exceptional facilities for getting information on such subjects, writes: "Nov. 6th.—The plum scale, *Lecanium cerasifex*, is slowly but surely making its way into our plum orchards. Last year I found two or three on some young trees which I had imported from the United States, but this year I found old scales here and there in different parts of my plum orchard. It is, therefore, evident that we must soon begin waging war against this insect very earnestly."

Fig. 12. The New York Plum Scale: scales on a twig.

Its injuries in Canada have not been very serious so far; in only two orchards has it been discovered in alarming numbers and in both of these instances the prompt action of the owners has had the satisfactory result of entirely cleaning the trees of what might have been a cause of much loss.

Mr. G. E. Fisher, of Freeman, noticed this insect in his orchard in 1894, and although observing particularly this year "the large number of larvæ which came from a single scale and that everyone of these was pregnant and turned out larvæ in countless numbers," reports under date of December 24th: "I think they are not any more numerous than they were. I have not found any parasites at work, but many of the scales have apparently been worked upon. The scales I find on the trees this winter seem rather smaller than those of last year. I find them quite frequently on apple and pear trees. I have not sprayed with kerosene emulsion, but am glad to know they can be managed."

Mr. A. W. Peart, also of Freeman, Ont., writes in the same strain: "The 'Plum Scale' has not increased with me this year and as yet has not done any material damage."

There is still some doubt among entomologists as to the correct name of this scale Mr. L. O. Howard, writes "it has been lately decided by Mr. Newstead, of Chester England, that it is identical with the European *Lecanium prunastri* (L. O. Howard in *Some Scale Insects of the Orchard*, U. S. Dept. Agr. Year Book, 1894, p. 272). It is the same as the "Lecanium from Queenston, Ont." which was kindly examined critically and compared with *L. rugosum*, Sig., by Prof. Cockerell on pp. 58–61 of the *Canadian Entomologist* for 1895. It is also thought by some to be a variety of *L. juglandis*. The first references to the insect in horticultural literature were, I believe, under the name of *L. cerasifex;* so, until the matter is definitely settled by specialists, it seems well to speak of it under that name.

The life-history and habits of the species in America have been carefully worked out and described by Mr. M. V. Slingerland in his usual careful and complete manner in Cornell University Agricultural Experiment Station *Bulletin No. 83* (December, 1894).

The dates of the different stages of development of the scales as there described agree almost to a day with our Canadian observations.

The life-history may be summarised as follows:—

The male and female scale-insects mature about the middle of May (winged males issued May 13th to 19th from scales sent from Bramley, Ont.); copulation takes place and eggs may be found under the scales soon after. These do not hatch until the end of June, when the young larvæ crawl out on to the leaves and remain there until the autumn. About September most of them migrate back again to the twigs and branches of the tree, where they pass the winter. Prof. Panton writes from Guelph, Ont., on June 28th last: "To-day the young Lecaniums are on the move in thousands," and Mr. G. E. Fisher, writing from Freeman, near Hamilton, Ont., on June 29th, says:—"I have been much interested in watching the hatching of the Plum Scale (*Lecanium*). The larvæ have now all left the scales and gone out on the leaves." During the first season the scales increase but little in size, although they feed continuously and emit large quantities of honey dew; but when they revive the following spring, they move out on to the young wood and grow rapidly, and as stated above, full development is attained about the middle of May. The males are very small white and active two-winged flies with two long thread-like tails. The females are merely soft, yellowish, hemispherical objects with almost circular outline. About the end of May the egg-laying process is completed, and the outer surface of the female becomes hard and dry, forming a thin brown scale-like covering over the mass of eggs. This is not a true scale, *i.e.*, a waxy secretion, as in the case of the Oyster-shell Bark-louse and some others; but merely the dried skin of the female now dead.

The two instances referred to where the New York Plum Scale occurred in sufficient numbers to call for special measures, were in the orchards of Mr. C. E. Fisher, at Queenston, Ont., and Mr. W. M. Orr, at Fruitland, between Hamilton and Grimsby. The following letters give facts on the matter which will be of interest to fruit growers. On finding that Mr. Fisher's trees were badly infested, I asked him to carry out carefully Mr. Slingerland's suggestion of spraying the trees in winter with a strong kerosene emulsion wash.

"Queenston, Ont., May 27.—For the Plum Scale I sprayed twice before the leaves opened, with kerosene emulsion diluted four times. I have since examined carefully several times and think it has been a success. Will report again to you later. If it has not been perfectly effective in destroying them, I will spray again."

"July 15.—I examined my plum trees as you suggested in your last letter for the Lecanium Scales. There appeared to be no life in them. The two sprayings of kerosene emulsion diluted four times, applied at intervals of 10 days before the buds had opened, put on until the trees were thoroughly drenched, seem to have destroyed the scales completely. All appeared to be lifeless. I noticed on one tree before I applied the first spray, about two weeks before the buds opened, a few young larvæ moving about on the small twigs. This was only on one tree, on the sunny side. They must begin to move pretty early sometimes, although I could not detect any movement of them on the other trees. Of course, the emulsion would effectually destroy them. This leads me to conclude that it might probably be better to spray the second time, just

immediately before the buds open, with the strong mixture. After the leaves are out, I suppose it would be necessary to dilute nine times or more before applying the emulsion. However, the two applications seemed to do the work for me."

"November 25.—The treatment for the Plum Lecanium was particularly satisfactory. On making a careful examination a few days before I received your last letter, I could not find a single healthy scale on any of the trees."—C. E. FISHER.

Badly infested branches of St. Lawrence plum were sent from Fruitland by Mr. W. M. Orr, in April, and he was advised to spray at once with kerosene emulsion. At the end of the season Mr. Orr writes :—"Nov. 26.—We sprayed with kerosene emulsion for Plum Scale. We did it thoroughly, but only once. So far as we can judge, it has destroyed them. The old scales are all dead and dried up, and no signs of any more coming on the limbs."

Remedy.—All of our Canadian experiments with this insect were based on Mr. Slingerland's work in the state of New York, and where the instructions were carefully attended to the results were quite satisfactory. The kerosene emulsion (Riley-Hubbard formula) diluted with four parts of water used in the winter was most effective. Mr. Slingerland in his bulletin, lays great stress upon the necessity of thorough work ; he says :—"Thoroughness must ever be the watchword in applying the emulsion. The scales when treated are very small objects and you must hit them with the emulsion. In making the application about July 1st, the only direction needed is to thoroughly soak the trees with the emulsion, diluted six to eight times. In combating the hibernating scales on the leafless trees, however, more care must be taken in directing the spray. Remember that most of the scales are on the undersides of the smaller branches, but there are thousands of them also in the crevices of the bark all over the tree, from the base of the trunk to the topmost twig. Thus in order to hit the scales, the spray must be directed from beneath the tree on all sides, and every crevice filled with the liquid. Drench every square inch of the bark. The horse power sprayers will not prove nearly so effective in fighting this pest as an ordinary hand pump and barrel or tank apparatus. You have got to stop at the tree, get under it, and stay at least a minute to do a thorough job. Remember where the scales are, which you want to hit, and do not leave the tree until they are hit. This idea of thoroughness cannot be too strongly impressed on the one who holds the nozzle while this pest is being fought."

The Best Time to Spray.—The remedy then is the standard kerosene emulsion diluted with four parts of water, to be applied twice before the buds burst, or diluted with eight parts of water just when the young scales are seen to be moving, i.e., in the last days of June.

Parasites.—This insect, like many other scale insects, is sometimes much reduced in numbers by parasites. From scales received from Mr. Alex. Glass, of St. Catharines, two species of chalcids were bred. These have been identified by Messrs. Howard and Ashmead as *Pachyneuron altiscuta*, How., and *Eunotus lividus*, Ashm. From other scales sent by Mr. Orr from Fruitland, three specimens of the small lady-bird beetle, *Hyperaspis signata*, Oliv., were reared. The white mealy larvæ, when they had eaten all the eggs beneath one scale, pushed their way beneath another and so on until they were full grown, about June 20. The beetles appeared early in July.

THE PEAR-LEAF BLISTER-MITE.

(*Phytoptus pyri*, Nalepa.)

Fig. 13.—Pear-leaf Blister: cluster of infested leaves; *a*, upper surface of leaf; *b*, lower surface; *c*, two galls enlarged. (Figure kindly lent by Prof. J. H. Comstock.)

Attack.—Reddish spots, irregular in shape, about $\frac{1}{8}$ of an inch in diameter, and frequently confluent. These appear on young pear leaves early in spring, and, as the summer progresses, they turn to corky, blister-like galls, with a hole in the centre, through which large numbers of minute, elongated mites issue, and attack fresh parts of the leaf.

Since special attention was drawn to this insect, and its habits were explained in my report for 1891, specimens and inquiries have come in from all parts of Canada where the pear is grown. Mr. L. Woolverton, the Secretary of the Fruit Growers' Association of Ontario, reports that "it is rapidly gaining ground in the Niagara district. On account of its small size and its habit of working out of sight between the upper and lower surfaces of the leaf, it is not recognized as an insect enemy by fruit growers in general, many mistaking it for some fungous disease; but if one examines an affected leaf in a good light with a magnifying glass, it is easy to detect the white, elongated mites. I find it is spreading slowly through our pear orchards, and it threatens to do us much harm."

In British Columbia I found that this insect, although not sufficiently numerous at the time of my visit to be the cause of much injury, occurred in many orchards, and Mr. Palmer says it is becoming common in every part of the province. However, its nature is now pretty generally known by fruit growers, and the recommended remedies are being applied. Mr. Sharpe writes from Agassiz as follows:—

"Agassiz, B. C., May 9.—I have been interested in the Pear-leaf Blister-mite for two years and at one time was very much concerned about it; for it was doing serious injury to some of my pear trees, more especially those received from one of the Ontario nurseries. I think it would be well if you would give this matter your attention. I have every reason to believe that it is very prevalent on the Pacific coast, as I get trees and see trees from several nurseries in British Columbia, Washington, Oregon and California, and I think all have it, and the climate being very favourable to their development on account of the moisture and consequent very succulent character of the leaves and abundant foliage, it is likely, if not checked very soon, to cause a serious loss. Up to last spring the Oregon people say that they thought it was a leaf blight, and I suppose, if treated at all, it was treated with Bordeaux mixture or some other fungicide, which I found had no effect on it. I tried a lot of combinations last year, but all were failures. This March and February I used the sulphur and salt combination, and my pear trees never looked so strong and healthy. The foliage is almost uniformly clean and bright, and if a few colonies escaped, I think, if I do not succeed in clearing them out this summer, that another thorough spraying next winter will rid me of them."—T. A. SHARPE.

In my report for 1891, I recommend as a remedy for this insect the ordinary kerosene emulsion with the addition of some flowers of sulphur, to be used just before the buds burst, and this has given tolerably good results; but, from the condition of Mr. Sharpe's trees, which I had an opportunity of examining last summer, as well as from

information received from Mr. R. M. Palmer, I judge that the most successful treatment has been with the lime, sulphur and salt winter wash, recommended by the Oregon Board of Horticulture. This wash, Mr. Palmer tells me, has been extensively used in British Columbia and has given good satisfaction.

The formula, as given in the report of the Inspector of Fruit Pests of British Columbia for 1894, is as follows:—

"No. 1. (Winter spray for Woolly Aphis, Scale insects and Pear-leaf Blister-Mite.)

Ingredients:	Lime, unslaked	30 pounds.
	Sulphur, powdered	20 do
	Salt, coarse	15 do
	Water	60 gallons.

This wash is practically the same and is prepared in the same manner as the winter wash recommended by the United States Entomologist for the San José Scale, and printed in my last annual report as follows:—

"The most favoured winter remedy in California, however, is the lime, salt, and sulphur mixture. This consists of unslaked lime 10 lbs., sulphur 5 lbs., stock salt 5 lbs., water to make 15 gallons. This wash will do great damage to the trees if applied during the growing season, *and should be used only in winter.* All the sulphur and half the lime are placed in a kettle, and 8½ gallons of water added; after which, the contents of the kettle are boiled briskly for about an hour. The solution, which at first is yellow from the sulphur, will turn very dark brown, assuming more or less of a reddish tint, and will finally turn from a thick batter to a thoroughly liquid condition, the product being ordinary sulphide of lime. All the salt is added to the remaining 5 pounds of lime, and the latter slaked; after which, the slaked lime and salt are added to the sulphide of lime already obtained, the whole being then diluted with water to make 15 gallons. This should be strained before application, as it does not form a perfect liquid solution, on account of the considerable quantity of undissolved lime, which will soon sink to the bottom, unless the solution is constantly stirred while being sprayed." (L. O. Howard, *Circular No. 3.)*

SPRAYING.

Spraying for insect enemies and fungous diseases is now universally recognized by progressive fruit growers in Canada to be a necessary part of their annual operations. Remarkable success has attended the adoption of spraying as a regular orchard practice by many growers, and great gain has resulted in both the quantity and the much improved quality of the crop reaped. It is certain that during the past season the number of fruit growers who have sprayed is far greater than it ever was before. This is largely due to the efforts made by the Dominion and Provincial Governments to disseminate accurate information as to the nature of the injuries to crops and the best means of preventing them. In addition to the work of the Entomologist, an excellent series of experiments was carried on by my colleague, Mr. John Craig, in some fruit orchards of Western Ontario during the summer of 1894; and, during the past season, this same work was carried out on a much more extensive scale by the Ontario Government under the able direction of Mr. A. H. Pettit, of Grimsby, who visited at regular intervals about 30 localities in the province and experimented carefully on the advantages of spraying with the standard mixtures. The results of this work are satisfactory, as appears from the following answer to a letter of inquiry. The full report of Mr. Pettit's work will, of course, be submitted to the Ontario Government for publication.

"November 7.—In regard to insects and the results of the spraying, I can only give you the facts as they presented themselves to me during the season. I do not think the Codling Moth has been nearly as numerous as in former years, from some cause or other, and the damage to fruit on the sprayed trees is much less than on the unsprayed. The same seems to apply in regard to the Apple Scab. While there has been a little on the unsprayed trees, scarcely any can be found on the sprayed trees, and

the improvement in the foliage is quite marked; another point is, the fruit on the sprayed trees is larger in size, marking no doubt the health and vigour of the tree.

"I am inclined to think the frost at the time of blooming and followed by (in this western part of Ontario) a long continued drought has been detrimental to the development of the Codling Moth and also to the Black Spot fungus. The Bordeaux mixture, I believe, will prove to be of great value to our fruit growers, if they will only apply it promptly and at regular intervals, and for apple trees I would add the Paris green every time. The Bud Moth has been quite numerous this year in some sections, and the Paris green applied at the first and second sprayings might catch it as well, and the extra cost would be light."—A. H. PETTIT.

Good results have also been obtained by other correspondents:—

"Hillside, Chateauguay Basin, Que.—Spraying was started on the 28th April, 1894, on Duchess, Astrachan and all early apples. They were sprayed once before the blossoms opened and three times afterwards. The Duchess and all early kinds, were in full bloom on May 13th, and on the 24th there was a heavy rain storm that beat off the blossoms. We sprayed for the Curculio (The Plum Curculio, *Conotrachelus nenuphar*, Herbst. Several specimens were bred.—J. F.) May 26, and noticed some of the newly formed Duchess already bitten. June 26th we gave the fruit the last spraying. The Fameuse were first sprayed May 1st, also Golden Russet and other late apples. They were in full bloom May 15th, and we were prevented by rain from spraying until the 30th. The second spraying was June 6th, and the last was July 4th, at which time we omitted the Paris green. The Duchess and Yellow Transparent were sprayed principally on account of the Curculio, which had been very destructive the previous year. The Fameuse, Walbridge, Haas and other apples influenced by fungus growth were sprayed to prevent it, and the result was very satisfactory. We experimented on the Fameuse by leaving a row as a check among the sprayed trees, and there was from sixty to seventy per cent difference when they were sprayed four times, the check row being badly spotted, and foliage showing a marked difference, being yellow and spotted. A check row in a different part of the orchard had been left unsprayed the previous year, and we noticed that the fruit last season was not so good as where the trees had been sprayed. The Curculio did not do so much damage as the previous year, and there is no doubt the Paris green was a valuable help in its destruction. There was also great improvement in the Yellow Transparent. Our orchard contains about 3,000 trees of all sizes, and the past season we gathered about 1,400 barrels of marketable apples."—R. JACK.

"Freeman, Ont., Dec. 26.—Spraying is exciting more interest and gaining adherents year by year. I used the Bordeaux mixture combined with Paris green on my apple trees with satisfactory results. The fruit was clean, and the foliage, in spite of drought, kept in good condition.—A. W. PEART.

"Ayr, Ont., Jan. 26, 1895.—As you instructed me last spring, I sprayed my apple trees to destroy canker-worm, and it was a grand success. It cleaned them all off."—JOHN MCRUER.

One of the correspondents of the Ontario Bureau of Industries writes from Elmsley, Lanark:—"Fruit trees and vines look well. We may thank the bureau and college for it. I sprayed my trees and vines as instructed and am well paid."

"Victoria, B.C., Oct. 30.—Spraying with Bordeaux mixture against fungous diseases has been generally very successful, although I noticed that some of the sprayed fruit has been russetted a little."—R. M. PALMER.

All the above references have been about the advantage of spraying fruit trees to prevent loss from Mandibulate or Biting Insects. There are also remedies for the other large class of injurious insects, Sucking Insects, which injure crops by sucking the sap. For the most economical and effective means of applying these, the spraying pump is also necessary. The materials used are for the most part insecticides which kill by mere contact with the bodies, they may be classed generally as Summer and Winter Washes; the latter may be used much stronger than the Summer Washes, because, the trees being dormant, the danger of injury is lessened. The most injurious of these Sucking Insects are the various plant-lice or Aphides, true plant bugs and scale insects.

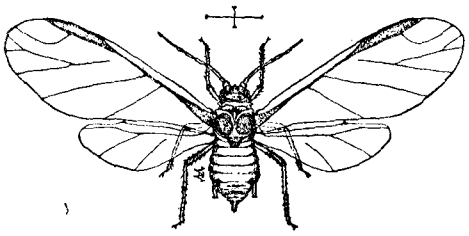


Fig. 14.—Apple Aphis: winged female.

THE APPLE APHIS (*Aphis mali*, L.) and Woolly Aphis are probably the two most injurious fruit insects in British Columbia, and are receiving special attention at the hands of Mr. R. M. Palmer, the Inspector of Fruit Pests, who has published in the *Fourth Report* of the Department of Agriculture of British Columbia (1894) valuable articles on diseases and pests of the orchard, garden and farm. In this report, receipts for spraying mixtures and instructions for their application are given, together with the latest information on the subject, gathered from outside sources. I found in conversation with British Columbian fruit growers during the past summer that kerosene emulsion, the standard remedy in the east for scale insects and plant-lice, was not at all popular, the English quassia hop wash or tobacco and soap wash being preferred, as shown in the following communications :—

"Victoria, B.C., April 4.—*In re* spraying mixtures, the Board of Horticulture have adopted certain formulas and placed them on their rules and regulations. The No. 1 Spray—Lime, sulphur and salt (see page 161)—is the one that has been most extensively used during the dormant season. A wash of one pound of concentrated lye to 5 gallons of water has also been freely used, and to some extent the lime, sulphur and blue vitriol wash. The kerosene emulsion has never become popular in British Columbia, partly on account of its cost, about 8 cents per gallon, and also because some injury has resulted to foliage from its use during the growing season. Our most successful summer spray for Aphides has been a mixture of whale oil soap or other soap (1 lb.), waste tobacco (4 lbs.) and water (10 gallons). This is a very economical mixture, as, so far, we have been able to get refuse tobacco stems and leaves from the cigar factories for little or nothing. I have found this wash very effective."—R. M. PALMER.

"Agassiz, B.C., Oct. 21.—As to the quassia and soap wash for Aphis, this does not compare with the tobacco wash for cheapness, simplicity of manufacture or effectiveness. I have tried both under the same conditions and speak from a fair trial without prejudice."—T. A. SHARPE.

"Kelowna, B. C., Dec. 24, 1894.—*In re* the Apple Aphis, we were much interested to hear you had complaints from other parties as to the Riley-Hubbard emulsion. We found that one of our neighbours, Mr. Crozier, who takes very good care of his trees, was not at all pleased with kerosene and soap, and had done much better with tobacco and soap, which, he declares, is surer and not so liable to damage the foliage. On the other hand, the horticulturist at the Coldstream Ranch (owned by the Governor General) tell us that he has had complete success with the kerosene emulsion used in the proportions of the original formula, namely, 9 to 1."—ROSE BROS.

Having heard that Mr. T. T. Lyon, special agent of the United States Division of Pomology, at Southhaven, Michigan, had been very successful with a tobacco wash for Aphides, I wrote and asked him for particulars of his treatment. His reply is as follows :—

"I fill a half barrel as full as convenient with tobacco stems, and turn on cold water sufficient to cover them, place strips of board on the top, with weights, so as to keep the tobacco submerged; leave it to digest about 24 hours, then strain, if needful, and apply with a spray pump and nozzle. With me, it has always been a sure antidote for sucking insects like Aphides, as well as slugs."

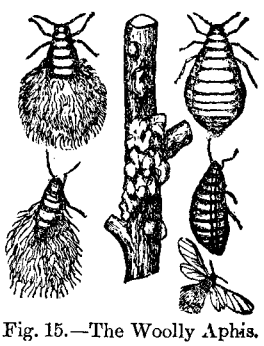


Fig. 15.—The Woolly Aphis.

THE WOOLLY APHIS (*Schizoneura lanigera*, Hausm.) occurs more or less all over Canada, but is apparently increasing in British Columbia. Mr. G. A. Knight has reported it as present to a certain extent for several years, but during this autumn I have received many letters of inquiry from the Pacific province. Mr. Palmer writes : "October 30.—You will be sorry to hear

that the Woolly Aphis is very troublesome again this fall, most of the orchards in Victoria and vicinity, and the wild 'crab apple' bushes, are hanging white with the pest. Of course some people are saying that spraying against it has been of no use, because the work that was done did not exterminate the aphides. I hope to get lots of spraying done this fall and winter."

There are two forms of this insect, one of which attacks the trunk and branches of the apple tree (Fig. 15 shows this form, twig and winged female natural size, the other figures enlarged) and the other which does much injury to the roots. When occurring on the trunks it is not a very difficult matter to destroy the Woolly Aphis with kerosene emulsion or any of the other washes for Sucking insects, but the root-inhabiting form is extremely hard to control, owing to the great difficulty of reaching with any liquid remedy the whole root system. Remedies which have been proposed are the use of hot water or soap-suds poured around the roots, after some of the soil has been removed. Refuse tobacco powder, hoed in around the roots, is also recommended. In view of the successful results obtained by Prof. J. B. Smith with kainit, it will be well to try experiments with that material in places where the Woolly Aphis may be found injuriously prevalent. Another method of avoiding loss from the attacks of this insect and which should also be tested, is the use of resistant stocks. In the "*Handbook of Destructive Insects of Victoria*," Australia, by Mr. C. French, the Government Entomologist, the following reference is made to this :—

"Before the advent of those excellent blight-proof stocks, the Majetin and Northern Spy, it was exceedingly difficult to find, in most orchards, an apple tree that was clean or in perfect health; now, with a little care and attention, the fruit grower, as a rule, may snap his fingers at the 'American Blight,' as, even if it should appear, it can now be kept within reasonable bounds, if not stamped out altogether. * * * According to the late Mr. Treen, the first systematic experiments with the non-blighting stock, the Majetin, were carried out by Messrs. T. Lang & Co., the well known nurserymen of Melbourne and Ballarat, in 1868–70. * * * The variety called the Northern Spy, was raised in America, and was also introduced here by Messrs. Thos. Lang & Co. It is said to be superior in every way to the Majetin, and but little else is now used on which to work young trees of the apple."

The above, of course, all refers to Australia.

Some work has been done in California in the direction of grafting on resistant stocks. In an article on *Beneficial Insects*, by Mr. J. F. McIntyre on page 1070 of the *Fourth Report* of the Department of Agriculture of British Columbia, the following occurs :—

"The Woolly Aphis has done extensive injury to the apple trees in Ventura county, infesting all kinds except those grafted on pear roots. If we can keep the aphis out of the ground by grafting on resistant roots, it will not be very difficult to keep the trees clean."

HOUSEHOLD PESTS.

THE CARPET BEETLE OR "BUFFALO MOTH."

(Anthrenus scrophulariæ, L.)

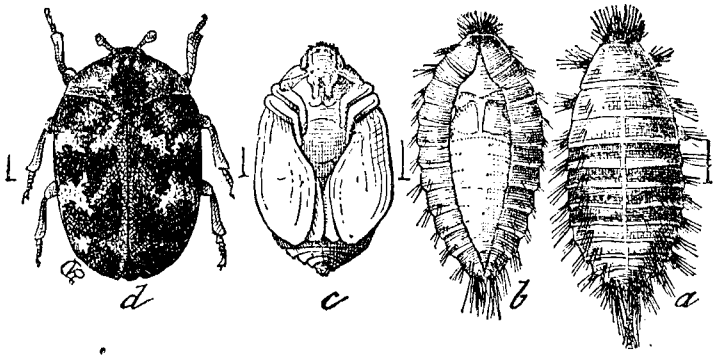


Fig. 16.—The Carpet Beetle: *a*, larva dorsal view; *b*, do ventral view; *c*, pupa; *d*, adult—all enlarged.

Attack.—Very active, dark brown, bristly insects about one-eighth of an inch in length, shaped as in figure 16 *a*, which during summer eat the woollen portions of carpets, particularly around the edges of rooms, and where they are nailed down.

The Carpet Beetle has occasionally been reported to me as being injurious to carpets since 1889, when the first mention of it in Canada, in that connection, was made. Previous to that, however, specimens of the beetle had been received among insects sent in for identification from various places, as Fort MacLeod, N.W.T., Leamington, Brantford, Toronto and Peterboro, in Ontario, and in 1884 a few specimens were found in the windows in the library of Parliament, Ottawa.

During the past season there have been more inquiries for information than ever previously, and I fear this pest must be extending its range as a household pest. Last year Mr. R. Alexander wrote to me from Galt, Ont., under date of July 24th:—"Please find inclosed an insect known here by the name of 'Buffalo Moth,' which is causing house-keepers a great amount of anxiety and trouble because of its numbers and destructiveness to carpets and woollens. Will you be kind enough to advise me how to destroy it?"

During the past summer injuries have been reported from Paris, Brantford and Hamilton, and Prof. J. H. Panton, also writes:—"Guelph, Ont. Dec., 5th.—I have had specimens of the Buffalo Carpet Beetle sent to me from Hamilton, Guelph City, and a farm house about five miles from Guelph. I have found them in my laboratory, and I think I have received some from Brantford. There is no doubt it is here."

Many articles have appeared upon this insect since its first occurrence as a house pest in 1874. By far the best of these are those by Dr. J. A. Lintner (*Ent. Contributions*, No. 4) and Dr. C. V. Riley (*Insect Life*, II., p. 127).

The life-history of this insect in Canada is probably as follows:—The perfect beetles emerge either in autumn or more abundantly in spring, at which time they pair and lay eggs, from which hatch the larvæ that do the harm during the summer. There is, I believe, only one brood in the season, although I have received pupæ in one instance as early as the 24th July. The beetle is a beautiful little creature, oval in shape, one-eighth of an inch in length by one-twelfth of an inch in width; in colour, black, variegated with three irregular bars of white scales, and with the edges of the wing-cases, where they meet on the back, bordered with brilliant scarlet.

Remedies.—This is a very difficult insect to eradicate when once established. Dr. Riley speaks of it in the article above referred to as the "despair of the good housekeeper", and also says, "Where carpets are used and only taken up once a year, at 'house-cleaning,' the conditions are very favourable for the insect's increase, particularly where the house-cleaning is hurriedly and carelessly done. When a house has once become infested, nothing but the most energetic measures will completely rid it of the pest, and in complete riddance is the only hope, as in a year a very few individuals will so increase as to do great damage. At house-cleaning time, then, as many rooms as possible should be bared at once, and the house-keeper should go carefully over the rooms, removing all dust, and with a hand atomizer charged with benzine should puff the liquid into all the floor crevices, etc.; the inflammability of benzine must be remembered, however, and no light brought near it for some hours." Gasoline or refined kerosene would answer as well as benzine. Good work can also be done by removing the carpets, having them well beaten, and scalding the floor with boiling water before replacing them. Before relaying the carpets, if a strip two feet wide of ordinary builders' tarred paper be placed round the edges of the room, it will, to a large measure, prevent the beetles from laying their eggs. Cloth covered furniture, and chests of drawers which have held infested clothing, should also be thoroughly treated with benzine or gasoline. In places where this pest is known to occur, woollen fabrics and other articles liable to be attacked should be examined and shaken out at short intervals.

It is sometimes inconvenient to take up carpets, in order to examine them to see if the beetles are present. For such cases Dr. Riley has suggested the following plan, which has given good results where tried:—

"Another method of treatment, which I have frequently recommended and which can be used to advantage whenever the work of the larvæ is noticed or suspected, consists of laying a damp cloth (an old towel or a folded sheet) smoothly over the suspected part of the carpet, and ironing it with a hot iron. The steam thus generated will pass through the carpet and kill all the insects immediately beneath. If not too laborious, an entire room could be gone over to advantage in this way."

Mr. C. H. Roberts, dispensing chemist, of Paris, Ont., who is frequently applied to for advice as to the best treatment for injurious insects, has recommended this last plan to some of his friends, and writes:—

"Paris, Ont., December 24.—I have to thank you for the very prompt and courteous reply to my inquiry *in re* the Carpet Beetle or Buffalo Moth. This pest has been spreading from house to house in this vicinity quite rapidly and in some cases has proved most disastrous to the carpets of many of our best houses. It has a preference for red and in some cases eats only the red portions, thus leaving the carpets riddled; it also seems to prefer darkness rather than light. Your prescription of putting a damp cloth around the edges of the carpets and ironing with a very hot iron, seems to answer well, if used at the proper time, and thoroughly. One lady remarked 'it is just splendid and I think has destroyed them all in our house.'

"It is astonishing how much damage is done sometimes before people know there are any of these pests in the house. I have known a lady to say she was positive there were none in her house, and on investigation she found them quite plentiful.

"Your department is a great boon to the public, where reliable information can be obtained promptly and gratuitously on all subjects connected with injuries by insects to farm crops and other property for the small trouble of asking for it."—C. H. ROBERTS.

"Toronto, Ont., December 31.—Mrs. Beadle tells me that, when on a visit to her sister, residing in Springfield, Mass., she heard the ladies complaining of the Carpet Beetle eating wearing apparel in drawers and closets, not only those of wool, but also those of silk, and even eating numerous holes in papers in their drawers; also that people availed themselves of its preference for red woollen fabrics, to trap them, by placing pieces of red flannel in drawers and closets, and that in this way, large numbers of the insects had been found and destroyed."—DR. D. W. BEADLE.

THE APIARY.

The practical management of the Apiary during the past season has been satisfactorily carried on under my supervision by Mr. John Fixter, the Farm foreman, an enthusiast in bee-keeping. Mr. Fixter has been of great service and has devoted much of his own time after hours to the careful work which is necessary to make the keeping of bees a success. He has also attended some meetings and explained the operations now in progress at the Experimental Farm. The interest in this subject has been shown by the large number of visitors at the Apiary. The 23 colonies of bees are in good condition and on November 20th were stored in the cellar prepared for them. A report by Mr. Fixter upon the working of the bees during the season is printed herewith and, I feel sure, will be of great interest to bee-keepers. The same experiments which were begun at the suggestion of Mr. R. F. Holtermann, of Brantford, Ont., and reported upon last year on different kinds of comb foundation, were continued during the present season, and a valuable report upon them by my colleague, Mr. Frank T. Shutt, will be found appended to this report. This investigation is one of great value to bee-keepers, and I feel sure that Mr. Shutt's report will be found a valuable addition to the literature of bee keeping.

REPORT OF MR. JOHN FIXTER.

Experiments in Wintering (1894–95).

Twenty colonies of bees were put into the cellar November 9, 1894. The bee cellar is a chamber 10 feet by 12, boarded off from a large stone cellar; the floor is boarded and there are no shelves. In the autumn of 1894, the hives were packed as follows:—A row of empty hives was first arranged around the wall, and the hives containing bees were put on the top of these so that they might not be too close to the floor. To secure ventilation, a piece of wood 3 inches thick was placed on the top of the empty hives at the back beneath the full hives; the bottom boards of the latter were loosened, and a $\frac{3}{8}$ of an inch block was also inserted between the bottom board and the brood chamber; the front entrances being left wide open. Thus the upper or second tier of hives was $3\frac{3}{8}$ inches higher at the back than in front. The wooden covers were removed from the hives and replaced by two common grain bags. This year cushions 4 inches thick and filled with chaff, have been used in place of these bags. Of the 20 colonies, 19 hives were arranged on the plan above described. All kept perfectly dry, but considerable humming was heard from the bees during the winter. One hive was put in the cellar with both wooden cover and propolis quilt on the top, and the bottom board left tightly attached; in fact, the hive was taken in just as it was in the bee yard. This hive was quite damp during the winter and some mould was noticed on the comb. Although the bees in this case wintered safely, this plan of wintering is not recommended. The average weight of each colony and hive when put in the cellar on November 9, 1894, was $48\frac{3}{4}$ pounds, and when taken out again on April 19, 1895, the average weight was 36 pounds and 3 ounces, each colony having only consumed an average of 12 pounds and 9 ounces of their stores against 20 pounds during the winter of 1893-94. This improvement was probably due to the higher average temperature maintained in the cellar during the winter and a better method of storing the hives.

The temperature of cellar expressed in degrees Fahrenheit was:—

November.....	38° to 42°	February.....	38° to 40°
December.....	do	March.....	40° to 42°
January	40° to 42°	April	42° to 46°

From 40° to 46° is claimed to be the proper average temperature to winter bees at; but we were unable to obtain this temperature throughout the winter in our cellar.

From an unknown cause, one colony died during the winter, although well supplied with sealed honey.

The Season of 1895.

April 18, 1895.—The weather being very fine, 6 hives were taken out of the cellar and placed on their summer stands in the bee yard. The remaining 13 hives were taken out on the morning of the 19th. All the colonies appeared to be very unsettled, and in the evening of the 19th a considerable number of dead bees were noticed around the six hives put out first on the evening of the 18th.

April 20.—Very strong wind. All colonies still unsettled. Temperature, 60° to 70°. I noticed that three small colonies which had purposely been put into winter quarters, weak in numbers, to see if they could be carried through the winter, had gradually dwindled, and the hives were forsaken.

" 21.—Very few bees carrying in pollen.

" 22-25.—Weather very cool. The bees did not come out at all. On the 26th they began to fly, but none were noticed carrying pollen.

" 27-29.—Very fine weather, Bees flying well and collecting pollen freely from soft maples. Very few willows in blossom yet.

" 30.—Morning opened cold and dull; but the afternoon was bright and the bees worked well on elms and willows.

May 1-4.—Bees flying well and gathering much pollen.

" 5.—Fine warm day. Bees working well. Noticed the bees beginning to cluster in front of one hive.

" 8.—Wet all day. No bees flying.

" 10.—Fine day. All colonies appeared to be working well. All hives inspected. Found abundance of brood. Some young bees coming out, A good quantity of fresh honey gathered. Found a few grubs of the Bee-moth (*Galleria mellonella*, L.) in one hive and at once destroyed them all.

" 11.—Fine day. Bees working well, cool towards evening.

" 12-13.—Very cold. Bees did not come out at all. It froze hard at night.

" 14.—A good deal of dead brood was carried out in front of several hives. Bees noticed clustering around water tap.*

" 15-16.—Bright and sunny, but very cold wind; very little working. A considerable amount of dead brood and young bees in front of every hive.

" 17-18.—Bright and sunny, but a cool wind; bees working fairly well.

" 19-21.—Wet, cold, and dull; very windy, very little flying.

" 22.—Cold, but beginning to get warmer,

" 23-24.—Very fine; bees working well.

" 24.—Inspected every hive; a considerable amount of new honey and brood, except in one colony which was very weak. Later, this colony was united with a new swarm from one of the other hives.

" 25-29.—Very fine weather. Bees working well.

" 29.—First swarm of the season.

" 30.—Fine till evening, when very heavy rain fell. Bees clustering around nearly every hive.

" 31.—Very wet. Bees did not fly until evening.

June 1.—Very fine. Bees working well. Placed first set of supers on all the hives except the weak colony mentioned above.

" 2.—Fine; bees working well, but still clustering.

" 3-5.—Rather dull, but bees working well; all clustering ceased.

" 6.—Rather dull; very little flying. White clover and Alsike coming into bloom.

" 7-10.—Very fine; bees working well.

" 11.—Mock Orange (Philadelphus) in full bloom and very attractive to bees.

* It must be remembered that bees require a good deal of water to drink, and when there is not a creek or pond near at hand, where a supply of good fresh water can be obtained, this want must be supplied by the bee keeper.

June 20.—A considerable amount of clover honey in the sections.
" 21.—Wet all day; bees working fairly well.
" 22–26.—Weather very fine; a large amount of clover honey gathered.
" 27–30.—Bees working well on clover blossoms which are now abundant.
July 1.—Basswood flowers fairly well opened; bees working well. All hives examined. Several supers full of clover honey; combs well capped. Each of these was marked and an empty super inserted below it, so that the bees might go on working, and the full super being on the top, it would not get travel-stained by the bees passing over it, and the honey would ripen to a certain extent.
" 2–15.—Bees working well on clover and basswood.
" 15.—All supers full of honey removed.
" 15–18.—Bees working well. Basswood just about finished.
" 18.—Buckwheat, plot No. 1, in bloom; bees working well on it and clover, which is still in bloom.
" 23.—Bees collecting much honey from English horse-beans.
" 23–31.—Very fine weather for bees; working well on clover, buckwheat and horse-beans. Buckwheat, plot No. 2, came into bloom.
Aug. 1.—Much buckwheat honey in supers.
" 1–15.—Bees working well on buckwheat plots 1, 2 and 3; and a good supply of buckwheat honey in supers.
" 17.—Considerable clustering, owing to the excessive heat. Made spaces for ventilation, between super and brood-chamber, just wide enough only to prevent bees getting through, and also put an extra wooden cover on the top of the hives for shade.
" 18.—Buckwheat plot No. 1 out of bloom; but bees are working well on plots 2 and 3 now well in blossom; plot 4 just coming into flower.
" 19–25.—Bees working well on buckwheat.
" 21.—Slight frost at night, not enough to injure buckwheat.
" 25.—Bees first noticed killing drones. Some bees seen attempting to rob; as soon as this was observed, the entrances to the hives which were threatened, were closed up, so that only one bee could enter at a time.
" 25–31.—Bees still working on buckwheat, also on *Hydrangea paniculata*.
Sept. 1–11.—Bees working well on buckwheat plots 2, 3 and 4.
" 11.—Plot 2 ploughed under as green manure.
" 15.—Very hard frost; buckwheat all frozen.
" 15.—Bees flying well. Removed all supers.
" 17–30.—Very fine weather; bees flying well; did not notice them gathering honey.
Oct. 1–6.—Very fine weather; bees working on alsike and crimson clover.
" 7–18.—Weather cold and windy; bees active when the weather was not too cold.
" 19–22.—Cold and dull; 3 coarse sacks placed on each hive.
" 23–26.—Days bright; but little flying.
" 27.—Very fine day; bees showing a tendency to rob each other; so closed entrances.
" 28–31.—Cold and windy; no flying.
Nov. 1–14.—Cold; very little flying.
" 15–18.—Very fine weather; considerable flying.
" 19.—Dull and cold.
" 20.—Very cold windy day, freezing hard. Bees were put into winter quarters at night.

Buckwheat.

Four plots of buckwheat were sown on the Experimental Farm last season, primarily as pasture for the bees but also for the grain. The plots were sown on sandy loan where there had been a plantation of forest trees and shrubs for the 5 years previously. No manure of any sort was used.

Plot No. 1.—Sown June 16th; came up 23rd; came into bloom July 18th. The bees began to work on this plot as soon as the blossoms appeared, which was rather early, as the bees were still gathering clover honey. If the buckwheat had been sown

a week later, the bees, this year, would have had more white honey. Seed ripe August 29th; yield 27 bushels 16 lbs. to the acre, notwithstanding that the blossoms were somewhat injured by the excessive heat about the middle of August and late in the season.

Plot No. 2.—Sown June 29th; came up July 5th; in bloom July 31st, when the bees began at once to work on it. Ploughed under for green manure September 11th, when seeds were beginning to form.

Plot No. 3.—Sown July 6th; soil part sandy, part clay; that sown on the clay did not do well; the soil being too dry, the seed did not germinate readily. Came up on the sandy portion July 13th; in bloom August 12th. Bees began to work on it at once. Frozen down by the sharp frost of September 14th, when the seeds were ripening nicely; yield, 21 bushels 37 lbs. to the acre.

Plot No. 4.—Sown July 16, came up July 21, in bloom August 20. Bees busy on the plot until frost of September 14. No ripe grain, so ploughed down for manure Sept. 15.

Five-banded Italian Queen.

The five-banded Italian queen, which was introduced Aug. 4, 1894, has given the best satisfaction. This beautiful queen bee was presented to the Apiary through Mr. R. F. Holtermann, Secretary of the Agricultural and Experimental Union of Ontario. The colony came out of winter quarters very strong in the spring of 1895. During the season of 1895 these bees made 78 sections of honey and swarmed twice. The colour of this race of bees is very beautiful. I should like to see many more colonies of them in the Apiary.

Returns.

The returns of the Central Experimental Farm Apiary for the season of 1895 show an average of 54 sections of honey for each colony.

Swarming for the season on the whole has been satisfactory. As stated above, the first swarm for the season was secured on May 29.

Experiments in Wintering (1895–96).

No. 1.—Seventeen colonies put into winter quarters in the cellar. Empty hives were placed on the floor, with 3-inch blocks of wood on the top of them, and the hives piled up three tiers in height. In addition to the 3-inch blocks, by which the back was raised higher than the front so as to give free ventilation, each hive is raised from its own bottom board with small blocks, $\frac{3}{8}$ inch in height. All front entrances left wide open. The wooden covers of all these hives removed and replaced by chaff cushions, four inches thick. Above the cushions strips of wood were placed so as to prevent them touching the bottom of the hive immediately above them, and also to allow air to circulate freely under each tier of hives.

This plan was recommended to us by Mr. Pettit of Belmont, Ont.

No. 2.—Two colonies were put into the cellar, with the tops and bottoms left on, just as they were brought in out of the bee yard. These are to be watched for dampness, to be weighed in spring, and notes are to be kept of their work during the following season.

No. 3.—One colony was placed in a packing case in the cellar and packed with four inches of dry sawdust all round the hive; brood chamber raised from bottom board by four small 1-inch blocks; wooden cover of hive replaced by a 4-inch chaff cushion, and the packing case filled up with four inches of dry sawdust, above the cushion. For ventilation a small shaft, of the same size as the opening to the Langstroth hive, leads from the hive to the outside of the packing case. Case placed on the top of another case three feet high, in the stone cellar beneath dwelling house.

No. 4.—This experiment is very similar to the last, but no ventilation is provided. The bottom board of the hive was removed and the hive was stood on four blocks 1½ inches high, one under each corner, placed right on the bottom of the packing case, which was then filled in with dry sawdust, four inches all round and above, as in experiment 3, except that no shaft for ventilation was cut through to the outside of the packing case; but immediately beneath the hive there is a narrow crack between the boards of the packing case, not $\frac{1}{16}$ of an inch wide. The packing case itself is raised about an inch off the earthen floor in the stone cellar by means of small blocks.

No. 5.—One colony was placed in a packing case large enough to allow of 4 inches of cut straw and chaff being packed all round the hive, and the box was left out of doors in a sheltered place on the ground in the yard. Bottom board loosened and 1 inch blocks put at each corner between bottom board and brood chamber. Wooden cover also replaced by 4 inch chaff cushion, and box filled up with 4 inches of chaff and cut straw. No ventilation.

No. 6.—One colony treated exactly as above, but with ventilating shaft from entrance to the outside of the case which is placed 3 feet from the ground on the top of an empty case.

JOHN FIXTER.

REPORT UPON FURTHER EXPERIMENTS WITH CERTAIN BRANDS OF "FOUNDATION."

BY FRANK T. SHUTT, M.A., F.I.C., F.C.S.

Last year a series of experiments was undertaken in order to ascertain the relative ease with which various brands of "foundation" were drawn out and used by bees in building comb. The results of these experiments and deductions therefrom were published in the report for 1894 (pages 220 to 223.) During the past summer this investigation has been continued, and the results obtained are now presented. In addition to the "foundations" tested last year, several new brands were put under trial. The relative weights of wax deposited when the honey was gathered from clover and buckwheat respectively, were also determined. The series also is more complete, inner and outer sections in all cases being examined.

The plan of procedure was as follows:—The frames were filled with the various "foundations" under experiment and of which the exact weight of two inches square had been taken. At the close of the season the cells were opened by the careful removal of the cap, and the honey extracted with the extractor. The last traces of honey were got rid of by successive exhaustions with cold water. After allowing the comb to thoroughly dry by exposure to the air, an area of two inches square was cut from the centre of the section. This method is practically the same as that used last year, with the exception that the caps of the cells only were removed. In the season of 1894 the cells were opened by shaving off the surface of the comb, a plan that necessarily involved the loss of more or less of the cell wall.

The data obtained are detailed in the following table :—

EXPERIMENTS with various Brands of "Foundation," 1895.

Designating Letter.	Name of Wax and Mill.	Section.	Milling Temperature.	Weight in grammes of "Foundation," 2 inches square.	Weight in grammes of empty honey-comb, 2 in. square.	Weight in grammes of wax added by bees per 2 in. square.	Percentage of wax added by bees.	Gathered from
			F.					
A 1	Choice wax, Root mill,	Outer	89°	1·401	2·969	1·568	111·9	Clover.
A 2	" "	Inner	89°	1·401	3·108	1·701	121·4	"
B 1	" "	Outer	120°	1·204	2·968	1·764	147·3	"
B 2	" "	Inner	120°	1·204	2·906	1·702	141·3	"
C 1	Foundation in general use, 1894,	Outer		1·414	2·946	1·532	108·4	"
C 2	" " "	Inner		1·414	2·973	1·559	110·2	"
D 1	" " " 1895,	Outer		1·215	2·655	1·440	118·5	"
D 2	" " " "	Inner		1·215	2·588	1·373	113·0	"
D 3	" " " "	Outer		1·215	3·258	2·043	168·1	Buckwheat.
E 1	Heavy sheet, Root mill,	Inner	120°	1·315	2·707	1·392	105·8	Clover.
E 2	" "	Outer	120°	1·315	2·685	1·370	104·2	"
F 1	Inferior wax, "	Inner	89°	1·224	3·006	1·782	145·6	"
F 2	" "	Outer	89°	1·224	3·046	1.822	148·8	"
G 1	" "	Inner	129°	1·167	3·024	1·857	159·1	"
G 2	" "	Outer	120°	1·167	3·028	1·861	159·4	"
H 1	Choice wax, Given process,	Inner		1·801	3·513	1·712	95·0	"
H 2	" "	Outer		1·801	3·372	1·571	87·2	"
I 1	Poor wax, "	Inner		1·582	3·176	1·594	100·8	"
I 2	" "	Outer		1·582	3·275	1·693	107·0	"
I 3	" "	Inner		1·582	3·453	1·871	118·2	Buckwheat.
I 4	" "	Outer		1·582	3·441	1·859	117·5	"
J 1	Patent process, 12 sq. ft. per lb.	Inner		1·004	2·515	1·511	150·5	Clover.
J 2	" " "	Outer		1·004	2·497	1·493	148·7	"
J 3	" " "	Inner		1·004	3·406	2·402	239·2	Buckwheat.
J 4	" " "	Outer		1·004	3·360	2·356	234·6	"
K 1	" 15 sq. ft. per lb.	Inner		1·093	2·818	1·725	157·8	Clover.
K 2	" " "	Outer		1·093	2·757	1·666	152·4	"
K 3	" " "	Inner		1·093	3·355	2·262	207·0	Buckwheat.
K 4	" " "	Outer		1·093	3·091	1·998	182·5	"
L 1	Foundation sent by R. F. H., 1895	Inner		1·257	3·495	2·238	178·0	Clover.
L 2	" " " "	Outer		1·257	3·016	1·759	139·9	"

Comparing these results with those of last year, the most notable feature to be observed is the fact that the weight of two square inches of the empty honey comb is greater than that recorded in 1894 for the same brand. This, I believe, is due entirely to the different methods employed this year in opening the cells, and not to any extra deposition of wax by the bees. The extra weight obtained this season represents, undoubtedly, the part of the cell wall that was shaved off in 1894 before the extraction of the honey. The weight of the "foundation" supplied being the same as that quoted in 1894, the percentage of added wax necessarily appears to be higher.

Respecting the relative amount of wax added by the bees in the inner and outer sections, it would seem that slightly more wax is deposited in the cell walls of the outer sections; but this does not hold good in all cases, and, where present, the additional amount is not large. The data, in my opinion, do not afford sufficient proof of the contention that the comb is heavier in the outer than in the inner sections, to allow such a conclusion to be drawn.

As shown last year, the percentage of wax produced by the bees is, as a rule, inversely proportional to the weight of wax supplied in the "foundation." This statement does not affect the fact that a heavy "foundation" is often continued by the bees by a heavy deposition of wax in the side walls of the cells.

In every instance where the same foundation was used for honey gathered from clover and from buckwheat, it was found that the wax deposited by the bees to contain the

buckwheat honey exceeded considerably in weight that deposited for the clover honey. The difference is most noticeable, as the foregoing table of data shows.

The general remarks made last year as to the appearance of the comb from the different brands might again be repeated. Dark and deeply coloured "foundations" are productive of unsightly "fishbones" and undoubtedly would injure the sale of the comb honey.

In order to bring out more emphatically certain points already noticed, the following table of averages has been prepared :—

TABLE of Averages.

Designating Letter.	Name of Wax and Mill.	Milling Temperature.	Average weight in grammes of 2-in. square of empty honey-comb.	Average weight in grammes of wax added by bees.	Average percentage of wax added by bees.	Gathered from.
		F.				
A 1 & 2...	Choice wax, Root mill	89°	3·038	1·634	116·6	Clover.
B 1 & 2...	" "	120°	2·987	1·733	144·3	"
C 1 & 2...	Foundation in general use, 1894....	.....	2·959	1·545	109·3	"
D 1 & 2...	" " 1895....	.....	2·621	1·406	115·7	"
D 3	" " 1895....	.....	3·258	2·043	168·1	Buckwheat.
E 1 & 2...	Heavy sheets, Root mill.....	120°	2·696	1·381	105·0	Clover.
F 1 & 2...	Inferior wax, "	89°	3·026	1·802	147·2	"
G 1 & 2...	" "	120°	3·026	1·859	159·2	"
H 1 & 2...	Choice wax, Given process.....	.....	3·442	1·641	91·1	"
I 1 & 2...	Poor wax, "	.....	3·225	1·643	103·9	"
I 3 & 4...	" "	.. ..	3·447	1·865	117·8	Buckwheat.
J 1 & 2...	Patent process, 12 square ft. per lb.	.....	2·506	1·502	149·6	Clover.
J 3 & 4...	" " ..	.....	3·383	2·379	236·9	Buckwheat.
K 1 & 2...	" 15 square ft. per lb.	.....	2·838	1·695	155·1	Clover.
K 3 & 4...	" " ..	.....	3.223	2·130	194·7	Buckwheat.
L 1 & 2...	Foundation sent by R.F.H.....	.....	3·256	1·998	158·9	Clover.

Though certain data would seem to point towards a greater ease in drawing out and using by the bees certain brands of "foundation" than others, the variations or differences in the investigation are such that no definite conclusions can be reached in this matter. The weight of the foundation supplied would appear to be the chief factor in determining the weight of wax to be added by the bees.

The milling temperature does not apparently affect to any extent the "ductility" (or ease with which it may be drawn out by the bees) of the wax.

The increased weight of wax deposited in the comb when the latter was used to store honey gathered from buckwheat, is most noticeable. Four brands of "foundation" were employed in this test, comparing the amount of wax deposited in the case of clover and buckwheat honey respectively; the results show that 40 per cent to 50 per cent more was added by the bees in constructing the cells to store the buckwheat honey.

FRANK T. SHUTT.

THE BEE-MOTH.

(*Galleria mellonella*, L.)

The honey-bee has several insect enemies which prey upon it or its products. The most troublesome of these, as far as the bee-keeper is concerned, is the insect figured here in its different stages, which is too well known to bee-keepers to require more than a brief description. At *a* is shown one of the full-grown caterpillars or "grubs" natural size. They are very active, dirty white, fat caterpillars, when full-grown about an inch in length, which sometimes occur in large numbers in neglected hives and eat long galleries through the comb, feeding on the wax and the bee-bread in the cells, and also, according to Dr. Riley, destroying any young bees that come in their way. The eggs are very small, oval, glistening white at first, but turning pink before hatching; they are pushed by the mother moth into any crack or crevice in or about the hive, by means of a long tube-like ovipositor. As soon as the young caterpillars hatch, they begin to spin as a protection a silken tube in which they live during their whole larval life and which is enlarged and extended as they progress. When full-grown, they leave these tubes and creep into any crevice or corner, generally near the bottom of the hive, where they spin a tough cocoon (Fig. 17 *b*) of white silk mixed with pellets of black excrement. The pupa (Fig. 17 *c*) may be found inside the cocoon. The perfect insect is figured natural size at *d*, a female with the wings expanded, and *e*, a male at rest.

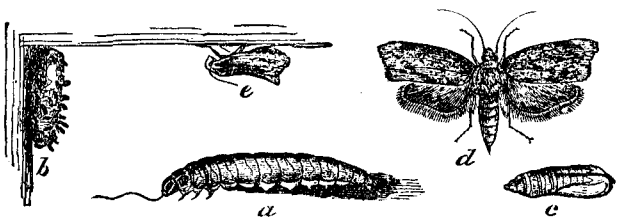


Fig. 17.—The Bee-moth: *a*, caterpillar; *b*, cocoon; *c*, pupa; *d*, a female moth with expanded wings; *e*, a male moth at rest.

There are normally two broods in the season, the first appearing in May and the second, usually much more numerous, in August. In infested comb brought into a heated office for study, the moths appeared at the end of March and through April well into May.

The moths are of various tints of dusky gray and differ a good deal, some being much lighter than others and some specimens of both sexes being of a more ruddy brown. They are very inconspicuous when at rest and in colour resemble very closely old weathered wood, a resemblance which is heightened by many dark spots on the wings. The peculiar shape of the wings, as is shown in the figure above, will easily enable anyone to identify this insect. The moths are about three-quarters of an inch long, and when at rest the wings are folded so as to leave a narrow, flat space at the top and then slope downwards abruptly; when disturbed, they run with great rapidity and slip quickly beneath any available shelter. They fly with ease and enter beehives about dusk in order to lay their eggs.

The indications of the presence of the Bee-moth grub in a hive are well known to most bee-keepers. If the little black pellets of excrement like small grains of gunpowder mixed with bee-bread or broken cappings are at any time noticed on the bottom board around the entrance, the hive should be at once carefully examined, and steps taken to remove any caterpillars that may be found. If attended to promptly while the grubs are few in number, this is an easy matter; but, if they are neglected and allowed to increase as they will very rapidly in the spring, much destruction will be wrought in a surprisingly short time.

When a grub is detected, it should be picked out with a knife or other sharp instrument (a pair of fine but stiff tweezers will be very convenient) and crushed. There will of course be some injury to the comb, but this the bees will soon repair. When the grubs occur only in small numbers, the bees will, as a rule, if the colony be of proper strength, keep them down themselves. The following extracts are confirmatory of this and will be found to contain much other information of interest to bee-keepers.

"It should invariably be borne in mind that a strong stock of bees is ever capable of resisting, to a great extent, the attacks of the worm, while a starved or queenless swarm is quite indifferent to its attacks. In a common box hive, a good way to entrap the worms after they are once in a hive, is to raise the front upon two small wooden blocks, and put a piece of woollen rag between the bottom board and the back of the hive. The worms find a cozy place under the rag, in which they form their cocoons, and may there be found and killed from time to time. Much can be done in the way of prevention, by killing every morning the moths which may be found on the outside of the hives."—C. V. RILEY (*Missouri Rep. I.*, p. 167).

"Italian bees are rarely injured by moths. The intelligent apiarist will also provide against weak and queenless colonies, which, from their abject discouragement, are the surest victims to moth invasions. Judge J. H. Andrews asserts no bees, Black or Italian, will be troubled so long as the combs are covered with bees. If through carelessness a colony has become thoroughly victimized by these filthy wax devourers, the bees and any combs not attacked should be transferred to another hive; after which the old hive should be fumigated with sulphur, then by giving one or two of each of the remaining combs to strong colonies after killing any pupae that may be on them, they will be cleaned and used; while, by giving the enfeebled colony brood, and, if necessary, a good queen, it will soon recover."—A. J. COOK (*Bee Keepers' Guide*, p. 413).

"Early in September I noticed just outside the entrance to one (the weakest) of my seven colonies of bees, a dead grub, evidently one of the troublesome and injurious Bee-moth grubs. I decided at once to examine the hive, out of which it had probably come, or had been carried by the bees, and, on doing so, soon found abundant evidence of where the intruder had been, which was almost in the centre of one of the brood frames. The bees, however, had proved equal to the emergency and had succeeded in dislodging their natural enemy by cutting away the cells on both sides of the frame (which at this time held brood nearly ready to hatch), and had made an opening in the comb several inches in circumference. I may add that this took place shortly after I had very materially increased the strength of the hive by putting a number of young bees in it from another colony that was particularly strong. I think that perhaps the inference from this would be that so long as colonies of bees are in good condition as regards strength, even if attacked by the bee-moth, they will themselves as a rule get rid of their enemy, which they certainly do not appear to have sufficient energy to do when in a weak state."—PERCY H. SELWYN (in *Ottawa Naturalist*, VIII., 1894, p. 141).

"In the spring, bees carry out dozens of caterpillars apparently lifeless and fly away with them. Those that are frequently thrown down simply on the supporting board, soon recover and creep up again to the combs.

"A swarm that has not many caterpillars, overcomes them and carries them out from time to time, especially in spring. We saw this particularly in an excellent swarm, by which a quantity of caterpillars were removed, and which we helped only by taking away in the morning the numerous caterpillars thrown out by the bees on the supports, so that these might not creep up again to the combs, as often happened."—NÖRDLINGER (quoted by Dr. Ritzema Bos, in *Tierische Schädlinge und Nützlinge*, p. 467).

A subject of much interest to bee-keepers in the greater part of Canada is the possibility of destroying such larvæ and pupæ of the Bee-moth as can be subjected to a very low temperature. Many years ago, in conversation with Mr. J. K. Darling, of Almonte, Ont., an experienced and successful bee-keeper, he informed me that he had had little trouble with the Bee-moth since he adopted the method of storing his empty combs in a dry shed where they would be exposed to the full intensity of winter cold. Having had some discussion with some western bee-keepers last year on this subject, I wrote to Mr. Darling, asking him if he still practised and had the same confidence in freezing to destroy the Bee-moth. The following is part of his answer:—

"Almonte, Ont., Nov. 14, 1894.—Yes, I practise the freezing method every winter. This remedy costs nothing and will suit everybody. It is just the thing for lazy people and those who are too poor to build close warm honey houses. All that is required, is to hang up the combs in the fall and they are all right in the spring. I have done this every year, and I have yet to find the first comb that has been destroyed by the moths

in the spring, although they hang in the hives in an open honey house until swarming time next season. Since the question has been raised as to whether the egg also can be destroyed by freezing, I will give it as my opinion that the frost does destroy the egg also, or else the mother moths in my yard are too wise to lay eggs that will not hatch out in the autumn; certainly none hatch in my combs the next spring. Unless I am careful, I have more or less trouble with them in weak colonies every spring, but the combs affected are always those that have wintered in the cellar or have been hung in the hives in the yard for a time after the bees have been set out. I will guarantee that in the spring I will lose as small a percentage of combs that have been frozen, as any other person will do who fumigates with sulphur and does not freeze. The weak points of the freezing method are: it cannot be applied in warm climates, and, it would spoil comb honey. I have every confidence in the freezing, so much so, that for several years I have not given my stored away combs any thought until I wanted to use them the next season, and I have always found them safe, when the mice had not got at them."

A few weeks later Mr. Darling wrote me further on the same subject:—

"I have been looking up the authories on the matter of freezing to destroy the bee moth. Prof. Cook says in his *Manual of the Apiary:* 'It is stated by Mr. Quinby that a freezing temperature will kill these insects in all stages, while Mr. Betsinger thinks that a deserted hive is safe; neither of which assertions is correct. I have seen hives whose bees were killed by the severe winter, crowded with moths the succeeding summer. I have subjected both larvæ and pupæ to the freezing temperature without injuring them. I believe, in very mild winters, the moths and the chrysalids might be so protected as to escape unharmed, even outside the hive. It is probable, too, that these insects may pass the winter in any one of the various stages during the cold season, though they generally exist as pupæ.'

"As I have said, the combs should be subjected to a winter's freezing in a dry, cold building. A hive in the yard, with the cover securely fastened to keep out wet, would be all right for empty combs during winter, but would be far more liable to be destroyed by moths the succeeding summer than if the combs were taken out and stored away in some building. You will observe that Prof. Cook does not say what time in the winter the bees died, nor how late the next summer the combs were destroyed. The bees might have died late enough to secure the moth larvæ a safe conduct through the winter, and the comb might have been destroyed late enough to have resulted from eggs deposited after warm weather set in the following spring. I never claimed that merely a 'freezing temperature' would destroy either moth or larvæ,—in fact, I know it will not destroy the larvæ,—and so I agree on that point. Also the statement that in some mild winters they might be so protected as to come through unharmed, is not very far astray, especially if we consider the location to be in some climate like Southern Michigan, or, in fact, any other place where they can raise peaches to perfection.

"That you may see I am in very good company, I will make two or three more references, and while one or two statements may not be exactly correct, I agree with them in the main, and think their teachings would not lead a level-headed bee-keeper very far astray.

"Mr. A. I. Root, in *A B C of Bee Culture*, after describing fumigating with sulphur to destroy the larvæ of the Bee-moth, says: 'Giving your combs a good freezing, say at a temperature of 15 or 20 degrees, will answer the same purpose as the fumigation.' Now, while that temperature might destroy the larvæ if subjected to it for two or three days unprotected, he has not fixed the temperature low enough to be safe. If he had put it 5 degrees or 10 degrees lower, I should say that he would have had a *dead* sure thing of it, as far as the Bee-moth is concerned.

"Again, in *Langstroth on the Honey Bee*, revised by Dadant, p. 464, sec. 810, it says: 'In northern latitudes, where the thermometer ranges for days and weeks below 10 degrees, the Bee-moth worm can winter only in the hive near the bee-cluster. It is a fact worthy of notice that apiaries that are wintered in the cellar are more annoyed with the moth the following summer than those that are wintered out of doors, because none of the larvæ of the moth perish.'

"Dr. Donhoff says that the larvæ became motionless at a temperature of 38 to 40 degrees, and entirely torpid at a lower temperature. A number which he left all the winter in his summer house revived in the spring, and passed through their natural changes. This was in Germany, where the winters are milder than in our Northern and Middle States. Some larvæ which Mr. Langstroth exposed to a temperature of 6 degrees below zero, froze solid and never revived ; others, after remaining for eight hours in a temperature of about 12 degrees, seemed after reviving to remain for weeks in a crippled condition.

"G. W. Demaree, of Christiansburg, Kentucky, U. S., says the way he protects his spare combs is to let them freeze through the winter, and in the spring before the moths are around he wraps them in factory cotton, ten to twelve combs in a pack, and they are safe until he wants to use them, whether it is the next season or later. Now, if it is safe in Kentucky, why is it not safe here?"—J. K. DARLING.

The following experiment was carried out by Mr. Fixter at Ottawa :—

"Two hives that had been deserted by their swarms in the autumn were left in the bee yard until the bees were taken into the cellar for the winter; both hives were full of empty combs and had very slight traces of the work of the Bee-moth grub ; one of these showed slightly more injury than the other, this one was closed up tightly and was left in a shed for the winter, where it would receive the full benefit of the winter's frosts. It was examined at different times and was kept in the same place until the swarming season the next year, when it was given to a new swarm, and was as good as if there had never been a grub in it. The other hive, which at first showed the least symptoms of injury by the Bee-moth, was taken into a warm office where the temperature would average about 65 degrees during the winter. This hive was also tightly closed at the top and bottom like the former, so that no moth could either get in or out. In the spring, when wanted for use, it was found to contain hundreds of grubs and winged moths. The comb had been entirely destroyed, and was bound together into a solid block by the webs. From this experiment and others, I am certainly convinced that freezing is a good method to keep the Bee-moth at bay."—JOHN FIXTER.

In view of the above, and also of some limited experiments which I carried out at the Experimental Farm, as well as from a careful examination of some samples of infested comb sent to me for examination by Mr. Darling, after they had been subjected to freezing, I feel that I can confidently recommend this easy method of controlling the Bee-moth, for all those districts where the temperature drops to zero Fahrenheit every winter. Mr. Fixter approves most thoroughly of Mr. Darling's plan of freezing to destroy the larvæ of the Bee-moth, and considers that the most convenient way of storing empty combs during the winter is to suspend them from strands of wire stretched across a dry shed, so that they will be safe from mice, but at the same time be exposed to the full intensity of the winter cold.

SOME SPECIALLY NOXIOUS WEEDS.

There has been great anxiety evinced by farmers all over Canada during the past season on the question of noxious weeds. More specimens than ever previously have been sent in for identification and advice as to their treatment. When attending the Central Farmers' Institute of the province of Manitoba, held at Brandon on July 9, 10 and 11 last, I found that the subject of weeds was continually brought forward and was decidedly of more interest than any other. Many specimens were brought to the meeting by delegates, and, at the request of the directors, I delivered two addresses upon noxious weeds. A largely attended and deeply interested meeting was also addressed at Wawanesa, Man., to which I was invited through the kindness of Mr. Hugh McKellar, Deputy Minister of Agriculture for Manitoba. At this latter place also, I was enabled to examine a patch of the so-called RUSSIAN THISTLE (*Salsola Kali*, L, var. *Tragus*, DC. This patch was on the banks of the Northern Pacific Railway. At the time of my visit, June 29, the young plants were very small, only an inch or two high, and great care was being taken to eradicate every plant. Gangs of men were

specially employed all the summer by the railway company to attend to this work of destroying dangerous weeds. Upon inquiring, at the end of the season, how the clean state of the railway which I observed at the end of August had been maintained, Mr. J. E. Riley, the roadmaster, answered as follows through Mr. G. W. Vanderslice :—

"In the matter of destroying noxious weeds during the past season, we have made it a point to go over all the right of way, at least once a week, and cut all that could be found, and, where there was Russian Thistle, oftener. We did not allow any of them to go to seed, and intend to follow this up until they are all exterminated. If the farmers would do the same, we should in a short time have none in the country."

Fig. 18.—Tumbling Mustard : a young seedling.

Fig. 19.—Hare's Ear Mustard.

Several false reports of the occurrence of the Russian Thistle have been received ; but all of these originated from wrong identifications of the plants referred to. The plant most frequently mistaken for the Russian Thistle is the Tumble weed (*Amarantus albus*), specimens of which were sent in from, among other places, Saskatoon, Sask., a locality in which it has never been found. Another plant in no way resembling the Russian Thistle, but which has been called by the same name, is the Prickly Lettuce (*Lactuca Scariola*), which is becoming too abundant in the county of Essex, Ont., as well as also in the Okanagan valley, B.C., where plants were measured 8 feet in height.

On the journey to Wawanesa with Mr. McKellar, we found that many miles of country between Morris and Myrtle along the railway and in cultivated fields on each side of the railroad, as well as south and west of St. Jean, in the municipality of Reinland, were infested to an alarming extent with the TUMBLING MUSTARD (*Sisymbrium sinapistrum*, Crantz). Immediately on our return to Winnipeg, an illustrated leaflet was issued by the Hon. Thomas Greenway, drawing attention to this pest and also to the HARE'S EAR MUSTARD (*Erysimum orientale*, R. Br.), another intruder which has lately appeared and which threatens likewise to be a cause of enormous loss to western farmers. Attention has already been drawn to these weeds in previous reports ; but from what I have this year seen and heard of them in

Manitoba and the North-west Territories, I am convinced that it is of the greatest importance that their appearance should be made known to farmers and that great efforts should be put forth at once to control them. I present herewith excellent figures of the Tumbling Mustard (Figs. 18, 20 and 21), and the Hare's Ear Mustard (Fig. 19) from photographs taken by Mr. Robert Mackay at Indian Head on July 5, when most of the plants were coming into bloom. In a later stage of growth the leaves drop off and the whole plant is a mass of long pods, bearing enormous quantities of seeds. Both of these plants are annuals which spring up for the most part in the month of June, and

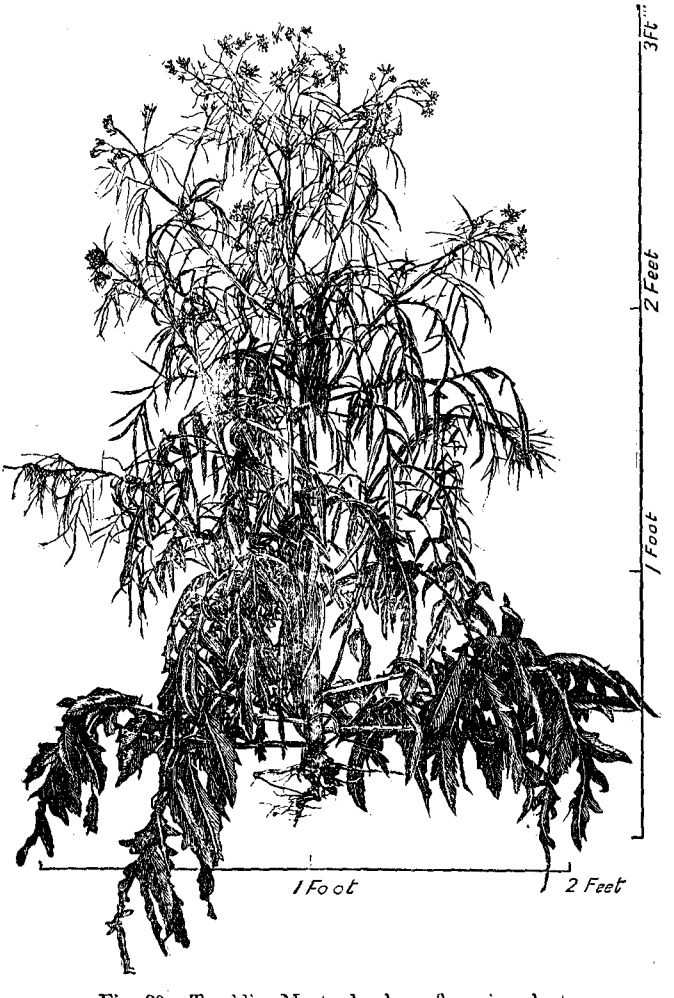


Fig. 20.—Tumbling Mustard: a large flowering plant.

come into flower about the end of the same month. By the time the wheat among which they grow is ready to harvest, the weed seeds are also ripe and, when the grain is handled, many are shed and left on the fields. These weeds not only have all the bad qualities of other noxious weeds, such as robbing the soil of its fertility—and, what in the west is of paramount importance, drawing off its moisture,—besides crowding and choking the crop, but are also exceedingly difficult to eradicate from the land, like all other members of the Mustard Family.

The importance of calling a plant by its proper name was brought forcibly before my notice in connection with these two weeds during the past summer. Any one who has seen them growing in a crop and noted the rapidity with which they spread, must acknowledge that they are two of the very worst agricultural pests which have ever been introduced into Canada; but, from the fact that Tumbling Mustard was spoken of generally as "Tumble Weed," a name belonging to the much less aggressive *Amarantus albus*, L., small effort was put forth by settlers to destroy it when it first appeared, as it was well known all through the west that the Tumble Weed is not a very troublesome enemy. It was similarly the case with the Hare's Ear Mustard, which I found was generally but wrongly spoken of in some districts as "Black Mustard," a name properly belonging to *Brassica nigra*, Koch, which is a true mustard.

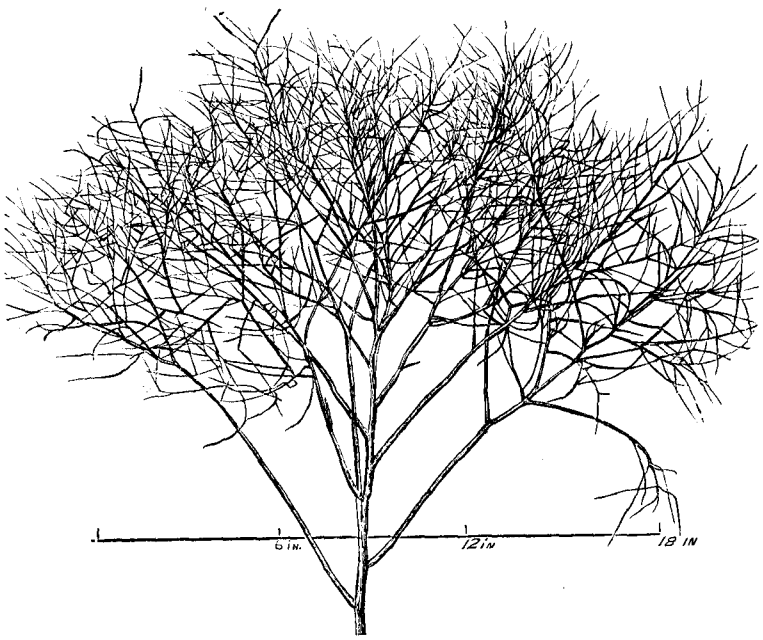


Fig. 21.—Tumbling Mustard: a tumbler with ripe seed.

Two other introduced plants which have spread rapidly and aggressively through Manitoba and the North-West of late years, are the FALSE FLAX (*Camelina sativa*, Fries.) and *Neslia paniculata*, Desv., widely known under the popular and appropriate name of BALL MUSTARD, on account of the shape of its numerous single-seeded, roundish pods. This latter weed is easily detected in a crop by its bright orange flowers. Specimens were found all through Manitoba and the North-West Territories, wherever the small grains are cultivated; and in one locality in Manitoba an area of no less than 200 acres of wheat was noticed to be quite orange with its flowers.

Fig. 22.—Penny Cress.

PENNY CRESS or "Stink Weed" *(Thlaspi arvense*, L.*)*, Fig. 22, is undoubtedly the most abundant weed in Manitoba, the peculiar greenish yellow colour of the unripe pods in infested crops in many parts of the province at once attracting the attention of travellers on the railway. Farmers, however, are becoming very much alive to the importance of fighting this weed, and Mr. Bedford, the Superintendent of the Experimental Farm for Manitoba, receives a great many letters inquiring as to the best treatment to rid land of this pest. He writes me on this subject, as follows :—

"Brandon, Dec. 4, 1895.—We find the most effectual treatment of land infested with Stink Weed is to first of all summerfallow the land thoroughly by ploughing shallow in June, harrowing at once. Then, as soon as the weed seeds have germinated, which is generally in a week, cross-cultivate with disc harrow or cultivator, followed again by the harrow. This will destroy a large number of plants when they are quite young. Should time permit, the land should again be ploughed, but deeper than at first, and well harrowed before hard frosts set in ; and the next year, in fact, as long as the Stink Weed plants show, no grain crop should be grown, but the land should be either summer-fallowed or sown to some hoed crop, and every plant of the weed removed before the seeds ripen. A hoed crop, such as field roots, corn, &c., will well repay the extra cost of cleaning the land. We find it impossible to clean the land from this pest as long as a grain crop is grown. The number of seeds from each plant is so great that the summer-fallowing or hoeing must be thoroughly done or the labour is wasted."—S. A. BEDFORD.

Mr. Bedford's report on the distribution of this weed is that it is to be found in nearly every part of the province, but generally in small patches west of Portage la Prairie.

REPORT OF THE AGRICULTURIST.

(JAS. W. ROBERTSON.)

To WM. SAUNDERS, Esq.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to present reports on, (1) experiments in the fattening of cattle, and (2) experiments in the feeding of swine.

Reports on work in the Experimental Dairy and on the 40-acre Lot will be submitted when some unfinished parts are further advanced or are completed.

As in former years, my work as Dairy Commissioner occupied the most of my time.

The supervision of the greatest part of the Agriculturist's branch, viz.: the grain and root crops, was taken by yourself as heretofore.

I am indebted to Mr. John Fixter, farm foreman, and Mr. R. R. Elliott, herdsman, for particularly faithful assistance in the work carried on.

I have the honour to be, sir,
Your obedient servant,

JAS. W. ROBERTSON,
Agriculturist.

PART I.—THE FATTENING OF CATTLE.

Experimental tests in the fattening of steers were commenced at the Centra Experimental Farm in December, 1890. The main object of the experiments was to obtain information on the comparative cost of fattening steers :—

(1.) Upon a ration of which the bulky-fodder portion was mainly corn ensilage, hay and roots;

(2.) Upon a ration of which the bulky-fodder portion was mainly hay and roots; and

(3.) Upon a ration of which the bulky-fodder portion was mainly corn ensilage.

For the purpose of arranging such data as would be obtained from the tests, in a manner which would be clear to the farmers and useful to them in making a comparison between the cost of feeding steers on the three different classes of rations, a cash value was estimated for the component fodders in each. The prices at which the several fodders were valued for the purposes of these comparisons, are higher than the cost of production to the ordinary farmers, and may be higher or lower than the prices which could be realized from their sale as fodders.

The values at which the calculations for the different years were made, are as follows :—

TABLE I.

——		1890-91.	1891-92.	1892-93.	1893-94.	1894-95.
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts
Corn ensilage	Per ton.	1 40	2 00	2 00	2 00	2 00
Robertson mixture ensilage	"	.....	.....	.....	2 50	2 50
Hay	"	8 00	8 00	8 00	.....	8 00
Roots (turnips, mangels and carrots)	"	4 00	4 00	4 00	.....	4 00
Straw	"	4 00	4 00	4 00	4 00	.....
Oil-cake and cotton-seed meal	"	30 00	30 00	.....	.....	.....
Mixed grain (pease, barley, wheat)	"	20 00	20 00	20 00	20 00	20 00
Frosted wheat	"	.....	12 00	12 00	.....	.....
Mixed grain (equal parts by weight pease, barley, wheat, oil-cake, bran)	"	.....	.....	.....	.....	20 00

The following table shows the rations which were fed in 1891-92. In 1890-91 instead of 2 lbs. of oil-cake in each ration, there was 1 lb. each of oil-cake and cotton-seed meal. Otherwise the rations were the same for the two years.

TABLE II.

Ration No. 1.	Lbs.	Ration No. 2.	Lbs.	Ration No. 3.	Lbs.
Corn ensilage	20			Corn ensilage	50
Hay (cut)	10	Hay (cut)	20		
Roots	20	Roots	40		
Straw (cut)	5	Straw (cut)	5	Straw (cut)	5
Oil-cake	2	Oil-cake	2	Oil-cake	2
Pease (ground)	2	Pease (ground)	2	Pease (ground)	2
Barley (ground)	2	Barley (ground)	2	Barley (ground)	2
	61		71		61

Feeding tests were continued during 1892-93 to obtain further data for a comparison of the economy of using the bulky-fodder portions of rations, No. 2 (hay, roots and straw), and No. 3 (corn ensilage and straw). Instead of equal quantities of meal being added to the different rations, an equal quantity of meal per head per day, was fed to the animals which were classed for comparison in the two groups.

Four steers (two of them 2-year-olds and two of them 1-year-olds) were arranged into Group I. and were fed on ration No. 2, as under; and four steers of similar age, quality and breeding, were put into Group II. and fed on ration No. 3, as under.

TABLE III.

Ration No. 2.	Lbs.	Ration No. 3.	Lbs.
Hay (cut)	20	Corn ensilage	50
Roots (turnips)	40		
Straw (cut)	5	Straw (cut)	5
	65		55

The animals were allowed as much of the mixture as they would eat. The meal, which was fed in addition, was a mixture of equal parts by weight of ground barley, pease and frosted wheat. The two-year-old steers in both groups were given 5 lbs. per head per day of the meal; and the one-year-old steers in both groups were given 4 lbs. per head per day of the meal. Occasionally, when the animals "were off their feed," the meal was reduced for a few days.

The full particulars of the feeding and the weights are given in the report of Experimental Farms, 1893.

The following is a summary of the results from the feeding tests for three years with two-year-old steers.

Conclusions. From the tests in 1890-91 it appears that:—

(1.) During the feeding period of 20 weeks, the steers which were fed upon ration No. 3 (corn ensilage, straw and meal), GAINED in weight, on the average, 33 lbs. per head MORE, and COST 7·33 cents per head LESS, per day for feed consumed, than the steers which were fed upon ration No. 2 (hay, roots, straw and meal);

(2.) During the feeding period of 20 weeks, the steers which were fed upon ration No. 3 (corn ensilage, straw and meal), GAINED in weight, on the average, 61½ lbs. per head MORE, and COST 3·68 cents per head LESS, per day for feed consumed, than the steers which were fed upon ration No. 1 (hay, roots, corn ensilage, straw and meal);

(3.) When the experiment was ended, the steers which were fed upon ration No. 3 (corn ensilage, straw and meal) were in the most attractive condition of the three lots for handling and selling.

Conclusions. From the tests in 1891-92 it appears that:—

(1.) During the feeding period of 18 weeks, the steers which were fed upon ration No. 3 (corn ensilage, straw and meal), GAINED in weight on the average 55½ lbs. per head MORE, and COST 3·75 cents per head LESS, per day for feed consumed, than the steers which were fed upon ration No. 2 (hay, roots, straw and meal);

(2.) During the feeding period of 18 weeks, the steers which were fed upon ration No. 3 (corn ensilage, straw and meal), GAINED in weight on the average 36 lbs. per head MORE, and COST 3.81 cents per head LESS, per day for feed consumed, than the steers which were fed upon ration No. 1 (hay, roots, corn ensilage, straw and meal);

(3.) The cost for feed consumed per 100 lbs. of increase in live weight, was 62·95 per cent greater on ration No. 2 (hay, roots, straw and meal), and 48·32 per cent greater on ration No. 1 (hay, roots, corn ensilage, straw and meal) than it was on ration No. 3 (corn ensilage, straw and meal).

Conclusions. From the tests in 1892-93 it appears that:—

(1.) During the feeding period of 24 weeks, the steers which were fed upon ration No. 3 (corn ensilage, straw and meal) GAINED in weight on the average 19 lbs. per head MORE, and COST 5·06 cents per head LESS, per day for feed consumed, than the steers which were fed upon ration No. 2 (hay, roots, straw and meal);

(2.) The cost for feed consumed per 100 lbs. of increase in live weight, was 66·34 per cent greater on ration No. 2 (hay, roots, straw and meal) than it was on ration No. 3 (corn ensilage, straw and meal).

Conclusions. From these tests for three years with two-year-old steers, it appears that:—

(1.) On the average the steers which were fed on ration No. 3 (corn ensilage, straw and meal) GAINED in weight on the average 35·8 lbs. per head MORE, and COST 5·38 cents LESS per head per day for feed consumed, than the steers which were fed upon ration No. 2 (hay, roots, straw and meal).

(2.) On the average of two years, the cost for feed consumed per 100 lbs. of increase in live weight, was 64·64 per cent greater on ration No. 2 (hay, roots, straw and meal) than it was on ration No. 3 (corn ensilage, straw and meal).

The following tables show the average of the results from six animals (2 two-year-old steers, 2 one-year-old steers and 2 two-year-old heifers) fed upon ration No. 2

(hay, roots, straw and meal) and from seven animals (3 two-year-old steers, 2 one-year-old steers and 2 two-year-old heifers) fed upon ration No. 3 (corn ensilage straw and meal) for the whole feeding period of 24 weeks:—

TABLE IV.

Ration.	—— ..	Weight, Nov. 22.	Weight, May 9.	Increase in weight.	Increase per head per day.
		Lbs.	Lbs.	Lbs.	Lbs.
Hay, roots and straw....	Average of six animals.....	1,024	1,201	177	1·05
Corn ensilage and straw.	Average of seven animals.....	997	1,225	228	1·35

TABLE V.

Ration.	——	Bulky-fodder per head per day	Meal per head per day.	Cost per head per day.	Cost per 100 lbs. of increase
		Lbs.	Lbs.	cents.	$
Hay, roots and straw....	Average of six animals..	44.00	4·41	13·87	13.35
Corn ensilage and straw.	Average of seven animals	50.31	4·36	9·26	6.95

Conclusions. From these tests it appears that:—

(1.) During the feeding period of 24 weeks, the animals which were fed upon ration No. 3 (corn ensilage, straw and meal) GAINED in weight on the average 51 lbs. per head MORE, and COST 4·61 cents per head LESS per day for feed consumed, than the animals which were fed upon ration No. 2 (hay, roots, straw and meal).

(2.) The cost for feed consumed per 100 lbs. of increase in live weight, was 92·08 per cent greater on ration No. 2 (hay, roots, straw and meal), than it was on ration No. 3 (corn ensilage, straw and meal);

(3.) The *cost* of feed consumed per 100 lbs. of increase in weight was *lowest* in the case of a grade Shorthorn heifer (viz., $5.44 per 100 lbs. of increase in weight), fed upon ration No. 3 (corn ensilage, straw and meal).

Feeding tests were begun in 1893-94 to gain information on the comparative cost of fattening steers:—

(1.) Upon a ration of which the bulky-fodder portion was Indian corn ensilage and straw; and

(2.) Upon a ration of which the bulky-fodder portion was Robertson mixture ensilage and straw.

The Robertson mixture for ensilage was reported upon in the report of Experimental Farms 1893. It is composed of the whole plants of Indian corn *(Zea mays)*, horse beans *(Faba vulgaris)* and the heads of sunflowers *(Helianthus annuus)*. Briefly it "came about" from the fact that for some years I had been looking for some other plant or plants to put into the silo with Indian corn to furnish the quantity of albuminoids necessary to make a balanced ration, in a form which would cost less than ripened cereals or concentrated feeding stuffs, such as oil-meal, cotton-seed meal or bran.

Clovers and pease were tried with indifferent success, and the climbing or pole beans were grown with cornstalks for trellis without appreciable advantage. It is desirable that ensilage should contain, besides the albuminoids and carbo-hydrates such

as may be found in Indian corn and horse beans, a larger quantity of fat than these plants contain. In a country with such a climate as prevails in Canada during the winter, it seems advisable to provide a winter ration for cattle containing a fairly large proportion of fat, as a bland, heat-producing part of a ration in a cheap and palatable form. I venture to believe that we have now secured that in the heads of sunflowers.

The horse bean or small field bean (*Faba vulgaris*, variety *equina*) seems to meet the case, so far as the albuminoids are concerned. This plant grows with a stiff, erect stem of a quadrangular shape. It attains in Canada a height of from 3 to 6 feet. It bears pods from within 6 or 8 inches from the base of the stalk to near its top. The beans when ripened are of a grayish-brown colour, and of oblong round shape, about ½-inch in long diameter and from ⅜ to a ¼-inch in short diameter. Plants have carried ripened beans in the lower pods, while the topmost ones on the same stalks were only beginning to form.

The sunflower (*Helianthus annuus*) grows luxuriantly over the whole of the temperate zone on this continent, and the seeds contain a large percentage of fat. The variety known as *Mammoth Russian* has been grown in rows 3 feet apart, and it appears to do best when the plants are 18 inches apart in the rows.

The "mixture" should contain about 10 tons of Indian corn fodder to 2½ tons of horse beans and one ton of sunflower heads. To obtain it in these proportions it should be grown at the rate of one-quarter of an acre of sunflowers, and half an acre of horse beans to every acre of Indian corn. It is to be fed with 4 lbs. less meal or grain per 50 lbs. of ensilage than has been required with ordinary Indian corn ensilage, to make it an economical ration for feeding milking cows and fattening cattle.

For the feeding tests of 1893-94 six steers were purchased. They were rough cattle with little good breeding and they did not appear to thrive well. Two animals, one steer "Finlay" and one heifer "Polly," reared on the Experimental Farm, were fed on the same rations. They did fairly well and showed a low cost per 100 lbs. of increase in weight.

The eight animals were put in two groups and fed from January 3rd to January 17th on a ration composed as follows:—

	Lbs.
Indian corn ensilage	50
Roots (turnips and mangels)	30
Hay	15

No meal or grain.

From January 17th to May 23rd, a period of eighteen weeks, they were fed on the following rations:—

Group I.—4 animals on Ration No. 3.	Lbs.	Group II.—4 animals on Ration No. 4.	Lbs.
Indian corn ensilage	50	Robertson mixture ensilage	50
Straw	5	Straw	5
Mixed grain (equal parts by weight of pease, barley and wheat, all ground.)		Mixed grain (equal parts by weight of pease, barley and wheat, all ground.)	

The animals were allowed as much of the bulky fodder part of the rations as they would eat. The mixed grain was weighed out to each animal separately. The animals in group I. were allowed 5 lbs. per head per day, and from April 11 that was increased to 7 lbs. per head per day. The animals in group II. were allowed 1 lb. per head per day, and from April 11. that was increased to 3 lbs. per head per day. The Indian corn ensilage, fed during January and February, was of poor quality, being made from Thoroughbred White Flint and Mastodon Dent corns, which had not grown to near maturity.

As in former years, the comparison between the cost of feeding steers on the different rations was based upon the cash value which was estimated for the component fodders in them as in table I.

The following tables show, (1) the quantity of fodder consumed per head per day, (2) the quantity of meal consumed per head per day, (3) the increase in weight per head for the period of 18 weeks, (4) the increase in weight per head per day, (5) the cost of feed per head per day, and (6) the cost per 100 lbs. of increase in weight for feed consumed.

TABLE VI.

GROUP I.—ON Indian corn ensilage and straw.

Name.	Fodder per day.	Meal per day.	Increase in weight.	Increase per day.	Cost per day.	Cost per 100 lbs. of increase.
	Lbs.	Lbs.	Lbs.	Lbs.	Cents.	$ cts.
Finlay	40·66	5·44	204	1·61	9·87	6·13
Dick	47·62	5·44	167	1·32	10·63	8·05
Jack	51·35	5·44	142	1·12	11·00	9·82
Billy	60·65	5·44	146	1·15	12·05	10·47
Average	50 07	5·44	164·75	1·30	10·88	8·32

TABLE VII.

GROUP II.—ON Robertson mixture ensilage and straw.

Name.	Fodder per day.	Meal per day.	Increase in weight.	Increase per day.	Cost per day.	Cost per 100 lbs. of increase.
	Lbs.	Lbs.	Lbs.	Lbs.	Cents.	$ cts.
Joe	62·87	1·66	81	0·64	9·94	15 53
George	59·88	1·66	95	0·75	9·55	12 73
Pat	49·34	1·66	93	0·73	8·16	11 17
Polly	38·34	1 66	111	0·88	6·71	7 62
Average	50·60	1·66	95	0·75	8·59	11·39

Conclusions.—(1.) In this test the animals on the Robertson mixture ensilage with the small allowance of grain per day during the first twelve weeks of the feeding period did not show a satisfactory gain;

(2.) During the last six weeks of the feeding period (with the increase of 2 lbs. of meal per head per day) the animals of group I. gained 34 per cent of the total increase in weight of the whole feeding period of eighteen weeks; and the animals of group II. gained 52 per cent of the total increase in weight of the whole feeding period of eighteen weeks.

In 1894-95 feeding tests were continued for a comparison of the cost of fattening steers on a bulky fodder ration composed of,—

(1) Indian corn ensilage, roots and hay.

(2) Robertson mixture ensilage, roots and hay.

Eight steers were divided into two groups as nearly even as possible.

From December 19 to April 10, a period of 16 weeks, they were fed on the following rations:—

Group I.—4 animals on ration No. 1.	Lbs.	Group II.—4 animals on ration No. 4.	Lbs.
Indian corn ensilage	50	Robertson mixture ensilage	50
Roots (turnips)	25	Roots (turnips)	25
Hay	5	Hay	5
Mixed meal (equal parts by weight of pease, barley, wheat, all ground, oil-cake and wheat bran).		Mixed meal (equal parts by weight of pease, barley, wheat, all ground, oil-cake and wheat bran).	

The animals were allowed as much of the bulky-fodder part of the rations as they would eat. The mixed grain was weighed out to each animal separately. The animals in group I. were allowed 6 lbs. per head per day, and the animals in group II. were allowed 2 lbs. per head per day.

The following tables show, (1) the quantity of fodder consumed per head per day, (2) the quantity of meal consumed per head per day, (3) the increase in weight per head for the period of 16 weeks, (4) the increase in weight per head per day, (5) the cost of feed per head per day, and (6) the cost per 100 lbs. of increase in weight for feed consumed.

TABLE VIII.

GROUP I.—On Indian corn ensilage, roots and hay.

Steer.	Fodder per day.	Meal per day.	Increase in weight.	Increase per day.	Cost per day.	Cost per 100 lbs. of increase.
	Lbs.	Lbs.	Lbs.	Lbs.	Cents.	$ cts.
No. 1	50·06	6	210	1·87	13·50	7 20
No. 2	49·99	6	165	1·47	13·49	9 15
No. 3	55·13	6	170	1·51	14·26	9 39
No. 4	55·46	6	170	1·51	14·31	9 42
Average	52·66	6	178·75	1·59	13·89	**8·70**

TABLE IX.

GROUP II.—On Robertson mixture ensilage, roots and hay.

Steer.	Fodder per day.	Meal per day.	Increase in weight.	Increase per day.	Cost per day.	Cost per 100 lbs. of increase.
	Lbs.	Lbs.	Lbs.	Lbs.	Cents.	$ cts.
No. 5	63·11	2	165	1·47	12·45	8 45
No. 6	64·74	2	200	1·78	12·72	7 12
No. 7	63·75	2	215	1·91	12·55	6 53
No. 8	52·50	2	123	1·09	10·69	9 73
Average	61·02	2	175·75	1·56	12·10	**7·71**

After April 10 a change was made, and the steers of group I. were put on ration No. 4, on which the steers of group II. had been fed; and the steers of group II. were put on the ration No. 1, on which the steers of group I. had been fed.

One steer of group I. became sick, and the corresponding steer in group II. was also dropped out of the test. The test after the change of rations was made, was continued from April 11 to June 5, a period of 8 weeks. During the last week of the test, the supply of corn ensilage became exhausted, and the steers of group II. were fed on ration No. 4 for that week. The allowance of meal during that week was reduced to 2 lbs. per head per day. That accounts for the average quantity of meal per head per day for the period of 8 weeks being 5·5 lbs. instead of 6 lbs. which was the quantity fed per head per day for seven weeks. It is not considered that the one week of different feeding made any appreciable difference in the results.

The following tables show, (1) the quantity of fodder consumed per head per day, (2) the quantity of meal consumed per head per day, (3) the increase in weight per head for the period of 8 weeks, (4) the increase in weight per head per day, (5) the cost of feed per head per day, and (6) the cost per 100 lbs. of increase in weight for feed consumed.

TABLE X.

GROUP I.—On Robertson mixture ensilage, roots and hay.

Steer.	Fodder per day.	Meal per day.	Increase in weight.	Increase per day.	Cost per day.	Cost per 100 lbs. of increase.
	Lbs.	Lbs.	Lbs.	Lbs.	Cents.	$ cts.
No. 1	59·14	2	78	1·39	11·79	8·46
No. 2	56·26	2	94	1·67	11·31	6·73
No. 3	58·08	2	76	1·35	11·61	8·55
Average	57·82	2	82	1·47	11·57	7·83

TABLE XI.

GROUP II.—On Indian corn ensilage, roots and hay.

Steer.	Fodder per day.	Meal per day.	Increase in weight.	Increase per day.	Cost per day.	Cost per 100 lbs. of increase.
	Lbs.	Lbs.	Lbs.	Lbs.	Cents.	$ cts.
No. 5	62·02	5·5	64	1·14	14·80	12·93
No. 6	61·00	5·5	54	0·96	14·65	15·19
No. 7	53·39	5·5	43	0·76	13·50	17·60
Average	58·80	5·5	53	0·95	14·31	14·93

The following table shows for the whole period of 24 weeks, December 19 to June 5, the cost per 100 lbs. of increase in weight while the animals were being fed on the different rations :—

TABLE XII.

Rations.	Total increase in weight.	Cost per 100 lbs. of increase.
	Lbs.	$ cts.
Indian corn ensilage, roots and hay, Groups I. and II.	876	9·85
Robertson mixture ensilage, roots and hay, Groups II. and I.	951	7·75

Conclusion.—From this test it appears that :—The cost for feed consumed per 100 lbs. of increase in live weight was 27·1 per cent greater on ration No. 1 (Indian corn ensilage, roots, hay and meal) than it was on ration No. 4 (Robertson mixture ensilage, roots, hay and meal).

PART II.—THE FEEDING OF SWINE.

Experiments were continued during 1894 to gain further information of the results from feeding swine on rations composed of different food materials. An examination was made (1) of the different rations consumed per pound of increase in live weight, and (2) of the percentage of shrinkage in weight after the animals were killed and dressed. In 1894 experiments were begun to discover the effect on the quality of the flesh of swine from the feeding of wheat and buckwheat. Complaints had been made by buyers of swine in Western Ontario that the quality of the meat was soft in a larger percentage of the animals killed than formerly ; and an opinion was current that the "softness" was a consequence of the feeding of wheat or of buckwheat. Fourteen swine of three different litters were sorted into three lots as nearly even as possible. They were fed as follows :—

Lot 1.—Fed on a mixture of equal parts by measure of barley, rye, wheat (all ground) and wheat bran, soaked in cold water for an average period of 30 hours.

Feed consumed per pound of increase in live weight,—4·28 lbs.

Lot 2.—Fed on ground wheat, soaked in cold water for an average period of 30 hours.

Feed consumed per pound of increase in live weight,—4·10 lbs.

Lot 3.—Fed on ground buckwheat, soaked in cold water for an average period of 30 hours.

Feed consumed per pound of increase in live weight,—4·45 lbs.

On October 11 these 14 swine were shipped alive to the Ingersoll Packing Company, Ingersoll, Ont., to be slaughtered and cured in the manner followed by packers who send bacon and hams to the British market. The swine of each lot were marked differently, and a report was made upon them by the manager of the Ingersoll Packing Company, according to the descriptive marks.

The report on the condition of the swine, 10 hours after they were killed, was as follows :—

"Lot 1, fed on mixed grain ; leaf lard, fairly firm ; best of the three lots.

Lot 2, fed on ground wheat ; lard softish ; not so firm as hogs of lot 1.

Lot 3, fed on ground buckwheat ; lard soft, and hogs also soft."

The report on the sides of bacon after they were cured was as follows:—

"Lot 1, fed on mixed grain; four hogs; all the sides turned out good hard meat, they were the best of the three lots.

Lot 2, fed on ground wheat; five hogs; six sides were soft and four quite firm.

Lot 3, fed on ground buckwheat, five hogs; two sides were soft and eight sides were firm."

Eight swine of a litter of cross-breds of **Tamworth** sire and **Poland-China** dam (farrowed May 26) were put into **three lots** as nearly even as possible.

TABLE I.

Pen No. 1 contained 3 swine.

They were fed on **a mixture** composed of equal parts by measure of barley, rye, wheat (all ground), and wheat bran, soaked in cold water for an average period of 30 hours.

Pen No. 1.	Aug. 8.	Sept. 5.	Oct. 3.	Oct. 31.	Nov. 28.	Dec. 26.	Totals.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Live weight	117	177	238	317	384	438	.....
Increase in weight	.....	60	61	79	67	54	321
Feed consumed	.....	198	210	239·5	233	224	1104·5
do per lb. of increase in live weight	.....	3·30	3·44	3·03	3·47	4·14	**3·44**

TABLE II.

Pen No. 3 contained 3 swine.

They were fed on a ration composed of **equal parts** by weight of **a mixture** as fed to pen No. 1, and **ground wheat**, soaked in cold water for an average period of 30 hours.

Pen No. 3.	Aug. 8.	Sept. 5.	Oct. 3.	Oct. 31.	Nov. 28.	Dec. 26.	Totals.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Live weight	117	181	228	302	370	420	.....
Increase in weight	.....	64	47	74	68	50	303
Feed consumed	.....	208	178	217	242	212	1057
do per lb. of increase in live weight	.....	3·25	3·78	2·93	3·55	4·24	**3·48**

TABLE III.

Pen No. 5 contained 2 swine.

They were fed on a ration composed of **equal parts** by weight of **a mixture** as fed to pen No. 1, and **ground buckwheat**, soaked in cold water for an average period of 30 hours.

Pen No. 5.	Aug. 8.	Sept. 5.	Oct. 3.	Oct. 31.	Nov. 28.	Dec. 26.	Totals.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Live weight	96	166	247	337	395	445	.....
Increase in weight	.....	70	81	90	58	50	349
Feed consumed	.....	203	264	316	284	256	1323
do per lb. of increase in live weight	.....	2·90	3·25	3·51	4·89	5·12	**3·79**

TABLE IV.

Table IV. shows the percentages of shrinkage in weight in the three lots.

	Pen No. 1. — Fed on mixture.	Pen No. 3. — Fed on mixture and ground wheat.	Pen No. 5. — Fed on mixture and ground buckwheat.
	3 Swine.	3 Swine.	2 Swine.
	Lbs.	Lbs.	Lbs.
Live weight, after feeding	443	442	454
do off feed and water 24 hours	429	424	440
Percentage of shrinkage	3·16	4·07	3·08
Dressed weight, 24 hours after killing	336	334	362
Percentage of shrinkage from fasted weight	**21·67**	**21·22**	**17·72**

Eight swine of a litter of cross-breds of Essex sire and Yorkshire dam (farrowed June 4) were put into two lots as nearly even as possible.

TABLE V.

Pen No. 7 contained 4 swine.

They were fed on a ration composed of equal parts by weight of a mixture, as fed to pen No. 1 (equal parts by measure of barley, rye, wheat, all ground, and wheat bran), and ground wheat, soaked in cold water for an average period of 30 hours.

Pen No. 7.	Sept. 5.	Oct. 3.	Oct. 31.	Nov. 28.	Dec. 26.	Jan. 23.	Totals.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Live weight	223	300	383	465	528	569	.....
Increase in weight	.....	77	83	82	63	41	346
Feed consumed	.....	350	285	288	255	228	1,406
do per lb. of increase in live weight	.....	4·54	3·43	3·51	4·04	5·56	**4·06**

TABLE VI.

Pen No. 8 contained 4 swine.

They were fed on a ration composed of equal parts by weight of a mixture, as fed to pen No. 1 (equal parts by measure of barley, rye, wheat, all ground, and wheat bran), and ground buckwheat, soaked in cold water for an average period of 30 hours.

Pen No. 8.	Sept. 5.	Oct. 3.	Oct. 31.	Nov. 28.	Dec. 26.	Jan. 23.	Totals.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Live weight	220	323	459	551	635	671	.....
Increase in weight	.....	103	136	92	84	36	451
Feed consumed	.....	404	442	411	383	275	1,915
do per lb. of increase in live weight	.....	3·92	3·25	4·46	4·55	7·63	**4·24**

TABLE VII.

Table VII. shows the percentages of shrinkage in weight in the two lots.

	Pen No. 7. Fed on mixture and ground wheat.	Pen No. 8. Fed on mixture and ground buckwheat.
	4 Swine.	4 Swine.
	Lbs.	Lbs.
Live weight, after feeding	562	676
do off feed and water 24 hours	551	660
Percentage of shrinkage	1·95	2·36
Dressed weight, 24 hours after killing	443	540
Percentage of shrinkage from fasted weight	**19·60**	**18·18**

Conclusions.—(1.) From the tests in 1894 referred to at page 191, it is evident that the feeding of wheat alone and of buckwheat alone is not always a cause of "soft" hogs and "soft" sides, since some of the swine fed on wheat and buckwheat yielded sides classed as firm;

(2.)—The report of the buyer and curer on the swine reported on in Tables I, II, III, V and VI was that he could not detect any difference in the quality of the meat; from which it is evident that the feeding of rations composed to the extent of one-half of ground wheat and to the extent of one-half of ground buckwheat is not a cause of "soft" sides;

(3.) The percentage of shrinkage, from fasted weight to dressed weight 24 hours after killing, was 2·46 per cent less in the swine fed on the mixture and ground buckwheat, than in the swine fed on the mixture and ground wheat.

Seven swine of a litter of crossbreds of Yorkshire sire and Tamworth, dam (farrowed July 5) and a litter of grades of Tamworth sire and Berkshire grade dam (farrowed July 15) were put into two lots as nearly even as possible.

TABLE VIII.

Pen No. 9 contained 3 swine:—1 Yorkshire sire and Tamworth dam, and 2 Tamworth sire and Berkshire grade dam.

They were fed on a mixture composed of equal parts by measure of barley, rye wheat (all ground) and wheat bran, soaked in cold water for an average period of 30 hours.

Pen No. 9.	Dec. 19.	Jan. 16.	Feb. 13.	Mar. 13.	Apl. 10.	Totals.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Live weight	350	440	540	623	691	.....
Increase in weight	.....	90	100	83	68	341
Feed consumed	.....	375	413	379	283	1,450
do per lb. of increase in live weight	.....	4·16	4·13	4·56	4·16	**4·25**

TABLE IX.

Pen No. 10 contained 4 swine:—1 Yorkshire sire and Tamworth dam, and 3 Tamworth sire and Berkshire grade dam.

They were fed on a mixture as fed to pen No. 9, getting half as much in quantity as pen No. 9 plus as much skim-milk as they would consume.

Pen No. 10.	Dec. 19.	Jan. 16.	Feb. 13.	March 13.	April 10.	Totals.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Live weight	412	548	708	862	985	.....
Increase in weight	.....	136	160	154	123	573
Feed consumed { meal	.....	187·5	206·5	189·5	141·5	725
Feed consumed { +milk	.....	2,915	3,814	3,814	3,983	14,526
do per lb. of increase in live weight { meal	.....	1·37	1·29	1·23	1·15	**1·26**
do per lb. of increase in live weight { +milk	.....	21·43	23·83	24·76	32·38	**25·35**

TABLE X.

Table X shows the percentages of shrinkage in weight in the two lots.

—	Pen No. 9. — Fed on mixture. — 3 swine.	Pen No. 10. — Fed on mixture plus skim milk. — 4 swine.
	Lbs.	Lbs.
Live weight, after feeding	717	1,034
do off feed and water 24 hours	702	986
Percentage of shrinkage	2·09	4·64
Dressed weight, 24 hours after killing	562	808
Percentage of shrinkage from fasted weight	**19·94**	**18·05**

TABLE XI.

Five cross-bred swine.—Berkshire sire and Yorkshire dam (farrowed March 15) were fed on wheat shorts, soaked in cold water for an average period of 30 hours plus 30 lbs. of skim-milk per day to the pen.

Pen. No. 1.—5 Swine.	Sept. 18.	Oct. 16.	Nov. 13.	Total.
	Lbs.	Lbs.	Lbs.	Lbs.
Live weight	896	1,111	1,305	.....
Increase in weight	.....	215	194	409
Feed consumed { shorts	.....	725	823	1,548
Feed consumed { +milk	.....	840	840	1,680
do per lb. of increase in live weight { shorts	.....	3·37	4·24	**3·80**
do per lb. of increase in live weight { +milk	.....	3·90	4·32	**4·10**

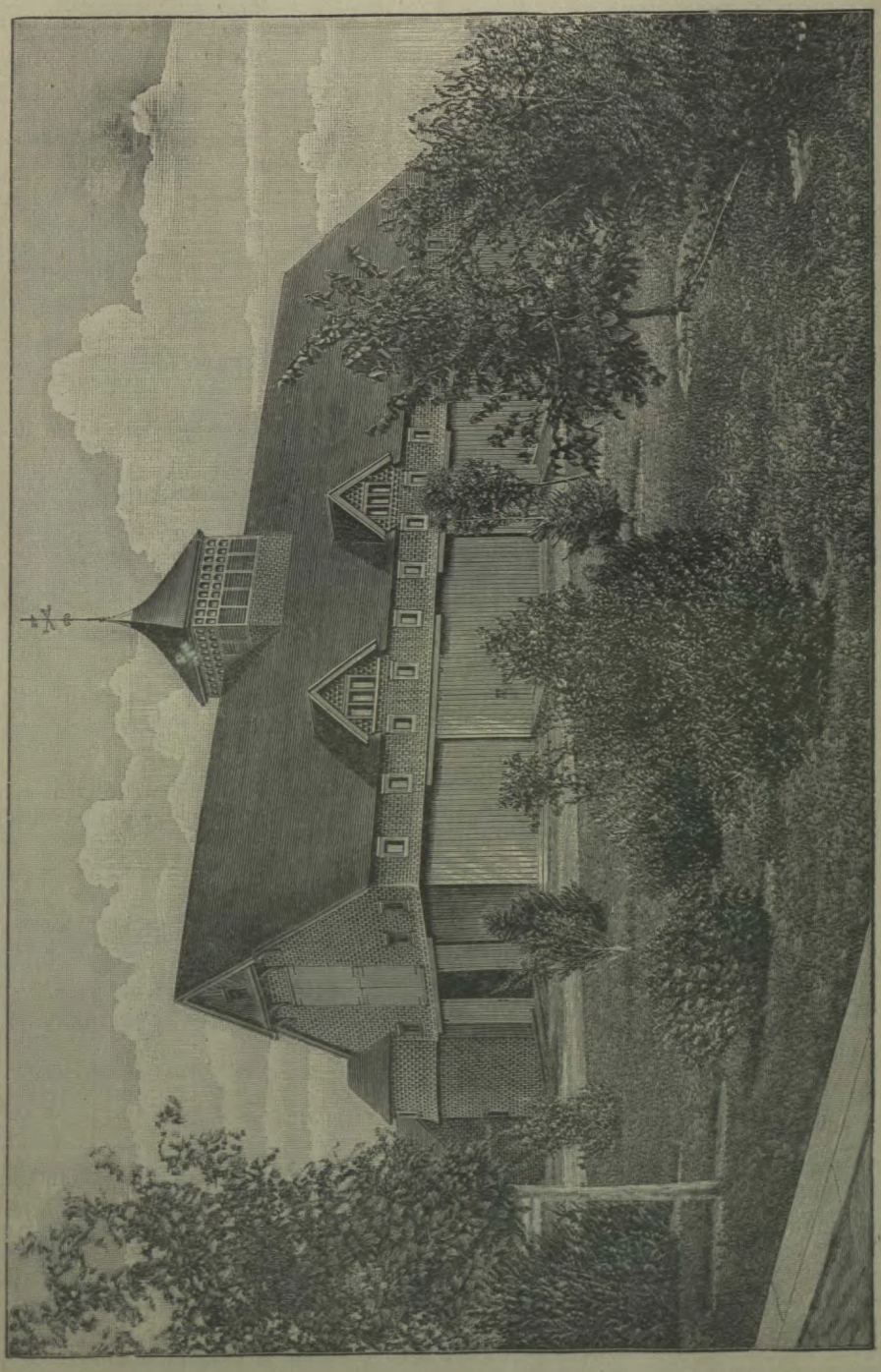
Conclusions.—From these tests, from the tests in 1894, and from our experience in feeding young pigs, it appears that:—

(1.) Skim-milk may form the largest part of the feed of young and growing pigs with advantage and economy;

(2.) For the fattening of swine weighing on the average over 100 lbs. each, live weight, it is economical to give an allowance of skim-milk not exceeding 5 lbs. per head per day;

(3.) In every case the swine fed with part of their ration of skim-milk were lustier, more vigorous and of a more healthy appearance than swine fed wholly on a ration for gain.

The accompanying cut represents the barn at the Central Experimental Farm, Ottawa.



BARN AT CENTRAL EXPERIMENTAL FARM, OTTAWA.

REPORT OF THE CHEMIST.

(FRANK T. SHUTT, M.A., F.I.C. F.C.S.)

OTTAWA, 1st December, 1895.

WM. SAUNDERS, Esq.
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith the ninth annual report of the Chemical Department of the Dominion Experimental Farms.

The chemical examination of Canadian virgin soils has been continued, this branch of the work being confined during the past year to samples from the province of British Columbia. In addition to the estimation of the *total* amount of plant food, a determination of the proportion of potash and phosphoric acid *more immediately available* in certain of the soils has been made according to the methods of Dr. Bernard Dyer, an eminent English agricultural chemist, who has recently made extensive researches on the subject of the availability of plant food in the soil. A diagnosis of the soils analysed is furnished, together with suggestions for their economic improvement.

Many samples of soils have been received from farmers. These, for obvious reasons, have not been subjected to a complete chemical analysis. A preliminary qualitative examination of them has, however, in all cases been made and reports have been furnished as to their character and the methods and measures for their improvement.

Naturally-occurring fertilizers include swamp muck, river and tidal muds, marls and other natural deposits containing plant food. The present report gives the analytical data obtained from the examination of many samples of these substances sent from various parts of Canada.

The ascertaining of the composition of food stuffs, dairy products, insecticides, special fertilizers and many other materials relating to agriculture, has formed a part of the work of this division.

A continuance of the experiments with various brands of "foundation comb" has been made and a report thereon will be found incorporated with that of the Entomologist and Botanist.

Further work here reported on includes "The Chemistry of Lead Arsenate, a New Insecticide"; the determination of the fertilizing value of tankage, slaughterhouse refuse, and waste from a shoddy factory; and the examination of moss litter and bracken fern as absorbents.

Instructive chapters on Basic Phosphate of Lime and Potash, on Ground Mineral Phosphate as a Fertilizer, on an Extensive Series of Experiments towards rendering available the Phosphoric Acid in Mineral Phosphate; and Superphosphate as a Fertilizer, are given.

The subject of "Green Manures" is discussed in all its bearings, and the results of the analyses of the clover plant, given in tabular form.

Well waters from farm homesteads have, as heretofore, received attention and those examined during the past year are here duly reported on.

An account of the most important details of the examination of the Canadian cereals at the World's Columbian Exposition is presented. The data here furnished afford ample

proof of the high food value of grains grown in Canada, and more especially emphasize the nutritive and milling qualities of the wheat of Manitoba and the North-west Territories. The results also show several points in favour of Canadian oats when compared with the foreign samples.

Besides the attention given to special experiments and investigations requiring the aid of chemistry, inaugurated by us, a large amount of work has been done on samples sent in by farmers. These may be tabulated as follows :—

SAMPLES received from farmers for examination and report.

November 30th, 1894, to November 30th, 1895.

	British Columbia.	N.W. Territories.	Manitoba.	Ontario.	Quebec.	New Brunswick.	Nova Scotia.	P.E. Island.	Total.
Soils	26	1	1	14	5	.....	2	.....	49
Swamp mucks	.....	.....	.....	13	4	.....	7	.....	24
Marsh and river muds	6	.....	.....	2	3	.....	14	.....	25
Fertilizers	3	.....	1	18	5	5	6	1	39
Waters	10	.....	7	53	10	6	.....	.....	86
Miscellaneous	3	7	4	25	10	3	9	.....	61
Total	48	8	13	125	37	14	38	1	284

A perusal of the above will make it clear that the farmers throughout the Dominion recognize the value of chemical assistance in their avocation and are availing themselves of the help offered them through the Experimental Farm system.

As a further proof of this fact, it may be stated that from November 30th, 1894, to the same date in 1895, 1323 letters have been despatched and 1223 received from farmers. The letters received contain inquiries on agricultural matters, and the answering of correspondents has now become an important part of my work.

The chief conventions addressed during the past year were as follows :—

The Farmers' and Dairymen's Association of New Brunswick, at Fredericton, N.B.

The Dairymen's Association of Eastern Ontario, at Gananoque, Ont.

The Creameries' Association of Ontario, at Chesley, Ont.

The Fruit Growers' Association of Nova Scotia, at Annapolis, N.S.

The Farmers' and Dairymen's Association at Bridgetown, N.S.

The Central Canada Agricultural Association, at Montreal, Que.

The District of Huntingdon Dairymen's Association, at Huntingdon, Que.

My thanks are due to Mr. Henry S. Marsh, Associate of the Institute of Chemistry, the Assistant Chemist, who has done valuable work in the laboratory during the past year and who has constantly endeavoured by his intelligent and assiduous application to make efficient the work of this department.

I have the honour to be, sir,
Your obedient servant,

FRANK T. SHUTT,
Chemist, Dom. Exp'l Farms.

Chemical Laboratories,
Central Experimental Farm,
Ottawa.

VIRGIN SOILS OF CANADA.

BRITISH COLUMBIA.

The soils submitted to complete analysis during the past year and now reported on are all from the province of British Columbia. They were obtained from the Island of Vancouver and the mainland, and were especially selected as being representative of large areas of land.

In the reports of former years I have discussed at some length the factors that conduce to a soil's fertility; it will, therefore, be only necessary on the present occasion to present the following digest:—

Tilth or Mechanical Condition.—This is a factor of great importance to a soil's productiveness. A good tilth includes the following qualities: retentivity of moisture, of warmth and of soluble fertilizing material, permeability to air and water, freedom for root extension, stability and strength, with friability.

These properties are largely dependent upon the relative amounts of a soil's ingredients—clay, sand, humus, &c. Dr. Fream, in his work entitled "*Soils and their Constituents,*" says (page 101) that "experience proves that a soil is best adapted for the purposes of cultivation when it contains of:

Sand (siliceous and calcareous)	50-70 per cent
Clay	20-30 "
Pulverized limestone	5-10 "
Humus (semi-decayed vegetable matter)	5-10 "

"It thus contains enough sand to make it warm and pervious to air and moisture; enough clay to render it moist, tenacious and conservative of manures; enough limestone to furnish calcareous material and to decompose organic matter, and lastly, sufficient humus to assist in supplying the alimentary needs of the plant and to aid in maintaining the carbonic acid in the interstitial air of the soil."

Finally, the culture that a soil receives has necessarily much to do with its tilth. Underdraining, ploughing, harrowing, rolling and other mechanical operations are the means that the skilful farmer uses in bringing about a favourable and fertile seed bed. These operations must be considered as equally essential with the manuring of the land, for they not only conduce to improved tilth but indirectly add to the soil's store of available plant food.

Chemical Composition of Soils.—Plants require for their sustenance and growth certain constituents contained in and obtained from (1) the atmosphere, and (2) the soil; we may at the present juncture briefly consider the latter.

Inorganic Constituents.—These comprise principally lime, magnesia, oxide of iron, alumina, potash and soda, combined with silica, phosphoric, sulphuric, hydrochloric and carbonic acids. They are present in a soil by reason of the disintegrating action of atmospheric and other agencies upon the rocks, which at one time entirely covered the earth's surface, the material so formed being now the inorganic and mineral portion of the soil.

Of the above named elements, potash and phosphoric acid must be regarded by the farmer as the most important, since, although the others are equally essential to the life of the plant, it is the available store of these two that continuous crop growth more particularly depletes, and, therefore, that the agriculturist must seek to restore in order to maintain and increase the soil's fertility.

Potash is present in the soil as a result of the decomposition of the originating granite or other felspathic rock. It exists there chiefly in an insoluble condition. Digestion of a soil with hot, strong hydrochloric acid, by the method agreed upon by the Association of the Official Agricultural Chemists of the

Analyses of Soils (air-dried), 1895.

Number.	Soil.	Locality.	Water.	Organic and Volatile matter.	Clay and Sand.	Ox.de of Iron and Alumina.	Lime.	Magnesia.	Potash.	Soda.	Phosphoric Acid	Soluble Silica.	Carbonic Acid. (undetermined.)	Total.	Nitrogen.	Clay and Fine Sand.	Coarse Sand.
1	Surface.....	Alberni, B.C....	3·82	10 89	58·84	23·17	0·97	0·86	0·16	0·02	0·33	0·10	0·84	100·00	0·157	33·34	25·50
2	"	Okanagan Mission, B.C.....	1·89	3·89	81·90	8·15	1·82	1·31	0·44	0·28	0·27	0·22	.....	100·17	0·122	32·70	49·20
3	"	" "	2·03	3·28	78·08	12·28	1·86	1·68	0·61	0·31	0·32	0·04	.....	100·49	0·075	37·95	40·13
4	"	Guisachan, B.C....	1·58	2·62	83·56	8·57	1·20	1·23	0·32	0·14	0·30	0·05	0·43	100·00	0·077	47·51	36·05
5	"	"	3·29	5·98	77·58	8·58	1·65	1·32	0·51	0·26	0·29	0·06	0·48	100·00	0·228	24·28	53·30
6	"	"	3·82	6·34	75·05	11·11	1·69	0·42	0·63	0·32	0·37	0·03	0·22	100·00	0·245	37·74	37·31
7	"	"	3·40	6 89	75·72	9·40	1·21	1·35	0·53	0·26	0·33	0·09	0·82	100·00	0·251	30·60	45·12
8	"	"	1·35	1·99	83·42	9·37	1·59	0·73	0·43	0·35	0·27	0·18	0·32	100·00	0·044	21·59	61·83
9	"	Cowichan, B.C...	2 88	6·90	67·24	19·29	1·33	1·55	0·38	.....	0·31	0·30	.....	100·18	0·099	25·84	41·40
10	.....	Quamichan Lake, B.C.....	3·05	4·42	84 45	6·16	0·73	0·32	0·08	.....	0·07	0·25	0·47	100·00	0·080	57·13	27·32
11	Surface.....	Victoria, B.C.	3·80	15·09	67·48	10·93	1·20	0·88	0·22	.....	0·18	0·03	0·19	100·00	0·572	15·04	52·44
12	At a depth of 18 in..	"	3·54	13·13	69·78	11·02	1·08	0·71	0·22	0·08	0·18	0·04	0·22	100·00	0·488	20·54	49·24
13	" 24 in..	"	1·93	4·54	79·09	11·73	0·99	1·20	0·25	.....	0·12	0·12	0·03	100·00	0·143	20·01	59·08

United States, yields, as a rule, potash between ·1 per cent and 1·5 per cent. Good agricultural soil possesses on an average between ·25 per cent and 1·0 per cent; soils in which clay predominates are usually the richest in potash.

Phosphoric acid.—Also derived from the disintegration and decay of the rocks forming the inorganic basis of the soil. The percentage of this constituent, as determined by the method already referred to, varies usually between ·15 per cent and ·5 per cent.

Lime ranks next in importance amongst the inorganic elements of plant food. Directly and indirectly, lime is of great service to growing crops, and many agricultural authorities place the minimum limit in a soil for good returns at 1·0 per cent. The presence of lime encourages nitrification of the humus and also sets free inorganic elements of plant food.

Organic Constituents.—Humus or semi-decayed vegetable matter, though not in itself direct plant food, plays a most important part in soils. Its presence in right proportions improves the physical condition of a soil, chiefly in that it regulates its temperature and degree of moisture. By the decomposition of humus carbonic acid gas is liberated, which in turn sets free mineral plant food in the soil.

Nitrogen.—An element of great value agriculturally, and contained to a very large extent in the humus in a condition not immediately available for plant use. Nitrification, or the conversion of this nitrogen into soluble forms, is brought about by the agency of micro-organisms known as bacteria, ferments, etc. The presence of lime, good tilth and suitable climatic conditions of moisture and warmth, are the factors that are favourable to their development. The total nitrogen in a soil of good average fertility lies between ·2 per cent and ·5 per cent—though there are many soils yielding lucrative crops, the nitrogen of which falls below ·2 per cent. Very rich soils contain between ·5 per cent and 1·0 per cent of this element.

Available Plant Food in the Soil.

The data enumerated in the foregoing table, like those given in former reports on soil analysis, represent the results obtained by the method generally in vogue and already referred to as that adopted by the Association of Official Agricultural Chemists of the United States. They consequently express the amounts of plant food dissolved out of the soil by strong acid, and give no indication of the proportion of those constituents that may be of immediate use to growing crops, *i.e.*, of the *available* plant food. Though such results are, as I have pointed out on previous occasions, of great value in indicating the general richness or poverty of soils in certain elements, it is obvious that a knowledge of the percentage of these constituents in an *immediately available* condition would be of immense value in diagnosing the present fertility of the soil, and be of great assistance in outlining a truly economical system of manuring.

One of the chief means whereby the constituents of the soil are rendered available, is by the acid exudations of plant rootlets. To determine the acidity or strength of these exudations, Dr. Bernard Dyer, an English chemist, has lately made an extended investigation, in the course of which he determined the acidity of the root sap of about 100 plants, belonging to 20 natural orders. His results and methods are given *in extenso* in a valuable paper in the Journal of the Chemical Society for March, 1894. He states that "the average sap-acidity" of the roots of the 100 plants expressed as crystallized citric acid is ·854 and "the average sap acidity for the roots of the 20 orders, ·910." After a lengthy discussion of details and results, he concludes that the average acidity of root sap may be represented (as regards solvent power) by a 1·0 per cent solution of crystalized citric acid. Dr. Dyer continued his researches by ascertaining the percentages of potash and phosphoric acid taken out by a 1·0 per cent solution of citric acid from certain soils from experimental fields at Rothamsted, the history of which for many years, as regards the manures applied and the yields obtained, was known. It will not be now my purpose to discuss the details and data of this research, interesting and instructive as they may be; it must suffice at present to point out that Dr. Dyer ascertained certain facts with regard to the amounts of the above named mineral ingredients

contained in soils, soluble in this solvent (and hence to be considered as immediately available), and secondly with respect to the proportion so available to the total amount of such constituents. Thus, in one instance, Dr. Dyer found in a soil to which no manure had been applied since 1852, that the total phosphoric acid amounted to 2,503 pounds per acre, and the phosphoric acid soluble in 1 per cent citric acid solution amounted to 139 pounds per acre; soil from the same field, but to which superphosphates had been applied annually since the above date, contained total phosphoric acid 4601 lbs. per acre, and phosphoric acid soluble in 1 per cent citric acid, 1170 lbs. Without entering into any consideration of the amounts of phosphoric acid taken from the soils by the successive crops, it will here serve our purpose to give Dr. Dyer's averages as follows:—

"The average percentage, as we have seen, of total phosphoric acid in the eight plots receiving no phosphates was 0·106; in the eight plots receiving phosphates, 0·178. These numbers are nearly in the ratio 1 : 1·7.

"Now, however, let us consider the percentages of phosphoric acid soluble in the 1 per cent solution of citric acid.

"We find that the average percentage thus found in the eight plots receiving no phosphates was 0·0078; in the eight soils that received phosphates, it was 0·0463. These percentages are in the ratio of nearly 1·6. The difference in the percentages of phosphoric soluble in dilute citric acid is thus comparatively overwhelming."

He sums up as follows:—

"From a careful consideration of the whole of the results, it would perhaps not be unreasonable to suggest that, when a soil is found to contain as little as about 0·01 per cent of phosphoric acid soluble in a 1 per cent solution of citric acid, it would be justifiable to assume that it stands in immediate need of phosphatic manure."

In potash he obtained results of an analogous character, and finally suggests that the limit that should be regarded as indicating the non-necessity of the application of special potash fertilizers at probably ·005 per cent of potash soluble in the solvent now spoken of.

We have here spoken at some length of these important results, since it is our purpose to adopt this method of examination in addition to the process used in future investigations on Canadian soils, and this explanation will serve to make the data the better understood by our readers. In the present report we give the figures obtained by this citric acid method on soil samples Nos. 10, 12, 13, 14, and these will be discussed when considering the other data respecting them.

Soil No. 1.—This sample was forwarded by Mr. Geo. A. Smith, government agent, from Alberni, B.C. Mr. Smith writes as follows:—

"This land, of which there is a large area in this district, when first ploughed, yields nothing; the second year it is better, and after several times ploughing grows fairly good crops of clover and pease. It is known as 'Fern and Salal soil,' for the reason that on this virgin soil these plants grow luxuriantly, crowding out to a great extent other vegetation."

This soil is of a deep red colour and though of sandy appearance contains a fair amount of clay. It shows a decided acid reaction when tested with litmus paper. The air-dried sample consisted of—

	Per cent.
Gravel and small stones	17·95
Fine earth	82·05
	100·00

The analysis proves that this soil contains a very large amount of iron, part of which possibly is present in a condition not fully oxidized. This would account for the statement above given that, while poor crops are obtained at first, better yields result on further tillage, which latter would have the effect, by exposure to the air, of completely oxidizing the iron compounds and correcting sourness. It should also be remembered that the action of the atmosphere is one of the chief factors in rendering assimilable the locked-up plant food in the soil.

In all probability, an application of lime would assist in bringing this soil into a more immediate state of fertility, particularly as the amount of this constituent lies below the average present in good productive soils.

Further, it is poor in potash and somewhat deficient in nitrogen. For the first of these an application of wood ashes is to be recommended and for the latter barn-yard manure and the turning under of a green crop of legumes such as clover or pease.

Underdrainage would undoubtedly prove beneficial for this soil, and would serve to more quickly bring it into condition.

It may be remarked that this sample, though very similar in colour to the common red soil of the benches, contains more clay than the specimens of the latter hitherto examined by us.

Soils Nos. 2 and 3.—These are from Okanagan Mission, being sent by Mr. C.S. Smith of that place. They had grown timothy and clover for many years, but, according to accounts, had never been manured. Their physical appearance and condition may be described as follows :—Of a light gray colour, showing but little organic matter, and wanting in mellowness and the general features of good tilth ; No 2, more particularly, on drying, cakes into hard masses.

From the data obtained, it would appear that they were most deficient in humus and its concomitant nitrogen, and the treatment involving the use of organic manures already suggested might be here again repeated. By this means, with underdrainage and careful culture, the tilth of these soils may be improved. Suggestions are asked regarding the treatment of these soils for hop growing, and I would therefore recommend bone meal and wood ashes as suitable suppliers of the constituents required by this plant. Bone meal contains nitrogen and phosphoric acid in a form that is gradually rendered assimilable, and English experience goes to show that this fertilizer is particularly adapted to hop culture. Though these soils could not be termed deficient in lime, a dressing of this material would in all probability improve the condition of the soil and enhance its productiveness.

Soils Nos. 4, 5, 6, 7 and 8. Are from the ranch of His Excellency the Governor-General, at Guisachan, British Columbia.

No. 4.—Light gray, sandy soil containing small lumps of agglutinated particles which easily crush between the fingers ; when moistened, does not become pasty or sticky, falling apart on drying ; under the microscope, shows a considerable amount of very fine sand ; possesses but few root fibres, and, from appearance, is poor in humus or partially decayed organic matter.

No. 5.—Soil, dark gray approaching black, in which sand predominates, very little in the form of powder, but principally as lumps, which are tough and resist pressure between the fingers ; becomes several shades darker on moistening, but not sticky ; fairly homogeneous, and, judging by appearance, contains a fair amount of humus.

No. 6.—A dark gray loam, very similar in shade of colour to No. 5, in powder and in lumps, the latter easily breaking down by the pressure of the fingers ; on treatment with water, same results as with No. 5 ; in organic matter, also evidently similar to sample No. 5.

No. 7.—Sandy loam, dark gray, but somewhat lighter than the two preceding soils ; in powder and lumps, most of the latter easily crushed between the finger and thumb ; on treatment with water, behaves as samples No. 5 and 6 ; appears to have about the same proportion of humus as No. 5 and No. 6.

No. 8.—Light gray, sandy soil (compared with No. 1, has not the yellowish shade of the latter) ; received as tolerably large lumps which are very hard, resisting all attempts at crushing in the hand ; on moistening, does not become sticky, but mass on drying is very tough ; apparently very little organic matter.

Soil No. 9 Was taken at Cowichan. It was forwarded by Mr. J. R. Anderson, Deputy Minister of Agriculture for British Columbia. The sample is from the common red soil of the bench land.

In appearance, it most resembles the sample from Alberni (No. 1), being a "deep red, sandy loam." It is said to give very poor returns for the first year or two, but to

improve on tillage. The causes for this and the remedy are probably the same as those indicated for the Alberni soil. In potash it is richer than the latter, containing an average percentage of that element. In the amount of its phosphoric acid it is very similar, but in nitrogen and humus it is poorer. Organic manures and especially "Green manures" are advocated for such light soils. For a light soil, apt to leach, it is always better when applying soluble fertilizers to give dressings of small quantities annually and to supply as far as possible nitrogen in the form of an organic manure, as above recommended. The object should be, first, to feed the immediate crop, and, secondly, to improve the retentiveness of the soil by more lasting fertilizers.

The determination of the amounts of available potash and phosphoric acid ascertained by the citric acid method afforded the following data:—

Available potash	·0089
Available phosphoric acid	·0171

While these amounts do not fall below the limits named by Dr. Dyer, they are however, such as to suggest that both potash and phosphoric acid would prove benefi, cial and give good returns in increased crop yields.

Soil No. 10.—This sample was also sent by Mr. J. R. Anderson. It is grayish white and of a clayey character. It occurs in several beds about Quamichan Lake and was supposed to be marl or at least a soil rich in lime. On account of its very fine grain it had proved a difficult soil to work.

Both in composition and appearance it has the characters of a sub-soil. In all the essential elements of fertility it is very poor. The probabilities are that the surface soil overlying this had been burnt off, thus leaving a soil destitute of plant food and quite unfit to support vegetable life. It would take many years of careful culture to bring such a soil into a state of fertility. Underdraining and green manuring are among the chief means to be used for improving it, mechanically and chemically.

Soils Nos. 11, 12 and 13 were furnished by Mr. R. M. Palmer, Inspector of Fruit Pests, of the Department of Agriculture of British Columbia. They were "taken from a valley field near Victoria, Vancouver Island, and are fairly representative of the land to a depth of about 2 feet." Mr. Palmer further says: "The field from which these samples were taken had never been manured, other than by the droppings of animals when in pasture, and has been cropped with grain the last three years. The land is similar to a large amount of what is usually considered first-class farming land."

No. 11 represents the upper 6 inches of the soil. When air-dried it is a dark brown loam, approaching black. It is of excellent texture, the small lumps that make up the mass of the soil powdering easily between the fingers. It is homogeneous throughout, containing clay and humus in good proportions.

In nitrogen this soil ranks very high, while the large amount of organic matter present should prove of value in regulating the soil's temperature and improving its retentiveness.

This soil, as regards potash and phosphoric acid, cannot be considered rich, the amounts of these important constituents of plant food being below those found in the best soils.

For fruit trees, both large and small, an application of these last named ingredients would undoubtedly prove of value, nitrogen being already present in sufficient quantities, providing the season allows the nitrification of the humus to proceed. The under-drainage of the soil would materially assist in this useful process. To supply potash and phosphoric acid, wood ashes may be specially recommended. This excellent fertilizer also furnishes lime, a constituent in which the soil under consideration is not rich.

No. 12 represents the soil between the depths of 12 inches and 18 inches, immediately beneath the preceding sample. In physical appearance and condition it is very similar to the surface soil just discussed. This resemblance is still further emphasized on comparing the chemical data of the two samples. As might be expected, it is somewhat poorer in organic matter and nitrogen than the soil above it; the amounts of total phosphoric acid and potash are, however, identical. These facts would show that the surface soil practically has a depth of 18 inches.

No. 13 was taken from the soil immediately beneath No. 12, and is representative of the soil between the depths of 18 inches and 24 inches. There would appear to be no clear line of demarkation between the surface and sub-soils. This sample is chiefly of a yellowish gray colour, with grains of black soil scattered throughout its mass.

Considered as a sub-soil, it must be regarded as of good quality, from both a chemical as well as a mechanical standpoint. The table of data indicates the differences in composition between this soil and those that overlie it.

The percentages of potash and phosphoric acid in these soils already discussed, represent what may be termed the *total* of their constituents. It will be now interesting to consider the proportions or percentages of these elements that may be looked upon as more or less *immediately available* for plant use, *i.e.* the amounts extracted by the one per cent citric acid solution before referred to.

COMPARISON of "Available" with "Total" amounts of Potash and Phosphoric acid.

SOIL.	POTASH.			PHOSPHORIC ACID.		
	Total Potash.	Available Potash.	Percentage of total Potash available for plant use.	Total Phosphoric acid.	Available Phosphoric acid.	Percentage of total Phosphoric acid available for plant use.
No. 11, Surface 6 inches ..	·22	·00483	2·20	·18	·01020	5·66
No. 12, between 12 & 18 ins.	·22	·00299	1·36	·18	·01055	5·85
No. 13, between 18 & 24 ins.	·25	·00169	·64	·12	·00588	4·90

These results are important in showing that the upper or surface portions of the soil contain a much larger amount of the mineral constituents, potash and phosphoric acid, in an available condition for plant use, than the underlying soil. This largely accounts for the fertility or productiveness of the surface soil as compared with that of the sub-soil. While the total amounts of these elements in the sub-soil may not be less than those in the surface soil, the percentage of the amount present in a condition more or less immediately assimilable is very much less in the former than in the latter. The factors that conduce to this conversion of the mineral matter are the usual atmospheric agencies—water, air and temperature, and in some measure, the nitrification and decomposition of the soil humus, the action of these latter processes being greatly increased by judicious culture—drainage, ploughing and other tillage operations.

NATURALLY OCCURRING FERTILIZERS.

Swamp Muck.

Since the attention of Canadian farmers was first called, now seven years ago, in our reports, to the value of swamp muck deposits as a fertilizer rich in nitrogen and humus, the use of this naturally occurring source of plant food has become widely prevalent. Inquiries as to the best methods of applying muck, many being accompanied by samples for report as to value, are continually being received from all parts of the Dominion. The approximate composition of the specimens analysed during the past year is given in the following table, which also shows the percentages of the important constituents, nitrogen and humus (vegetable and organic matter), in the air-dried material. Of these samples, seven were from Prince Edward Island, one from Nova Scotia, three from New Brunswick, three from Quebec, and three from Ontario. The nitrogen varies from 11 pounds per ton to 54.4 pounds per ton in the air-dried substance, which shows that, other factors being equal, the latter as a nitrogenous manure was worth five times the value of the former. As pointed out in former reports, however, the average amount of nitrogen in muck after drying by exposure, is between 30 and 35 pounds, though a large number contain about half that quantity :—

Analyses of Swamp Muck (air-dried), 1895.

Number.	Locality.	Sender.	Nitrogen.		Organic and Volatile Matter.	Sand and Clay.	Mineral Matter soluble in Acid.	Water.	Remarks.
			Per cent.	Pounds in one ton of air-dried muck.					
1	Cape Traverse, P.E.I	E. Crosby	1·61	32·4	62·12	12·07	15·74	16·07	Good average specimen.
2	" " ..	"	1·56	31·2	45·05	33·13	11·37	10·45	" "
3	Lot 11, P.E.I.....	W. J. Kilbride	·714	14·3	46·78	20·11	14·73	18·38	Could be used with advantage for composting, and as absorbent.
4	Mill Cove, P.E.I....	W. McGrath..	·792	15·8	.....	.....	.....	.....	A fair sample; very acid while fresh.
5	Lot 27, Rock Barry, P.E.I.	F. McDonald..	·694	13·88	83·65	4·45	2·02	9·88	Suitable as an absorbent and for composting.
6	Little Harbour, P.E.I.	A. Mooney....	·94	18·8	80·77	5·85	2·44	10·94	Below the average, but nevertheless valuable.
7	" " ..	"	·55	11·0	20·65	67·00	7·19	5·16	Of the nature of a good soil.
7	Pictou, N.S.....	Jas. McDonald	2·72	54·4	72·70	4·79	5·93	16·58	Very rich in nitrogen.
9	Hillsboro', N.B.....	S. S. Steens...	·70	14·0	65·41	·20	7·41	26·98	In excellent condition for absorbing purposes.
10	Rogersville, N.B....	A. Thibodeau.	·819	16·4	70·85	2·40	17·45	9·30	
11	Lower Woodstock, N.B.	A. W. Hay...	1·61	32·2	50·71	31·07	9·66	8·56	Average amount of nitrogen.
12	Walton, Que.....	A. Lemire....	1·70	34·0	73·83	2·71	7·46	16·00	A very good sample.
13	Shawville, Que.....	E. Hodgins...	1·61	32·2	56·42	9·58	7·18	26·82	Surface sample. An excellent sample.
14	"	" ...	2·27	45·4	73·92	·79	6·70	18·59	18 inches below surface. An excellent sample.
15	Orono, Ont.....	R. Moment...	1·89	37·8	55·23	14·45	13·92	16·40	Of a peaty nature; a go absorbent.
16	Phillipsville, Ont....	A. Acheson...	1·85	37·0	66·01	18·68		15·21	A muck soil rich in nitrogen.
17	"	" ...	1·875	37·5	65·22	20·06		14·72	" "

A close inspection of the data makes it clear that the percentage of organic matter (humus) is not always a safe indication of the sample's richness in nitrogen. Thus

sample No. 5, contains 83.65% of organic matter, and .694% of nitrogen, while No. 15 possesses 55.23% of organic matter and 1.89% of nitrogen. In the first instance the humus contains .83% of nitrogen, in the latter, 3.4% of nitrogen. The humus of mucks is seen therefore to vary much in its nitrogen content. It has been established that the humus of arid soils, though small in quantity, contains a much larger proportion of nitrogen than does the humus of soils in humid districts, so that there is a certain equilibrium in the amount of soil nitrogen in both these classes of land. It is evident that there is an analogous case as regards the variation in nitrogen in our mucks. Whether the cause is similar, cannot as yet be definitely said, but in all probability the difference is not so much due to variations of the nitrogen in the originating vegetable matter as to the conditions of temperature and moisture under which it has been converted into muck and preserved in the swamps. Though not invariably the case, it would appear that the lower layers are somewhat richer in nitrogen than the surface layer.

Undoubtedly the greatest benefit from muck is to be derived after its use as an absorbent in and about the farm buildings. The air-dried material will hold many times its own weight of fluid and can therefore be used to good advantage in the cow stable, pig-pen and barn-yard to save the liquid manure from going to waste. The subsequent fermentation in the manure heap induces conditions favourable to the development of the nitrifying organisms and thus a fertilizer rich in available nitrogen compounds is produced.

With respect to the general instructions in making and using muck composts, the reader is referred to my report for 1894, in which the subject is treated at some length.

MARSH, RIVER AND MUSSEL MUDS.

Considerable dispute still exists as to the exact value of these materials as fertilizers. This disagreement is due to many causes, but chiefly to the differences in the composition of the materials applied, in the amounts employed and in the character of the soils upon which they are used. Many samples have been found to be fairly rich in nitrogen and organic matter—and in this respect somewhat similar to swamp mucks—while others abound more particularly in carbonate of lime. There are also others which can only be regarded as of the nature of fair or good soils, since their composition, as revealed by analysis, is very similar to the latter.

The excellent results that are sometimes obtained from the use of the muds last named, may be due in a large part to the heavy amounts applied per acre—often from 150 to 200 loads—and to mechanical effect they exert upon the tilth of the soil. Of this class, is the following sample sent by Mr. D. Nicholson, of Little Sands, Prince Edward Island, This was of a gray colour, light and sandy and bound together by many root fibres, and in appearance, not rich in humus. This is not strictly comparable to marsh muds; both as to origin and appearance, it more closely resembles the so-called river muds:—

ANALYSIS OF MARSH MUD (AIR-DRIED) FROM LITTLE SANDS, P.E.I.

Water	1·66
Organic and volatile matter	11·58
Sand and clay (insoluble in acid)	76·87
Oxide of iron and alumina (Al_2O_3,Fe_2O_3)	6·68
Lime (CaO)	·19
Magnesia (MgO)	1·35
Potash (K_2O)	·54
Soda (Na_2O)	·80
Silica (SiO_2)	·03
Phosphoric acid (P_2O_5)	·15
Undetermined	·15
	100·00
Nitrogen, in organic matter	·283

It will be noticed that none of the essential ingredients of plant food (nitrogen, potash and phosphoric acid) are in larger amounts than in fairly fertile soil. Neither is it rich in lime, which may be regarded as both a direct and indirect fertilizer. The possibility is that the plant food in these muds is in a more readily available form than that of ordinary soils. To determine this point, we hope to conduct a series of experiments as opportunity offers. In considering the value of such a material, the cost of cartage must be taken into consideration, as well as the effect of the mud upon the physical condition of the soil.

A sample labelled "Marsh Mud" was forwarded by Mr. F. S. McPhail, of Orwell, P.E.I., for examination. This specimen, however, was not a tidal deposit and, consequently, not similar in character to the marsh mud of the Bay of Fundy. It was found along the banks of a "salt water river" to a depth of 4 to 5 feet and "covered in summer with a strong growth of excellent grass." Evidently, this material is made up of the detritus brought down by the river, and the roots of growing vegetation, together with the finely ground-up rock matter, shells and organic debris deposited by the sea. Its composition is tabulated as follows:—

ANALYSIS OF MARSH MUD (AIR-DRIED) FROM ORWELL, P.E.I.

Water	3·12
Organic and volatile matter	23·46
Sand and clay (insoluble in acid)	59·43
Mineral matter (soluble in acid)	13·99
	100·00
Phosphoric acid (P_2O_5)	·18
Potash (K_2O)	·76
Nitrogen	·687

The amounts of nitrogen and organic matter are seen to be quite large for a material of this character, while the other elements of plant food are by no means lacking.

The physical condition of this was very fair, though quite capable of improvement by composting. Much of the nitrogen still exists in undecomposed root fibre, which requires to be broken down by active fermentation with barn-yard manure. A small quantity of common salt is present, but not sufficient to act deleteriously to vegetation. In this connection it may be pointed out that on many soils, salt in small amounts acts beneficially by setting free potash, a valuable plant food element. It also improves the tilth of heavy clay soils, by floculation of the granules and rendering the soil less plastic. It is quite possible that the good effects of certain marsh muds are due to the presence of the traces of salt they contain.

A sample of mud, forwarded by the Hon. Senator Arsenault, from Wellington, P. E. I., gave the following data on analysis:—

ANALYSIS OF RIVER MUD (AIR-DRIED) FROM LOT 15, WELLINGTON, P.E.I.

Water	1.02
Organic and volatile matter	9.90
Clay and sand (insoluble in acid)	72.29
Mineral matter (soluble in acid)	16.79
	100.00
Nitrogen, in organic matter	.262
Phosphoric acid	.15
Lime, present in small quantity.	

This mud was dug in the winter from Jacques Creek and is described as "the accumulation of marsh and swamp muds, sea-weed, &c., carried by high tide into the bottom of this narrow river or creek." It contains a good deal of sand, is of a gray colour and dries on exposure into somewhat hard lumps. As regards the essential

elements of fertility, it resembles very closely the sample from Little Sands already described, being similar in composition to a good soil of more than average fertility.

Of similar character and appearance to the above was the specimen sent by Mr. G. H. Ross, of Ross Corners, P. E. I. It was, however, much richer in nitrogen than either of the foregoing, containing 1·61 per cent of that element.

Our analysis of a sample of river mussel mud, sent by Mr. G. F. Miller from Bear River, Digby Co., N.S., affords the following data :—

ANALYSIS OF MUSSEL MUD (AIR-DRIED) FROM BEAR RIVER, DIGBY CO., N.S.

Water	·90
Organic and volatile matter,	7·23
Clay and sand (insoluble in acid)	53·00
Mineral matter (soluble in acid)*	38·87
	100·00
*Containing carbonate of lime	29·62
Nitrogen, in organic matter	·225
Phosphoric acid	Considerable traces.

As received, it was of a light gray colour and contained a large number of small shells. It differs essentially from the afore-mentioned sample in containing about 30 per cent of carbonate of lime.

In conclusion, I may state that the beneficial action of such "muds" does not entirely depend upon the nitrogen and organic matter they possess (as is the case with swamp mucks), but also upon the somewhat small quantities of the other essential elements of fertility they supply, or to the carbonate of lime they contain.

Muds must be regarded as "amendments" rather than fertilizers which contain plant food in considerable quantities. In many ways, both chemically and physically they may be valuable, but as far as possible their use should be supplemented with more assimilable and stronger fertilizers. Undoubtedly green manuring, *i.e.*, turning under a green crop, preferably clover or pease, will prove one of the cheapest and at the same time one of the most effective methods of treatment when applying "muds" as a fertilizer.

FERN LITTER—BRACKEN *(Pteris Aquilina var. Lanuginosa).*

In many parts of Canada and more especially in British Columbia, large quantities of the common bracken fern grow, and inquiries have been received regarding its manurial value, when ploughed under or first used as litter. For this latter purpose it may be used with advantage, having a well marked absorptive capacity for liquids. A sample of the the air dried fern was received from Mr. T. Wilson, of Loch Erroch, B.C., and the analysis was made with the following results :—

ANALYSIS OF BRACKEN (air dried).

	Percentage Composition.	Lbs. per ton.
Mineral matter or ash	6·78	135·6
Phosphoric acid	·43	8·6
Potash	1·52	30·4
Nitrogen	1·29	25·8

When used as a litter, the subsequent fermentation in the manure pile rots the fibre and sets free the plant food, which, as the analysis shows, is present in notable quantities.

GREEN MANURES.

On many farms in the Dominion, and more especially in the newly settled up districts, sufficient stock is not kept to supply the necessary manure for maintaining the fertility of the soil. As yet, the use of commercial fertilizers is not widespread, owing in part to their apparently high price, and to the lack of the requisite knowledge to use them economically. There are, however, in many instances, materials more or less cheaply obtained which can be employed with profit when their nature and method of application are understood. Among such might be mentioned the deposits of swamp muck, marl and gypsum; fish refuse, slaughter-house offal, and animal matter of all kinds; sea-weed, and decaying vegetable matter generally. But whether these are obtainable or not, every farmer may improve his soil, be it light or heavy, by green manuring; that is, by ploughing under a green crop, preferably of a legume (clover, pease, &c.) and while in flower.

By the acid exuded from the rootlets, by the carbonic acid of the atmosphere, and by other means, plants are enabled to make use of much of the mineral matter of the soil. This is stored within their tissues, together with water and organic matter, the latter being derived in the gaseous form from the atmosphere, and elaborated by the leaves. The turning under of a green crop, therefore, supplies for succeeding crops a store of readily digested plant food—of potash, phosphoric acid, and nitrogen. In addition to these essential elements of fertility, the decaying organic matter from the turned-under crops acts beneficially in conserving the soil's moisture, a most important matter for light and gravelly soils. Further, the presence of this organic matter serves to regulate the soil's temperature, and its decay brings about the solution of inert forms of plant food already present.

Buckwheat, rye and clover are the principal crops used for green manuring. Buckwheat has been found very useful, as a growth may be obtained on comparatively poor soils, soils that in the first instance would not support a growth of clover, and undoubtedly both it and winter rye when turned while green vastly improve many soils. The legumes (clover, pease, beans, etc.), however, are still more valuable, inasmuch as they not only furnish a supply of readily digestible food obtained from the soil, but add a store of nitrogen derived from the atmosphere. It is owing to this power of atmospheric nitrogen-assimilation (which takes place by the agency of certain micro-organisms in the tubercles on the rootlets) that the legumes have been termed "nitrogen collectors" in contradistinction to all other plants, which are classed as "nitrogen consumers." The legumes appear to be richest in this element at the period of flowering, a fact which suggests this time as the best for ploughing under the crop. Since nitrogen is the most expensive of all plant foods, the knowledge of the amount of this element added to the soil per acre by manuring with clover, will prove of interest and value to our readers. The results given in the following table have been obtained from an experiment inaugurated by the Director of the Experimental Farms. Among other interesting and instructive data, the table shows the large amount of nitrogen stored up in the roots, stubble and foliage of clover. This nitrogen, on turning under the crop, becomes available plant food, The value of this crop as a nitrogen accumulator, even when the clover is not turned under, is very apparent. Since these data are more fully discussed in the report of the Director (page 26), it will be unnecessary here to consider them in further detail.

NITROGEN in Clover crop.

Clover cut and roots dug on 25th May, 1895.	Weight of material in grammes per square foot.	Weight of material in pounds per acre (calculated).	Percentage of "dry matter."	Weight of "dry matter" in pounds per acre.	Percentage of Nitrogen in fresh material.	Pounds of Nitrogen per acre in fresh matter (calculated).
One year's growth—						
Leaves and stems (green)	209·0	20,070·0	13.29	2,667·30	·505	101·3
Roots, to a depth of four feet	119·5	11,476·0	16·19	1,857·96	·423	48·5
Semi-decayed material on surface of ground	32·0	3,073·0	23·53	723·07	·732	22·5
Total		34,619·0		5,248·33		172·3
Two year's growth—						
Leaves and stems (green)	117·0	11,235·0	19·51	2,191·95	·447	50·0
Roots, to a depth of four feet	193·0	18,535·0	18·85	3,483·85	·354	61·5
Semi-decayed material on surface of ground	13·0	1,248·0	35·73	445·91	·410	5·1
Total		31,018·0		6,121·71		116·6

All the nitrogen in the clover crop is not taken from the atmosphere, but under favourable circumstances a large portion of it is derived from that source. If we assume that a fair crop of clover per acre takes 75 pounds of nitrogen from the air and the value to be 15 cents per pound, we have $11.25 worth of ready assimilable nitrogen for this area, and this is in addition to the valuable humus and the store of plant food rendered available and obtained from the soil.

It is often found advantageous previous to sowing the clover to dress the land with gypsum or, still better, with wood ashes. If these are not obtainable, an application of lime or marl may be found of value. These materials not only furnish food for the clover and succeeding crops, but also assist in the nitrification of the clover when ploughed under. Clover requires potash and lime for its growth, and very often light soils, those especially benefited by green manuring, are deficient in these constituents. Wood ashes supply both potash and lime; lime, marl and gypsum furnish lime and assist in rendering available for the clover crop the potash locked up in the soil.

The chief features of green manuring may be summarized as follows:—

1. A large amount of humus is added to the soil which acts beneficially in:—
   - *a.* Serving to increase the retentive power of light soils for moisture.
   - *b.* Regulating and providing against the extremes of soil temperature.
   - *c.* Opening up and improving the tilth of heavy soils.
   - *d.* Furnishing, by means of the products of its decomposition, available mineral food from the inert rock matter of the soil.
2. A considerable quantity of previously unavailable soil plant food is presented thereby in a condition already digested and easily assimilated by future crops.
3. The plant food thus supplied is not as readily lost by drainage as that in certain forms of commercial fertilizers and hence green manuring is specially adapted for the permanent improvement of light soils.
4. When the legumes are used, there is a large gain to the soil in nitrogen, and this gain is from a source that otherwise the farmer cannot draw upon. Nitrogen is a costly and valuable element of fertility, and its presence in large quantities (·5 per cent to 1 per cent) is always indicative of a fruitful soil.

When clover is used and stock is kept that can consume the crop, the most profitable plan would be to feed off the first cutting and to turn under the second growth. In this way a highly nutritious fodder is obtained and in the manure produced about 75 per

cent of its plant food may be returned to the soil, and this in addition to the fertilizing material in the roots and second crop.

MOSS LITTER.

The absorptive capacity of moss turf has for many years been recognized in Europe as establishing a high value for this substance as a bedding material. In Sweden and Holland, and of later years in England and the larger cities of the United States, moss litter has been used extensively in stables and found to be highly satisfactory, both in keeping the animals dry and the surrounding atmosphere free from odour.

Large bogs or moors, some of them miles in extent, occur in Canada made up (principally) of several species of Sphagnum moss. These in many places are many feet in depth, the growing surface of moss overlying the more or less closely packed turf composed of the remains of preceding generations. The preparation of the litter is simple and comparatively inexpensive, the piled moss being dried by the sun and wind (preferably after exposure in heaps to a winter's frost). The turf is then placed in a cylinder containing a revolving toothed roller and the fine material thus resulting is baled under pressure in a manner similar to that in vogue for preparing hay for shipment.

The absorptive capacity of moss is much greater than that of straw or peat. This power of taking up and retaining fluids and gases varies according to—

1. The species of moss.
2. The dryness of the moss.
3. Its fineness.
4. Its degree of decomposition.

The species of moss.—Some mosses in an air-dried condition will retain but twice their weight of water, while others will absorb 15 to 20 times that quantity. This absorptive power is due to the botanical structure of the plant, the large cells of the stalks and leaves being distended by capillary attraction. As the microscopical structure varies in the different mosses, so will this physical property vary.

The dryness of the moss.—Providing the organic structure of the moss has not been injured in the process of drying (as by the use of artificial heat), the drier the moss the more liquid will it retain. Artificial drying has been found to materially injure, if not entirely destroy the absorptive capacity of moss litter.

Its degree of fineness.—While the absorptive capacity of moss may be considerably increased by teasing, it has been found that too fine a state of division is detrimental to the value of the material as an absorbent.

Its degree of decomposition.—The greater the decay, the lower the absorptive power. Hence the recent grown upper layers consisting of bright loosely-textured fibrous moss, are the best to employ as litter.

Moss litter has in a large degree the ability to absorb ammonia and other gases. This absorption is partly chemical, but chiefly mechanical. By careful experiment, it has been shown that the air of stables in which moss litter was used was free from ammonia, and already we have abundance of Canadian testimony to corroborate the statement. It is this feature of moss litter that specially commends it as a bedding material in cities.

At the instigation of Mr. R. D. Wilmot, Jr., M.P., samples of moss litter were forwarded me last summer by Edward Jack, Esq., of Fredericton, N.B., from several of the larger bogs of New Brunswick. I am much indebted to Mr. Jack for information respecting the occurrence and properties of this material. He has conducted several valuable experiments both in the preparation and use of the moss as a litter. A most interesting and instructive account of moss litter was prepared by Mr. Jack for the Bureau of Mines for the province of Ontario, and appears in the report of that department for 1893.

My results on the samples here referred to are as follows :—

ANALYSES of Moss Litter.

No.	Designation.	Locality.	Moisture.	Ash.	Nitrogen.	Absorptive Capacity.
1	Artificially dried.....	Musquash, N.B..	23·01	1·06	0·57	623
2	Open air dried.....	"	19·44	1·45	0·71	905
3	Upper layer.....	Rustagonish, N.B.....	14·28	0·84	0·51	1666
4	" loose.....	Point Cheval, N.B....	13·53	2·30	0·38	1834
5	Lower layer compact.....	"	14·25	7·88	0·48	1166

The above data were obtained on the material as received. With respect to the determination of absorptive capacity, the operation was as follows:—

The moss litter being weighed out into a copper gauze funnel and covered with a cap of the same material, the whole was immersed in water for 24 hours. The funnel and contents were then taken out and allowed to drip for ten minutes. The dripping then having ceased, a weighing was again made and the water absorbed was determined and calculated to a hundred parts of the moss, as recorded above. Samples No. 1 and No. 2 were prepared by Mr. W. F. Todd, of St. Stephen, N.B. It will be noticed that the operation of artificially drying the moss had seriously impaired its absorptive capacity. An experiment tried by us confirmed this fact. Some moss was dried all night at the temperature of 205 degrees F. Its absorptive capacity was entirely destroyed, as after one week's submersion in the gauze funnel it was only wet on the edges. Further, it may be remarked that both specimens show the presence of a comparatively large amount of water. No. 2 has a noteworthy percentage of nitrogen.

Samples 3, 4 and 5 are excellent, having a very large absorptive capacity and suitable in every respect for the manufacture of litter. No. 5, being from a lower layer, was compact in character and had a lower absorbent co-efficient than Nos. 3 and 4, compared with which it is consequently less valuable.

Mention has already been made of its usefulness in keeping stables dry and free from odour. It may now be remarked that the resulting manure has been found of excellent quality, giving the very best returns with all classes of garden and farm crops. The moss litter in itself contains a notable quantity of plant food (chiefly nitrogen) which in the subsequent composting is rendered available. In addition to the data given in the foregoing table, we have ascertained that the ash or mineral matter contains one-tenth of its weight (10·15 per cent) of potash. It is quite possible that the structure and composition of the litter assist in the development of the nitrifying organisms which bring about the conversion of the plant food into available forms.

INDUSTRIAL FERTILIZERS.

WASTE FROM A SHODDY FACTORY.

This is esentially a nitrogenous fertilizer, potash and phosphoric acid being present in little more than traces. The percentage of nitrogen in this material is very apt to vary, owing to the fact that now-a-days cotton is largely used to replace wool in all woollen goods, the former is very much poorer in this element than wool.

A sample obtained from a shoddy factory at Stratford, Ontario, when air-dried, gave the following figures on analysis:—

Water	5·58
Organic and volatile matter	87·05
Mineral matter	7·37
	100·00

ESSENTIAL ELEMENTS of fertility in air dried shoddy waste.

	Per cent.	Lbs. per ton.
Nitrogen	2·19	43·8
Phosphoric acid	·17	3·4
Potash	·15	3·0

This material when received contained a comparatively large percentage of water and was distinctly acid.

Shoddy waste decay but slowly in the soil; its nitrogen is not readily available, and consequently it is always advisable to induce fermentation in the compost heap before applying it as a fertilizer. Except in warm, moist soils, it is very apt to remain for a long time unchanged and useless. Any organic and easily putrescible substance such as animal refuse, urine, &c., would prove useful in starting decomposition in the shoddy waste when mixed with it in the heap. Reduction to soluble form of the nitrogen in this material may also be brought about by treatment with lime and wood ashes. This method has in many parts of Europe been used successfully.

BONE AND MEAT MEAL OR TANKAGE.

This fertilizer is made from slaughter-house refuse, *e. g.*, bones, meat scraps, blood, offal and other waste materials. The raw material is cooked under a pressure of steam and the greater part of the fat, which would otherwise interfere with the beneficial action of the fertilizer in the soil, removed. The product after thorough drying is crushed or ground and bagged. This material must, therefore, be valued according to the amounts of nitrogen and phosphoric acid it contains and the fineness of its particles; for, providing the product is dry and does not cake into masses, the finer the granules the greater the surface exposed to the solvent action of the soil water. Like other organic manures, its decomposition in the soil assists in many indirect ways in increasing fertility, by improving the tilth and the power of retaining moisture and heat, and by the solvent action of the carbonic acid set free by its fermentation. Such fertilizers will, therefore, give the best returns in soils that are neither too wet, nor too light, nor too heavy; for in them the conditions for active fermentation are most favourable. Unlike the more soluble chemical fertilizers—nitrate of soda, sulphate of ammonia, kainit and superphosphate—these organic manures do not yield immediately a large amount of available plant food; on the other hand, however, they are more lasting in their effects, their results being noticeable often for many years.

It being desired to know the composition of the tankage or "bone and meat meal" manufactured by the St. Lawrence Chemical Co., Montreal, a sample was submitted to analysis with the following results:—

ANALYSIS of Tankage or Bone or Meat Meal.

Moisture	5·04
Organic and volatile matter	67·67
Mineral matter soluble in acid	26·65
Mineral matter insoluble in acid	·64
	100·00

	Per cent.	Lbs. per ton.
Nitrogen	8·92	178·4
Phosphoric acid	9·84	196·8

From the figures I conclude that the material is composed of about 25 per cent of bone and about 75 per cent of meat or other albuminous substances.

It may be noted that fertilizers of this character do not contain potash; they should therefore be supplemented with the latter element in some form (wood ashes, kainit, or muriate of potash) if a manure is required that will furnish all of the essential elements of fertility.

FRESH SLAUGHTER-HOUSE OFFAL.

The fresh material consists of entrails, trimmings, bones and other refuse of the slaughter-house. Its essential fertilizing elements are nitrogen and phosphoric acid. It is readily decomposed and consequently is excellent for composting with swamp muck or soil rich in humus. The process of fermentation that ensues converts the plant food in both materials into readily assimilable forms. Such a fertilizer properly prepared would not only be rich as regards nitrogen and phosphoric acid, but would also be quick acting. In these respects it is very similiar to fish refuse.

A sample of fresh offal forwarded from Orillia, Ont., afforded me the following data:—

COMPOSITION of Slaughter-house Offal (fresh).

Water	48·65	
Organic matter (entrails, &c.)	27·20	
Mineral water (bones)	24·15	
	100·00	
Nitrogen		1·97
Phosphoric acid		8·28

FERTILIZING CONSTITUENTS per ton of fresh Material.

Nitrogen	39·4 pounds
Phosphoric acid	165·6 "

REDUCTION OF BONE ON THE FARM.

In order to render the nitrogen and phosphoric acid of bones more immediately available as plant food, some method of reduction must be resorted to. The weight of bones produced annually on the farm scarcely warrants, in most instances, the purchase of a mill for grinding, and even when this plan is pursued the fat of the bones must first be extracted, for the presence of oil would prevent the fine grinding of the bones and the ready decomposition of the material in the soil.

The method of reduction with oil of vitriol (resulting in the production of superphosphate) is not to be recommended for the farm, owing to the great care that it is necessary to exercise in handling such a dangerous substance.

When there are only a few bones to treat, the simplest way is to put them in a fermenting manure pile or in the compost heap; when the quantity is large, the following plan will be found advantageous:—

In a water tight barrel or wooden tub, place alternate layers of bones and unleached wood ashes, the layers being about six inches thick, and the lowest and uppermost being of ashes. Drive several wooden stakes through the mass to the bottom and moisten the whole well with the water. After a few weeks withdraw the stakes and keep the mass damp by pouring water into the channels so left. At the expiration of a month thoroughly mix the mass and moisten afresh. Repeat this operation twice at intervals of two months, and the bones should then be completely reduced. If bone meal is used, it may be mixed with wood ashes in proportion of one ton of the former to five barrels of the latter, the mixture being treated with water in a barrel as already described. When wood ashes are not procurable, a strong solution of lye may be used. About five pounds of the concentrated lye should be sufficient for 100 pounds of bones.

When the bones are quite soft, the mass should be spread out in a thin layer to dry. It should then be thoroughly powdered and mixed with loam for convenience in distribution on the land. As this fertilizer contains all three of the essential elements of fertility in a soluble condition, it should be preserved until wanted under cover from rain.

BASIC PHOSPHATE OF LIME AND POTASH.

This fertilizer was prepared by Messrs. E. A. Barnard and H. Nagant, of Quebec, by fusing together finely ground mineral phosphate, carbonate of potash and sand. By direction of the Honourable Minister of Agriculture, analyses were made of the two samples forwarded, with a view of ascertaining the percentages of phosphoric acid and potash contained in them and the proportion of these constituents that might be regarded as more or less immediately available for plant food.

ANALYSES.

	No. 1.	No. 2.
Phosphoric acid—total	21·55	21·27
" soluble in one per cent citric acid solution	20·55	21·18
" soluble in water	1·53	trace.
Potash—total	27·10	21·66
" soluble in one per cent citric acid soluble	19·94	17·45
" soluble in water	8·67	1·54

Since, as has been shown by Dr. Bernard Dyer (*Journal of Chemical Society*, March, 1894), the average acidity of root-sap may be represented by a one per cent solution of citric acid, we may suppose that the amounts of phosphoric acid and potash dissolved out of these fertilizers by this solvent, indicate the quantities that are more or less immediately available for crop use. The above data show that by far the larger portion of phosphoric acid and potash present has been converted by this process into more valuable, because more readily available forms.

GROUND MINERAL PHOSPHATE AS A FERTILIZER.

The finely ground mineral phosphate (apatite), according to experiments made in our laboratory at Ottawa, is but very slightly soluble in one per cent citric acid solution. Thus, my results, obtained when using such a solvent in the proportion of one part of phosphate to 100 of the solution, showed that when treating a finely ground

phosphate containing approximately 25 per cent of carbonate of lime, only 6·2 per cent of the total phosphoric acid was rendered soluble. In other words, 1·5 per cent, approximately, of phosphoric acid had passed into solution by this treatment. Science has, therefore, corroborated practice, in showing that the ground mineral phosphate cannot be regarded as an economical source of *available* phosphoric acid, though undoubtedly the fineness and specific hardness of the material largely determines its exact value in this respect.

Chemical Experiments towards rendering available the Phosphoric Acid of Mineral Phosphate.

From these results it became apparent that a previous treatment of the mineral phosphate was desirable and, indeed, necessary, if it was to be applied with a view to immediate returns.

To this end various experiments have been made in the laboratory of the Central Farm since 1893 towards a means of cheaply and effectively converting the phosphoric acid of ground phosphate into soluble and available forms, by means of the sulphates and bisulphate, and carbonates of the alkali metals. The first report on these experiments is contained in the report of the Minister of Agriculture for 1893. It is there shown that the fusion of one part of finely ground phosphate with the bisulphate of soda renders soluble a large proportion of phosphoric acid. Thus, in one instance, phosphoric acid equivalent to 38·49 per cent of apatite had been so converted. I may be allowed to quote from that report my conclusions as to the solubility of the phosphoric acid after ignition with the sulphates and bisulphates of soda and potash :—" I infer from these results (1) that any soluble phosphoric acid that may be formed during the ignition of the mineral phosphates with the sulphate of soda and potash, immediately recombines in the presence of water to form tricalcic phosphate, and (2) that the ignition of the mineral phosphates with the bisulphates of soda and potash produces, according to circumstances, more or less soluble phosphoric acid.

" This latter conclusion is a very important one, since it is possible that by using the by-product, sodium bisulphate, an economical method for the treatment of mineral phosphates may be devised. It is scarcely necessary to add that such a process would prove of great value to Canada and Canadian agriculturists. Before an affirmative statement can be made regarding the commercial success of such a method for converting and utilizing our phosphate, the cost of the raw materials and of the treatment, as well as the price obtainable for the manufactured article, must be taken into careful consideration."

Since 1893, further work had been done, the details of which have not yet been published. These latter experiments comprise the following :—(*A*) Heating together finely ground phosphate and sulphate of soda and treating the residue with 2 per cent citric acid solution. The results showed that phosphoric acid equivalent to 35 per cent to 37 per cent of the phosphate had been dissolved.

(*B*) Ignition of the finely ground phosphate with sodium bisulphate and treatment of the mass with 2 per cent citric acid solution. In this case 50 per cent of the apatite was found to have been rendered soluble in the acid solution.

The by-product that was used in these experiments contained only a small proportion of bisulphate, the larger part being sulphate of soda. It did not yield, therefore, as large an amount of soluble phosphoric acid as when pure bisulphate was used.

These experiments, the results of which I have condensed, were made before the appearance of Dr. Dyer's paper before referred to. Consequently, I was not then aware that 1 per cent citric acid represented the acidity in root sap. My solvent was undoubtedly too strong to give results which would allow us to say that the percentages of phosphate above stated are such as are rendered immediately available for plant use. Nevertheless, we may safely draw the conclusion that ignition of the finely ground phosphate with sulphate of soda, as well as the by-product, bisulphate of soda, does convert a considerable amount of phosphate into a form much more readily available than the phosphoric acid in the untreated material.

I intend to repeat these experiments, using 1 per cent citric acid solution for the treatment of the ignited mass.

(*C*) The third series of experiments in this investigation conducted by us, affords data regarding the effect of igniting finely ground phosphate with (1) wood ashes and (2) carbonate of potash. A mixture of wood ashes and finely ground phosphate was heated together and the mass subsequently treated with water. In the aqueous extract, phosphoric acid equivalent to 1·25 per cent of the phosphate was found. The residue, after treatment with water, was left over night in a 1 per cent solution of citric acid; this brought into solution phosphoric acid equivalent to 3 per cent of the phosphate. As the duplicate experiment in this trial closely agreed, we must infer that simple heating with wood ashes does not appreciably improve the solubility of the phosphoric acid in the mineral phosphate.

In the next experiment sand was added to the wood ashes and ground phosphate before ignition. This method was not found to increase the percentage of available phosphoric acid over that found in the preceding experiment.

Trials were then made by fusing together carbonate of potash and finely ground phosphate. Treatment of the mass with water dissolved phosphoric acid equivalent to 6·5 per cent of the phosphate, and the subjection of the residue to the action in the cold of 1 per cent citric acid further dissolved phosphoric acid corresponding to 43·00 per cent of the phosphate.

From these experiments, I conclude that ignition with wood ashes does not materially increase the availability of the phosphoric acid in apatite, but that ignition with carbonate of potash does so very materially. If commercially any of the processes that comprise heating ground phosphate with the sulphates and bisulphates or carbonates of soda or potash are practicable, undoubtedly we have a means of readily rendering more or less immediately available much phosphoric acid now locked up and well-nigh useless to agriculture.

I may point out that if the potash salt were used in the fusion, the resulting fertilizer would contain in addition to the available phosphoric acid, another element of almost equal importance to farm crops, viz., potash.

SUPERPHOSPHATE.

Superphosphate is the result of treating mineral phosphate or bones with sulphuric acid. The process converts the insoluble phosphoric acid into soluble and available forms. In commercial samples we find phosphoric acid in three forms, (*a*) phosphoric acid soluble in water, (*b*) "reverted" phosphoric acid, soluble in dilute citric acid solution, and (*c*) insoluble phosphoric acid. The value of any particular brand depends on the percentages present of the two first named. Reverted phosphate of lime is due to the formation of a compound intermediate between insoluble tricalcic phosphate and the water-soluble mono-calcic phosphate. Superphosphate is apt to revert in the soil or simply by keeping, the percentage of reverted phosphoric acid reducing that of the water-soluble phosphoric acid. This reversion may be caused by the action of the water-soluble phosphate on the insoluble phosphate present, as takes place on keeping or by the presence of lime, iron or alumina in the soil.

When reversion is caused in the soil by excess of lime, the deterioration in value, from an agricultural standpoint, is not nearly as serious as when caused by iron or alumina. The value of reverted phosphoric acid is a question of great dispute. Reverted phosphate is of vastly greater value than the insoluble tricalcic, but does not appear to be quite equal to that of the water soluble (monocalcic) phosphate.

Superphosphate has been found the very best source of phosphoric acid for crops whose early growth must be hastened and for those whose season of growth is not an extended one. Thus, in the case of turnips, its application may advance the growth of the crop to such an extent that the plants are able to successfully resist the ravages of the turnip fly. For cereals, and especially barley, in conjunction with nitrogenous manures, it is especially valuable. In a fertilizer for pastures, potatoes, mangels and other root crops it is also a most useful ingredient.

Available phosphoric acid in the soil has the tendency to bring about early maturity of the crops. As the season of growth advances, the phosphoric acid migrates, accummulating in the seed. It is thus that the soil is particularly impoverished in this constituent when the custom of growing large areas of grain and selling their product off the farm is persisted in.

Application of Superphosphate.

With regard to the rate of application of superphosphate, no definite amounts can be stated as being the most economical for all crops and all soils. As a special fertilizer for fruit trees and orchards, it must be supplemented by some form of potash in addition to nitrogen. Roots also require liberal quantities of phosphoric acid ; for cereals superphosphate gives the best returns when applied with available nitrogenous manure.

With barn-yard manure, 100 to 300 pounds of superphosphate per acre will be probably the quantity most profitable to use. For special and intense farming, 300 to 500 pounds per acre may be applied, together with a nitrogenous or potash fertilizer, as the case may require. As plant food in different soils varies so much in amount, and as plant requirements also vary greatly, it is impossible to lay down any hard and fast lines for universal guidance. Any excess of phosphoric acid applied, however, is not likely to be lost, for it is not, like nitrogen, easily leached from the soil. All farm crops require phosphoric acid, and there are but few of our cultivated soils in the older provinces of Canada that would not have their crop yields increased by an application of phosphoric acid in an easily available form.

MISCELLANEOUS INVESTIGATIONS.

ARSENATE OF LEAD, A NEW INSECTICIDE.

This substance has been recommended as a substitute for Paris green in spraying mixtures used for the destruction of "biting" insects, such as the apple worm (Codling Moth) and the Plum Curculio. Being insoluble in water, and reported as non-injurious to foliage, it is held that it may with safety be employed in larger amounts than those given in the formulæ containing Paris green; at the same time it is said that this compound is equally as efficacious in the extermination of insect foes as the latter well known and widely used insecticide.

Since many erroneous and misleading formulæ have appeared in print for its preparation, it has been thought advisable to ascertain the exact chemical nature of the compound used and to deduce therefrom the correct weight of the materials to employ, corroborating the latter by actual experiment. It is probable that some of the apparent discrepancies in the published formulæ have been due to the employment of crude and impure arsenate of soda, such as is used in calico-printing. The chemicals used are acetate of lead and arsenate of soda, the result of the reaction on mixing solutions of these being the formation of an insoluble precipitate of lead arsenate, acetate of soda remaining in solution. Lead arsenate so formed is a white amorphus compound, settling to the bottom of the vessel, on standing. The reaction when using pure reagents is represented by the following equation:—

$$\underset{\text{(Arsenate of Soda).}}{2\,Na_2\,HAsO_4,\,7\,H_2O} + \underset{\text{(Lead Acetate).}}{3\,Pb\,(C_2H_3O_2)_2} = \underset{\text{(Lead Arsenate).}}{Pb_3\,(AsO_4)_2} + \underset{\text{(Acetate of Soda).}}{4\,NaC_2H_3O_2} + \underset{\text{(Acetic Acid).}}{2\,HC_2H_3O_2} + \underset{\text{(Water).}}{14\,H_2O}$$

Directions for Preparing the Insecticide.

To prepare fifty gallons of the mixture at the rate of one pound of lead arsenate to two hundred gallons of water: dissolve three ounces of arsenate of soda in a quart or so of water (it dissolves readily in cold water). Dissolve four and three-quarter ounces of lead acetate in a similar volume of water. Pour both solutions into a barrel already containing about forty-five gallons of water and stir well. The volume may now be made up to fifty gallons. This formula provides for the presence of a slight excess of lead acetate in solution: if the arsenate of soda were in excess, injury would probably result to the foliage.

The lead arsenate remains longer in suspension when precipitated in a large volume of water than when made concentrated and subsequently diluted.

On filtering off a little of the liquid and adding to it a few drops of the arsenate of soda solution (which is reserved for this purpose), a white precipitate should form, showing excess of lead.

It should be remembered that arsenate of soda and acetate of lead, as well as the product, are poisonous.

Respecting the price of the material, I could not obtain any Canadian quotations for commercial arsenate of soda; the pure article costs about $2 per pound. Acetate of lead retails at 25 cents per pound or in quantities of five pounds or more at 15 cents per pound. At these prices, the cost of the material for 50 gallons of the insecticide (strength as above) would be about 42 cents.

WELL WATERS ON FARM HOMESTEADS.

We here present in tabular form the analytical data of 65 samples of well waters from Canadian farms examined during the past year. In each instance a full report has been sent to the forwarder of the sample. In many cases we have been obliged to advise the immediate discontinuance of the use of the water for household purposes, for it will be seen from the brief remarks given in the last column of the table that a large proportion of the samples proved on analysis to be seriously polluted.

The importance of pure and unpolluted water to the health of man and animals, and the danger that exists in water contaminated with drainage we have emphasized in previous reports and at the chief agricultural conventions. It is now well known that many infectious diseases are conveyed through an impure water supply, and, further, that thrift in the farm cattle and first class, wholesome dairy products are largely dependent upon a plentiful supply of good water. The value of this branch of our work, therefore, is obvious, since without an analysis it is usually very difficult to judge of the purity of water.

A word of caution may be given to those about to sink wells. Information received from those forwarding samples shows that many farmers' wells are in the stable or barn-yard or at best dangerously near the privy or other polluting source. The result of this convenient (?) method is that too often an infiltration of drainage into the well has taken place; indeed, in many instances the well has been found to be a veritable cess-pit containing a fluid much better for watering a hot-bed than for use as a beverage. We would, therefore, strongly advise sinking the well at a safe distance from such sources of contamination, and, further, a careful examination from time to time of the well and its environment. It must be remembered that in light sandy soils, drainage will travel long distances and if opportunity presents itself will find its way into the well, which naturally offers a lower level in its passage through the soil.

Farmers desiring to avail themselves of the privileges of water examination at the laboratories of the Central Farm are asked to write for instructions for the collection and shipment of samples. In very many instances, owing to the small quantity sent, or the water being contained in dirty bottles, it has been impossible to make an analysis upon which a report as to the quality of the sample could be based.

ANALYSES OF

RESULTS STATED

Number.	Locality.	Marks.	Date.	Free Ammonia.	Albuminoid Ammonia.	Nitrogen in Nitrates and Nitrites.	Chlorine.	Total Solids at 105° C.
			1894.					
1	Athens, Ont.	W. J. G.	Nov. 2.	0·036	0·045	0·034	3·75	278·0
2	Almonte, Ont.	D. M. F. No. 1.	Dec. 7.	trace.	0·132	3·006	28·0	444·8
3	"	D. M. F. No. 2.	" 7.	0·89	0·068	1·062	2·5	352·2
4	Vernon, B.C.	L. N. No. 1	" 18.	0·03	0·06	0·038	1·6	449·2
5	"	L. N. No. 2		0·02	0·062	0·041	3·0	429·6
6	"	L. N. No. 3		0·01	0·073	0·025	2·6	492·0
7	"	L. N. No. 4		trace.	0·024	0·026	1·0	269 2
8	"	L. N. No. 5		trace.	0·035	0·1150	0·8	366·4
9	"	L. N. No. 6		0·044	0·12	.....	0·8	.....
10	Cowansville, Que.	A. McF.	Dec. 26.	0·004	0·111	2·344	6·8	160·8
			1895.					
11	Bradford, Ont	R. T. per W. C.	Feb. 2.	0·09	0·37	3·566	60·0	664·0
12	Hamilton, Ont.	W. G. W. No. 3.	" 13.	0·27	0·335	0.1894	0·5	.....
13	"	W. G. W. No. 4.		0·20	0·190	0·1071	0·4	.....
14	"	W. G. W. No. 5.		0·22	0·225	0·160	trace.	.....
15	Newstadt, Ont.	L. K.	Feb. 13.	1·632	0·108	0·023	1350·0	4888·0
16	Shakespeare, Ont.	J. W. D.	" 23.	trace.	0·15	11·51	130·0	698·0
17	Lansdown, Ont.	J. D.	" 25.	0·638	0·96	0·084	96·0	362·0
18	Thornbury, Ont.	G. F. M. No. 1.	" 25.	0·35	1·156	0·025	4·3	266·0
19	"	G. F. M. No. 2.		0·008	0·48	10·966	316·0	1166·0
20	East Templeton, Que.	F. C.	Mar. 8.	0·032	0·17	2·98	7·0	262·4
21	Bonnechère River, Renfrew, Ont.	K. R.	" 25.	0·034	0·325	0·169	4·0	129·6
22	Bonnechère River, Renfrew, Ont.	J. K. R.	" 25.	0·09	0·325	0·0576	6·6	134·0
23	Hurd's Lake, Renfrew, Ont	J. K. R.	" 25.	0·10	0·547	0·125	2·0	86·0
24	Cowansville, Que.	A. McF.	" 26.	0·017	0·097	1·995	9·0	160·0
25	Miami, Man.	W. R.	April 25.	0·041	0·980	0·093	30·0	9276·0
26	Regina, N.W.T.	C. G.	" 25.	0·45	0·715	0·04	2·10	47·6
27	Ladner's Landing, B.C.	H. N. R. (B.)	May 7.	0·16	0·42	0·527	192·0	.....
28	"	H. N. R. (G. A.)		1·235	0·475	?	22·0	.....
29	"	H. N. R. (J. P.)		1·312	0·175	?	20·0	.....
30	Qu'Appelle, N.W.T.	H. M. P.	June 14.	0·569	0·31	0·09	10·8	.....
31	"	S. C. B.	" 14.	0·214	0·812	0·04	11·0	.....
32	Beachburg, Ont.	J. B.	July 2.	0·256	0·14	0·108	16·0	369·0
33	Plevna, Ont.	A. M. W.	" 4.	15·75	2·73	.....	84·0	.....
34	Outremont, Que.	H. L. B.	June 26.	none.	0·05	1·56	2·35	226·3
35	Forrester's Falls, Ont.	A. W. R.	July 6.	3·614	0·26	none.	332·0	6246·0
36	Almonte, Ont.	E. P. W.	" 31.	0·046	0·101	3·27	30·0	436·8
37	"	D. M. F.	" 31.	1·67	0·256	0·074	1·6	.....
38	Paris Station, Ont.	J. H. W.	Aug. 22.	0·06	0·078	2·355	3·8	306·8
39	Regina, N.W.T.	N. W. M. P.	" 30.	0·63	1·12	none.	14·0	588·0
40	"	N W. M. P.	" 30.	0·33	1·14	none.	14·0	596·0
41	Waterville, N.S.	J. A. G. C.	Sept. 4.	0·044	0·34	5·035	70·0	324·0
42	Winona, Ont.	M. P.	" 7.	0·01	0·24	5·130	95·0	4137·2
43	Orillia Ont.	R. A. L. No. 1.	" 10.	0·02	0·06	.....	2·0	....
44	"	R. A. L. No. 2.	" 10.	0·08	0·16	.....	5·5	... .
45	Grenfell, N.W.T.	L. H. H.	" 10.	0·436	0·70	.....	160·0	.....
46	Vernon, B.C.	W. & B.	" 23.	0·02	0·084	0·05	3·0	428·0
47	Renfrew, Ont.	J. K. R. No. 1.	" 25.	0·16	0·05	5·015	105·0	701·2
48	"	J. K. R. No. 2.	" 25.	0·02	0·024	3·805	42·5	558·0
49	"	J. K. R. No. 3.	" 25.	0·066	0·03	5·315	13·0	493·6
50	"	J. K. R. No. 4.	" 25.	none.	0·175	13·654	330·0	1672·4
51	Sherbrooke, Que.	W. P. R.	" 27.	trace.	0·05	0·132	1·20	212·0
52	Milton, Ont	J. S.	Oct. 5.	trace.	0·06	0·085	2·70	320·0
53	Merton, Ont.	W. G. W. (T. S.) No. 6.	" 5.	0·3	0·02	1·879	26·5	337·0
54	"	W. G. W. (J. A. R) No. 7.	" 5.	0·008	0·01	1·377	15·0	310·4
55	"	W. G. W. (J. M.) No. 8.	" 5.	0·63	0·13	1·31	29·0	492·0
56	Bronte	W. G. W. (E.M.W.) No. 9	" 5.	0·01	0·004	1·415	20·0	325·2
57	Utterson, Ont	D. B. No. 1.	" 7.	trace.	0·10	1·72	6·0	.....

WELL WATERS, 1895.

IN PARTS PER MILLION.

Solids after Ignition.	Loss on Ignition.	Oxygen absorbed at 80° F. In 15′	Oxygen absorbed at 80° F. In 4 hours.	Phosphates.	Report.
228·0	50·0	·1080	·2376	.....	A good water.
263·2	181·6	·504	1·0188	traces.....	Contaminated.
235·2	117·0	·2252	·5040	"	Evidently seriously polluted.
316·8	132·4	·428	·948	"	From small stream ; good water.
345·6	84·0	·948	1·916	"	From spring "
428·0	64·0	·852	1·704	"	From small stream "
246·6	22·6	·252	·524	"	" " "
322·4	44·0	·216	·464	none	Spring water "
.....	.....	.....	.....	.....	" insufficient data for report.
118·8	42·0	·520	1·072	slight traces.....	Must be regarded as suspicious.
432·0	232·0	·900	2·156	heavy traces.....	Seriously contaminated, not safe to drink.
.....	.....	.....	.....	slight traces	Sample of ice from Burlington Bay ; impure.
.....	.....	.....	.....	"	" " "
.....	.....	.....	.....	.....	" " "
3764·0	1124·0	.....	.....	traces	Very impure, condemned for drinking purposes.
464·0	234·0	·332	·772	"	Previously polluted, not a safe water.
202·0	160·0	....	.....	heavy traces.....	Receives contaminating drainage water.
160·0	106·0	....	.....	traces	Condemned.
806·0	360·0	.....	.....	"	" very bad water.
162·4	100·0	·388	·828	heavy traces.....	Not first class, must be regarded as suspicious.
69·6	60·	2·26	4·268	"	Below Smith's Creek; a fair water.
72·0	62·0	2·516	4·804	traces	Above " suspicious, indicates pollution.
36·0	50·0	2·248	4·700	slight traces	Six miles from Renfrew. " "
98·0	62·0	·372	·572	heavy traces.....	Highly suspicious. [character.]
7736·8	1539·2	.....	.....	... .	Contains a large amount of saline matter of a purgative
9·2	38·4	1·844	3·429	.....	Probably polluted, not a safe water.
.....	.....	.....	....	.....	Condemned for use.
.. ...	...	.....	.....	.....	" very seriously polluted.
... .	.....	... .	... .	.....	" " "
.....	.....	.....	....	.....	Seriously contaminated with organic filth.
.....	.....	...	.....	.....	Polluted with drainage.
240·0	129·0	.....	.....	.....	Unfit for drinking purposes, contaminated.
.....	.....	.....	.....	.....	A very bad water, very dangerous to use.
194·8	31·5	·064	·440	.....	Probably a safe water.
5726·8	520·0	.....	.....	traces	Evidently receives drainage of a pernicious character
326·0	110·8	·356	·512	heavy traces.....	Viewed with grave suspicion.
.....	...	·544	1·296	.....	A very dangerous water, extremely impure.
250·8	56·0	·704	1·292	.....	Not condemned, but highly suspicious.
425·6	162·4	4·456	7·608	trace	Not fit for drinking purposes, polluted.
425·2	170·8	4·096	7·548	heavy traces.....	" " "
266·4	57·6	....	.....	traces.....	Nitrates too high, a highly dangerous water.
3199·8	937·4	·7732	1·6652	slight traces.....	Unsafe for household purposes.
.....	...	.....	.....	.....	Upper stream, a really first-class water.
.....	.....	.....	.....	.....	Lower stream, inferior in quality to No. 1.
.....	.....	.....	.....	.....	Very impure, dangerous to use.
370·0	58·0	·3504	·7424	very slight traces..	A good water, unpolluted and wholesome.
537·2	164·0	·724	1·156	slight traces.....	Private well, not a good water.
478·0	80·0	·412	·620	none.....	Public " polluted.
408·0	85·6	·422	·580	traces	Convent " "
1170·6	501·8	·928	1·816	heavy traces.....	Well in stable yard, a very bad water.
188·0	24·0	.....	.....	very slight traces..	A good wholesome water, no pollution.
257·6	62·4	.....	.....	traces.....	A safe and wholesome water.
235·0	102·0	.....	.....	"	Previous contamination, not a first-class water.
240·4	70·0	....	.....	heavy traces.....	" "
440·4	52·0	....	.....	"	A very bad water, seriously polluted.
283·3	42·0	.....	.....	traces	Shows previous contamination.
.. ...	.....	.....	.....	.....	Polluted.

ANALYSES OF

RESULTS STATED

Number.	Locality.	Marks.	Date.	Free Ammonia.	Albuminoid Ammonia.	Nitrogen in Nitrates and Nitrites.	Chlorine.	Total Solids at 105° C.
58	Utterson, Ont.....	D. B. No. 2.....	Oct. 7..	trace.	0·028	trace.	trace.	.....
59	Inverary, Ont.....	A. R.....	" 11..	7·708	0·40	0·817	750·0	684·4
60	Milverton, Ont.....	R. R.....	" 14..	0·072	0·07	1·96	120·0	609·4
61	N. Easthorpe.....	P. L. (Dr. W.).....	" 17..	none.	0·066	1·515	2·0	304·0
62	"	J. B. (Dr. W.).....	" 17..	0·435	0·12	1·64	10·4	330·8
63	Ancaster, Ont	W. G. W. (R.E.G.) No. 10	" 29..	free.	0·056	2·513	6·0	.....
64	"	W. G. W. (J. P.) No. 11..	" 29..	0·026	0·112	2·054	70·0	.....
65	Dundas, Ont.....	W. G. W. (B. B.) No. 12 .	" 29..	free.	0·02	1·128	9·8	.....
66	Ancaster, Ont.....	W. G. W. (G.H.H.) No. 13	" 29..	0·15	0 028	2·426	10·4	.....
67	Almonte. Ont...	Mrs. P. D.....	" 31..	0·056	0·17	14·731	620·0	.....

WELL WATERS, 1895—*Concluded.*

IN PARTS PER MILLION.

Solids after Ignition.	Loss on Ignition.	Oxygen absorbed at 80° F.		Phosphates.	Report.
		In 15'	In 4 hours.		
.....	.....	...	.....	.....	Pure and wholesome.
354·4	330·0	.....	.....	traces	An exceedingly bad water, quite unfit for use.
390·6	218·8	.....	.....	"	Must be regarded as seriously contaminated.
257·6	46·4	.....	.....	.....	Free from pollution.
254·8	76·0	.....	.....	.....	Pollution from drainage matter; dangerous.
.....	.....	.....	.....	.....	Indication of previous contamination.
.....	.....	.....	.....	.....	Polluted.
.....	.....	.....	.....	.....	Indication of previous contamination.
.....	.....	.....	.....	.....	Evidently seriously polluted.
.....	.....	.....	.....	.....	Very impure, seriously polluted.

CANADIAN CEREALS AT THE WORLD'S COLUMBIAN EXPOSITION.

At the instance of Sir Henry Trueman Wood, Secretary to the British Commission, and acting under instructions from the Honourable the Minister of Agriculture, the writer, in the autumn of 1893, went to Chicago as a professional juror to participate in the work of the analysis of the cereals entered for award at the World's Columbian Exposition.

The analysis of food products competing for awards was under the direction of Dr. Harvey W. Wiley, Chief Chemist of the Department of Agriculture, Washington, D. C., who, for the purpose of this extensive investigation, had a large and well equipped laboratory in the United States Government building on the grounds.

Owing to the limited time and the large number of samples sent in, it was found that the analyses could not be completed in Chicago. It was, therefore, deemed expedient to determine at that time the essential constituents and such as would prove useful in determining the food values of the grains submitted, leaving the other estimations to be made by Dr. Wiley's staff at the United States Government laboratories in Washington. Accordingly, Mr. T. S. Trescot (of the Department of Agriculture, Washington) and the writer determined the percentage of albuminoids, while others determined the moisture, ash and weight of 100 kernels. The other data were subsequently determined in Washington.

The results of this investigation have been collated and prepared for publication by Dr. Wiley, and issued in September, 1895, by the Department of Agriculture, Washington, as *Bulletin* N ¼5 of the Division of Chemistry.

Besides serving the purpose of supplying data for making the awards, it was hoped that such an extensive investigation into the composition of American and foreign cereals would be of scientific value in affording information from which deductions might be made as to the effect of climate and soil on the grains. This latter object, however, has only in part been realized, since the samples submitted for analysis cannot be said in all cases to be typical of the States and Provinces from which they were collected. If strictly typical grains had been selected by an expert, there can be no doubt that the chemical results published in the bulletin referred to would have been of far greater and more lasting value.

The analytical data about to be presented are not, however, without interest, proving in many instances the high nutritive qualities of Canadian cereals, and showing beyond dispute that the soil and climate of Manitoba and the North-west Territories are particularly favourable to a wheat valuable alike as to its nutritive and milling properties.

WHEAT.

Of the 166 samples of wheat submitted to analysis, 49 samples were from Canada. Their composition in detail is given in the following table :—

Grower.	Variety.	Weight of 100 kernels.	Moisture.	Albuminoids.	Ether extract.	Crude fibre.	Ash.	Carbo-hydrates.	Wet gluten.	Dry gluten.
ONTARIO.										
Jos. Brethour, Burford....	Russian Spring	5·270	11·15	11·73	1·71	2·62	1·79	71·00	26·60	10·14
Henry Grout, Townsend..	Red Clawson	4·044	10·12	11·20	1·92	2·35	1·76	72·65	22·82	8·77
Andrew Turnbull, North Dumfries.	Surprise.....	5·335	10·58	8·23	2·04	2·12	1·67	75·36	19·53	2·80
J. E. Richardson, Burford	Golden Cross	4·857	11·11	9·80	1·77	2·17	1·88	73·27	20·86	8·10
Thos. Puzey, Woodhouse..	Red Manchester	4·687	10·46	9·98	1·96	2·40	1·93	73·28	22·91	8·72
Thomas Elmes, Burford...	White Winter	4·376	11·75	9·80	1·73	2·57	1·70	72·45	19·16	7·50
Robert Walker, Ancaster.	American Bronze . .	4·389	12·75	10.50	1·59	2·50	1·70	70·95	20·17	8·14
F. Lloyd Jones, Burford..	White Clawson Fall.	4·803	12·15	10·50	1·68	2·35	1·82	71·50	21·23	8·18
" ..	Rio Grande Spring..	3·276	12·27	11·38	1·99	2·77	2·00	69·59	22·25	9.14
John A. Smith, Charlotte-ville.	Golden Cross Fall...	4·100	10·87	9·80	1·83	2·21	1·87	73·42	21·85	4·99
James Brethour, Burford.	Wild Goose...	4·655	12·17	13·48	2·32	2·17	1·93	67·93	32·56	13·09
Richard Wilson, Townsend	Surprise Winter.....	4·421	11·76	9·63	1·74	2·19	1·83	72·85	15·09	5·66
And. Clifford, St. Joseph Island.	Red Fern.....	3·567	11·15	10·50	2·20	2·50	1·72	71·93	22·84	9·18
J. T. Talman, Saltfleet...	Clawson white winter	4·743	11·64	9·28	1·76	2·12	1·66	73·54	18·54	7·08
John W. Clark, Saltfleet..	" ..	4·673	11·92	9·28	1·76	2·15	1·73	73·16	14·04	5·42
William Tuck, Nelson....	Zerewa White Winter	4·459	11·47	8·40	1·88	2·05	1·75	74·45	14·27	5·35
John C. Shaw, Woodburne	Surprise.....	4·107	11·95	8·58	1·85	2·05	1·60	73·97	6·38	2·29
D. Burt, St. George.....	Red Clawson	4·981	10·00	11·64	1·98	2·12	1·84	72·42	23·91	9·56
W. Pennock, South Crosby	McCarling	5·144	12·10	12·43	2·06	2·30	1·96	69·15	25·21	10·08
Major Walker, Ancaster..	American Bronze...	4·198	11·95	9·45	1·89	2·10	1·81	72·80	18·12	6·85
T. Manderson, Reach.....	White Fife	4·429	11·24	12·95	2·08	2·20	1·76	69·77	27·37	11·20
J. E. Richardson, Princeton.	Spring.....	3·827	13·98	9·45	0·41	2.12	1·60	72·44	19·84	6·62
T. Manderson, Reach.....	Standard White.....	4·294	13·80	9·11	1·79	2·25	1·56	71·49	18·67	7·54
Wm. Tuck, Watertown...	Zerewa White.....	4·478	12·65	8·58	1·82	2·12	1·75	73·08	12·34	4·79
Wm. Pennock, South Crosby	White Fife Spring ..	3·899	11·36	13·48	1·96	2·30	1·82	69·28	26·97	10·83
J. S. Pearce, London, Ont	White Russian Spring	3·891	11·29	14·18	1·45	2·32	1·72	69·04	27·91	10·88
MANITOBA.										
Government of Manitoba, Winnipeg.....	Red Fife.....	3·452	10·56	15·05	1·99	3·12	1·45	67·83	33·28	13·47
W. Sandy, Thornhill.....	White Fife	3·450	11·98	13·91	1·79	2·40	1·48	68·44	20·77	8·00
W. A. Kilkenney, Broomhill	Red Fife	3·389	12·08	15·05	1·60	2·10	1·38	67·79	28·11	11·43
W. J. Benny, Eden	"	3·376	11·93	15·40	1·86	2·37	1·41	67·03	28·24	11·69
E. & A. Melon, Portage la Prairie.....	"	3·113	12·73	13·30	1·92	2·42	1·54	68·09	32·32	13·24
W. Foxwell, Brandon.....	"	3·412	12·17	14·70	1·88	2·10	1·44	67·71	24·03	9·83
R. H. Honeyman, Eden..	"	3·242	12·23	14·97	1·85	2·35	1·61	66·99	30·25	12·30
Wm. Hope, Carberry.....	"	3·259	12·10	14·70	1·82	2·25	1·44	67·69	29·35	12·05
M. Morrison, Griswold...	White Fife	3·380	12·05	14·53	1·89	1·75	1·50	68·28	30·37	12·60
NORTH-WEST TERRITORIES.										
N. W. T. Govt., Regina..	Hard Red Fife	4·105	11·30	15·84	1·86	2·00	1·74	67·26	37·11	14·40
" ..	White Fife	3·791	11·50	15·05	1·66	2·07	1 50	67·22	35·87	13·86
" ..	Wheat in Straw.....	4·181	12·30	11·90	1·99	2·25	1·80	69·76	22·83	9·13
A. N. Morden, Pincher Creek.....	.....	3·672	10·07	16·10	1·92	2·00	1·47	68·44	38·94	15·24
N. W. T. Govt., Regina..	Ladoga.....	3·362	9·38	13·30	1·97	2·17	1·42	71·76	29·11	11·45
" ...	White Fife	3·976	11·09	15·23	1·91	2·00	1·51	68·26	32·75	13·39
" ...	Red Fife	4·085	12·91	15·58	1·51	2·15	1·93	65·92	24·54	10·09
		3·951	12·90	13·48	1·70	2·37	1·63	67·92	33·13	13·15
		3·447	12·53	14·44	1·70	2·27	1·63	67·43	27·20	11·30

WHEAT—*Continued.*

Grower.	Variety.	Weight of 100 kernels.	Moisture.	Albuminoids.	Ether extract.	Crude fibre.	Ash.	Carbo-hydrates.	Wet gluten.	Dry gluten.
BRITISH COLUMBIA.										
Price Ellison, Vernon.....	Colorado Spring Wheat.....	4·411	11·47	12·08	1·87	2·60	1·88	70·19	31·87	12·18
D. G. Gummongs, Spallumcheen.....	Cambell's White Chaff Spring.....	4·100	11·50	12·08	1·69	2·50	1·87	70·36	29·75	11·25
D. Matherson, Spallumcheen.....	Red Fife.....	4·052	10·77	13·65	2·27	2·10	1·86	69·35	31·99	12·76
Earl of Aberbeen, Spallumcheen.....	Cambell's White Chaff Spring.....	4·197	12·03	11·73	1·70	2·00	1·88	70·66	27·29	10·40
W. H. Ladner, Ladners..	Ladoga.....	4·118	11·63	15·23	1·77	2·05	1·72	67·60	30·59	12·17
Means.....	.....	4·052	11·69	12·25	1·80	2·26	1·69	70·31	25·13	9·76

In order that the wheats from the different provinces exhibiting may be easily compared, the subjoined table has been compiled.

CANADIAN WHEAT AVERAGES.

Provinces.	Number of Samples.	Weight of 100 kernels.	Moisture.	Albuminoids.	Ether extract.	Crude fibre.	Ash.	Carbo-hydrates.	Wet gluten.	Dry gluten.
Ontario.....	26	4·419	11·75	10·51	1·81	2·27	1·39	72·27	20·82	7·80
Manitoba.....	9	3·341	11·98	14·62	1·84	2·32	1·47	67·77	28·52	11·62
North-west Territories.....	9	3·841	11·55	14·53	1·80	2·14	1·63	68·35	31·27	12·44
British Columbia	5	4·175	11·48	12·95	1·86	2·25	1·02	70·44	30·30	11·75

In *Bulletin* No. 4 of the Experimental Farm series and in other of our publications, information has been given at length respecting the several constituents, the names of which appear on the tables here presented. It will, therefore, suffice now to point out that the food element of chief value is included under the term "albuminoids," which represents the nitrogenous or flesh-forming portion of the grain, referring the reader to the publications of the farm mentioned above, for fuller information on this subject.

In order to arrive at the comparative food values of the grains analysed, it was assumed that the albuminoids and fats were two and a half times as valuable as the carbo-hydrates. The data supplied to the jury of awards, therefore, were obtained by multiplying the percentages of albuminoids and fats by 2·5 and the percentage of carbo-hydrates by one and adding the products together.

It has been remarked by Richardson (*Bulletins* Nos. 1, 3, 9, Chemical Division, United States Department Agriculture) and others that wheat, of all cereals, is most susceptible to environment. We also pointed out the marked effect of climate upon the quality of wheat as grown in various parts of Canada, in the *Bulletin* No. 4 on Ladoga wheat, already referred to.

It will not, therefore, appear strange to those who have any knowledge of the subject that the best Canadian wheats exhibited were those grown in Manitoba and the North-west Territories. The percentages of albuminoids in these wheats are considerably higher on the whole than in those grown in other parts of Canada, and it is very evident from the analytical data here given, as well as those furnished in former reports, that the popular impression regarding the very excellent qualities of wheat from these provinces receives a further and most emphatic corroboration.

WHEAT AVERAGES.

That Canadian readers may have the opportunity of comparing foreign grown wheats with those grown in the Dominion, the annexed table has been given:—

State.	No. of Samples.	Weight of 100 Kernels.	Moisture.	Albuminoids.	Ether Extract.	Crude Fibre.	Ash.	Carbohydrates.	Wet Gluten.	Dry Gluten.
New York	8	4·057	10·38	12·34	1·92	2·07	1·67	71·63	27·36	9·69
Oregon	11	4·579	11·53	9·19	1·72	2·25	1·69	73·61	16·74	6·41
Bulgarian	1	4·696	12·40	11·55	1·52	1·95	1·67	70·91	29·10	7·97
South Dakota	8	3·337	9·02	14·89	2·04	2·49	1·70	69·89	30·25	13·71
Nebraska	5	2·973	10·31	13·86	1·91	2·83	1·93	71·16	32·57	12·36
Montana	2	2·858	11·12	13·21	2·23	2·48	1·99	68·95	28·35	11·41
Pennsylvania	12	3·900	11·08	12·98	1·84	2·45	1·91	69·73	29·57	11·41
Michigan	6	3·896	10·64	11·43	1·78	2·31	1·85	71·98	23·51	9·17
Ohio	3	4·136	10·34	11·08	1·85	2·17	1·85	72·71	22·06	8·79
Maine	1	3·532	9·45	13·13	1·85	2·25	1·90	71·42	30·90	11·95
Australian	4	5·468	11·54	9·10	1·55	2·04	1·82	73·94	20·64	7·88
Iowa	1	3·874	11·90	16·01	1·77	2·20	1·45	66·67	33·44	13·80
Colorado	5	4·302	9·46	13·65	1·94	2·74	1·92	70·28	30·26	11·66
Wisconsin	16	3·519	10·73	12·85	1·77	2·25	1·81	70·58	28·00	11·13
Wyoming	7	4·290	11·44	12·43	1·91	2·24	1·86	70·34	28·54	10·87
Kentucky	4	3·769	11·42	13·17	1·71	2·41	1·74	69·55	26·68	10·59
Indiana	8	3·680	11·18	12·05	1·71	2·42	1·82	70·81	25·92	10·04
West Virginia	5	3·716	10·90	13·30	1·83	2·20	1·85	69·92	30·02	11·75
Missouri	1	3·844	11·50	12·25	1·75	2·10	1·94	70·46	29·13	11·33
Washington	11	4·787	10·46	10·66	1·67	2·31	1·83	73·08	23·20	8·59
Argentine Republic	5	3·112	9·55	12·78	1·84	2·69	1·99	71·15	28·83	11·58
Illinois	22	4·255	10·59	11·76	1·69	2·39	1·80	71·77	24·40	9·69
Costa Rica	2	3·298	10·74	12·12	1·69	2·44	1·78	71·23	26·31	10·44
Spanish	1	5·446	10·50	12·60	1·80	2·42	2·01	70·67	32·57	12·33
Kansas	28	3·417	10·21	12·15	1·64	2·41	1·90	71·68	27·51	10·46
Canadian	49	4·090	11·69	12·25	1·80	2·26	1·69	70·31	25·13	9·76
North Carolina	2	4·476	12·32	11·42	1·70	2·35	1·80	70·40	24·16	9·41

OATS.

Twelve samples of Canadian oats were examined. Since oats find their chief market as horse feed, the hulls were ground with the kernel before analysis, and this fact accounts for the apparently high percentages of fibre and ash found in the samples.

Canada.	Weight of 100 kernels.	Moisture.	Albuminoids.	Ether extract.	Crude fibre.	Ash.	Carbohydrates.
Ontario Agricultural College, Guelph, Ont.	3·871	9·27	11·73	4·09	13·48	2·95	58·48
I. E. Richardson, Blenheim	3.390	9·43	11·47	4·36	13·00	2·86	58·88
Gaylord Greenman, Charlotteville	2·791	9·21	11·73	5·56	8·60	2·92	61·98
I. E. Richardson, Blenheim	3·750	9·20	10·68	4·29	13·89	3·29	58·65
Richard P. Wilson, Trafalgar	3·076	9·87	11·55	5·49	8·52	3·22	61·35
George Baker, Woodhouse	3·278	8·83	11·38	3·93	14·25	3·16	58·45
A. G. Meisner, Gainesborough, Ont.	2·912	8·55	12·08	4·07	13·36	2·99	59·04
George Baker, Woodhouse	3·092	8·52	11·20	3·79	15·65	3·23	57·61
George Padget, Markham, Ont.	4·253	9·21	12·25	4·90	11·62	2·71	59·31
D. Alton, McDonald	3·698	10·16	12·78	4·27	12·27	2·87	57·65
I. Wilson, Fergus, Ont.	.....	9·65	14·18	6·63	1·12	1·94	66·48
W. Wanman, Souris, Man.	2·895	11·63	11·03	4·96	11·00	2·97	58·41
Means	3·364	9·46	11·83	4·73	11·39	2·92	59·69

We may note several points in favour of Canadian oats. These are: (1) A heavy kernel; (2) a low percentage of moisture; (3) high albuminoids; (4) a large percentage of fat. These facts will be apparent on examining the following averages, taken from Dr. Wiley's bulletin on World's Fair cereals:—

From.	No. of Samples.	Weight of 100 kernels.	Moisture.	Albuminoids.	Ether extract.	Crude fibre.	Ash.	Carbohydrates.
Colorado	2	3·024	8·12	12·26	4·23	13·96	4·09	57·34
Illinois	10	2·684	9·59	11·69	3·39	12·82	3·47	58·54
Indiana	5	2·672	9·24	12·71	4·06	14·05	3·15	56·79
Iowa	1	3·255	8·30	10·68	4·44	15·23	3·81	57·54
Kansas	11	2·920	10·19	12·55	5·12	10·01	3·72	58·40
Kentucky	4	2·254	9·85	12·06	4·35	12·35	3·60	57·78
Michigan	5	3·176	11·43	12·95	4·14	12·25	2·90	56·36
Ohio	2	2·409	9·52	12·95	4·13	13·00	3·15	57·26
Pennsylvania	6	2·589	10·16	12·46	3·92	12·68	3·04	57·73
Wisconsin	1	2·843	11·65	10·68	4·27	11·17	3·15	59·08
Wyoming	8	3·248	10·82	11·26	4·91	10·33	3·92	58·75
Canada	12	3·364	9·46	11·83	4·73	11·39	2·92	59·69
Great Britain	1	3·242	10·29	10·68	6·21	9·40	2·75	60·67
Total mean, foreign oats	.....	3·354	9·52	11·75	4·84	11·24	2·91	59·76
Total mean, all oats	.....	2·995	9·96	12·07	4·42	11·92	3·35	58·28

BARLEY.

Of the 55 samples of barley analysed, 20 samples were Canadian grown. Their composition is tabulated as follows:—

——	Weight of 100 kernels.	Moisture.	Albuminoids	Ether extract.	Crude fibre.	Ash.	Carbohydrates
CANADA.							
Ontario Agricultural College, Guelph, Ont.	4.300	9.15	11.03	2.17	4.07	2.55	71.03
" " " ..	3.856	11.52	10.59	2.24	5.00	2.66	67.99
" " " ..	3.882	10.75	9.89	2.25	4.35	2.68	70.08
" " " ..	5.368	10.68	10.68	2.22	4.35	2.56	69.51
Richard P. Wilson, Trafalgar, Ont.....	5.718	11.48	10.24	2.36	3.77	2.43	69.72
" "	5.507	12.65	10.24	2.38	3.82	2.36	68.55
" "	5.897	12.10	10.68	2.32	4.05	2.39	68.46
" "	4.809	12.10	10.85	2.11	4.60	1.88	68.46
George Baker, Woodhouse.....	4.265	11.89	11.20	2.14	4.37	2.44	67.96
Gaylord Greenman, Charlotteville.....	5.038	11.38	11.03	2.19	3.90	2.13	69.37
Thomas Puzey, Woodhouse.....	5.597	11.41	11.20	2.06	3.60	2.32	69.41
Ralph Brewels, White Church, Ont.....	5.598	10.99	10.85	2.29	3.87	2.55	69.45
Andrew Clifford, St. Joseph's Island.	5.768	12.74	10.68	2.05	4 07	2.43	68.03
" "	5.520	12.38	9.28	2.28	4.50	2.25	69.31
Major Thomas Walker, Ancaster, Ont....	5.820	12.07	10.68	2.44	3.87	2.31	68.63
Wm. Tuck, Nelson, Ont.....	5.820	12.87	11.03	2.29	3.75	2.42	67.64
Wm. Tuck, Watertown, Ont....	5.783	13.61	10.50	.56	4.05	2.48	68.80
Richard P. Wilson, Trafalgar, Ont. .. .	5.797	13.55	10.50	1.24	4.00	2.36	68.35
Ralph Brewels, White Church, Ont.....	5.547	12.47	11.03	2.38	4.12	2.58	67.42
T. Pyke, Markham, Ont.....	5.351	13.40	9.28	1.26	3.95	2.32	69.79
Means.....	5.262	11.96	10.57	2.06	4.10	2.41	68.90

Barley contains less gluten and more starch than the other grains. That used for feeding purposes should be rich in albuminoids, while for brewing it is generally held that the carbo-hydrates should predominate. An eminent authority says that "a good brewing barley should have a thin, clean, wrinkled husk, closely adhering to a plump, well fed kernel, which, when broken, appears white and sweet, with a germ full and of a pale yellow colour. The specific gravity being between 1·280 and 1·333, and weighing from 53 to 58 pounds per bushel."

A tabular comparison of the barleys analysed is as follows:—

From.	No. Samples.	Weight 100 kernels.	Moisture.	Albuminoids.	Ether extract.	Crude fibre.	Ash.	Carbohydrates.
California.....	1	4·679	10.35	8·58	2·22	5·15	2·47	71·23
Illinois	3	4·895	11·60	8·96	2·14	4·05	2·34	70·97
Indiana.....	1	3·403	11·47	10·33	2·05	5·62	2·52	68·01
Kansas	1	3·190	11·57	11·73	1·93	5·07	2·95	66·95
Michigan	1	4·873	9·35	13·83	2·19	1·85	2·44	70·34
Minnesota	1	4·445	9·24	12·78	2·42	4·55	2·64	68·37
New York	9	4·079	11·65	10·91	2·09	3·98	2·52	68·84
Ohio.....	2	3·280	11·06	11·20	2·09	4·70	2·15	68·80
Pennsylvania.....	1	3·897	8·92	12·95	2·41	4·47	2·83	68·42
Utah	6	4·262	9·77	10·42	2·11	3·52	2·24	71·93
Washington.	4	4·699	10·61	9·46	2·14	4·28	2·47	71·07
Wisconsin.....	1	3·240	11·72	10·85	2·27	5·17	2·75	67·24
Wyoming.....	1	4·090	10·32	12·08	2·23	2·00	2·24	71·13
Argentine Republic..	2	4·185	12·66	10·24	1·63	3·94	2·76	68·78
Canada.....	20	5·262	11·96	10·57	2·06	4·10	2·41	68·90
Spain.....	1	5·731	11·67	9·45	1·75	4·50	2·40	70·23

RYE.

No examples of Canadian rye were submitted by the jurors for analysis. This is somewhat to be regretted, as we have no analytical data of Canadian grown rye on record.

BUCKWHEAT.

Three samples of Canadian grown buckwheat were analysed, furnishing the heaviest and lightest grains of the ten examples examined. The extremes as regards fat content were also found among the Canadian samples. The hull was ground with the kernel, and on this account the fibre appears to be high compared with that of the other grains.

The composition of home grown buckwheats, and the averages from the United States samples are given below :—

Country.	No. of Samples.	Weight 100 kernels.	Moisture.	Albuminoids.	Ether extract.	Crude fibre.	Ash.	Carbo-hydrates.
Canada.								
Geo. N. Harris, Beverly, Ont.	1	2·203	12·82	10·94	2·62	9·09	1·57	62·96
W. H. R. Talbot, London, Ont.	1	3·400	13·14	11·03	1·31	10·77	1·69	62·06
" "	1	3·250	12·12	11·38	1·87	10·62	1·94	62·07
Total means from Canada	3	2·951	12·69	11·12	1·93	10·16	1·73	62·36
United States.								
Indiana	4	3·345	11·95	11·33	2·22	11·08	1·85	61·56
Michigan	1	2·350	11·75	11·55	2·08	9·57	1·90	63·15
Minnesota	2	3·054	12·76	9·19	1·90	10·68	1·99	63·49
Total means from United States	7	3·119	12·15	10·75	2·11	10·75	1·89	62·33
Total means, all buckwheats	10	3·069	12·31	10·86	2·06	10·57	1·85	62·34

It will be noticed that in albuminoids, Canada gives a higher average than the United States, and, further, that the average percentage of fibre in our buckwheats is lower than obtained from the samples grown across the border.

REPORT OF THE POULTRY MANAGER.

(A. G. GILBERT.)

To WILLIAM SAUNDERS, Esq.,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have pleasure in submitting to you the eighth annual report of the Poultry Department of the Central Experimental Farm.

The operations of the year have been successful beyond the average. There has been a marked and gratifying increase in the number of farmers who are giving their poultry proper care and management, so as to make them revenue producers. In proof of this, I give the following extract from a letter lately written by Mr. David Moir, a farmer near Almonte, Ont., and a director of the North Lanark Agricultural Association. He says: "The addresses given last winter in Carleton Place and later in Pakenham have awakened a lively interest in their poultry by the farmers. There has been more money spent in lumber and tar paper, wherewith to build poultry houses, since last spring, than in five years. The hen to-day is where the cow was fifteen years ago and that should not be. We (farmers) should be able to put our poultry and eggs on the English market in the same condition as the cheese."

Among the subjects treated in this report are:—

The different markets for eggs.

The cause of so many bad eggs being placed on the summer market.

How to prevent bad eggs from being placed on the market.

The result of different rations in egg production.

The chickens hatched; their care and progress.

Characteristics of different crosses.

And other matter which it is hoped will be found interesting and instructive to the farmers and the poultrymen of the country.

The laying stock during their moult were carefully looked after. No attempt was made to stimulate egg production during that period. The hens, however, were fed a generous diet, in order, to induce the growth of new feathers and they had the run of a grass and clover field in rear of the main poultry building. As soon as they were completely over their moult they received a liberal allowance of cut bone, and winter laying had fairly commenced by the end of November.

As in previous years cut green bone was found a valuable incentive to egg production and also beneficial, in smaller quantities, during the moulting period. During the month of December 943 eggs were laid. Particulars will be found in proper place. An illustration of the poultry buildings will be seen on following page. A ground plan of the buildings is also given on page 243.

During the year a number of meetings in different parts of the country were attended. At these meetings addresses on the management, care and proper housing of poultry were delivered.

I am, sir, your obedient servant,

A. G. GILBERT,
Manager Poultry Department.

VIEW OF POULTRY HOUSES, CENTRAL EXPERIMENTAL FARM, OTTAWA.

RATIONS.

A great part of my report of last year was devoted to the consideration of different kinds of rations, within easy reach of the farmers and calculated to make their hens lay in winter. In reports of previous years the production of eggs at that season, has been urged from a money making basis. In a bulletin on "Poultry and Eggs" issued from the Department of Agriculture in 1894 the subject is laid before the farmers as follows: —"The (winter) market is comparatively undeveloped, because few farmers realize the value of their poultry as money makers. In order to make the most money out of their poultry the aim of the farmers should be to dispose of their eggs when they are highest in priceviz: the winter season. He would be considered a poor business man who should hold his stock until it was of least value and then begin to sell it. Yet it is something similar our farmers are doing with their poultry. During winter their laying stock have remained non-productive, very likely at actual loss. With the advent of warm spring weather everybody's hens begin to lay and prices go down to their lowest. It is at this time the hens of the great majority of farmers begin production."

THE DIFFERENT MARKETS.

The quotation still applies with force to the greater portions of the Dominion, but that our farmers are beginning to realize the value of their poultry as money makers, is evidenced by the increasing demand for information as to the proper care and management of their birds, as well as by the increasing number of new laid eggs placed on the market in recent winters. It may be said that if a greater number of eggs are being placed on the winter market, there will soon be enough to supply that market. Granted, that there has been a greater supply of new laid eggs in recent winters, there is also the fact that prices were never higher in Ottawa and Montreal at any rate—than they were last winter, which goes to show that if there has been greater production there has also been a correspondingly increased demand. And both surely go to prove that there is a better market, offering better opportunities to our farmers to make more money out of their poultry than heretofore.

A SUMMER MARKET.

Observation and experience of the markets in recent years lead to the conclusion that the winter market is not the only paying one, but that there is a great and growing demand, in the summer months, for new laid eggs of unimpaired flavour.

As for THE ENGLISH MARKET it is practically unlimited. A bulletin issued from the Finance Department in October, 1892, states in effect that an UNLIMITED, STEADY and PROFITABLE trade can be done with England in Canadian poultry and eggs.

COULD WINTER PRICES NOT BE LOWER, AND YET REMUNERATIVE?

In proof of the high prices of winter, it may be stated that the writer attended an agricultural meeting in Montreal during January of 1895, when he was informed by several farmers present that they had sold new-laid eggs the week previous at 60 cents per dozen to choice customers. It is but right to say, at the same time new-laid eggs were selling at 35 cents per dozen retail in Toronto, and 25 cents per dozen in London, Ont.; in Manitoba and the North-west prices ranged from 35 to 50 cents per dozen, according to locality. Mr. Sutherland, assistant secretary of the Montreal Poultry Association, wrote later on that he had sold his new-laid eggs during that winter at first named price. Eggs at 60 cents per dozen meant that they were a luxury which only

the rich could indulge in. If eggs were put on the Montreal market during winter in such numbers that lower prices would follow, it is only reasonable to suppose that more people would purchase them. There is no reason why the great masses should not be supplied with new-laid eggs in winter, rather than the ill-flavoured, artificially preserved article, at a price within the reach of all, and there yet remain a paying margin of profit to the farmer. What then are remunerative prices?

WHAT ARE REMUNERATIVE PRICES?

In order to find out what are remunerative figures, the summer market prices, at about their lowest points, viz., 12 to 15 cents per dozen, are taken. The following calculation is made, based on the experience of several practical breeders :—

100 eggs from hen for 1 year, at 1 cent each	$1 00
10 chickens hatched by her, at 10 cents each	1 00
Body of hen to sell or eat	0 25
	$2 25
Deduct cost of hen for year	$1 25
	$1 00

We have, according to the foregoing, a margin of $1 per hen profit per annum, taking eggs at 12 cents per dozen. No figure is placed upon the manure, which is valuable when made into a compost. It may be said that the cost of producing the egg is greater in winter. But this statement may be met by the other, that the cost of production is little in summer, for at that period the farmer's hens, in most cases, are allowed to forage for their living. So that the cost of $1.25 per hen per annum is very fair—if anything, it is on the high side. It will be seen that eggs, at the summer price of 12 cents per doz afford a paying margin. Surely then, with the modern and cheaper rations, prices during the winter season could be much lower, and yet afford a fair margin of profit.

SUMMER PRICES MISLEADING.

But the summer price of 12 cents per dozen is a misleading one, for in reality it should be placed at twice the figure. Twenty-four cents per dozen for eggs in midsummer? Yes, and in this way: It is a well-known fact that during the midsummer months it is hardly possible to buy from farmer or storekeeper a dozen or two eggs that will all be found good; that in the majority of cases half of the eggs will be likely unfit for eating purposes. In the case of a dozen eggs, making the six actually worth twelve cents, or TWENTY-FOUR CENTS PER DOZEN, and probably the flavour of the remaining six will not be such as new-laid eggs ought to have.

There is not the slightest doubt that the great majority of purchasers would rather pay twenty-four cents per dozen, in the first place, for a reliable article than half the amount for inferior goods. There is no intention to say that our farmers bring into the markets, or sell to the dealers, or that the latter dispose of, bad or ill-flavoured eggs, knowing them to be such. On the contrary the farmers, as a rule, unfortunately give as little attention to the age, or condition of the eggs they are taking to market, as they give to the fowls which laid them. The questions may be asked, How can we tell what the inside of an egg is like? How can we distinguish the bad eggs from the good ones?

PRECAUTIONS THAT SHOULD BE TAKEN.

The answer to the above queries is that while the farmer is not supposed to be in the van of poultry lore as to the means of discovering partially hatched, or ill-flavoured gegs from the new laid ones, yet there are simple precautions which he may take, in

order to secure the new article and which he is in duty bound, in the interests of his customers, to take. By observing the following, eggs of fine flavour may be sold during the entire summer season :—

1. Keep no male bird with the laying stock.
2. Collect the eggs once or twice every day.
3. Take no eggs to market gathered from under barns, nests in the fields or from stolen nests.
4. Prevent, if possible, the laying hens eating decayed vegetable, or animal substances.
5. Keep the eggs after gathering them in a cool, sweet atmosphere. If in a cellar let it be dry.
6. Keep the nests the layers use clean, comfortable and free from vermin.
7. Have a sufficient number of nests for the layers. Offer every inducement to the hens to lay in these nests and not shun them.
8. Allow no brooding hen to sit on the new laid eggs, be it for ever so short a period.
9. Take the eggs to market clean and inviting in appearance.
10. Make it a rule to take no eggs to market that you are not sure are fresh, or that you are doubtful about the flavour being good.

There is not one of the above suggestions so difficult as to prevent its being put into immediate practice.

WHERE DO ALL THE BAD EGGS COME FROM?

The question is frequently asked and much speculation indulged in as to where all the bad eggs come from, particularly in summer time? And that leads to the question: What is a bad egg?

In the past eight years large numbers of eggs have been handled in our poultry house. Many eggs have been put under hens, or in incubators, and close observation has been made of these eggs during incubation, and afterwards of the eggs which failed to produce chickens. The eggs, in course of incubation, were also tested at the end of six or seven days and note taken of the varied appearances presented. No small amount of experience was gained, and it leads to the classification of the different sorts of eggs met with, and the cause therefor, as follows :—

1. THE FERTILE EGG in which the germ is in a well advanced stage, with the promise of making a strong vigorous chicken.
2. THE ADDLED EGG, or one in which the germ has started, but from some cause its progress has been arrested, when decay sets in and you have a very ill-flavoured article.
3. THE CLEAR OR UNFERTILE, which contains no germ and presents the appearance of a new laid one.
4. The egg containing a broken or ruptured yoke and which presents a similar appearance to No. 2.

The state of Nos. 1 and 2 can only result from fertilization.

No. 2 is the egg most frequently met with, and is probably the result of taking eggs from nests under barns, or stolen nests, or nests on which the hen has been sitting some days.

No. 3, the clear or unfertilized egg, can be used for cooking purposes with every confidence after examination by tester on the seventh day. The unfertilized eggs are frequently removed after the fertilized eggs have hatched out into chickens (on the 21st day) and boiled hard and fed to the chicks.

PRESERVE THE FLAVOUR OF THE EGG.

Having secured the non-fertilized new laid eggs, care should be taken to preserve the flavour intact. The shells of the eggs are porous, and contaminating surroundings will doubtless affect the egg. The unfertilized egg may be kept in a cellar, with pure atmosphere, for many weeks and yet retain its flavour. In course of time it may shrink and

partially dry up from evaporation, but there is no germ to start on its mission of bringing about change as soon as the conditions are favourable, or partly so.

Mr. C. A. Cyphers, of Boston, the author of "Incubation and its Natural Laws," admitted to be one of the best works on the subject ever published, in a letter to the writer says: "An unfertilized egg will keep longer than the other, and an egg from a hen fed on corn will keep its flavour better. The eggs should be kept in a sweet atmosphere."

A GOOD FLAVOUR ALL IMPORTANT.

It must be borne in mind that it is THE FLAVOUR of the egg that is all important to keep intact. And on this point a farmer in the neighborhood of New York City who sends thousands of eggs per week to that city, writes to the *Rural New Yorker*, "that if a brooding hen is allowed to sit on a new laid fertilized egg for twelve hours that the flavour of that egg is ruined." The same authority, who uses a large number of incubators, says that he tests his incubator eggs on the fifth day, and all the clear or unfertile eggs he removes, marks them as such, and ships them to New York City, where they are sold for cooking or baking purposes.

In our poultry department eggs have been tested on the sixth and seventh day and the unfertile eggs have frequently been boiled hard wherewith to feed the chicks. On some occasions, at the end of the hatching period of twenty-one days, the clear, or unfertile eggs have been removed from the nest and boiled hard to mix up with chicken food. All poultry men know that is impossible to boil a rotten egg hard.

It must not be inferred from the foregoing that unfertilized eggs should be kept a long time before being taken to market. Eggs, as advised in a previous page, should be sold as soon after being laid as possible. There are cases where the farmer is some distance from the purchaser, or cannot come to market as frequently as one nearer to the city. In such a case the eggs for sale may have to be kept some time, and it is all the more important that they should be unfertilized and kept in a cool, sweet atmosphere.

A BETTER PRICE FOR UNFERTILIZED EGGS.

In the opinion of the writer it is only a matter of time and education, when eggs for sale in summer will have to be guaranteed as unfertilized by the seller before a purchase will be made. Indeed the subject is already receiving practical attention. The following letter shows that unfertilized eggs shipped from the town of Pakenham, Ont., to a city customer during the past summer brought better prices.

DEAR SIR,—Our dealing with Messrs. Bate and Co., during the past summer, has been very satisfactory. They gave us more than the market price. Mr. Bate said he was well satisfied with the quality of the eggs we sent.

W. M. McARTHUR.

The eggs were unfertilized, as I was assured by Mr. McArthur; were clean and inviting in appearance; of good size; carefully packed and as a result received what they deserved from a shrewd business firm, a better price than the market figure. Is there not a moral in the transaction, by giving heed to which our farmers might profit? Other instances might be given, but the above will suffice.

A PROSPECTIVE QUESTION ANSWERED.

While on this subject, a prospective question likely to be asked, in connection with its discussion, may as well be answered, viz.: If we are to allow no male bird with the laying stock how are we to breed our chickens? Easy enough, by picking out in early spring time, or better still, if circumstances will permit by keeping apart all winter and not stimulating them to lay—nine or eleven of your best layers and best shaped birds. Mate them with an unrelated, healthy well-shaped two-year old cock, if the birds are

pullets or yearling hens and a cockerel if they are two years old. When eggs enough have been saved to hatch out what chickens you wish, close up, kill, or dispose of the male bird and after keeping the hens he has been mated with, inclosed for a week longer let them run with the other laying hens, with which there is, of course, no male. And having saved eggs for hatching from birds selected for good qualities, superior progeny are likely to follow. The chickens from eggs saved from such mating, will certainly be better, in every way, than those bred in the usual hap-hazard manner. As to keeping the male bird with the laying stock, the following is again quoted from Experimental Farm Poultry Department report of 1889, viz. :—"The cock bird is a nuisance in the pen of layers. He not only monopolizes the most of the food, but teaches the hens to break eggs and so learn to eat them. Besides the stimulating diet is too fattening for him and will ruin him as a breeder."

CONCLUSIONS FROM THE FOREGOING.

In noting, in the foregoing, the features of the different markets, the demand and supply peculiar to them and the requirements of the various seasons, the following conclusions may be arrived at, viz.:—

1. That our home winter market offers the inducement of high prices for new laid eggs.
2. That notwithstanding greater production in this district—prices were never better than they were last winter.
3. That there is no reason why new laid eggs should not be produced, in winter, in such quantity as to take the place (in a very great measure) of packed, or preserved eggs.
4. That with the modern and cheaper rations in vogue, winter prices could be much lower than they are and yet afford a profitable margin.
5. That eggs in the summer months which can be relied on as being new laid and of good flavor, will bring better prices than the ordinary article.
6. That so many summer eggs are bad, or ill-flavored because (*a*) they are not unfertilized; (*b*) not collected immediately after being laid; (*c*) not brought to market soon after being laid.

RATIONS FED LAST WINTER (1894–95.)

THE DIFFERENT BREEDS AND HOW THEY LAID.

The time is not far distant when the points touched upon in the foregoing pages will be patent to and practised by the majority of farmers. The aim of the farmer should be to lessen as much as possible the cost of production, so as to have the greater margin of profit. And it is with the object of aiding him so to do that the experimental winter work of some years past has been carried on, particular attention having been given to egg producing rations.

The rations during the winter of 1894-95, beginning with date of report, viz., the first day of January, were as follows :—

Morning Ration—Warm mash composed of ground wheat, ground oats, ground barley or ground rye and bran. A little of all sometimes and again only three of the ground grains. Enough of this was fed to satisfy but not to gorge the hens.

Noon—A little grain of some kind, to keep the hens busy scratching.

Afternoon—A liberal ration of wheat or buckwheat, mostly the former.

Occasionally cut bone was given in lieu of the morning or afternoon ration, but it was frequently given, at one time or the other, and with excellent results. The value of cut green bone as an incentive to egg production cannot be overestimated.

Green Food—Green stuff in the shape of cabbages, turnips or mangels was liberally fed and much relished. Occasionally clover hay was steamed and mixed in the mash.

GRIT—Broken oyster shells and mica and limestone grit were supplied in liberal quantity.

DRINK WATER—Pure drink water was liberally supplied in fountains in Nos. 1 and 2 houses and in pails or shallow dishes in No. 3. The fountains proved the better way, except in very cold weather, when their contents froze and were rather difficult to thaw out.

All grain fed was given in such a way as to make the hens work in order to get it. The straw on the floor of some pens was superior to the earth on some of the other floors, as a means of making the hens search for the grain.

ARRANGEMENT OF THE DIFFERENT BREEDS.

The fowls in the three poultry houses were arranged as follows at the beginning of the month of January, 1895:—

	Hens.	Pullets.
Barred Plymouth Rocks	8	11
White Plymouth Rocks	11	..
Silver Laced Wyandottes	4	7
White Wyandottes	6	..
Langshans	6	11
Light Brahmas	11	4
White Leghorns	11	16
Black Minorcas	11	18
Andalusians	11	..
White Minorcas	..	11
Coloured Dorkings	..	11
Golden Polands	9	..
Houdans	6	..
White Javas	..	4
Langshan—Black Minorca cross	8	..
White Leghorn—Brahma cross	6	..
Other crosses	24	..
	132	93

Of the above number the following were purchased in the latter part of November, 1894, with the object of obtaining new breeds for trial, younger stock and new blood, viz.:—

11 White Leghorn pullets.
11 Coloured Dorking pullets.
11 White Minorca do
7 Barred Plymouth Rock pullets.
7 Langshan do
4 Silver Laced Wyandotte do
4 White Java do

The new breeds were the Coloured Dorkings and White Minorcas. Eleven pullets of different breeds were put in each of the ten pens in No. 1 house. Pullets were taken from our own stock to make up the number of layers to eleven, in cases where necessary to do so. As there were not enough pullets of the breeds named to fill the ten pens, in two cases yearling hens were used, and in one case three-year-old Brahmas. As arranged the stock in No. 1 house, stood as follows:—

BREEDS IN No. 1 HOUSE.

NORTH WING.

Pen No. 1— 8 Silver Laced Wyandotte pullets, 4 hens.
do 2—11 Barred Plymouth Rock do
do 3—11 White do yearling hens.
do 4—11 Langshan pullets.
do 5—11 Light Brahma hens, 3 years old.

SOUTH WING.

Pen No. 1—11 White Leghorn pullets.
do 2—11 Black Minorca yearling hens.
do 3—11 White do pullets.
do 4— 7 Andalusian hens, 4 pullets.
do 5—11 Coloured Dorking pullets.

The object aimed at was, by placing the different breeds side by side, to give them opportunity to show what they could do in egg production. But as some of the pullets were later hatched than others, they did not begin to lay as soon as the older ones and results were not as satisfactory as anticipated. The coldness of the house had also an apparent effect in retarding the development of the late hatched pullets and egg laying in the older ones. The result in eggs for the six months beginning from the 1st of January, 1895, was as follows:—

—	—	Jan.	Feb.	March.	April.	May.	June.	Total.
7 pullets, 4 hens....	S. L. Wyandottes...	89	71	96	104	69	45	474
11 do	Barred P. Rocks....	80	88	77	142	115	105	607
11 hens (1 year).....	White do	80	61	83	106	88	12	430
11 pullets.....	Langshans	83	112	105	112	94	57	563
11 hens.....	Light Brahmas	5	23	54	72	38	27	219
15 pullets.....	White Leghorns	81	96	137	154	141	98	707
11 hens (1 and 2 years)	Black Minorcas.....	75	51	44	82	94	65	411
11 pullets.....	White do	7	35	56	45	81	72	296
7 do 4 hens.....	Andalusians	43	37	64	92	117	109	462
11 pullets.....	Coloured Dorkings..	.....	25	73	68	73	19	258

It should be stated that it was only for six weeks that the White Leghorn pullets numbered 15. For the most part of the time their number was the same as the others. The greatest egg production actually came from the Barred P. Rocks, closely followed by the Langshans. The latter were, perhaps, the later hatched of the two. The White Minorcas did not show much vigour during the early part of the winter, and several of them died during the early part of the month of March. The Coloured Dorkings were, apparently, late chickens, and were slow in maturing. The Brahma hens did not do well as they were three years of age and were likely fat.

No. 2 House.

In this house 7 or 9 hens of the following breeds were placed in different pens to be used as breeding stock viz.:—Barred P. Rocks, Langshans, Light Brahmas, (4); Houdans and Golden Polands. In this house were also the male birds to be used as breeders in spring.

No. 3 House.

In this house were the following birds:—

1. Pen of 9 Black Minorca pullets, late hatched.
2. do 9 do do do
3. do 4 White Java do
4. do 8 Langshan do
5. do 6 W. Leg-Bra. cross hens.
6. do 8 Indian Game cross do
7. do 11 White Leghorn do

and a number of other hens kept for sitters.

The intention was to have the crosses lay as much as possible during the winter, so as to make early spring sitters, using them as such in preference to thoroughbred stock.

The old White Leghorn hens were kept to make up a second breeding pen should it be necessary so to do in the breeding season.

It was much easier to keep the temperature in No. 3 house at a moderate degree of warmth with a base burner stove than it was in No. 1 house. In sudden drops of temperature the thermometer in the last named house would go as low as 15 and 20 below freezing, with the result that water, vegetables and droppings would all be frozen solid. On such occasions the thermometer outside registered 20 to 23 degrees below zero and was accompanied by a piercing wind. As in the case of No. 3. house, a base burner stove was used.

The rations fed to all the laying stock are given in full in another place.

The total egg yield from 1st of January, 1895, to 1st of July, of the same year, is given below. On the first day of July the male birds were removed from the breeding pens and the hens were allowed to run together in the fields in rear of the poultry houses.

Eggs laid from 1st January to 30th June, 1895.

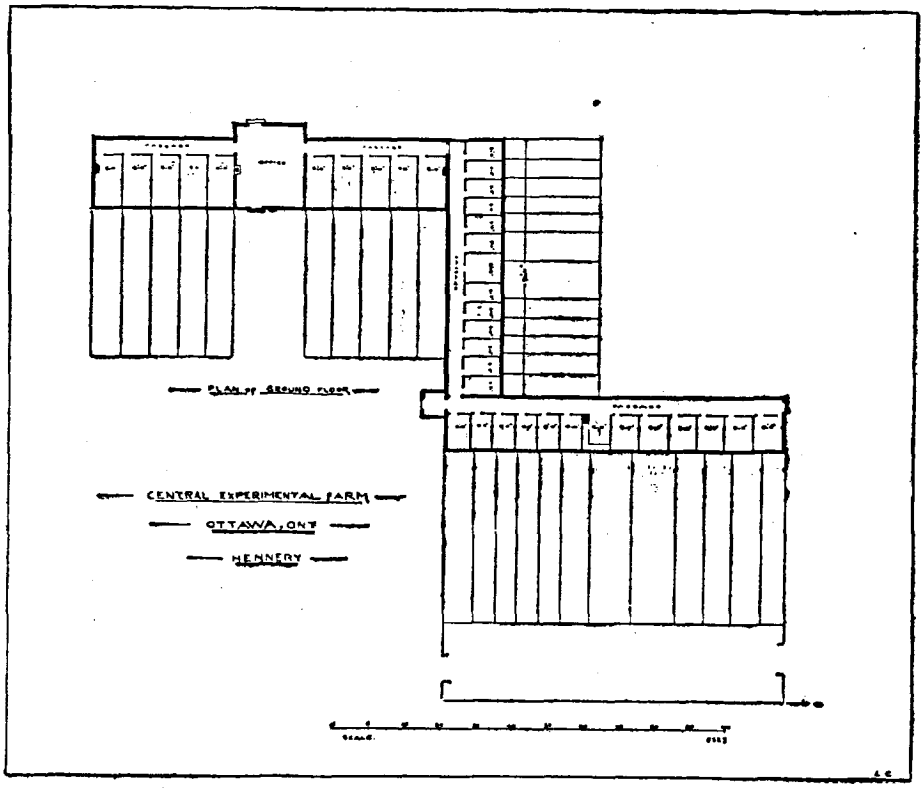
Breeds.	Age.	January.	February.	March.	April.	May.	June.	Total.
7 Silver Laced Wyandotte pullets	4 hens	89	71	96	104	69	45	474
Barred Plymouth Rocks	11 pullets	80	88	77	142	115	105	607
do do	8 hens	42	23	43		Sitting.		108
White Plymouth Rocks	11 do	80	61	83	106	88	12	430
Langshans	11 pullets	83	112	105	112	94	57	563
do	6 hens	25	20	21	37	...	...	103
Light Brahmas	11 do	5	23	54	72	38	27	219
do	4 pullets	.....	8	18	32	39	2	99
White Leghorns	16 do	81	96	137	154	141	98	707
do	11 hens	.....	.....	54	111	69	57	291
Black Minorcas	11 do	75	51	44	82	94	65	411
do	18 pullets	18	94	86	171	146	154	669
White Minorcas	11 do	7	35	56	45	81	72	296
Andalusians	11 hens	43	37	64	92	117	109	462
Coloured Dorkings	11 pullets	....	25	73	68	73	19	258
White Wyandottes	6 hens	30	23	21	46	33	13	166
Golden Polands	9 do	.....	.....	7	45	62	39	153
Houdans	6 do	.....	16	25	50	26	12	129
White Javas	4 pullets	56	64	76	71	83	55	405
Crosses.								
Langshan-Black Minorca cross	8 hens	31	88	90		Sitting.		209
Leghorn-Brahma cross	6 do	35	48	30		do		113
Sundry other crosses	24 do	39	97	127	283	235	193	971
								7,843
July—Eggs laid. Hens running at large								456
August								438
September								246
October								23
November								160
December								943
Total for year								10,109

The above figures are not given to show the best that could be done under conditions more favourable. What is meant by more favourable conditions may be explained in this way. In the number of layers given are included about 24 old hens and the mixed hens kept for sitters. As the warmer weather approached the sitters became broody and they were given eggs. At one time there were 40 hens either with chickens

or sitting on eggs. Other hens would become broody and some time would elapse before they would be broken up and beging egg-laying again. Thus the number of layers were considerably reduced.

What would a farmer do, under the circumstances?

He would keep a sharp watch on his hens and kill off the non-productive ones, or else they would certainly reduce the profit made by the active layers. If he had a non-sitting breed he would have to keep a few of a sitting variety to hatch out his chickens, or, he might have a small incubator and brooder. It has been shown in a previous portion of this report how he could select his breeding stock from his largest, best shaped, and most prolific layers, mating them with a vigorous male which had been kept apart from them during the winter season.



GROUND PLAN OF POULTRY BUILDINGS, OTTAWA.

The following will show how the breeding pens were made up and the number of eggs set and chickens hatched :—

BREEDING PENS MADE UP.

About the beginning of March, and towards the middle of the month, the different breeding pens were made up, composed of White Leghorns, Black Minorcas, Andalusians, Coloured Dorkings, White Minorcas, Barred and White Plymouth Rocks, Silver Laced and White Wyandottes, White Javas, Light Brahmas, Langshans, and Golden Polands.

The following were mated with the view of producing crosses to make good layers and market fowls.

Houdan cock; 4 Light Brahma pullets. White Java cock; 3 White Leghorn hens. Wyandotte cock; 7 Andalusian pullets. Barred Plymouth Rock cock; 3 Coloured Dorking hens. Indian Game cock; Coloured Dorking hens, Langshan pullets, and Red Cap hens.

EGGS SET AND CHICKENS HATCHED.

When Set.	Description of Eggs.	Chickens Hatched.	Remarks.
March 31..	26 W. Java eggs.	19	Pullets eggs.
April 10..	13 Light Brahma eggs	6	Old hens, rather fat.
do 28..	26 S. L. Wyandottes eggs	14	Eggs from a farmer.
do 28..	15 Light Brahma eggs	7	
do 30..	24 P. Rock-Dorking cross	17	
do 30..	26 S. L. Wyandotte eggs	17	
do 30..	13 White Java eggs.	12	
May 7..	15 Indian-Game Langshan cross eggs	10	
do 7..	15 Houdan-Brahma cross eggs	6	
do 7..	15 S. L. Wyandotte-Andalusian cross eggs.	10	
do 13..	26 W. Minorca eggs	14	
do 13..	26 B. Minorca eggs	14	
do 15..	26 White Plymouth Rock eggs	13	
do 18..	13 Andalusian eggs	6	Several eggs broken.
do 25..	26 White Java eggs	18	
do 25..	13 White Leghorn eggs	8	
do 31..	13 Golden Poland eggs	8	Breeding stock old.
		199	

It is worth noting, while reading the above table, that the White Java eggs, which were set on the 10th of March, were from four early pullets of the year before; that these pullets laid well all winter and on being early mated their eggs, some time after, proved fairly fertile, giving 19 chicks out of two settings of eggs. The chickens were hardy from the first and made rapid development. Indeed, the eggs from these Javas hatched remarkably well during all the season, so giving proof of sturdy and vigorous inherent qualities. The Light Brahma eggs did not do well, owing to the hens being three years of age and at that age predisposed to take on fat. The Plymouth Rock Coloured Dorking cross eggs hatched well.

PROGRESS OF THE CHICKENS.

The early hatched White Java cockerels made development of one pound per month. They were attended to and regularly fed and watered, as all chickens should be. The progress made will compare favourably with previous years- Some of the weights are given as follows :—

White Java Cockerels, hatched March 31; on 14th September following weighed 6 lbs. 5 ozs.; 5 lbs. 7½ ozs.; 4 lbs. 13¾ ozs.: Plymouth Rock-Dorking Cross, hatched 30th April, weighed 14th September, 4 lbs. 1 oz.; weighed 20th November, 6¾ lbs. Indian Game-Langshan Cross, hatched 7th May, weighed on 14th September, 4 lbs. 6 ozs.; weighed on 19th December, 7 lbs. 8 ozs. A pair of these chickens at the latter date made 14 lbs. 13 ozs. live-weight. Houdan-Brahma Cross, hatched on 7th May, weighed on 14th September 4 lbs. 5¼ ozs.; weighed on 20th December 6 lbs. 4 ozs.

HOW THE CHICKENS WERE CARED FOR.

On hatching out, the chickens were allowed to remain undisturbed in their nests for 24 or 30 hours, when with the mother hen they were removed to a coop on the grass outside. The mother was given food and water, and if strong enough on their legs, the chicks received a small quantity of bread crumbs, or a very small quantity of stale bread

soaked in milk and squeezed dry. If the chicks did not show any inclination to eat, they were allowed to brood under the hen, or bask in the sun until strong. If the weather was too cold, the hen and chickens were placed on dry sand, in a coop or pen by themselves, in a comfortable temperature inside. The dry bread crumbs were stopped after the first day and granulated oatmeal substituted therefor. Rice boiled dry was added to the bill of fare, and on this and the oatmeal and stale bread soaked in milk and pressed dry, the chicks made rapid progress. When about a fortnight old, wheat was fed in small quantities, and a coarser and cheaper mash of cornmeal, shorts and ground oats was given in place of the bread and milk. It is a good plan to send the chicks to brood for the night, with their crops full. Milk for drink was found an excellent incentive to growth. The chicks require great care until they get well on their feet and as remarked in previous reports, the future fowl is either made or marred in the first five weeks of its existence. To make heavy market birds, the cockerels require to be generously fed, and as they grow, cheap and nutritious rations must be fed, and in these the table and kitchen waste can enter with advantage. The same treatment must be given to pullets if they are to be early layers. Care was also taken to keep the chickens free from lice. And it is also requisite that the mother hen should be dusted regularly with insect powder in order to keep her free from these pests. Half the supposed ailments of chickens are the result of lice on the young birds. Free range, after five or six weeks, with liberal feeding, will cause rapid development. The reason why the hen should be confined to a coop (until she is ready to leave her chicks) is that the chicks in that way can be fed more frequently, and put on flesh more quickly. Whereas if she was dragging them about she would be taking off much of the flesh it is all important to get on them as quickly as possible.

WHEN PULLETS BEGAN TO LAY.

One of the White Java pullets began to lay on the 12th November, followed by two others on the 15th of the same month, and they have laid regularly since. On the 9th of December one of the Andalusian pullets laid her first egg, and she was followed a few days after by a Wyandotte-Andalusian cross pullet. A Silver Laced Wyandotte pullet laid her first egg on 20th December. A P. Rock-Dorking cross pullet laid first egg 20th December.

HOW AND WHEN WINTER LAYING COMMENCED.

During the moulting season of latter part of September, October and November the hens were well cared for and given rations similar to those fed for egg production. The hens had a free run in a field in rear of the main poultry building from time of breaking up the breeding pens on the 30th of June. The male birds at that date were removed to a separate building and will there remain until put into the breeding pens next spring. As the moulting season approached, egg production slackened until it almost ceased. As soon as the moulting season approached, liberal rations were given, beginning with a warm mash, a grain ration at noon and a generous grain ration at evening. The result was not evident for some time, but as the new feathers appeared the hens presented a very fine appearance.

FEEDING FOR EGG PRODUCTION.

Towards the end of October, with a view to egg production the feeding of cut green bone, occasionally was commenced. During November cut bone was fed more frequently, about three times per week, and daily for noon ration at end of the month when the fowls were shut into winter quarters. At the beginning of December, a warm mash composed of two parts ground wheat, one part ground oats and one part pea-meal was fed three mornings of the week. Cut bone was fed in small quantities every day at noon. The afternoon ration was wheat thrown into the straw and fed early enough to permit of the hens searching for it. Indeed, it is the rule whenever grain is fed to throw

it into the litter on the floor of the pens, when the hens eagerly seek for it. Cabbages were hung in the pens and the fowls eat them with avidity. Grit was supplied in abundance, as also drink water.

The response to this treatment was most gratifying, the egg yield beginning in the second week of November with 6, 8 and 10 eggs which gradually increased in number until the second week in December when they numbered 18, 22, 32, 36 and as high as 53 per diem, making a total egg yield for December of 943 eggs. The eggs laid and now being laid, are of the size usually laid by the different breeds and are of delicious flavour.

FIRST BREEDS TO RE-COMMENCE.

The first to resume laying were the White Javas, White Plymouth Rocks, Silver Laced Wyandottes, White Leghorns, Barred Plymouth Rocks and some of the crosses. They were followed in the middle of December by the Langshans and Andalusians

CHARACTERISTICS OF SOME CROSSES

Indian Game–Brahma.—The hens of the Indian Game–Brahma cross, made in the early summer of 1894, turned out large in body and compact in shape, rather taking after the Brahma. Colour of feather, light brown. They are of quiet disposition. Colour of egg, light; size, medium.

Indian Game–C. Dorking.—The Indian Game–Coloured Dorking cross also made very fine hens, taking more after the first named in shape and appearance. They are compact in body, of heavy weight and tightly feathered ; egg, long in shape and light in colour.

Langshan–Black Minorca.—Both the Langshan—Black Minorca and White Leghorn—Brahma crosses, made two years ago, turned out fine specimens and magnificent layers. The first named are large black fowls, some showing the Langshan type with slight feathering on the shanks, while others distinctly show the Minorca shape. Their eggs are large and of a rich brown colour. The fowls of the Leghorn-Brahma cross are not so large nor are their eggs of the same size as the original breeds named.

Plymouth Rock–Coloured Dorking.—Of the crosses made this year the pullets of the Plymouth Rock–Coloured Dorking Cross, are of the most serviceable shape and promise. They are of the long full body of the Dorking, rather loose in feather, but in every case with the barring of the Plymouth Rock, although dark in colour. They have yet to show what they will be as layers, but the best anticipations seem warranted. One of the pullets laid her first egg on the 19th December.

The Indian Game–Langshan.—The Indian Game–Langshan pullets are all as black as crows in colour. They are tight in feather, gamy in appearance and promise to make a very serviceable and handsome fowl. Few crosses give better promise.

Houdan–Brahma.—The pullets of the Houdan–Brahma cross are of dark feather, with the tuft of the Houdan partly developed on top of head.

Wyandotte–Andalusian.—The pullets of the S. L. Wyandotte–Andalusian cross are Rose combed Andalusians of the most beautiful shape and colour. A Silver Laced Wyandotte cock was mated with several Andalusian pullets off in colour, being a smoky white splashed with blue black feathers. The result is as stated, some beautiful Rose Comb Andalusian pullets, one of which began to lay two weeks ago. The bodies of the pullets are larger than the Andalusian original, but the nervous energy of the Spanish is conspicuous. The introduction of the Wyandotte characteristics should make a layer hard to outrival.

STRAW VERSUS EARTH.

A trial has been made for two seasons of straw litter on the floors of some of the pens and of sand on others, in order to find out their relative merits. On the floor, of the pens in the north wing of No. 1 house, straw was placed. On the floor of the pens in the south wing coarse dry sand, which was mixed with a small quantity

of gravel. A quantity of sand and fine gravel was stored in the cellar in order to renew that on the floors, as occasion required. Results were altogether in favour of the straw for the following reasons:—

1. It covered the grain thrown into it much better than the sand, and was in consequence a much greater incentive to exercise.
2. It was much easier to handle and could be removed and renewed in much less time.
3. It was not so cold to the feet of the hens. Except on days of bright sunshine the fowls did not seem inclined to scratch in the sand.
4. On being removed from the pens every particle of *excreta* went with it. In the case of the sand it was found that on its being raked over a quantity of the droppings remained.
5. By the month of April the sand covered floors had become much mixed with the droppings, notwithstanding that the latter were removed daily from the platforms.
6. On the grain rations being thrown on the sand, the fowls are likely to pick up some of the contaminated floor material and disease to follow in consequence.

INCUBATOR TRIAL.

On the 16th May 100 eggs, principally from crosses, were put into an hot water incubator of the manufacture of M. Gagné, Quebec. The incubator was filled and run as per directions, but there was no result. On examination of some of the eggs after the twenty-third day,—two days over the regulation time—they all appeared to have been fertile. The *embryo* had apparently made satisfactory progress until the seventh or ninth day, when all progress seemed to have ceased. It should be stated that the eggs had been tested on the sixth day and the clear, or unfertile eggs removed. On several occasions the thermometers were examined and the incubator seemed to have kept the heat at the regulation mark, fairly well. At times there was a slight fall of two or three degrees in temperature, when hot water was put into the incubator and the proper figure of 102 reached again. The temperature of the room in which the incubator was kept was not regular. The maker claims a regular temperature of 60 degrees for the proper working of the machine. An even temperature of the figure named is very hard to keep in an ordinarily constructed poultry house, which is always subject to more or less fluctuations of temperature. With artificial heat, except in the shape of hot water pipes, it is very hard to keep a regular temperature in a large poultry building.

DISEASES OF POULTRY.

The past year has been marked by the absence of the complaints of previous years, as to diseases of a fatal nature, among poultry in different parts of the country. Several cases of roup were reported and remedies asked for. In one case, the ailment which was described as diarrhœa, was traced to overfeeding. And overfeeding with too little exercise, particularly when the laying stock are in winter quarters, are causes of many of the ailments reported from time to time.

EXPERIMENTAL FARM FOR THE MARITIME PROVINCES.

REPORT OF WM. M. BLAIR, *Superintendent.*

NAPPAN, N.S., November 30, 1895.

To WM. SAUNDERS, Esq.,
Director Dominion Experimental Farms,
Ottawa.

SIR,— I have the honour to submit herewith the following report of the operations on the Experimental Farm for the Maritime Provinces, at Nappan, N.S., during the year 1895.

WEATHER.

On November 16th, 1894, the thermometer registered 23° of frost. This continued for three days, then the weather became mild, continuing so until the 26th, when the temperature again fell, registering 23° of frost. On the 29th a slight snow made sleighing in various parts of the provinces. We had fair sleighing here on December 3rd, and it continued cold until the 17th of December, when the frost in the ground was completely thawed out. On the 23rd it again turned cold, the thermometer registering at zero, and 5° below zero on the following morning.

Snow fell January 1st and 2nd, measuring about one foot deep, with the temperature at 14° below zero on the 3rd. There were several heavy snowstorms during the winter months, and the weather was very changeable at times. Sleighing continued good until April 10th, and the snow had almost disappeared by the 19th. The frost was about out of the fields by the 20th, and ploughing was commenced on the 21st.

The first seed was sown on April 27th. Seeding proper commenced on April 30th, and the weather continued favourable until its completion. There was only a moderate amount of rainfall in May, with three light rains in June and one slight shower on July 9th. The heavy rains of August 5th and 8th were greatly needed, being the first rain of much consequence since the middle of May.

During parts of the summer months the weather continued very warm, but on the average was of exceptionally moderate temperature. During the latter part of June the thermometer, on various occasions, registered 80° in the shade; on July 9th it stood at 86°; and at 81° and 82° on the 21st and 22nd. On account of the dry weather, pasture was short, cereal crops did not seem to suffer as much on the Experimental Farm as in some other parts of the country, probably due to the underdrains. During the early part of the season the roots promised but a light crop, but after the August rains they made a rapid growth and a crop above the average was gathered.

HAY.

The hay was about an average crop on the upland, but not up to the average on the marsh lands. The lessened crop on the upland, as compared with 1894, was due to less acreage than formerly, the land being taken up with experimental plots and pasturage. The timothy marsh gave a yield of seven loads less than the previous crop. The broad-leaf marsh was also five loads short. The yield of hay was as follows: Upland, 31 loads; marsh (timothy), 48; broad leaf marsh, 14 loads. Total yield, 93 loads or about 98 tons.

EXPERIMENTS WITH SPRING WHEAT.

The test plots of spring wheat which included thirty-three varieties, gave above the average yield of well-filled grain. Among the most promising of cross-bred sorts are: the Stanley, Preston, and Huron. The Stanley is particularly noticeable as a very desirable sort. The Red Fife, Red Fern, and Campbell's White Chaff are among the best of the older varieties. The straw was entirely free from rust, was bright and exceptionally stiff. The soil was a clayey loam, the previous crop being clover, the aftermath of which was ploughed under in the fall. The plots were one-twentieth acre each. The seed was sown on the 30th of April at the rate of $1\frac{3}{4}$ bushels per acre, and the following results were obtained:—

WHEAT.—Test of Varieties.

Name of Variety.	Date of Ripening.	No. of days Maturing	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	Weight per Bushel.
			In.		Inche		Bush. Lbs.	Lbs
Preston	Aug. 18	110	33	Stiff	$2\frac{1}{2}$ to $3\frac{1}{2}$	Bearded	32 ..	60
Stanley	do 21	113	38	do	3 to $3\frac{1}{2}$	do	32 20	59
Major	do 22	114	36	do	$2\frac{1}{2}$ to 3	Beardless.	31 40	59
Campbell's White Chaff	do 17	109	34	do	3 to 4	do	31 40	61
Herisson Bearded	do 23	115	36	do	$1\frac{1}{3}$ to $1\frac{3}{4}$	Bearded	31 20	63
Red Fern	do 18	110	32	Medium stiff	3 to $3\frac{1}{2}$	do	31 ..	61
Huron	do 20	112	35	Stiff	3 to $3\frac{1}{2}$	do	31 ..	60
Admiral	do 22	114	36	Medium stiff	$2\frac{3}{4}$ to $3\frac{1}{4}$	Beardless.	30 40	$62\frac{1}{2}$
Golden Drop	do 17	109	32	Stiff	$2\frac{3}{4}$ to 3	do	30 40	60
Old Red River	do 23	115	35	do	$2\frac{1}{2}$ to $3\frac{1}{4}$	do	30 20	$61\frac{1}{2}$
White Connell	do 22	114	35	do	$3\frac{1}{4}$ to 4	do	29 20	62
Percy	do 18	110	33	do	$2\frac{3}{4}$ to $3\frac{1}{2}$	do	28 20	60
White Russian	do 23	115	35	do	3 to 4	do	28 ..	62
Goose	do 16	108	36	do	2 to $2\frac{1}{2}$	Bearded	27 40	61
Glengarry	do 26	118	37	do	$3\frac{1}{2}$ to 4	Beardless.	27 20	58
Captor	do 22	114	38	do	3 to $3\frac{1}{2}$	do	27 ..	62
Blenheim	do 22	114	38	do	3 to $3\frac{1}{2}$	Bearded	27 ..	62
Advance	do 21	113	37	do	3 to $3\frac{1}{2}$	do	26 20	62
Wellman's Fife	do 24	116	36	do	$3\frac{1}{2}$ to $4\frac{1}{4}$	Beardless.	25 20	60
Rideau	do 16	108	32	Medium stiff	$2\frac{1}{2}$ to 3	do	25 20	60
Black Sea	do 16	108	34	Stiff	$2\frac{1}{4}$ to $2\frac{3}{4}$	Bearded	25 ..	59
Red Fife	do 22	114	33	do	$2\frac{1}{2}$ to 3	Beardless.	24 ..	59
Alpha	do 17	109	36	do	$2\frac{1}{2}$ to $2\frac{3}{4}$	do	24 ..	$59\frac{1}{2}$
Ladoga	do 16	108	35	do	$2\frac{1}{2}$ to 3	Bearded	24 ..	60
White Fife	do 24	116	38	do	3 to $3\frac{1}{2}$	Beardless.	23 40	$62\frac{1}{2}$
Rio Grande	do 23	115	37	do	$3\frac{1}{2}$ to 5	Bearded	22 40	62
Gehun	do 16	108	26	Medium stiff	$2\frac{1}{4}$ to $2\frac{3}{4}$	do	22 40	62
Crown	do 19	111	34	Stiff	3 to $3\frac{1}{2}$	do	22 40	$60\frac{1}{2}$
Dion's	do 24	116	34	Medium stiff	4 to 5	do	22 20	63
Abundance	do 15	107	35	Stiff	$3\frac{1}{4}$ to $3\frac{3}{4}$	do	21 10	60
Beaudry	do 20	112	33	Medium stiff	2 to $2\frac{3}{4}$	do	19 ..	58
Pringle's Champlain	do 21	113	35	Stiff	3 to $3\frac{1}{4}$	do	18 20	62
Colorado	do 22	114	32	do	3 to $3\frac{1}{4}$	do	17 ..	60

NOTE.—The weights per bushel given here, and also in all other grain tables in this report, were taken from the grain as it came from the threshing mill, and are not the maximum weights that the grain could be brought to by cleaning.

CROSS-BRED WHEATS.

Six varieties of cross-bred wheats produced at the Experimental Farms were sown on 1st May. The soil was a clayey loam. The previous crop being clover, the aftermath of which was plowed under in the fall of 1894. On these plots also the straw was entirely free from rust. The results were as folows:—

Name of Variety.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	Weight per Bushel.
Beauty.			In.		Inches.		Bush. lbs.	Lbs
Red Fife female with No. 1 Club Bombay male	Aug. 21	113	37	Very stiff.	3 to 3½	Beardless.	30 ..	60
Dufferin.								
Anglo-Canadian female with Indian Karachi male	do 15	107	30	Stiff	2½ to 2¾	Bearded..	27 20	59
Vernon.								
Ladoga female with Early Sonora male	do 22	114	34	do	2½ to 3	do ..	27 20	62
Progress.								
Red Fife female with Ladoga male...	do 21	113	34	do	2½ to 3	Beardless.	27 ..	61
Countess.								
Early Sonora female with Red Fife male	do 22	114	32	do	2¼ to 3	do ..	23 20	61½
Dawn.								
Early Sonora female with Red Fife male	do 17	109	32	Medium stiff	2½ to 3	do ..	19 40	60

EXPERIMENTS WITH OATS.

Fifty-three varieties of oats were sown in plots of one-twentieth acre each. The straw was free from rust, but some of the heads of Doncaster Prize and Lincoln were smutted.

Those varieties, which have given the largest average yield for five consecutive years, have not yielded as heavily during the latter part of the period, as have some of the lately introduced sorts. Those which have given the best average results during the last four, as well as the last three years, are tabulated in the summary.

In the table giving results of the best averages for the five years, the Cream Egyptian heads the list as the best yielding white oat; surpassed by the Black Tartarian, which, however, is four pounds lighter per bushel. The Egyptian is said to be one of the thickest hulled oats, which, if correct, must lessen its value.

The Joanette heads the list of the four years' test of varieties. This is a black oat which is said to have a very thin hull. It has also short straw and stools very freely, about 1½ bushels of seed per acre being sufficient to sow. In the three years' test, the Abyssinia white oat heads the list, this grain so far has proved to be a very fine variety.

The soil chosen for the test of varieties was a clayey loam, it was ploughed in the fall, and the previous crop was timothy and clover. A barrel of complete fertilizer was

used per acre. No rust was found this season on any of the varieties. The results are given in the following table :—

OATS—Test of Varieties.

Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	Weight per Bushel.
				In.		In.		bus. lbs.	Lbs
Early Golden Prolific	May 3.	Aug. 17.	106	36	Stiff	6 to 7	Branching	72 12	39
Golden Beauty	" 3.	" 16.	105	32	"	7	"	69 14	37
Early Gothland	" 3.	" 17.	106	38	"	7 to 8	Half sided	66 16	40½
American Beauty	" 3.	" 18.	107	35	"	7 to 7½	Branching	64 24	39
Cave	" 3.	" 19.	108	38	"	8 to 9	Sided	64 24	41½
Golden Giant	" 3.	" 27.	116	38	"	10 to 11	"	64 4	38
Giant Cluster	" 3.	" 26.	115	40	"	9 to 10	"	63 18	34
Abyssinia	" 3.	" 15.	104	34	"	7 to 9	Half sided	62 12	42
Early Blossom	" 3.	" 18.	107	32	"	8	Sided	62 12	38½
Bavarian	" 3.	" 16.	105	34	"	7 to 8	Branching	60 20	39
White Russian	" 3.	" 14.	103	32	"	9	Half sided	60	40½
Prolific Black California	" 3.	" 15.	104	36	"	8 to 9	Sided	59 14	37
Columbus	" 3.	" 15.	104	35	Medium	6½ to 7	Branching	59 14	37
Oderbruch	" 3.	" 14.	103	33	Stiff	7½ to 8	Half sided	58 28	40
Imported Irish	" 3.	" 9.	98	36	"	8	Branching	57 22	43½
Cream Egyptian	" 3.	" 14.	103	33	"	7½	Sided	57 2	41
Abundance	" 3.	" 18.	107	34	"	8 to 9	Branching	56 16	37
Early English White	" 3.	" 10.	99	39	Medium	11	"	55 30	43
Wallis	" 3.	" 17.	106	33	Stiff	6 to 7	"	54 24	39
Banner	" 3.	" 16.	105	34	"	8½	"	54 24	40
Improved Ligowo	" 3.	" 16.	105	34	"	8	"	54 24	36½
White Schonen	" 3.	" 15.	104	33	"	8	"	54 24	37
Holstein Prolific	" 3.	" 17.	106	35	Medium	7 to 8	"	54 24	37½
Early Etampes	" 3.	" 15.	104	29	Stiff	6 to 7	"	54 4	36
Victoria Prize	" 3.	" 9.	98	36	"	11	"	52 32	41
Black Brie	" 3.	" 26.	115	32	"	8 to 9½	"	52 32	39½
Wide Awake	" 3.	" 14.	103	36	"	7 to 8	"	52 12	38
Joanette	" 3.	" 15.	104	28	"	6 to 7	"	52 12	37
Challenge	" 3.	" 8.	97	36	"	8½	"	51 16	42
White Wonder	" 3.	" 8.	97	36	Medium	10	"	51 16	42
Poland White	" 3.	" 10.	99	36	"	9½	"	51 6	38
Scotch Hopetown	" 3.	" 24.	113	36	Stiff	10 to 11	"	51 6	40
Lincoln	" 3.	" 15.	104	33	Medium	7½	"	50 20	36
New Electric	" 3.	" 24.	113	36	"	8 to 9½	Branching	50 20	39
Early Maine	" 28.	" 26.	90	33	Stiff	7 to 8	Half sided	50 ..	37
Hazlett's Seizure	" 3.	" 8.	97	37	"	10	Branching	49 14	41½
Rosedale	" 3.	" 15.	104	34	"	8	Half sided	48 28	40
Prolific Black Tartarian	" 3.	" 19.	108	36	"	8	Sided	48 8	38
Welcome	" 3.	" 8.	97	38	"	9	Branching	47 22	43
Early Racehorse	" 3.	" 10.	99	38	"	10	"	46 16	41
Canadian Triumph	" 3.	" 9.	98	37	Medium	11½	"	45 30	43
Bonanza	" 3.	" 14.	103	32	"	8½	"	44 24	43
Coulommiers	" 3.	" 27.	116	33	Stiff	8½ to 9	"	44 4	39½
Early Archangel	" 3.	" 9.	98	38	Very stiff	8	"	44 4	40½
Prize Cluster	" 3.	" 8.	97	36	Stiff	9	"	43 18	40½
Scottish Chief	" 3.	" 8.	97	36	Medium	9	"	40 20	43
Siberian	" 3.	" 26.	115	38	Stiff	10	Sided	38 28	40
Doncaster Prize	" 3.	" 17.	106	36	"	7 to 8	Branching	38 8	42
Rennie's Prize White	" 3.	" 9.	98	36	"	9	"	37 22	40
Flying Scotchman	" 3.	" 10.	99	36	"	11½	"	36 16	42
American Triumph	" 3.	" 26.	115	42	"	10 to 11	"	36 16	40½
Winter Grey	" 3.	" 14.	103	33	"	8 to 9	"	32 12	42
White Monarch	" 3.	" 18.	107	36	"	9 to 10	"	31 26	41

SUMMARY.

The average yield of all these oat plots for the season 1895, has been 52 bushels 6 lbs. per acre.

The average yield per acre, from five years' experiments, of seven of the most promising varieties, has been as follows:

	Bush.	Lbs.	Weight per bush.
Prolific Black Tartarian	65	25	37
Cream Egyptian	64	25	41
Early Blossom	64	12	38½
Banner	61	17	40
Poland White	60	9	38
Victoria Prize	59	24	41
Race-horse	57	18	41

Average yield from four years' experiments, of three of the most promising varieties grown in the years 1892-3-4 and '5.

	Bush.	Lbs.	Weight per bush. lbs.
Joanette	60	2	37
Abundance	57	29	37
Early Gothland	55		40½

Average yield from three years' experiments, of three of the most promising varieties for the years 1893-4 and '5.

	Bush.	Lbs.	Weight per bush lbs.
Abyssinia	61	19	42
Oderbruch	60	20	40
Bavarian	59	24	39

EXPERIMENTS WITH BARLEY.

The experimental plots of barley consisted of thirty-seven varieties; sixteen of six-rowed bearded sorts, eighteen of two-rowed; and three of beardless six-rowed varieties.

The straw of all these was entirely free from rust, but Baxter's and Rennie's Improved were somewhat smutty. The grain was rather above the average, both as to yield and quality. From the summary of the results of the experiments conducted here during the past three years, it will be noticed that there is a slight difference in yield in favour of the six-rowed varieties; but taking the average yield of seven of the most promising varieties of two-rowed and six-rowed for comparison, the advantage is slightly in favour of the two-rowed sorts. The six-rowed varieties prove to be somewhat earlier; which is of considerable advantage if the season happens to be somewhat late, close observation has shown that in the majority of cases the six-rowed gives the most satisfactory results in the Maritime Provinces, although a larger yield of superior grain can often be had from a well cultivated field by sowing one of the best two-rowed sorts.

Among the most promising six-rowed varieties are some of the hybrid sorts produced at the Central Farm. Royal, Trooper, Surprise and Summit taking the lead since they were introduced two years ago. Among the older favourites Oderbruch takes a leading place; of the two-rowed sorts, the Canadian Thorpe, closely followed by the Kinver Chevalier. The first named variety has been more productive and thrifty than either the Duck-bill or Goldthorpe, which it closely resembles. Two of the hybrid two-rowed sorts produced at the Central Farm, viz., Bolton and Sidney, have also given good results.

Very promising results were obtained from the new beardless varieties sown this year for the first time. The soil chosen for the test of varieties was a rather light loam. The land had been in pasture for several years, was ploughed in the spring, and one

barrel of complete fertilizer used per acre. The seed was sown at the rate of two bushels per acre. The following table gives the results :—

SIX-ROWED BARLEY—TEST OF VARIETIES.

Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Yield per Acre.		Weight per Bushel.
				In.		Inches.	Bus.	lbs.	Lbs.
Odessa	May 2..	Aug. 2..	92	28	Stiff	2½ to 3	52	4	50
Royal	" 2..	" 2..	92	28	Medium	2½ to 3	45	20	51
Mensury	" 2..	" 3..	93	34	Stiff	2 to 2¾	44	28	51
Trooper	" 2..	" 9..	99	34	Medium	2 to 2¼	43	16	50
Pioneer	" 2..	" 3..	93	36	Weak	2¼ to 2½	42	24	54
Common	" 2..	" 2..	92	32	"	2 to 2½	42	4	52
Surprise	" 2..	" 13..	103	36	Stiff	1¾ to 2	41	32	50
Phœnix	" 2..	" 3 .	93	34	"	2½ to 2¾	41	.	51
Vanguard	" 2..	" 3..	93	32	"	2½ to 3	40	20	50½
Oderbruch	" 2..	" 3..	93	27	"	2 to 2½	38	16	48½
Petschora	" 2..	" 2..	92	30	Medium	2¾ to 3¼	37	44	50½
Stella	" 2..	" 13..	103	36	"	2½ to 2¾	34	28	51
Summit	" 2..	" 13..	103	34	"	2¼ to 2½	34	8	51
Baxter's	" 2..	" 4 .	94	28	Stiff	1½ to 2¼	34	8	53
Rennie's Improved	" 2..	" 4..	94	28	"	1¾ to 2	32	44	51½
Nugent	" 2..	" 9..	99	33	Very stiff	2 to 2¼	31	32	49

TWO-ROWED BARLEY—TEST OF VARIETIES.

French Chevalier	May 2..	Aug. 14..	104	29	Medium	2¾ to 3¼	47	44	52
Canadian Thorpe	" 2..	" 13..	103	33	Stiff	3 to 3¼	46	32	52
New Golden Grains	" 2..	" 13..	103	29	Weak	3 to 3½	44	28	50½
Danish Chevalier	" 2..	" 14..	104	28	"	3½ to 4	42	24	53
Prize Prolific	" 2..	" 15..	105	31	Very weak	3½ to 4	38	16	51
Kinver Chevalier	" 2..	" 18..	108	30	Weak	3 to 3¾	37	4	53
Newton	" 2..	" 14..	104	32	Stiff	2½ to 3	35	20	52
Thanet	" 2..	" 16..	106	26	Medium	2½ to 4	35	20	51½
Bolton	" 2..	" 7..	97	32	"	2½ to 3½	34	8	52
Golden Melon	" 2..	" 19..	109	32	Stiff	3½ to 4	32	4	53
Monck	" 2..	" 16..	106	42	"	3 to 3½	30	40	52
Duck-bill	" 2..	" 14..	104	32	"	2¼ to 3	30	20	54
Victor	" 2..	" 15..	105	32	"	2½ to 3¼	30		55
California Prolific	" 2..	" 15..	105	35	Very stiff	3 to 3½	29	8	52
Two-rowed Naked	" 2..	" 16 .	106	30	Medium	3 to 3¾	28	36	65
Sidney	" 2..	" 15..	105	30	Stiff	3½ to 4	27	40	54
Beaver	" 2..	" 16..	106	27	Medium	2½ to 3	27	24	52
Rigid	" 2..	" 16..	106	38	Stiff	2¼ to 2¾	22	44	52

BEARDLESS BARLEY—TEST OF VARIETIES.

Success	May 2..	Aug. 2..	92	34	Medium	2½ to 3¼	45	40	48
Excelsior	" 2..	" 2..	92	36	Weak	2½ to 3½	45		45
Champion	" 2..	" 3..	93	36	Stiff	2¾ to 3¼	42	20	46

	Bush.	Lbs.
Average yield of all the six-rowed varieties for 1895	39	38
Average yield of all the two-rowed sorts for 1895	38	30

SUMMARY.

Best average yields from experiments conducted with six-rowed varieties of barley for the past four years—

	Bush.	Lbs.
Oderbruch	37	9
Baxter's	35	5
Rennie's Improved	32	6

Best average yields from six-rowed varieties for the past two seasons—

	Bush.	Lbs.
Royal	41	22
Trooper	34	38
Surprise	33	26
Summit	31	22

Average yield per acre of the above seven promising six-rowed varieties—

Bush.	Lbs.
35	4

Best average yield from experiments conducted with two-rowed varieties of barley for the past four years—

	Bush.	Lbs.
New Golden Grains	35	42
Duckbill	34	2
French Chevalier	33	41

Best average yields from two-rowed varieties for the past two seasons—

	Bush.	Lbs.
Canadian Thorpe	37	44
Kinver Chevalier	37	42
Bolton	34	38
Sidney	34	22

Average yield per acre of the above seven promising two-rowed varieties—

Bush.	Lbs.
35	45

RESULTS OF EARLY, MEDIUM AND LATE SOWINGS OF GRAIN.

Experiments to test the relative advantages of early, medium and late sowing were again carried on this year. From the results of five years' tests, it will be seen that with oats the third and fourth sowings have given the largest crops followed by the second and first. With barley the advantage has been with the third, second and fourth sowings, and with wheat the second and third sowings have given the largest returns.

The first of these plots was sown April 30, the size was one-twentieth of an acre, the soil sandy loam, and the previous crop was corn, one week intervening between each

of the six sowings. No rust was observed on any of the plots. There were two plots each of wheat, barley and oats in each series. The following results were obtained:—

OATS—RESULTS OF EARLY, MEDIUM AND LATE SOWINGS.

Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	Weight per bushel.
				In.		In.		Bus. lbs.	Lbs
No. 1—									
Banner	April 30..	Aug. 5..	97	34	Stiff	8	Branching..	42 2	36
Abundance	" 30..	" 5..	97	31	"	7	" ..	44 24	37
No. 2—									
Banner	May 7..	" 7..	92	38	"	8½	" ..	42 2	36
Abundance	" 7..	" 7..	92	36	"	7½	" ..	54 24	38
No. 3—									
Banner	" 14..	" 16..	91	39	"	8	" ..	50 ..	39
Abundance	" 14..	" 16..	91	36	"	7	" ..	67 22	38½
No. 4—									
Banner	" 21..	" 22..	93	36	"	8	" ..	54 24	37
Abundance	" 21..	" 22..	93	36	"	7	" ..	56 16	38
No. 5—									
Banner	" 28..	" 27..	91	30	"	7	" ..	50 ..	37
Abundance	" 28..	" 27..	91	30	"	6	" ..	42 12	38
No. 6—									
Banner	June 4..	Sept. 5..	93	32	"	7	" ..	52 32	37
Abundance	" 4..	" 5..	93	32	"	7	" ..	48 8	37

BARLEY—RESULTS OF EARLY, MEDIUM AND LATE SOWINGS.

Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	Weight per Bushel.
				In.		In.		Bus. lbs.	Lbs
No. 1—									
Canadian Thorpe	April 30..	Aug. 1..	93	27	Stiff	2½ to 2¾	Two-rowed	18 36	50½
Oderbruch	" 30..	July 24..	85	31	"	2	Six-rowed	25 ..	50
No. 2—									
Canadian Thorpe	May 7..	Aug. 3..	88	27	"	2½ to 2¾	Two-rowed	19 28	49
Oderbruch	" 7..	July 30..	84	30	"	2 to 2¼	Six-rowed	32 14	50
No. 3—									
Canadian Thorpe	" 14..	Aug. 12..	90	25	"	2¼ to 2¾	Two-rowed	23 16	49
Oderbruch	" 14..	" 5..	83	29	"	2¼	Six-rowed	32 24	49
No. 4—									
Canadian Thorpe	" 21..	" 17..	88	24	"	2 to 2½	Two-rowed	22 24	48
Oderbruch	" 21..	" 8..	78	26	"	2 to 2¼	Six-rowed	33 36	48
No. 5—									
Canadian Thorpe	" 28..	" 22..	86	24	"	2½ to 2¾	Two-rowed	27 4	49
Oderbruch	" 28..	" 13..	77	26	"	2 to 2¼	Six-rowed	22 4	48½
No. 6—									
Canadian Thorpe	June 4..	" 31..	88	24	"	2½ to 3	Two-rowed	23 16	49
Oderbruch	" 4..	" 22..	79	24	"	2	Six-rowed	21 32	48

Wheat—Early, Medium and Late Sowings.

Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	Weight per Bushel.
				In.		In.		Bus. lbs.	Lbs
No. 1—									
Red Fife	April 30..	Aug. 17..	109	31	Stiff ...	2¾ to 3½	Beardless...	14 20	61
Stanley	" 30..	" 15..	107	34	" ...	2½ to 3¼	" ..	19 20	59
No. 2—									
Red Fife	May 7..	" 19..	104	32	" ...	2½ to 3½	" ..	11 20	60
Stanley	" 7..	" 17..	102	38	" ...	2½ to 3	" ..	26 40	59
No. 3—									
Red Fife	" 14..	" 24..	99	36	" ...	3¼ to 3¾	" ..	12 ..	60
Stanley	" 14..	" 22..	97	37	" ...	2½ to 3	" ..	25 20	61
No. 4—									
Red Fife	" 21..	" 31..	102	29	" ...	3 to 3¾	" ..	16 ..	57
Stanley	" 21..	" 30..	101	32	" ...	2½ to 3	" ..	15 ..	57
No. 5—									
Red Fife	" 28..	Sept. 8..	103	30	" ...	3 to 3½	" ..	15 ..	58
Stanley	" 28..	" 5..	100	31	" ...	3 to 3½	" ..	20 ..	59
No. 6—									
Red Fife	June 4..	" 8..	96	34	" ...	3¼ to 3½	" ..	15 40	56
Stanley	" 4..	" 8..	96	35	" ...	3 to 3½	" ..	19 ..	55

SUMMARY.

Results for the period of five years' tests of early medium and late sowing of all varieties:—

OATS.

	Bush.	Lbs.
1st sowing, average of ten tests	45	16
2nd " " " "	48	22
3rd " " " "	55	25
4th " " " "	50	30
5th " " eight "	43	32
6th " " " "	43	33

BARLEY.

	Bush.	Lbs.
1st sowing, average of ten tests	25	38
2nd " " " "	27	57
3rd " " " "	29	42
4th " " " "	27	44
5th " " eight "	25	19
6th " " " "	22	42

WHEAT.

	Bush.	Lbs.
1st sowing, average of ten tests	18	38
2nd " " " "	20	34
3rd " " " "	19	33
4th " " " "	15	51
5th " " eight "	18	25
6th " " six "	17	39

The average of all the sowings of all the varieties for the period of five years is as follows :—

	Yield per acre.
Oats (56 sowings)	48 bush. 4 lbs.
Barley (56 sowings)	26 " 32 "
Wheat (54 sowings)	18 " 27 "

GRAIN SOWN ON LAND MANURED WITH DIFFERENT QUANTITIES OF MANURE PER ACRE.

The land on which this grain was sown was in turnips last season, being manured for that crop with 20, 30 and 40 30-bushel cart loads of manure per acre. The results then obtained are given in last year's report. This land was sown this season with mixed grain, made up as follows : Wheat, $\frac{1}{2}$ bush. ; oats, $1\frac{3}{4}$ bush. ; pease, $\frac{1}{2}$ bush.; total, $2\frac{3}{4}$ bush. per acre. Sown on 4th May, harvested on August 6th, the following results were obtained : The first plot, manured with 20 loads per acre, yielded 30 bush. of mixed grain per acre, weighing 43 lbs. per bush. ; straw, medium heavy. The second plot, which had received 30 loads of manure per acre, yielded 34 bushels of grain per acre, with a weight of 41 lbs. per bush., straw heavy.

The third plot, with 40 loads of manure per acre, yielded 32 bushels of grain per acre, weighing 44 lbs. per bushel, straw very heavy.

FIELD LOTS OF GRAIN.

Name of Variety.	Character of Straw.	Yield per Acre.		Weight per Bushel.
		Bus.	Lbs.	Lbs.
Cream Egyptian	Stiff	52	21	$41\frac{1}{2}$
Rosedale	Stiff	48	8	$41\frac{1}{2}$
Winter Grey	Medium	39	8	$38\frac{1}{2}$
Oderbruch	Stiff	38		40

The other lots of grain gave a yield as follows :—from the marsh 248 bushels, upland 265 bushels with 40 bushels of buckwheat.

FIELD PEASE.

Ten varieties of field pease were sown May 2nd, on one-twentieth acre plots; the soil was a light loam. This land had been in pasture for several seasons and was ploughed in the spring, and one barrel of complete fertilizer used per acre, with the following results.

PEASE—TEST OF VARIETIES,

Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Character of Growth.	Length of Straw.	Length of pod.	Size of Pea.	Yield per Acre.		Weight per Bushel.	Remarks.
					In.	In.		Bush.	Lbs.	Lbs	
Crown, 7½ lbs. or 2½ bush. per acre	May 2.	Aug. 6.	96	Strong..	38	1¾ to 2	Small..	55	..	62	Stiff.
Black-eyed Marrowfat, 10½ lbs. or 3½ bush. per acre	" 2.	" 23.	113	do ..	39	2½ to 3	Large..	53	20	59½	"
Canadian Beauty, 10 lbs. or 3½ bush per acre	" 2.	" 20.	110	do ..	36	2 to 2½	do ..	47	40	60	"
Potter, 7½ lbs. or 2½ bush. per acre	" 2.	" 14.	104	do ..	38	2 to 2½	Small..	47	20	59	"
Pride, 9 lbs. or 3 bush per acre	" 2.	" 6.	95	do ..	39	2 to 2½	Medium	43	40	62½	Medium
Centennial, 9 lbs. or 3 bush. per acre	" 2.	" 7.	97	do ..	40	2¼ to 2¾	do ..	42	40	60	"
Prince Albert, 7½ lbs. or 2½ bush. per acre	" 2.	" 18.	108	do ..	37	2¼ to 2½	Small..	42	20	60½	Stiff.
Multiplier, 7½ lbs. or 2½ bush. per acre	" 2.	" 20.	110	do ..	37	2 to 2½	do ..	41	40	60½	"
Golden Vine, 7½ lbs. or 2½ bush. per acre	" 2.	" 7.	97	do ..	34	1¾ to 2	do ..	41	..	62	"
Mummy, 9 lbs. or 3 bush. per acre	" 2.	" 13.	103	do ..	38	2 to 2½	Medium	40	..	60½	Medium

SUMMARY.

Average yield of pease per acre, from three years' tests of seven of the most promising varieties:—

	Bush.	Lbs.
Black Eyed Marrowfat	47	13
Canadian Beauty	42	
Multiplier	41	17
Prince Albert	41	16
Crown	40	
Pride	39	
Golden Vine	39	

RYE.

A plot of winter rye was sown on September 11, 1894. This made a very strong growth of stout, bright straw, and gave a heavy yield. Harvested July 30.

TURNIPS.—TEST OF VARIETIES.

The land used for these experiments was a clay loam, the previous crop was oats. It was ploughed in the fall of 1894, and thirty 30 bushel cart loads of manure, well rotted, was used per acre, which was ploughed under in the spring. The first set of plots

were sown on the 25th of May. The second on the 8th of June. The yield of all roots per acre has been calculated from the quantity obtained from three rows, each 66 feet long and 28 inches apart. All the varieties made a strong and healthy growth. The following results were obtained :—

Name of Variety.	1st Plot Sown.	2nd Plot Sown.	1st Plot Pulled.	2nd Plot Pulled.	Yield per Acre, 1st Plot.		Yield per Acre, 1st Plot.		Yield per Acre, 2nd Plot.		Yield per Acre, 2nd Plot.	
					Tons.	lbs	Bus.	lbs.	Tons.	lbs	Bus.	lbs.
Lord Derby	May 25.	June 8.	Oct. 21.	Oct. 21.	35	1250	1187	30	31	700	1045	..
Purple Top Swede	" 25.	" 8.	" 21.	" 21.	34	1825	1163	45	29	1375	989	35
Elephant's Master	" 25.	" 8.	" 21.	" 21.	33	975	1116	15	28	1000	950	..
East Lothian	" 25.	" 8.	" 21.	" 21.	33	975	1116	15	28	1470	957	50
Skirving's Swede	" 25.	" 8.	" 21.	" 21.	33	500	1108	20	26	725	878	45
Prize Purple Top	" 25.	" 8.	" 21.	" 21.	33	500	1108	20	24	1870	831	10
Hartley's Bronze	" 25.	" 8.	" 21.	" 21.	30	800	1013	20	41	1125	1385	25
Giant King	" 25.	" 8.	" 21.	" 21.	30	325	1005	25	23	740	779	..
Imperial Swede	" 25.	" 8.	" 21.	" 21.	28	1950	965	50	26	725	878	45
Champion Purple Top	" 25.	" 8.	" 21.	" 21.	28	1950	965	50	36	200	1203	20
Carter's Elephant Swede	" 25.	" 8.	" 21.	" 21.	28	1000	950	..	30	800	1013	20
Jumbo, or Monarch	" 25.	" 8.	" 21.	" 21.	28	525	942	5	33	1450	1124	10

TURNIPS.

General average for two sowings per acre.

	bush.	lbs.
No. 1. Sowing of 25th May, 1895	1053	10
No. 2. " " 8th June, 1895	1003	11

SUMMARY.

Average yield for five years sowing per acre.

Name of Variety.	Plots No. 1.		Plots No. 2.	
	Bush.	Lbs.	Bush.	Lbs.
Purple Top Swede	915	35	853	31
Jumbo or Monarch Swede	868	14	833	23
Prize Purple Top Swede	820	49	681	59
Skirving's Swede	799	7	961	30
Carter's Elephant Swede	767	41	738	43

Average yield of plots No. 1 for five years test, 834 bush. 17 lbs.
Average yield of plots No. 2 sown two weeks later for five years, 813 bush. 49 lbs.

MANGELS, TEST OF VARIETIES.

The mangel plots were sown on similar soil; which had the same treatment and manuring as those for turnips. The Giant Yellow Intermediate has given the largest returns for the period of five years test, followed by the Mammoth Long Red. The following are the results obtained during the past season when all the varieties made a strong growth.

MANGELS.—TEST OF VARIETIES.

Name of Variety.	1st Plot Sown.	2nd Plot Sown.	1st Plot Pulled.	2nd Plot Pulled.	Yield per Acre, 1st Plot.	Yield per Acre, 1st Plot.	Yield per Acre, 2nd Plot.	Yield per Acre, 2nd Plot.
					Tons. lbs.	Bush. lbs.	Tons. lbs.	Bush. lbs.
Giant Yellow Intermediate	May 25.	June 8.	Oct. 19.	Oct. 19.	35 965	1,182 45	29 1,850	997 30
Golden Tankard	do 25.	do 8.	do 19.	do 19.	32 790	1,079 50	30 800	1,013 40
Dairy Farmer	do 25.	do 8.	do 19.	do 19.	27 1,100	818 20	23 1,500	791 40
Red Fleshed Tankard	do 25.	do 8.	do 19.	do 19.	24 165	802 45	15 875	514 35
Gate Post	do 25.	do 8.	do 19.	do 19.	22 175	736 15	21 1,600	726 40
Evan's Mammoth Long Red	do 25.	do 8.	do 19.	do 19.	21 1,700	728 20	20 1,800	696 40
Conqueror Yellow Globe.	do 25.	do 8.	do 19.	do 19.	21 1,415	723 35	17 1,150	585 50
Webb's Mammoth Long Red	do 25.	do 8.	do 19.	do 19.	19 950	649 10	24 450	807 30
Warden Prize Orange Globe	do 25.	do 8.	do 19.	do 19.	19 475	641 15	16 15	533 35
Champion Yellow Globe.	do 25.	do 8.	do 19.	do 19.	17 1,625	593 45	23 1,975	799 35
Sharpe's Mammoth Long Red	do 25.	do 8.	do 19.	do 19.	16 775	546 15	23 75	767 45
Red Globe	do 25.	do 8.	do 19.	do 19.	10 1,375	356 15	15 400	506 40

MANGELS.—General average for two sowings per acre :—

	Bush.	Lbs.
No. 1 Sowing of May 25, 1895	738	12
No. 2 " June 8, 1895	728	28

SUMMARY.

Average yield per acre for five years' sowing :—

Name of Variety.	Plot No. 1.		Plot No. 2.	
	Bush.	Lbs.	Bush.	Lbs.
Giant Yellow Intermediate	860	6	819	43
Mammoth Long Red	790	48	742	36
Golden Tankard	739	27	658	14
Gate Post	723	30	728	9
Yellow Globe	646	2	669	33

Average yield of plots No. 1 for five years 751 bushels, 58 lbs.
Average yield of plots No. 2 for five years 723 bushels, 39 lbs.

CARROTS.—Test of Varieties.

The carrot plots were on land similar to that of the turnip plots; and received the same cultivation and manuring. It will be noticed that, while on the average the difference is not very large between the early and late sown plots of turnips and mangels, there is a very marked difference in the carrot plots in favour of early sowing.

Name of Variety.	Character of Growth.	1st Plot Sown.	2nd Plot Sown.	1st Plot Pulled.	2nd Plot Pulled.	Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
						Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
Improved Short White	Strong..	May 25	June 8	Oct. 21	Oct. 21	24	1,400	823	20	9	525	308	45
Mam. White Intermediate	do ..	do 25	do 8	do 21	do 21	21	275	704	35	13	1,550	459	10
Iverson's Champion	do ..	do 25	do 8	do 21	do 21	20	1,800	696	40	15	1,825	530	25
Carter's Orange Giant	do ..	do 25	do 8	do 21	do 21	20	565	676	5	8	150	268	10
Improved Half-Long White	do ..	do 25	do 8	do 21	do 21	19	950	649	10	15	1,825	530	25
Early Gem	do ..	do 25	do 8	do 21	do 21	19	190	636	30	6	1,775	229	35
Yellow Intermediate	Fair....	do 25	do 8	do 21	do 21	18	1,050	617	30	9	1,950	332	30
Long Scarlet Altringham	Poor ...	do 25	do 8	do 21	do 21	14	1,925	498	45	5	450	174	10
White Belgian	Fair....	do 25	do 8	do 21	do 21	13	125	435	25	10	425	340	25
Scarlet Intermediate	do ...	do 25	do 8	do 21	do 21	11	1,275	387	55	11	1,275	387	55
Long Orange, or Surrey	Poor ...	do 25	do 8	do 21	do 21	11	325	372	5	5	450	174	10
Giant Short White Vosges	Fair....	do 25	do 8	do 21	do 21	8	1,765	296	5	14	975	482	55

CARROTS.—General average for two sowings—per acre :—

	Bushels.	Lbs.
No. 1 Sowing of May 25, 1895	566	3
No. 2 " June 8, 1895	351	5

SUMMARY.

Average yield per acre, for five years :—

Name of Variety.	Plot. No. 1.		Plot. No. 2.	
	Bush.	Lbs.	Bush.	Lbs.
White Intermediate	851	38	516	11
Improved Short White	814	2	496	33
Early Gem	695	52	386	18
Guerande or Oxheart	680	35	405	1
Carter's Orange Giant	580	8	380	21
White Belgian	550	41	363	26

Average yield of plots No. 1 for five years 695 bushels, 29 lbs.
Average yield of plots No. 2 for five years 424 bushels, 38 lbs.

Sugar Beets.

Five varieties of sugar beets were sown on May 25th. These were pulled on October 24th. The soil was of a sandy loam; a complete fertilizer, at the rate of six hundred pounds per acre being used. The following results were obtained:—

Name of Variety.	Yield per Acre.			
	Tons.	Lbs.	Bush.	Lbs.
Austrian Electoral	19	250	637	30
German White	17	1,250	587	30
White French	14	1,775	496	15
Klein Wanzleben	13	250	437	30
Vilmorin's Improved	12	975	416	15

Field Crops of Roots.

In addition to the root plots already referred to; four acres of turnips gave a yield of 982 bushels per acre. One-half acre of mangels gave a yield of 800 bushels per acre. A plot of Steele's Improved Short White carrots which were sown on the same date as the mangels June 9th, and pulled October 25th, gave a yield of 725 bushels per acre.

EXPERIMENTS WITH POTATOES.

Cutting Seed Potatoes for Planting.

Potatoes for seed were cut in eight different ways and planted. It seems evident from the experiments conducted along this line at Nappan that it pays to use large tubers for seed rather than small ones and that care should be taken in cutting potatoes that they are not cut too small. It will require more seed per acre to make large cuts, yet the extra yield would more than pay the difference in the value of the seed used. The following results were obtained:—

Name of Variety.	Yield per Acre.			
	Marketable.		Unmarketable.	
	Bush.	Lbs.	Bush.	Lbs.
Whole	320	..	40	..
One eye	180	..	20	..
Two eyes	255	..	40	..
Three eyes	310	..	30	..
Butt end	307	30	55	..
Seed end	312	30	35	..
Cut lengthwise	307	30	35	..
Seed end cut off	310	..	57	30

POTATOES PLANTED WITH AND WITHOUT FERTILIZER.

These plots were on a rather light loam which was ploughed in the fall of 1894, being in timothy and clover that year. Six hundred pounds of potato fertilizer was used per acre, sown broadcast, without other manure. The other plot received neither fertilizer nor manure.

WITH FERTILIZER, PER ACRE.

	Marketable.	Unmarketable.
Clarke's No. 1	362·40 busb.	26·40 bush.
Pearce's Prize Winner	415·00 "	55·00 "

WITHOUT FERTILIZER PER ACRE.

	Marketable.	Unmarketable.
Clarke's No. 1	240 bush.	31·40 bush.
Pearce's Prize Winner	282·30 "	52·30 "

BORDEAUX MIXTURE FOR THE PREVENTION OF POTATO ROT.

Three plots were used to ascertain the effects of Bordeaux mixture as a preventive of potato rot. The first application was made on August 1st, and the second two weeks later. The soil selected was of a uniform character, yet there appeared to be a difference in yield in favour of the plots on which the Bordeaux mixture was used. No rotten potatoes were found in any of the plots. The results obtained were as follows :—

BORDEAUX MIXTURE APPLIED.

	Marketable. Per acre.	Unmarketable. Per acre.
World's Fair	177 bush.	28 bush.
Pearce's Prize Winner	167 "	26 "
Clarke's No. 1	138 "	16 "

NO BORDEAUX MIXTURE USED.

	Marketable. Per acre.	Unmarketable. Per acre.
World's Fair	161 bush.	11 bush.
Pearce's Prize Winner	152 "	25 "
Clarke's No. 1	93 "	8 "

POTATOES, TEST OF VARIETIES.

Eighty-five varieties of potatoes were planted on a light loamy soil, which had been in meadow the previous season, it was ploughed in the fall of 1894. Not having sufficient barn-yard manure, six hundred pounds of potato fertilizer was used per acre, sown broadcast. All the plots were treated with the Bordeaux mixture, and no rotten ones were found.

Among the most promising varieties are: Early Sunrise, Pearce's Extra Early, Early Gem, Clarke's No. 1, I. X. L., Late Puritan, Delaware, State of Maine and Pearce's Prize Winner. The following results were obtained.

Potatoes—Test of Varieties.

Name of Variety.	Planted.	Dug.	When matured.	Average size.	Quality.	Total yield per acre.		Yield per acre of marketable.		Yield per acre of unmarketable.		Form and colour.
						Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
Pearce's Prize Winner	May 23.	Sept. 24.	Late	Medium	Good	375		352	30	22	30	Oblong, white.
Wonderful Clay Rose	" 23.	" 24.	"	"		360		340		20		Roundish, pink.
Richter's Rose	" 23.	" 24.	Medium late	"	Good	350		330		20		Oblong, white.
Holborn Abundance	" 23.	" 25.	Late	Large	"	350		315		35		Long round, white.
Carman's No. 1	" 23.	" 24.	Medium late	Medium	"	345		325		20		Round, white.
Empire State	" 23.	" 24.	Late	Large	"	340		302	30	37	30	Long round, white.
American Wonder	" 23.	" 25.	"	"	"	340		312	30	27	30	Elongated, white.
Dreer's Standard	" 23.	" 25.	Medium early	"	"	340		302	30	37	30	Long round, white.
Clarke's No. 1	" 23.	" 24.	"	"	"	336	15	315		21	15	Round, white and pink.
Richter's Elephant	" 23.	" 24.	Medium late	Medium	"	330		280		50		Long round, pinkish.
Early Harvest	" 23.	" 24.	Early	"	"	325		295		30		Round, white.
Irish Daisy	" 23.	" 25.	Medium late	"	"	325		270		55		Roundish, white.
Brownell's Winner	" 23.	" 24.	Late	Large	Fair	320		305		15		Oblong, red.
Late Puritan	" 23.	" 25.	"	Medium	Good	320		305		15		Long round, white.
Peerless Junior	" 23.	" 24.	"	Large	"	320		305		15		Round flat, white.
Home Comfort	" 23.	" 24.	Medium early	"	"	307	30	285		22	30	Oblong, light and pink.
New Variety No. 1	" 23.	" 24.	Medium late	Medium	"	307	30	285		22	30	Round, pinkish white.
Rural New Yorker No. 2	" 23.	" 25.	"	"	"	306		301		5		Oblong roundish, white.
Dixon's Early	" 23.	" 24.	Medium early	"	"	302	30	267	30	35		Oval, pink and white.
Pride of the Table	" 23.	" 24.	"	"	"	302	30	272	30	30		Round, red.
Abbot	" 23.	" 24.	Medium late	"	"	300		280		20		Long round, pink.
Delaware	" 23.	" 24.	Late	Large	"	300		275		25		Round, white.
Chicago Market	" 23.	" 25.	Medium late	Medium	"	300		257	30	42	30	Oval, white.
Polaris	" 23.	" 25.	"	"	"	300		255		45		Oblong, white.
Bruce's White Beauty	" 23.	" 24.	Medium early	"	"	300		260		40		Oblong. white.
State of Maine	" 23.	" 24.	Late	"	"	300		275		25		Long round, white.
Munro County	" 23.	" 25.	Medium late	"	"	297	30	265		32	30	Long round, light red.
Dakota Red	" 23.	" 25.	Late	Large	Fair	295		262	30	32	30	Round, red.
Muchonic	" 23.	" 24.	"	Medium	"	292	30	267	30	25		Round, blue and white.
Bent's Late	" 23.	" 25.	"	Large	"	290	30	265		25	30	Roundish, white.
Kidney	" 23.	" 24.	Medium early	Medium	Good	287	30	275		12	30	Long, blue.
Richter's Schneerose	" 23.	" 25.	Late	"	Fair	285		252	30	32	30	Round, white.
Earliest of All	" 23.	" 25.	Early	"	Good	285		250		35		Oval, white and pink.
Copper	" 23.	" 24.	Late	"	"	285		230		55		Round, blue.

POTATOES—TEST OF VARIETIES—*Continued.*

Name of Variety.	Planted.	Dug.	When Matured.	Average Size.	Quality.	Total yield per acre.		Yield per acre of marketable.		Yield per acre of unmarketable.		Form and colour
						Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
Jerusalem	May 23	Sept. 24	Late	Medium	Good	283		275		8		Round, red.
Troy Seedling	" 23	" 24	"	Large	"	282	30	262	30	20		Round, white.
I. X. L.	" 23	" 25	"	"	"	282	30	265		17	30	Oblong, white and pink.
Early Ohio	" 23	" 25	Early	Medium	"	280		245		35		Oval, light pink.
Lee's Favourite	" 23	" 24	"	"	"	280		250		30		Round, pink and white.
Burbank	" 23	" 24	Medium late	"	"	280		265		15		Oblong, white.
Rose's New Giant	" 23	" 25	"	"	Fair	277	30	262	30	15		Long, round, white.
Pride of the Market	" 23	" 25	Medium early	Large	Good	275		250		25		Long, flat, white.
Lightning Express	" 23	" 24	Medium late	"		275		260		15		Round, pink.
Northern Spy	" 23	" 25	Late	Medium	Good	272	30	255		17	30	Round, red.
Crown Jewel	" 23	" 25	Early	"	"	272	30	222	30	50		Oval, white.
Rosy Morn	" 23	" 24	Medium late	"	Fair	272	30	225		47	30	Round, pinkish.
Richter's Imperial	" 23	" 24	"	"	Good	268	30	225		43	30	Round, white.
Beauty of Hebron	" 23	" 24	Medium early	"	"	267	30	225		42	30	Oblong, white and pink.
Acadian	" 23	" 24	Medium late	"	"	265		240		25		Round, blue.
Compton's Surprise	" 23	" 25	Late	"	"	262	30	240		22	30	Round, white.
Everett	" 23	" 25	Medium early	"	Fair	260		215		45		Oval, pink.
Harbinger	" 23	" 25	"	"	Good	260		210		50		Round, light pink.
Early Gem	" 23	" 24	Very early	"	"	260		225		35		Oval, pink.
Early Rose	" 23	" 24	Early	"	"	260		225		35		Oblong, pink.
Early Norther	" 23	" 24	Medium early	Large	"	260		215		45		Round, light red.
Money-maker	" 23	" 25	Medium late	Medium	"	260		230		30		Long, smooth, white.
Early White Prize	" 23	" 24	Early	"	"	255		220		35		Round, white.
New Queen	" 23	" 24	Medium early	"		250		220		30		Long, round, white.
Victor Rose	" 23	" 24	Late	"		250		235		15		Round, pink.
Sharpe's Seedling	" 23	" 25	Medium early	"	Good	250		205		45		Round, pale pink.
Late Goodrich	" 23	" 25	Late	Large	Fair	247	30	222	30	25		Round, white.
Burpee's Extra Early	" 23	" 25	Very early	Medium	Good	247	30	212	30	35		Oblong, whitish pink.
Henderson's Late Puritan	" 23	" 24	Late	Large	"	247	30	230		17	30	Roundish, white.
Wonder of the World	" 23	" 24	Medium late	Medium	"	237	30	207	30	30		Roundish, white.
London	" 23	" 25	"	"	Fair	235		202	30	32	30	Oval, pink.
Early Sunrise	" 23	" 25	Very early	"	Good	230		177	30	52	30	Oblong, pink.
Sugar	" 23	" 24	Medium late	Small	"	225		190		35		Round, white.
Great Divide	" 23	" 24	Early	Medium	"	225		210		15		Long, round, white.

Pope	"	23..	"	24..	Late	"	....	Good	225		208		17		Roundish, red and white.
Maggie Murphy	"	23..	"	24..	Medium late	"	....		224	30	214	30	10		Round, pink.
Algoma	"	23..	"	25..	Very early	"	....	Good	220		190		30		Oblong, white and pink.
World's Fair	"	23..	"	25..	Medium late	"	....	"	217	30	165		52	30	Round, yellowish white.
Puritan	"	23..	"	24..	Early	"	....		215		180		35		Roundish, white.
Lizzie's Pride	"	23..	"	25..	Medium late	"	....	Good	202	30	167	30	35		Oval, white and pink.
Freeman	"	23..	"	25..	Early	"	....	"	200	50	160		40	50	Oval, wh te.
Prize Taker	"	23..	"	24..	Medium late	"	....	"	200		160		40		Round, red.
Toronto Queen	"	23..	"	24..	"	Small	....	"	195	30	152	30	43		Round, pink and white.
Daisy	"	23..	"	24..	Medium early	Medium	....	"	192	30	157	30	35		Round, white and pink.
Early Puritan	"	23..	"	25..	"	"	....	"	189	40	152	10	37	30	Oblong, white.
Orphans	"	23..	"	24..	Late	"	....	"	185		175		10		Long, round, white.
Pearce's Extra Early	"	23..	"	25..	Early	"	....	"	181		143	30	37	30	Long, round, whitish pink.
Rural Blush	"	23..	"	25..	Late	Large	....	Fair	178	30	143	30	35		Round, red.
Stray Beauty	"	23..	"	25..	Medium early	Medium	....	"	177	30	147	30	30		Round, red.
Thorburn	"	23..	"	25..	Medium late	"	....	Good	170		117	30	52	30	Round, pink and white.
Early Six-weeks	"	23..	"	24..	Very early	Small	....	"	147	30	130		17	30	Round, pink.

EXPERIMENTS WITH CORN.

Seventeen varieties of corn were sown on a light loamy soil in rows and a duplicate set of plots were planted side by side in hills. From the experiments which have been conducted here during the last three years it would appear that there is a decided gain in yield by planting in rows and as the seed is sown in the rows with the seed drill, a saving in labour is also effected as compared with the planting in hills.

CORN—TEST OF VARIETIES.

Name of Variety.	Date of Sowing.	Date when Cut.	Condition when Cut.	Weight per Acre grown in Rows.		Weight per Acre grown in Hills.	
				Tons.	Lbs.	Tons.	Lbs.
Rural Thorough-bred White Flint	May 18..	Sept. 14..	Silking	19	500	18	850
Angel of Midnight	do 18..	do 14..	Soft glazed	17	100	16	1,000
Country Gentleman	do 18..	do 14..	do	15	250	12	750
Red Cob Ensilage	do 18..	do 14..	Tasselling	14	600	13	950
New White Cap Yellow Dent	do 18..	do 14..	Silking	12	750	13	1,500
Extra Early Huron Dent	do 18..	do 14..	Hard glazed	12	640	10	1,450
Compton Early	do 18..	do 14..	Soft glazed	12	1,300	13	1,500
Sanford White Flint	do 18..	do 14..	do	12	640	11	1,650
Champion White Pearl Dent	do 18..	do 14..	do	12	200	10	1,450
Longfellow	do 18..	do 14..	Glazed	12	750	11	1,120
Giant Prolific Ensilage Sweet	do 18..	do 14..	Silking	11	1,650	11	....
Mam. Eight-rowed Flint	do 18..	do 14..	Soft glazed	11	1,100	9	700
Canada White Flint	do 18..	do 14..	Silking	11	1,100	14	50
North Dakota	do 18..	do 14..	Hard glazed	9	1,250	7	300
Pearce's Prolific	do 18..	do 14..	Glazed	9	1,250	8	500
Canadian Dent	do 18..	do 14..	do	8	1,050	8	1,050
Mitchell's Extra Early	do 18..	do 14..	Hard glazed	8	500	4	1,350

CORN.—Average yield per acre from corn sown in rows and hills:

	Ton.	Lbs.
Sown in hills, 1895	11	986
do rows 1895	12	796

SUMMARY.

Average yield per acre from experiments conducted with corn during three years, 1893-4 and 95.

—	Condition when cut.	Rows. Tons.	Rows. Lbs.	Hills. Tons.	Hills. Lbs.
Angel of Midnight	Soft glazed.	19	1350	14	783
Compton's Early	Glazed.	15	800	15	1166
Longfellow	do	13	675	10	1185
Pearce's Prolific	do	12	1300	11	1100
Mitchell's Extra Early	Hard glazed.	11	1283	8	1233

Average yield of corn sown in hills for three years, 12 tons 293 pounds.
Average yield of corn sown in rows for three years, 14 tons 1081 lbs.

ROBERTSON MIXTURE.

Two and three-quarter acres of corn was sown at different times ; ½ acre on May 10th ; ½ acre on the 17th ; and 1¾ acres on May 18th. The seed was sown with the seed drill in rows 3 feet apart. There was no apparent advantage in early sowing. The corn all matured well giving a yield of 9 ton 224 lbs. per acre.

One and one-half acres of horse beans was sown in rows 3 feet apart on May 18th. These made strong growth and matured well, yielding 5 ton 800 lbs. per acre.

Three-quarters of an acre of sunflowers was sown in rows, three feet apart, on May 24th, giving a yield of 3 ton 288 lbs. of heads per acre. These were well mixed when put in the silo. The corn and beans were cut to about ¾ of an inch in length. The sunflower heads were put in whole, making nearly 37 tons of the mixture.

EXPERIMENTS WITH GRASSES.

Of the grasses sown on 30th April, 1894, twenty varieties have proven sufficiently hardy to stand our winters. The following notes were taken on their growth during the past season :—

Canary Reed Grass. *Phalaris arundinacea.*—Growth 20th May, 16 inches, cut for seed 11th July; growth rank, height when cut 5 feet.

Tall Oat Grass. *Avena elatior.*—Growth 20th May, 13 inches, cut for seed 9th July, height when cut 4 feet.

Awnless Brome Grass. *Bromus inermis.*—Growth 20th May, 13 inches, cut for seed 21st July, height when cut 4⅓ feet, growth very thick.

Tall Fescue. *Festuca elatior.*—Growth 20th May, 10 inches, cut for seed 12th July, height when cut 3 feet 9 inches, growth medium thick.

Western Brome Grass. *Bromus Pumpellianus.*—Growth 20th May, 9 inches, cut for seed 12th July, height when cut 4 feet.

Meadow Fescue, *Festuca pratensis.*—Growth 20th May, 9 inches, cut for seed 12th July, height when cut 2 feet 10 inches, fair growth.

Orchard Grass. *Dactylis glomerata.*—Growth 20th May, 12 inches, cut for seed 6th July, height when cut 3 feet 7 inches, made a good thick growth.

Sheep's Fescue. *Festuca ovina.*—Growth 20th May, 7 inches, cut for seed 6th July, height when cut 18 inches, thick growth.

Hard Fescue. *Festuca duriuscula.*—Growth 20th May, 7 inches, cut for seed July 6th, height when cut 19 inches, thick growth.

Late or Fowl Meadow grass. *Poa serotina.*—Growth 20th May 6 inches, cut for seed 2nd Aug., height when cut 2½ feet, medium thick growth.

Meadow Brome Grass. *Bromus pratensis.*—Growth 20th May, 5 inches, cut for seed 10th July, height when cut 2 feet 8 inches, fair growth.

Upright Brome Grass. *Bromus erectus.*—Growth 20th May, 5 inches; cut for seed 12th July; height when cut 2 feet 10 inches; fair growth.

Lyme Grass. *Elymus Virginicus.*—Growth 20th May, 6 inches, cut for seed 20th August, height when cut 3 feet 3 inches, thick growth.

Chess. *Bromus secalinus.* Growth 20th May, 5 inches, cut for seed 29th July, height when cut 3 feet, medium thick growth.

Western Rye Grass. *Agropyrum tenerum.*—Growth 20th May, 3 inches, cut for seed 19th July, height when cut 3 feet 2 inches, poor growth.

Sweet Vernal. *Anthoxanthum odoratum.*—Growth 20th May, 2 inches, cut for seed 6th July, height when cut 1 foot 10 inches, poor growth.

Meadow Fox-tail. *Alopecurus pratensis.*—Growth 20th May, 20 inches, cut for seed 22nd June, height when cut 3½ feet, strong growth.

Switch Grass. *Panicum virgatum.*—Growth 20th May, 1 inch; cut for seed 26th August; height when cut, 2 feet, 10 inches ; fair growth.

Timothy, *Phleum pratense.*—Growth, 20th May, 7 inches; cut for seed 5th August; height when cut 2½ feet.

Red Top, *Agrostis dispar.*—Growth, 20th May, 2 inches; cut for seed 4th August; height when cut, 18 inches; fair growth.

CANARY SEED.

On 1st May, a one-twentieth acre plot of canary seed was sown. The soil was rather loamy, the previous crop being clover, the aftermath of which was ploughed in in the fall of 1894. This ripened 5th August, maturing in 96 days, giving a yield of 17 bushels 44 pounds per acre, with a weight per bushel of 49 pounds.

MILLET.

Two varieties of Millet, the French, and the German or Golden, were sown on 18th May on one-twentieth acre plots. These failed to germinate well, probably due to the dry weather, and, the growth being weak, they were ploughed up.

BEANS.

Six varieties of beans were sown on 31st May:

Name of Variety.	Ripe.	Number of days Maturing	Remarks.
Arctic	Sept. 4	96	White and yellow, very prolific.
Early Dun Colour	do 6	98	Dun colour, very prolific.
Refugee Wax	do 7	99	White, medium prolific.
Red German Wax	do 7	99	Red and white, very prolific.
Detroit Wax	do 8	100	Black and white, very prolific.
Prince William	do 8	100	Poor growth.

WATER AND MUSK MELONS.

Six varieties of Musk and two of Water melons were sown in the open ground on 31st May. On account of the dry weather these made poor growth and failed to produce fruit. The following varieties were sown of Musk melon: the Osage, New Port, Christiana, and Hackensack. Of Water melons the Peerless and Mountain Sweet were the varieties tested.

CUCUMBERS.

Eight varieties of cucumbers were sown on 31st May. On account of the dry weather these did not make very strong growth.

Noah's Forcing—Fairly productive, a good variety for forcing.
Improved White Spine.—Prolific, one of the best for general use.
Improved Long Green.—Good cropper, long, firm and crisp.
Tailby's Hybrid.—Medium productive, quality good.
Rollinson's Telegraph.—16 to 20 inches long, very prolific.
Japanese Climbing.—Very prolific, of a good quality.
Lord Kenyon's Favourite.—Crisp and firm, quality good.
Livingston's Evergreen.—Strong grower, quality good.

ONIONS.

Eight varieties of onions were sown on 8th May. These failed to bulb well, and some varieties formed scullions badly. The onion maggot (*Phorbia ceparum*) did

considerable damage. Carbolic emulsion was used and proved quite effective in checking the pest.

Name of Variety.	Yield of marketable.	Yield of unmarketable.
	Lbs.	Lbs.
Yellow Flat Danvers	34	37
Silver Skinned	24	24
Red Globe Danvers	20	36
Southport Yellow Globe	21	33
Large Yellow Globe Danvers	15	30
Large Blood Red Wethersfield	15	60
Southport Large Red Globe	15	45
Giant Spanish Yellow	....	10

PARSNIPS.

Four varieties of parsnips were sown 8th May.
Maltese.—Fair quality.
Half Long Guernsey.—Failed to grow.
Student.—Not as good as Hollow Crown.
Hollow Crown.—Finest variety.

GARDEN CARROTS.

Five varieties of table carrots were sown 8th May. In point of earliness for house purposes they rank in the order named :—
Danver's Improved Half-long.—Good market variety.
Mitchell's Half-long.—Fair market variety.
Scarlet Model.—Fair market variety.
Henderson's Intermediate.—Good market variety.
Short Valery.—Fair market variety.

BEETS.

Five varieties of beets were sown 8th May. As to quality, they rank in the order named :—
Evans' Medium.—Fairly productive.
Early Blood Turnip.—Fairly productive.
Rennie's Intermediate.—Very productive.
Ne Plus Ultra.—Fairly productive.
Whyte's very deep.—Very productive.

GARDEN CORN.

Five varieties of garden corn were planted on 18th May. The following notes were taken when fit for table use :—

Name of Variety.	Fit for table use.	Remarks.
Mitchell's Extra Early	Aug. 28	Cobs, small.
Early Marblehead	Sept. 2	Cobs fair size, fine flavour.
Early Minnesota	" 6	Cobs fair size, good flavour.
Perry's Hybrid	" 10	Large, fine.
Champion Sweet	" 10	Large, good quality.

GARDEN PEASE.

Fifteen varieties of garden pease were sown on 8th May, all of these made good growth:

Name of Variety.	Fit for use.	Remarks.
Little Giant	July 9..	A prolific dwarf of good flavour.
Hair's Dwarf Mammoth	do 22..	Medium prolific, good quality.
C. P. R.	do 23...	Very prolific, good flavour.
Telegraph	do 21...	do excellent quality.
Shropshire Hero	do 22...	Prolific, extra good quality.
Maud S.	do 8...	Medium prolific, fair quality.
Sunol	do 6..	do do
Juno	do 24...	Fairly productive, fine flavour.
Heroine	do 22...	Prolific, excellent quality.
Burpee's Profusion	do 20...	Very prolific, good quality.
Bliss' American Wonder	do 10...	do fine quality.
Horsford's Market	do 20...	Prolific, excellent.
Stratagem	do 20...	Very prolific, fine quality.
Pride of the Market	do 13...	do do
Prince of Wales	do 18...	Prolific, good quality.

RADISHES.

Nine varieties of radishes were sown in the open ground on 8th May. These made good strong growth but proved to be infested with the radish maggot. These were all dug up and destroyed on 15th June. The following notes were taken:

French Breakfast.—Best for hot bed growing; of quick growth and fine quality, fit to use 12th June.

Rosy Gem.—Fine for hot bed growing; mild flavour and crisp; fit to use 13th June.

Scarlet Button.—Very fine, not large, good flavour, fit for use 14th June.

Ne Plus Ultra.—Good quality—fine forcer, fit to use 13th June.

Rond Rose Hatif.—Fine flavour, a good forcing variety, fit to use 13th June.

Vaughan's Earliest Carmine Turnip.—Of excellent flavour and crisp, fine for forcing, fit for use 13th June.

Long Bright Scarlet.—Medium late, fine field market variety.

Golden Turnip.—Late variety.

China Rose Winter.—Very late winter variety.

TOMATOES.

Seventeen varieties of tomatoes were sown in the hot bed on 18th April. These were thinned to about one inch apart, and were transplanted to the open ground on June 5th. They all made excellent growth, and all the varieties ripened more or less fruit. The Conqueror, a very desirable smooth variety proves, to be one of the most prolific. Vaughan's Earliest Of All ripened first; and although somewhat rough it is of fine quality. The yield of the different varieties was obtained by weighing the entire product of two plants to the end of maturity.

TOMATOES.

Name of Variety.	Date when first Ripened.	Yield from two Plants.
		Lbs.
Earliest of All	Aug. 18..	9
Mayflower	do 26..	4
Atlantic Prize	do 30..	13
Dwarf Champion	do 31..	8
Mitchell's No. 1	Sept. 1..	7
Dwarf Aristocrat	do 4..	9¼
Early Michigan	do 4..	8
Large Red	do 4..	9
Fordhook's First	do 4..	7
Early Conqueror	do 5..	19½
Early Ruby	do 5..	8¼
Canada Victor	do 5..	9½
Trophy	do 5..	11
Everbearing	do 7..	5½
Acme	do 8..	6½
Optimus	do 8..	4
Ponderosa, Henderson's	.....	7¾

LETTUCE.

Nine varieties of lettuce were sown in the open ground on May 8th. Duplicate plots were filled with lettuce transplanted from the hot-bed on June 19th. The transplanted lettuce headed better than that sown in the open ground.

Early Ohio.—Fine early variety.

Big Boston.—Good quality, heads well.

Early Curled Silesia.—One of the best early kinds.

California All Heart.—Fine and crisp, heads well.

Imperial Cabbage.—Tender and of good quality, heads well.

Defiance.—Good variety, fair header.

Nonpareil.—Crisp and excellent.

New Blonde Beauty.—Tender and crisp, good flavour, an excellent market variety.

Paris White Cos.—One of the best of the Cos varieties, these should be tied up to blanch.

CABBAGE.

Fifteen varieties of cabbage were sown in the hot bed on 18th April and transplanted to the open ground May 23rd. The cabbage root maggot, *Anthomyia Brassicæ*, again made its appearance and although various methods were resorted to for the destruction of this pest, most of the plants were killed and the plants had to be reset. Seed was sown in the open ground May 18th. The plants made strong growth and were not affected with the root maggot and headed well.

Early Varieties Sown.

Extra Early Express—The earliest cabbage grown, Good header, finest quality.

Henderson's Early Summer.—Large and solid, later than the Wakefield.

Jersey Wakefield.—Very early, pyramidal in shape, fine header.

Dwarf York—Heads small and solid. Good quality.

Early Winningstadt—Good header, excellent flavour. One of the best for general use.

Early Etampes—Medium heads, fine quality. Medium solid.

Second Early.

Drumhead Savoy—Large head, firm.
Henderson's Succession—Fair head, firm, of good quality.
Vandergaw—Fair size, good header, solid.

Late.

Marblehead Mammoth Drumhead, very solid, good header, fine winter variety.
St. Denis Large Drumhead, firm, good header, fine quality.
Filderkraut, solid head, good quality, fine keeper.
Late Flat Dutch, solid head, fine winter variety.
German Drumhead Savoy, large, fine quality, solid.
Dark Red Erfurt, medium large, blood red, crisp, fine for pickling.

CAULIFLOWER.

Thirteen varieties of cauliflower were sown in the hot bed on 18th May, and transplanted to the open ground 23rd May. The root maggot was first noticed July 12th and subsequently some of the varieties were completely destroyed.

Early Snowball, one of the earliest dwarf, and compact.
Gilt Edge, sure to head ; quality good.
Demi-Dur, early, medium head, compact and firm.
Extra Early Erfurt, dwarf, good to head, firm of good quality.
Dwarf XXX. Erfurt, large, firm ; quality excellent.
Early Favourite, large, firm, compact head, quality good.
Extra Early Whitehead, solid compact, white, of fine quality.
Walcheren, heads large, firm and compact, fair header,
Late Algiers, firm, good header, excellent quantity.

CELERY.

Seventeen varieties of celery were sown in the hot-bed 18th April, and transplanted to the open ground 27th June. These all made strong growth. Among the most promising kinds are:

White Plume, dwarf, early, self-blanching, of fine flavour.
Paris Golden Yellow, self-blanching, crisp and firm, of fine quality.
Boston Market, dwarf growth, crisp and solid, good quality.
Simmer's Ribbed Dwarf, white, crisp, of fine flavour.
Giant Pascal, solid, crisp, flavour excellent, one of the finest winter varieties.
Rennie's Giant White, white, large, solid, thick, quality fair.
New Rose, crisp, fine flavour, good for late use.
Giant Golden Heart, white, crisp, flavour fair, good keeper.

The other varieties are :

Perfection Heartwell, Evans New Triumph, Perle La Grande, De Candolle, Henderson's Golden Dwarf, Golden Yellow Large Solid, Turkish Giant Purple, White Solid, and Carter's Incomparable Dwarf Crimson.

ASPARAGUS.

Three varieties of asparagus, the Giant, Palmetto and Donald's Elmira were sown on 18th June. These made good growth. The three varieties planted last year made strong growth and will probably give good returns next season.

HOPS.

The two varieties of hops, California Cluster and East Kent Goldings, planted in the spring of 1894, made strong growth and produced a fair crop.

TOBACCO.

Six varieties of tobacco were sown in the hot-bed on 9th May, and transplanted to the open ground on 27th June. These all made strong growth, but failed to properly mature. The following were the varieties sown:—Blue Pryor, Connecticut Seedleaf, Kentucky, Havana, Cannelle and White Burley.

STRAWBERRIES.

Of the fourteen varieties of strawberries reported as under test last year, only eight survived the winter, and of these only a limited number of plants were secured. These have been moved to a more favourable locality where it is hoped better results will be obtained. Eleven varieties were received on 24th April, from the Central Experimental Farm, these were planted 2nd June. Some of these varieties made strong, and others only poor growth. As to the season's growth they rank in the order named:—Warfield, Crescent, John Little, Jas. Vick, Pearl, Beverly, Williams, Parker Earle, Haverland, and Beder Wood.

On 30th August, plants of twelve varieties were received from the Central Experimental Farm. Five of these were to complete plots which had partially died after spring planting, these were: Pearl, Beverly, Williams, Parker Earle, and Beder Wood. Those added as new varieties were: Captain Jack, Shirts, Woolverton, Leader, 1001, Iowa Beauty and Wilson.

GRAPES.

In the spring of 1891, a vine of the Green Mountain grape was procured from a local nurseryman. This made a strong growth and was removed to permanent quarters in the spring of 1893. The growth during this period showed this to be a very vigorous and hardy grape. In 1894 this vine bore twelve well formed bunches, but on account of the very early frost of 7th September, the fruit did not reach maturity. Some 65 bunches were formed on this vine during the past season, these all ripened well, being fully matured by 25th September. The vine is strong and healthy with large foliage; very productive; fruit of good quality; bunch and berry of medium size, fruit greenish-white and a good keeper; keeping in the cold store-house till the middle of October.

Eight additional varieties were received from the Central Experimental Farm and set out on 2nd May, these made promising growth, the following are their names: Lady, Rogers 17, Vergennes, Moore's Diamond, F. B. Hayes, Barry, Florence and Herbert.

CURRANTS.

The eleven varieties of currants reported as under test last year made strong growth and produced a considerable quantity of fruit.

White Varieties.

White Transparent.—Strong growth, very productive, fruit large, of excellent quality, ripe 1st August.

White Grape.—Similar to the White Transparent.

White Dutch.—Strong growth, very productive, fruit large, flavour fine, ripe 1st August.

Red Varieties.

Red Dutch—Very strong growth, productive, fruit large and of good quality, ripe 2nd August.

La Fertile.—Growth fair, fairly productive, fruit large and of excellent quality, ripe 2nd August.

La Hative.—Made moderately strong growth, medium in productiveness, fruit large, flavour excellent, ripe 30th July.

Knight's Early Red.—Strong growth, very productive, fair quality, ripe 27th July.

La Conde—Very strong growth, moderately productive, fruit large, of good quality, ripe 29th July.

Black Varieties.

Ogden's Black.—Strong growth, moderately productive, fruit medium to large and of excellent quality, ripe 2nd August.

Lee's Prolific—Strong growth, prolific, fruit large, and of good quality. Ripe 2nd August.

Baldwin's Black.—Strong growth, fairly productive, quality good, ripe 6th August.

GOOSEBERRIES.

The gooseberries reported as under test last year, made in many cases strong growth. Some of the varieties are very promising for this locality. Mildew and other fungous growths were kept completely in check by the application of Bordeaux mixture.

English Varieties.

Queen Victoria.—Strong growth, large fruit, fair flavour, ripe 2nd August.

Whenham's Industry.—Very strong growth, fruit large, flavour good, ripe 2nd Aug.

Green Overall.—Weak growth, fruit large, extra good flavour, ripe 2nd August.

Companion.—Fair growth, flavour fair, ripe 3rd August.

White Champagne.—Very strong growth, medium to large fruit, flavour good, ripe 3rd August.

Governess.—Medium growth, fruit medium, of fair quality, ripe 4th August.

Pitmaston Green Gage.—Weak growth, fruit small, of excellent flavour, ripe 4th August.

Dublin.—Growth fair, fruit large, of extra quality, ripe 5th August.

Bobby.—Growth poor, fruit large, of excellent quality, ripe 6th August.

Red Champagne.—Growth fair, fruit small, quality excellent, ripe 10th August.

Whitesmith.—Very strong growth, very productive, fruit medium, ripe 10th August.

Leveller.—Strong growth, fruit large and firm, of good quality, ripe 11th August.

American Varieties.

Houghton.—Growth strong, fruit small, good, tender and sweet, ripe 2nd August.

Smith's Improved.—Growth very strong, fruit medium in size and of good quality, ripe 6th August.

Downing.—Very strong growth, very productive, fruit of medium size and fair quality, ripe August 8th.

RASPBERRIES.

In addition to the Cuthbert and Golden Queen; which have proved to be the best and hardiest varieties so far tested, eight new sorts have been added, viz., Clarke, Hornet, Marlboro, Niagara, Hansell, Hebner, Reeder and Hudson River Antwerp. The last named variety was kindly supplied by Campbell Black, Esq., Truro. All these newly added sorts have made strong growth.

BLACK RASPBERRIES.

Four varieties of black raspberries were also received from the Central Experimental Farm and have made fair growth. The varieties are: Tyler, Older, Progress and Smith's Giant.

BLACKBERRIES.

Five varieties of blackberries were planted on 2nd May, these have made strong growth. They are Ancient Briton, Snyder, Agawam, Stone's Hardy and Eldorado.

JUNE BERRIES.

Several Dwarf June berries were received from the Central Farm and planted 2nd May. They have not made strong growth, but are now fairly well rooted and will probably make more progress next season.

LARGE FRUITS.

Many additions have been made to the orchards since last year.

The total number of varieties of fruit now growing in orchards and in nursery rows ready for planting in orchards are: Apples 147, Crab Apples 12, Pears 36, Cherries 39, Plums 41, Apricots 3, Nuts 10. Total 288 varieties.

The orchards generally have made good growth, and have produced a limited quantity of fruit.

Forty varieties of apples fruited this year, among the most productive are: The Yellow Transparent, Longfield, Duchess, Haas, Mann, Scott's Winter, Grimes' Golden, Golden Russet, Red Astrachan, Alexander and Talman's Sweet.

Nine of the cherries fruited, namely Wragg, Montmorency, English Morello, Lieb, Ostheim, Olivet, Early Richmond, Coe's Transparent and Orel.

Of the plums, eight varieties fruited, viz.: Lawrence's Favourite, Shipper's Pride, Reine Claude, Lombard, Moore's Arctic, Imperial Gage, Pond's Seedling and Coe's Golden Drop.

ORNAMENTAL TREES AND SHRUBS.

In addition to the shrubs and ornamental trees reported on last year, 165 different varieties were planted this fall. It is hoped that as a result of these useful tests, reliable information will soon be available as to the most hardy and desirable sorts for the Maritime Provinces, so that the farmer and the citizen may be enabled to beautify their homes, without running the risk of failure from selecting tender sorts.

HEDGES.

Twenty-one different sorts of trees and shrubs have been planted as hedges, each 50 feet long. This test will be a most interesting and instructive one, and will soon furnish reliable information as to the best varieties to select for this purpose.

FLOWERS.

Most of the flowers reported on last year, were again grown during the past season, with the addition of some new varieties.

DRAINAGE.

In addition to the four acres of marsh land underdrained last year, two acres were drained in the spring. The underdraining on the marsh has given excellent satisfaction; all the drains are working well.

SWINE.

Three breeds of pigs are kept: the Tamworth, Yorkshire, and Berkshire. The boars are available to the farmers for service, and the young stock from these breeds find a ready sale, being shipped to various parts of the provinces.

POULTRY.

Three breeds of poultry are kept: the Red Caps, Plymouth Rocks, and White Leghorns.

DISTRIBUTION OF SEED GRAIN, AND POTATOES.

In all, 341 applicants were supplied during the past season with samples of potatoes, wheat, oats, rye, pease or barley.

Total number of packages sent out:—

Oats	302
Potatoes	198
Barley	121
Wheat	76
Pease	52
Rye	9
Total	758

MEETINGS ATTENDED.

Meetings of farmers were attended in different parts of the Maritime Provinces, where subjects bearing on agriculture were discussed.

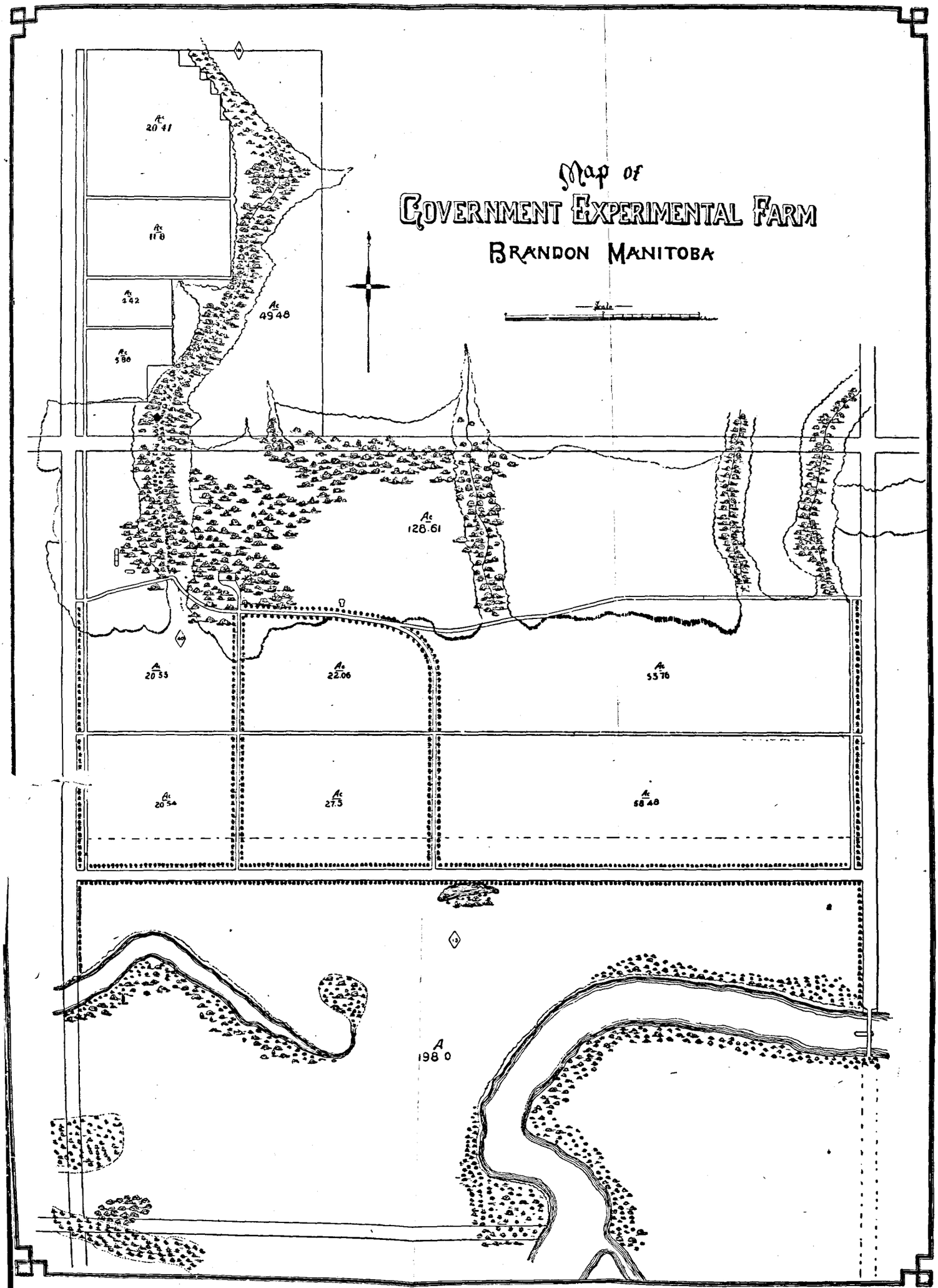
Fredericton, N.B., 6th and 7th March.
Bridgetown, N.S., 8th March.
Berwick, N.S., 9th March.
Windsor, N.S., 11th March.
Wolfville, N.S., 12th March.
Upper Stewiacke, N.S., 14th and 15th March.
Great Village, N.S., 26th March.
Sussex, N.B., 28th March.
Folly Village, N.S. 1st April.
Truro, N.S., 2nd April.
Lions Brook, N.S., 4th April.
East Florenceville, N.B., 27th June.
Andover, N.B., 28th June.
Antigonish, N.S., 3rd July.
Pugwash, N.S., 11th July.
Georgetown, P.E.I., 3rd October.

EXHIBITIONS ATTENDED.

The International Exhibition at St. John, N.B., United Counties Exhibition, New Glasgow, N.S., Westmoreland County Exhibition, Sackville, N.B., and King's County Exhibition, Georgetown, P.E.I., were attended during the past season.

I have the honour to be,
Your obedient servant,

W. M. BLAIR,
Superintendent.


Map of
GOVERNMENT EXPERIMENTAL FARM
BRANDON MANITOBA
Scale
Ac 20 41
Ac 11 8
Ac 2 42
Ac 5 80
Ac 49 48
Ac 128.61
Ac 20 33
Ac 22.06
Ac 55 76
Ac 20 54
Ac 27.3
Ac 58 48
A 198 0

EXPERIMENTAL FARM FOR MANITOBA.

BRANDON, MAN., 30th November, 1895.

To WM. SAUNDERS, Esq.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith my eighth annual report with details of the experiments undertaken and work accomplished on the Brandon Experimental Farm during the past year.

The past season has been a remarkable one in some respects.

The temperature of the three spring months was slightly above the average, with nearly double the average rainfall in May, while the temperature of the three summer months was considerably below the average, accompanied by an abundance of rain, evenly distributed in light showers, the natural result of this was a rank growth of straw with long well filled ears, and the heaviest yields of grain the province has experienced in its history.

Spring opened up early, a considerable quantity of grain having been sown during the first week in April, and it was expected that the crop would mature early, but owing to the low summer temperature, ripening was greatly delayed and in some parts of the province the frost of 20th August found the grain in a very green condition, and considerable injury resulted.

In the central and south central parts of the province a hot wind from the 2nd to 4th of July, accompanied by a temperature of from 90 to 92° in the shade, did considerable damage to early sown wheat just coming into head, the injury was more apparent on high, dry ridges and on poorly farmed land devoid of sufficient moisture, in some cases the ears of wheat were only half filled, reducing the yield very materially.

On this farm the returns of nearly all farm produce is above the average. Owing however, to a heavy storm on August 8th, the grain was badly lodged and the ripening so much delayed that a considerable portion of the wheat was injured by the frost of August the 20th.

It is pleasing to notice the very general acknowledgment of service done the province through the results of experiments carried on in cutting wheat at different stages of ripeness, the conclusions reached at the Experimental Farm at Brandon, have been very generally acted on, with the result that large quantities of grain were this year saved from injury by frost by cutting it slightly on the green side, we regret, however, that some farmers have gone to the other extreme and cut grain altogether too green, resulting in a very much shrunken berry.

It is also a source of gratification that the results of the leading experiments carried on at this farm are so uniform from year to year, it makes the conclusions reached more impressive and indicates the suitability of the very uniform prairie soil for experimental work.

EXPERIMENTS WITH WHEAT.

This year thirty-five varieties were sown, twelve of which were cross-bred wheats, originated on the Dominion Experimental Farms. The following varieties have been tested here for the first time, Rideau, Admiral and Alpha, they are beardless sorts and they have all yielded over forty bushels per acre.

Owing to a large number of the varieties lodging, the dates of ripening given on the table are only approximate, the same cause has in some cases reduced the weight per bushel.

Gehun, Ladoga and Colorado are the only three that ripened to any noticeable extent in advance of Red Fife.

It is to be observed that the first seven on this year's list, are all varieties that have taken the lead for productiveness in other years.

Preston the second in the list in the variety test, gave the largest yield (52 bush. per acre) in the one-acre plots, it is apparently a very productive wheat and also weighs well.

WHEAT.—Test of Varieties.

(These were all sown on the 16th of April, on clay loam, in $\frac{1}{10}$th acre plots.)

Name of Variety.	Date of Ripening.	No. of days maturing	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per acre.	Yield per acre.	Weight per bushel.	Rusted.
			Ins.		Ins.		Lbs.	Bush. Lbs.	Lbs	
Red Fife	Aug. 27	133	39	Stiff	3½	Beardless.	5,760	49	60½	None.
Preston	" 27	133	43	"	4	Bearded..	6,010	48·20	61	"
Old Red River.	" 27	133	37	"	3½	Beardless.	5,670	47·10	61	"
White Fife	" 27	133	38	"	3¾	" ..	5,900	46·40	60	"
Pringle's Champlain	" 27	133	43	Lodged	4	Bearded..	5,510	46·30	60	Slightly.
Advance	" 28	134	42	Stiff	3½	" ..	5,020	46·20	60	None.
White Connell	" 27	133	42	"	4	Beardless.	5,810	44·50	60	"
Stanley	" 27	133	45	"	4	" ..	4,490	43·30	62	"
Rideau	" 31	137	38	"	2⅓	" ..	4,920	43·	60	"
Admiral	" 28	134	51	Lodged	4	" ..	5,830	42·50	60	"
Crown	" 24	130	50	Stiff	4	Bearded..	5,330	42·50	59	Slightly.
Gehun	" 20	126	30	Medium	3	Beardless.	3,940	42·40	61	Considerably.
Goose Wheat	" 27	133	50	Weak	3	Bearded..	4,900	42·10	62	None.
Hungarian Mountain	" 31	137	39	"	3½	Beardless.	5,420	42·10	60	"
Ladoga	" 22	128	45	Lodged	3	Bearded..	6,070	42·10	60	Considerably,
Rio Grande	" 27	133	43	"	4	" ..	5,610	41·30	60	None.
Herisson Bearded	Sept. 2	139	40	Stiff	2	" ..	5,510	41·30	60	"
Red Fern	Aug. 27	133	43	"	4	" ..	5,730	41·10	60	"
Percy	" 19	125	51	Fair	3¾	Beardless.	4,240	41·	60½	"
Alpha	" 28	134	44	Stiff	4	" ..	4,680	40·20	60	"
Emporium	" 27	133	45	"	5	Bearded..	6,280	39·30	60	"
Campbell's White Chaff	" 28	134	47	"	4	Beardless.	5,020	38·50	60	Considerably.
Black Sea	" 24	130	49	Lodged	3½	Bearded..	5,840	38·30	61	"
Dion's	Sept. 2	139	43	"	4	" ..	4,520	38·20	60	Slightly.
Golden Drop	Aug. 22	128	35	Stiff	3¼	Beardless.	4,680	37·50	62	"
Blenheim	" 27	133	46	"	4	Bearded..	5,260	37·20	60	None.
Yeoman's Defiance	" 31	137	40	Weak	4	Beardless.	4,620	37·10	60	"
Wright's Favorite	Sept. 2	139	41	Stiff	3½	" ..	5,180	37·	60	"
Monarch	" 2	139	38	"	3	" ..	5,810	36·30	58	"
Major	Aug. 28	134	54	"	4	Bearded..	6,360	35·40	61	"
White Russian	Sept. 2	139	39	"	3	Beardless.	5,220	35·30	58	"
Colorado	Aug. 22	128	47	Lodged	4½	Bearded..	6,150	34·10	59	Very badly.
Wellman's Fife	Sept. 2	139	40	Stiff	3	Beardless.	5,260	34·	56	None.
Captor	" 2	139	40	"	3½	" ..	5,000	32·30	59½	Slightly.
Beaudry	Aug. 24	130	44	Lodged	3¾	" ..	2,470	25·36	60	"

NOTE.—The weights per bushel given here, and also with all other grain tables in this report, are not the maximum weights that the grain could be brought to, but were taken from grain cleaned to a condition fit for milling purposes only.

The parentage of the cross-bred varieties referred to in the table is as follows:

Alpha—Ladoga	female with	White Fife	male	Beardless.
Advance	"	"	"	Bearded.
Admiral—White Chaff	female with	Red Fife	male	Beardless.
Blenheim—Ladoga	female with	White Fife,	male	Bearded.
Captor	"	"	"	"
Crown	"	"	"	"
Major	"	"	"	"
Preston	"	Red Fife,	"	"
Percy	"	White Fife	"	Beardless.
Rideau—Spiti Valley	"	Red Fife	"	"
Stanley—Ladoga	"	"	"	"

TEST OF WHEAT FROM HUNGARY.

Hungary has for many years been noted for the excellent quality of its flour. The sample of wheat here referred to is one of the most esteemed varieties grown in that country it was received at the Central Experimental Farm from the Baron Von Berg a prominent agriculturist of Kapowar, Hungary, for test at the experimental farms. It was sown along side of Red Fife on 23rd April on one-tenth acre plots of rich sandy loam.

It will be seen that the wheat is bearded, that it has this year ripened three days earlier than the Red Fife, and given almost the same yield per acre.

Name of Variety.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per acre.	Yield per Acre.		Weight per Bushel.	Proportion Rusted.
			Ins.		Ins.		Lbs.	Bush.	Lbs.	Lbs.	
Wheat from Hungary	Aug. 26	125	37	weak	3½	bearded	4960	45	4 0	60	none.
Manitoba Red Fife	" 29	128	38	stiff	3½	beardless	5430	45	20	60	"

THE PREPARATION OF LAND FOR WHEAT.

A great diversity of opinion prevails regarding the most suitable way of preparing land for wheat. The accompanying table gives the results of sowing a series of adjoining plots prepared in four different ways. The summer fallow was ploughed deeply in June and cultivated on the surface during the summer to keep down weeds. The "drilled on stubble" plot was summer fallowed in 1893 was quite free of weeds, and received no preparatory treatment, the seed being simply press drilled as deeply as possible with a "superior" machine.

Name of Variety.	How Treated.	When Sown.	When Ripe.	No. of Days Maturing.	Length of Straw.	Yield of Straw per Acre.	Yield per Acre.		Weight per Acre.
					Ins.	Lbs.	Bush.	Lbs.	Lbs.
Red Fife	Summer fallow	April 16	Aug. 28	134	40	5,420	48	....	60
do	Drilled on stubble	do 16	do 19	125	36	3,670	34	40	60
do	Spring ploughed	do 13	do 13	122	36	2,750	24	10	62
do	Fall do	do 13	do 13	122	36	3,280	18	40	60

GENERAL RESULTS.

1st. As in former years summer-fallowed land gave last season much the largest yield; in this instance over 13 bushels more than the drilled on stubble plot, nearly 24 bushels more than the spring, ploughed, and over 29 bushels in excess of the fall-ploughed plot.

2nd. The yield of straw on the summerfallow was very heavy and the ripening of the grain was delayed by the rank growth, this is about the only objection to summer-fallow on strong land in a moist season.

3rd. It would appear from several years' experience here that fall-ploughing of clean stubble land for wheat, is a waste of time, as it has invariably given a less return than if the seed is sown on the unploughed stubble.

4th. The above result may be accounted for by the drying out of the soil during fall and winter and by the heavy stubble ploughed under, keeping the soil too loose for wheat.

5th. Drilling on the unploughed land keeps the stubble on the surface where it acts as a mulch.

6th. Only one crop should be taken off without ploughing, the land should then be spring-ploughed for coarse grain, or summer-fallowed for wheat.

THE USE OF MANURE FOR WHEAT.

Three plots of $\frac{1}{10}$th acre each were set apart for this experiment, equal parts of cow and horse manure was used, and ten two-horse loads of one ton each per acre was applied by ploughing it in about six inches deep.

It would appear from experiments in former years on this farm that manure ploughed under in spring *during a dry season* reduces the yield of wheat the first year. This season owing to unusual conditions of moisture the result was different, still the gain from the use of rotted manure from the first crop was only 50 lbs. of wheat per acre, and from green manure exactly one bushel per acre, it is, however, evident from former experiments that the manure continues to be beneficial to the land for some years after the application, and one of the methods for keeping up the fertility of the soil in this province is to make and apply all the manure possible.

Name of Variety.	How Treated.	Manure.	When sown.	When ripe.	No. of days maturing.	Length of straw.	Yield of straw per acre.	Yield per acre.	Weight per bushel.
						Ins.	Lbs.	Bush. Lbs.	Lbs.
Red Fife....	Spring ploughed.	Green ..	April 13	Aug. 13	122	24	3,290	25 10	61
do	do ..	Rotted .	do 13	do 13	122	24	2,900	25 ..	61
do	do ..	None ..	do 13	do 13	122	24	2,750	24 10	62

SMUT IN WHEAT.

Although many carefully conducted experiments on the Experimental Farms have repeatedly shown the advantage of the bluestone treatment for the prevention of smut in wheat; there are still a number of farmers, who either do not treat their seed grain, or do it in such a careless manner, that each year a large quantity of wheat is rejected for smut, the loss from this cause is still so large that it was thought advisable to continue these experiments.

In addition to applying the liquid by sprinkling, one plot was this year sown with seed immersed in the bluestone liquid for five minutes, it will be seen that this plot gave the smallest number of smutty heads, and also the largest yield of wheat. The liquid for the dipped seed was composed of 1 lb. bluestone to three pails of water, the

grain can either be put into a coarse bran bag and placed in the liquid, or treated as recommended for coarse grain in another part of this report.

The grain used was a very bad sample of smutty Red Fife.

The plots in this test were one-tenth acre, and the soil a rich sandy loam.

The weights per bushel given, were taken before the smut balls were removed, hence the light weight of the untreated.

Name of Variety.	How Treated.	Good heads on 10 feet square.	Bad heads on 10 feet square.	Weight of straw per acre.	Yield per acre.		Weight per bushel.
				Lbs.	Bush.	Lbs.	Lbs
Red Fife, very smutty..	Dipped in bluestone liquid.....	4,700	32	5,820	44	40	58
do do ..	Sprinkled 1 lb. bluestone to 5 bush	4,169	256	5,480	43	40	60
do do ..	do do 10 do	3,791	1,243	5,710	38	10	59
do do ..	Not treated.....	914	3,685	5,430	17	50	50

SUMMARY.

1st. The dipped seed gave the smallest number of smutty heads and the largest yield of grain per acre.

2nd. The yield was exactly one bushel less from the sprinkling of the strongest liquid, than from the dipped, but the sprinkled gave 200 more smutty heads per 10 feet square.

3rd. The difference in yield between the weakest sprinkling and the untreated was over 100 per cent. Or in other words for about two cents worth of bluestone and labour, twenty bushels of wheat was saved and the sample greatly improved.

4th. Sprinkling of very smutty wheat with the weaker solution is not sufficient to kill all the smut.

5th. Although it was necessary in this case to use badly smutted wheat so as to make the experiment emphatic, we would advise no one to use smutty grain for seed even when treated.

6th. In five years' experience on this farm, we have never had smutty grain from good seed sprinkled with the weak bluestone liquid.

TEST OF DRILLS AND BROADCAST MACHINE FOR WHEAT.

In this experiment the drills have again given the best result, the difference in favour of the press drill over the broadcast machine is this year over eight bushels per acre.

The press drill plot also ripened six days earlier than the broadcasted grain.

When the grain was only two inches high, it was quite evident that the drilled grain would give the best return, and these series of plots were a good object lesson to visiting farmers all the summer.

The tests referred to have been conducted on plots of $\frac{1}{10}$t acre; soil rich loam.

DRILL Test for Wheat.

Name of Variety.	How sown.	When sown.	Pecks per Acre.	When ripe.	No. of days Maturing.	Length of Straw.	Weight of Straw per Acre.	Yield per Acre.		Weight per Bushel.
						Ins	Lbs.	Bush.	Lbs.	Lbs
Red Fife	Press drill	April 16	6	Aug. 28	134	46	6,740	46		60
do	Common drill.....	do 16	7	do 31	137	40	7,220	44	40	58
do	Broadcast machine.....	do 16	8	Sept. 3	140	40	6,710	37	20	58

WHEAT GROWN AFTER FODDER CORN.

The area planted to fodder corn in this country is increasing each year, the land being usually sown to wheat the following season; either spring ploughed or on the unploughed stubble.

From the test made this year it would appear that it may pay to plough the corn stubble before sowing wheat. This test was made on plots of one tenth acre, sandy loam, and the seed was sown 9th April.

Name of Variety.	How prepared.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre.	Yield per Acre.		Weight per Bushel.
				Ins.		Ins.		Lbs.	Bush.	Lbs.	Lbs
Red Fife	Spring ploughed	Aug. 12..	125	25	Stiff.....	3	Beardless.	3,860	32	20	61
do	Not ploughed....	do 12..	125	24	do	3	do	3,830	29	30	61½

ONE-ACRE PLOTS OF WHEAT.

The following table gives the yield of nine varieties of wheat in plots of one acre each. Owing to unevenness in the character of the soil of this field these results cannot be regarded as a very reliable test of the relative productiveness of the several sorts named. These plots were all sown on 12th April on a loamy soil, which varied from sandy to clay.

Name of Variety.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.		Weight per Bushel.	Rusted.
			Ins.		Ins.		Bush.	Lbs.	Lbs.	
Preston.....	Aug. 22....	132	49	Very stiff...	3¼	Bearded....	52	....	63½	None.
Blenheim...	do 17....	127	49	Stiff	3½	do	46	58	61½	do
Percy	do 14....	124	50	Medium....	3¼	do	46	24	58	do
White Fife .	do 13....	123	45	Stiff	4	Beardless...	44	48	61½	do
Crown	do 22 ...	132	43	Very stiff..	3¼	Bearded....	43	23	60½	Slightly.
Major	do 17....	127	43	Stiff	3½	do	41	26	60	None.
Ladoga.....	do 19....	129	46	Medium....	3½	do	41	5	61	Slightly.
Captor	do 13....	123	50	Stiff	4	Beardless...	37	20	61½	None.
Dion's	do 23....	133	52	Medium....	4	Bearded....	36	55	59½	Slightly.
Ottawa.....	do 19 ...	129	49	Stiff	3¼	Beardless...	36	10	61	None.

RESULTS OF EARLY, MEDIUM AND LATE SOWING.

These very interesting series of experiments have been continued this year with much the same results as in former years, in every instance the earliest sown wheat and oats ripened the first, but only in one instance, viz.: Stanley wheat did the earlies, sown give the largest return.

With Red Fife the fourth plot gave the best return; with both Banner and Abundance oats the last sown plot gave the largest yield.

The severe frost (ten degrees) of May 11th, seriously interfered with the test of barley's, so much so that the dates of ripening given are only approximate.

The first four plots of Oderbruch barley were cut to the ground 11th May, and more or less thinned out, the Canadian Thorpe, although sown at the same date suffered very little injury, none of the wheats or oats were hurt.

For the purpose of comparing varieties the average yields of all the sowings is also given. The Stanley wheat, Banner oats and Canadian Thorpe barley are the varieties which have given the largest returns, this is the first year that Stanley has exceeded Red Fife and this is no doubt attributable to the Stanley ripening earlier and so receiving less injury from frost, the first two plots of Red Fife and the first three plots of Stanley would grade No. 1 Hard, the balance was all more or less frozen.

Twelve additional plots were sown with pease, but a severe wind storm rising soon after the pease were cut, they were so badly mixed that an accurate comparison of yields was not possible.

WHEAT—EARLY, MEDIUM AND LATE SOWINGS.

(One-tenth acre plots—soil, clay loam.)

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw, per acre.	Yield per acre.	Weight per Bushel.	Rusted.
				In.		In.		Lbs.	Bush. Lbs.	Lbs.	
Red Fife	April 6	Aug. 17	133	44	Stiff....	3½	Beardless.	4 870	43 50	62	None.
do	do 13	do 27	136	43	do	3½	do ..	4 820	43 ..	62	do
do	do 20	do 31	133	40	do	3	do ..	4 830	44 30	60	do
do	do 27	Sept. 2	128	39	do	3	do ..	5 940	46 50	58	do
do	May 4	do 8	127	50	Fair....	4	do ..	4 150	25 50	51	do
do	do 11	do 12	124	51	Stiff. ..	3½	do ..	4 770	25 30	51	do
Stanley	April 6	Aug. 15	131	40	V'y stiff	3	do ..	4 950	50 50	62	do
do	do 13	do 21	130	42	do	4	do ..	5 010	49 ..	62	do
do	do 20	do 28	130	46	do	3½	do ..	5 090	48 30	61	do
do	do 27	do 31	126	40	do	3	do ..	5 330	42 ..	59½	do
do	May 4	Sept. 2	121	40	do	3	do ..	5 000	38 20	59	do
do	do 11	do 4	116	40	do	3	do ..	3 920	36 20	59	do

Average yield of the six plots of Red Fife Wheat, 38 bush. 15 lbs.
do do Stanley do 44 do 10 do

OATS—EARLY, MEDIUM AND LATE SOWINGS.

(One-tenth acre plots—soil, clay loam.)

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Length of Head.	Kind of Head.	Weight of Straw, per acre.	Yield per acre.	Weight per Bushel.	Rusted.
				In.	In.		Lbs.	Bush. Lbs.	Lbs.	
Abundance	April 6	Aug. 26	142	50	9	Branching	3 270	96 6	38	Slightly.
do	do 13	do 28	137	51	9	do ..	3 430	90 10	38	do
do	do 20	do 30	132	50	8½	do ..	3 780	88 28	38	do
do	do 27	Sept. 1	127	50	8½	do ..	3 280	87 12	38	do
do	May 4	do 3	122	50	8	do ..	3 420	92 2	36	do
do	do 11	do 6	118	47	7½	do ..	3 380	99 4	36	do
Banner	April 6	Aug. 26	142	52	9½	do ..	3 540	95 30	37	do
do	do 13	do 29	138	51	9	do ..	3 530	96 6	37	do
do	do 20	do 31	133	50	9	do ..	4 660	104 4	38	do
do	do 27	Sept. 2	128	50	8½	do ..	4 630	103 18	37	do
do	May 4	do 4	123	49	8½	do ..	4 210	102 22	37	do
do	do 11	do 7	119	49	8	do ..	4 690	110 20	37	do

Average yield of the six plots of Banner oats, 102 bush. 5 lbs.
do do Abundance 92 do 10 do

BARLEY—EARLY, MEDIUM AND LATE SOWINGS.

(One-tenth acre plots—soil, clay loam.)

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw, per acre.	Yield per acre.		Weight per Bushel.	Rusted.
				In.		In.		Lbs.	Bush.	Lbs.	Lbs.	
Oderbruch	April 6	Aug. 18	134	37	Fair	3	6-rowed	4 840	20	—	45	None.
do	do 13	do 18	127	37	do	3	do	4 251	21	42	47	do
do	do 20	do 18	120	37	do	3	do	5 770	31	42	48	do
do	do 27	do 18	113	37	do	3	do	4 150	42	34	49	do
do	May 4	do 18	106	37	do	3	do	3 220	51	32	50	do
do	do 11	do 21	102	36	do	2¼	do	3 320	64	8	49	do
Canadian Thorpe	April 6	do 31	147	37	Weak	3	2-rowed	3 610	51	42	47	do
do	do 13	do 31	140	37	do	3	do	3 360	44	28	47	do
do	do 20	Sept. 2	135	36	do	3	do	4 110	49	38	48	do
do	do 27	do 3	129	36	do	3	do	3 640	53	16	48	do
do	May 4	do 4	123	36	do	3	do	2 010	64	18	48	do
do	do 11	do 6	118	35	do	3	do	3 730	51	22	47	do

Average yield of the six plots of Oderbruch Barley, 38 bush. 34 lbs.
do do Canadian Thorpe, 52 do 27 do

From the foregoing, as well as from past experience in this series of tests it would appear that nothing is gained by sowing barley or oats very early. That although the first sowing of wheat seldom gives such a large return as that sown a week or two later, the risk from frost is greatly lessened by early sowing. These results show that the Banner oats still maintain their high character for productiveness and they are recommended for general cultivation.

EXPERIMENTS WITH OATS.

The past season being cool and moist was particularly favourable for oats, and the yield in all parts of the province has been large. On this farm the yield of most varieties was above the average, owing, however, to a severe storm on the 8th of August, the grain was badly lodged and many of the varieties were light in weight.

A noticeable feature in this year's test of varieties of oats is the very varying yields, ranging from 101 bushels from Banner, to 41 bushels from Welcome; this great difference is no doubt largely attributable to smut, which was very bad in some varieties, and not in others. It is proposed in future to treat all oats for smut, which will it is hoped lessen the injury from this cause, it is evident that some varieties are more liable to injury from smut than others.

As heretofore, the Banner heads the list for productiveness, yielding 101 bushels per acre, this variety is very highly spoken of by the oatmeal millers of the province and the Banner is almost exclusively grown in those districts in Manitoba where there is a large demand for a milling oat. This variety is also highly esteemed in the Eastern Provinces. It is noticeable that this variety is not so subject to smut as some others.

Several parties in the Red River Valley having reported large yields from a variety of oats imported from Russia by the Mennonites, a test has been made of them this year, with gratifying results as regards yield, they having given over 96 bushels per acre; they are however light in weight, and their yellow colour and lean appearance is very much against them. They appear in the list under the name of Mennonite.

White Schonen, favourably mentioned in my last report, has again given a large yield.

Holstein Prolific keeps up its reputation for productiveness and was quite free of smut.

Rosedale, usually one of the most productive, was so badly injured by smut that it only ranks 14th on the list this year.

Several other varieties have this year been tested for the first time, but in such small quantities that the returns are not available, larger plots will be sown of these next season.

OATS—TEST OF VARIETIES.

All sown on 22nd April, on clay loam, and on plots of one-tenth acre each.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre.	Yield per Acre.		Weight per Bushel.	Rusted.	Smut.
			In.		In.		Lbs.	Bush.	Lbs.	Lbs		
Banner	Aug. 24	124	56	Medium..	8	Branching	4,210	101	6	37	None.	Little
Mennonite	do 26	126	48	Very weak	7	do ..	4,010	96	26	35	do	do
American Beauty	do 28	128	59	Weak	10	do ..	4,280	96	6	35	do	None.
Holstein Prolific	do 28	128	53	Stiff	9	do ..	4,400	95	20	36	do	do
Bavarian	do 24	124	49	Weak	9	do ..	4,580	93	8	39	do	do
White Schonen	do 28	128	56	Medium..	9	do ..	4,980	93	8	35	do	Little
Early Golden Prolific	do 28	128	61	Weak	10	do ..	4,630	93	8	36	do	None.
Columbus	do 28	128	53	Fair	9	do ..	4,080	91	26	34	do	do
Golden Giant	Sept. 3	134	49	Weak	9	do ..	4,370	90	20	32	do	Little
Oderbruch	Aug. 28	128	55	Medium..	9	Sided	4,220	89	4	38	do	do
Wallis	do 29	129	58	Weak	8	Branching	4,680	88	18	37	do	do
Early Archangel	do 26	126	54	Very stiff.	8	do ..	4,700	88	8	38	do	None.
Siberian	Sept. 3	134	49	Weak	8	Sided	4,330	87	12	37½	do	Little
Rosedale	Aug. 22	122	57	do	9	do	4,440	87	2	38	Slightly	Much
Abyssinia	do 28	128	58	Medium..	10	do	3,950	86	26	39½	None.	do
White Russian	do 31	131	49	Weak	8	do	5,060	86	16	37	do	Little
Early Gothland	do 31	131	50	do	9½	do	4,520	84	24	38	do	do
Golden Beauty	do 29	129	56	Stiff	6	Branching	4,050	83	28	36	do	None.
Black Tartarian	Sept. 15	146	39	Weak	6	Sided	5,670	83	8	34	do	Little
Lincoln	Aug. 28	128	54	Medium..	7	Branching	4,420	81	26	37	do	None.
Joanette	Sept. 5	136	48	Very weak	9	do ..	5,430	81	16	34	Badly	Little
Improved Ligowo	Aug. 28	128	56	Medium..	9	do ..	3,580	81	16	38	None.	None.
Flying Scotchman	do 24	124	55	Very weak	10	do ..	4,390	81	6	38½	Slightly	Little
Giant Cluster	Sept. 3	134	51	Weak	8	Sided	3,280	80		34	do	do
Early Blossom	do 3	134	50	do	8	do	3,200	79	14	37	None.	do
Abundance	Aug. 28	128	49	Medium..	8	Branching	3,750	79	14	38	do	None.
Coulommiers	Sept. 5	136	54	Weak	11	do ..	5,570	77	12	36	Slightly	Little
Winter Grey	Aug. 28	128	58	Medium..	10	do ..	4,580	77	2	40½	None.	Much
Wide Awake	Sept. 3	134	48	do	7	do ..	4,180	77	2	34	Slightly	Little
California Prolific	do 15	146	49	Weak	7	Sided	4,690	76	26	35	None.	do
Saltzer's Nameless	Aug. 28	128	51	do	10	Branching	5,190	75	10	34	do	None.
Hazlett's Seizure	do 22	122	53	do	9	do ..	4,830	74	4	38	Slightly	Much
Prolific Bl'k Tartarian	Sept. 15	146	39	do	6	Sided	4,780	74	4	33	None.	Little
Victoria Prize	Aug. 22	122	55	do	9	Branching	4,630	68	8	41	Slightly	Much
White Monarch	do 31	131	48	do	8	do ..	4,680	68	8	35	None.	Little
American Triumph	Sept. 3	134	53	do	9	do ..	2,980	68	8	34	do	do
Poland	Aug. 22	122	56	do	10	do ..	4,470	67	2	38	Slightly	Much
Imported Irish	do 21	121	56	Stiff	9	do ..	4,380	66	26	38	None.	None.
Scottish Chief	do 22	122	54	do	10	do ..	5,040	65		41	Little	Little
Scotch Hopetown	Sept. 8	139	60	Very weak	11	do ..	4,400	61	26	34	do	None.
Rennie's Prize White	Aug. 23	123	37	Weak	12	do ..	4,710	61	16	40	Consid'rably	Much
Prize Cluster	do 22	122	50	Medium..	10	do ..	3,930	60	30	40	None.	do
Early Etampes	Sept. 15	146	45	Weak	8	Sided	4,230	57	32	33	Slightly	Little
Doncaster Prize	Aug. 28	128	56	Very stiff.	10	Branching	5,230	56	16	35	Very badly.	do
Dunn	Sept. 16	147	52	Fair	11	do ..	1,520	55	10	38	None.	None.
White Wonder	Aug. 22	122	59	Medium..	10	do ..	4,580	52	2	40	Slightly	Much
Cream Egyptian	do 21	121	51	do	10	Sided	4,030	47	22	42	Badly	V. do
Bonanza	do 22	122	47	do	9½	Half sided	4,030	44	24	34	Slightly	do
Welcome	do 20	120	55	do	12	Branching	4,530	41	26	41	Consid'rably	V. do

TREATING OATS FOR SMUT.

At no time in the history of the province has there been so much smut among oats as prevailed this year; some varieties were so badly affected that the yield was reduced by one-half and the threshing made very disagreeable on account of the dust.

Finding in former years that sprinkling of coarse grain with bluestone liquid did not completely prevent smut, a different plan was adopted this year: a very smutty sample of Welcome oats was completely covered for five minutes with a liquid composed of 1 lb. bluestone dissolved in three pails of water.

The accompanying table shows that although this mode of treating a *badly* affected sample of oats did not effectually destroy the smut, it certainly reduced the smutty heads by one-half, and increased the yield by 25 bushels and 20 pounds per acre.

In all probability, with a sample only slightly affected, this mode of treatment would be effectual in preventing injury, and even a *very* smutty sample treated in this manner for several seasons, would, probably in time become free of smut.

The following extract, taken from the Annual Report for 1894, describes the manner of treating large quantities of oats or barley by this method.

A quantity of liquid is prepared, composed of one pound of bluestone dissolved in two pails of water, a coal oil barrel is then three parts filled with the grain and sufficient of the liquid is poured on to just cover the grain. This is allowed to remain for a few minutes only, when the liquid is drawn off through a $\frac{3}{4}$-inch hole at the bottom of the barrel, and the grain emptied out; by adding about three-quarters of a pailful each time the same liquid can be used a number of times.

TREATING VERY SMUTTY OATS WITH BLUESTONE.

Name of Variety.	How Treated.	Good heads.	Smutty heads.	Weight of straw per acre.	Yield per acre.	Weight per bush.
				lbs.	bush. lbs.	lbs.
Welcome	Dipped in bluestone liquid	2,473	839	3,930	68. 8	41
"	Not treated	1,841	1,632	3,750	42.22	38

EXPERIMENTS WITH BARLEY.

This grain has yielded unusually well during the past season, but, owing to the rank growth, many kinds were badly lodged, which injured the colour and lessened the weight.

Among the six-rowed varieties Mensury heads the list for productiveness; this variety was also among the most productive in 1894; the light weight of Mensury is largely owing to its persistent beard, which is difficult to remove, and prevents the kernels from lying closely in the measure.

The Hybrid barleys, originated on the Experimental Farms, are this year noticeable for their productiveness and excellent straw; next to Mensury five of them head the list for yield and four of these have stiff straw. With the rank soil generally found here it is always desirable that the straw should be stiff, but its importance was emphasized this year when all the two-rowed and many of the six-rowed varieties were badly lodged.

The two-rowed varieties of barley are as a rule weaker in the straw than the six-rowed sorts and for that reason they should, when practicable, be sown on lighter soils where the growth would be shorter.

BARLEY—SIX-ROWED, TEST OF VARIETIES.

All sown on 15th May, soil, rich loam, size of plots $\frac{1}{10}$ acre each. There was no rust on any of these plots.)

Name of Variety.	Date of Ripening.	No. of days maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per acre.	Yield per Acre.	Weight per Bushel.	Smut.
			In.		In.		Lbs.	Bush. Lbs.	Lbs.	
Mensury	Aug. 22	99	45	Medium	3¼	Six-rowed.	4,490	68·46	46	None.
Nugent	do 22	99	40	Stiff	2½	do	4,810	68·26	46	Considerable.
Royal	do 20	97	36	V'y stiff	2½	do	3,950	65·30	49	do
Surprise	do 21	98	40	Weak	2¼	do	5,270	65·10	48	Little.
Trooper	do 20	97	40	V'y stiff	3½	do	3,970	65·10	50	do
Vanguard	do 18	95	39	Stiff	2½	do	3,820	64· 8	50	do
Common	do 19	96	40	Weak	2¼	do	4,570	63· 6	49½	do
Odessa	do 21	98	40	Medium	3	do	4,760	60·10	45½	None.
Summit	do 22	99	37	V. weak	2¼	do	4,970	58·46	46	Little
Baxter's	do 20	97	37	Medium	2	do	3,920	57·44	48	Considerable.
Petschora	do 17	94	38	Weak	2¼	do	3,670	56·42	48	Little.
Stella	do 28	105	39	Fair	3	do	3,020	53·36	50	None.
Phoenix	do 19	96	39	Medium	2	do	4,120	51·32	49	Considerable.
Rennie's Improved	do 18	95	38	V. weak	2	do	4,720	51·32	47	do
Oderbruch	do 20	97	39	Weak	2	do	4,050	48·46	49	do
Champion	do 11	88	41	Stiff	3	do	4,190	48· 6	40	None.
Excelsior	do 11	88	41	do	3	do	4,500	47·44	39	do
Success	do 10	87	33	do	2	do	4,150	30·10	40	do

BARLEY—TWO-ROWED, TEST OF VARIETIES.

French Chevalier	Aug. 26	103	41	Medium	4	Two-row'd	4,310	62·14	48	None.
Emerson	do 27	104	49	do	2	do	3,940	61·32	48	do
Sidney	do 28	105	39	Fair	5	do	3,111	60· 9	47	do
Canadian Thorpe	do 27	104	39	Weak	4½	do	2,850	58·16	46	do
California Prolific	do 27	104	40	do	3	do	3,900	57·14	47	do
Duck-bill	do 23	100	41	do	3	do	3,860	57· 4	47	do
Newton	do 26	103	41	Fair	3	do	4,010	56· 2	47	do
Beaver	do 28	105	38	V. weak	4	do	4,490	50·10	49	do
Kinver Cbevalier	do 28	105	38	do	4	do	3,710	45·30	47	do
Thanet	do 26	103	38	Weak	4½	do	3,190	43·46	47	do
Prize Prolific	do 26	103	43	do	3	do	4,772	42·12	48	do
Danish Cbevalier	do 27	104	44	do	4	do	3,560	41·22	48	do

The hybrid varieties in the preceding list are as follows:—Two-rowed, Beaver and Sidney, six-rowed, Royal, Summit, Stella, Vanguard, Nugent, Surprise and Trooper.

The parentage of all these varieties is Swedish two-rowed female with Baxter's six-rowed male.

EXPERIMENTS WITH PEASE.

Ten varieties of pease were sown, but the produce of three of the plots was so badly mixed by a wind storm just after they were cut that accurate returns from them were not obtainable. The remaining seven were fortunately all housed before the storm.

It will be noticed that the yields are all very large, and the weights exceptionally good.

The Pride, a comparatively new variety, is at the head of the list for yield, and the weight per bushel exceeds 65 lbs., but, owing to the testing scales not indicating more than 65 lbs., the exact weight could not be obtained. This pea is of medium size, and had a very handsome appearance.

All were grown on summer-fallowed land, and were sown with a hoe drill at the rate of from 2 to 2¾ bushels per acre.

PEASE—TEST OF VARIETIES.

ALL sown 17th May, soil clay loam, size of plots, one-tenth acre each.

Name of Variety.	Date of ripening.	No. of days maturing.	Character of growth.	Length of pod.	Size of pea.	Yield per acre.	Weight per bushel.	Remaks.
				Inch.		Bush. Lbs.	Lbs.	
Pride	Aug. 22.	97	Rank ..	4	Medium..	68	65	The straw was so badly tangled that average lengths cannot be given; some of it was 8 and 9 ft. long and podded nearly the full length
Crown	do 24.	99	do ..	2	Small	60 50	64	
Potter	do 30.	105	do ..	4	Medium..	56 40	64	
Mummy	Sept. 3.	109	do ..	2	do ..	53 10	65	
Black-eyed Marrowfat.	do 10.	116	do ..	3½	Large	52 ..	64	
Golden Vine	Aug. 28.	103	do ..	2½	Small	46 20	65	
Canadian Beauty	do 29.	104	do ..	3¾	Medium..	39 ..	65	

EXPERIMENTS WITH FLAX.

It is generally supposed that a crop of flax exhausts the fertility of soil very rapidly. With the object of testing this, the plots on which flax was grown in 1894 were this year sown with wheat, oats and barley, two plots being sown with each kind of grain. For comparison, six adjoining plots of wheat stubble were also sown at the same time with wheat, oats and barley.

From the accompanying table it will be seen that in every case but one the flax stubble gave the largest yield, and in each instance the largest average, which would indicate that a flax crop is not as exhaustive as is generally supposed.

TABLE showing the yield of different kinds of grain after flax and after wheat, sown on the stubble and on spring ploughing.

Name of Variety.	Rotation.	How treated.	When sown.	When ripe.	Weight of Straw per acre.	Yield per acre.	Weight per bushel.
Wheat.					Lbs.	Bush. lbs.	Lbs.
Red Fife	Following wheat..	Spring ploughed..	April 17	Aug. 21	2,610	24	61
do	do do ..	Not do ..	do 17	do 21	3,280	30 20	61
do	do flax	Spring ploughed..	do 17	do 21	2,780	25 20	61
do	do do	Not do ..	do 17	do 21	3,820	36 20	62
Oats.							
Banner	Following wheat..	Spring ploughed..	April 27	Aug. 23	3,410	76 6	37
do	do do ..	Not do ..	do 27	do 23	4,680	41 26	36
do	do flax	Spring ploughed..	do 27	do 31	3,730	59 14	38
do	do do	Not do ..	do 27	do 31	4,190	63 18	35
Barley.							
Odessa	Following wheat..	Spring ploughed..	May 17	Aug. 15	3,270	42 14	45
do	do do ..	Not do ..	do 17	do 15	3,370	38 6	45
do	do flax	Spring ploughed..	do 17	do 21	3,450	55 10	45
do	do do	Not do ..	do 17	do 21	3,120	47 24	45

SUMMARY as to effect of previous crop.

	Bush.	lbs.
Average yield of wheat after flax	30	50
do do wheat	27	10
Average yield of oats after flax	61	16
do do wheat	58	33
Average yield of barley after flax	51	17
do do wheat	40	10

SPRING PLOUGHING VS. SOWING ON THE STUBBLE.

In connection with the preceding experiment, a test of sowing on the stubble against spring ploughing was made.

The following tables show that with wheat the yield has been best from sowing on the stubble without ploughing, but oats and barley have done best when the land was ploughed, this agrees with our experiment in former years, clean land, that is free of weeds, the second year after fallow, has always given better returns from sowing on stubble than from ploughing, the ploughing in of heavy stubble makes the land too loose for wheat, this is particularly true if the ploughing is done in the fall. But with oats and barley the results are different, and ploughing especially if done in spring has proved best for these cereals.

SUMMARY AS TO THE EFFECT OF PLOUGHING.

	Bush.	Lbs.
Average yield of wheat with ploughing of stubble	24	40
" " " without ploughing of stubble	33	20
Average yield of oats with ploughing of stubble	67	27
" " " without ploughing of stubble	52	22
Average yield of barley with ploughing of stubble	48	36
" " " without ploughing of stubble	42	39

GRASSES AND FODDER CROPS.

GRAIN GROWN FOR HAY.

In sections of the country, at a distance from native hay marshes, the question of a sufficient supply of fodder is an important one. The naturally fertile soil of Manitoba permits, however, of the growing of a number of annual crops suitable for hay, some of which, under proper treatment, will usually yield large returns.

From the accompanying tables it will be seen that summer-fallowed land gave much the largest yield of mixed grain, reaching, in one case, to over five tons of dry hay per acre; this yield is, of course, an exceptional one, and was due to the favourable season and strong land.

In districts where summer-fallowed land has a tendency to produce too rank a growth of wheat straw and delay ripening, it will be found an excellent plan to grow grain for fodder the first year, for if the crop is cut before it has time to lodge, there is no objection to a rank growth in a fodder crop.

It will be noticed in another part of this report, that oat sheaves, cut green, give excellent results as cattle feed, and this crop can be grown and harvested with very little manual labour, an important consideration in this country.

GRAIN GROWN FOR HAY.

Mixture Sown.	How Land was prepared.	Soil.	Size of Plot.	Sown.	Cut.	Weight, dry, per acre.
No. 1 Mixture.						Tons. lbs.
1 bush. Golden Vine Pease 1 do Red Fife Wheat... 1 do Banner Oats..... per acre	Summer-fallow....	Clay loam.	$\frac{1}{10}$ acre .	May 8.	Sept. 3	5 100
No. 2.						
1 do Golden Vine Pease 1 do Prize Prolific Barley 1 do Banner Oats..... do	do ..	do ..	do .	do 8.	do 3.	4 800
No. 3.						
1 do English Tares..... 1½ do Banner Oats ..... do	do ..	do ..	do .	do 8.	do 3.	4 100
No. 4.						
2½ do Banner Oats..... do	Spring-ploughed oat stubble.....	do ..	do .	do 13.	Aug. 3.	2 1,700
No. 5						
1 do Spring Rye.. ..... 1 do Odessa Barley..... do	do ..	do ..	do .	do 6.	do 13.	2 900

EXPERIMENTS WITH MILLETS.

These have been found very useful here in supplementing a light crop of native hay. Millets do not require to be sown until the middle of May, and by that date a very fair idea can be had of the prospects for a crop of wild hay.

Millets of all kinds have given a large yield this year, especially when succeeding a crop of potatoes.

Both fallow and potato land was well harrowed before and after sowing, but not rolled. Sowing was done with a broadcast machine at the rate of 23 pounds per acre; the soil being moist, the plants soon covered the ground, and the plots were very free of weeds, all were cut with a mower; and the weather being favourable, the hay was cured in excellent condition.

As Millet hay was the supposed cause, in former years, of indigestion among the farm horses, it was only fed mixed with wild hay, in the proportion of about half and half; the horses appeared to relish the mixture, and no injurious results were noticed.

This year five varieties of millets were sown being a selection from a number grown in former years.

The Manitoba millet is evidently an early ripening strain of East Indian "Chana" and has very coarse stalks and branching heads.

Golden Millet is very similar in appearance to Common Millet, but is somewhat later in maturing, it was the most productive variety this year.

The Common Millet was grown from seed ripened on this farm las year, the seed was quite free of foul weeds and germinated well.

MILLETS—TEST OF VARIETIES.

Name of Variety.	Size of plot.	When sown.	When cut.	Height.	Stage when cut.	Rotation.	Yield per acre dry.	
				In.			Tons.	Lbs.
Golden Millet	1/10 acre	May 5..	Aug. 17.	33	Bloom	After potatoes..	3	1,500
White French	"	" 5..	" 17.	45	"	" ..	3	1,100
Common	"	" 5..	" 17.	32	Water	" ..	3	850
Hungarian	"	" 5..	" 17.	33	Head not quite out.	Summer-fallow..	3	900
Common	"	" 5..	" 17.	32	Water	" ..	3	
Manitoba	"	" 5..	" 21.	47	"	" ..	3	

GRASSES.

In the spring of 1894 a number of varieties of native and imported grasses and clovers were sown with grain, but owing to the dry spring only two varieties became established, these were both natives.

The grasses grown on the two and three year old plots were cut again this year, and weighed, and the accompanying table gives the yields, all were grown on rolling prairie in the valley.

In addition to these plots a large field was sown in 1894, with Awnless Brome grass and wheat, but the seed did not germinate freely, and it was too weedy for an accurate test. The returns given are from the two year old field only.

Timothy has failed to make a catch on the upland for the past two years, so that we have no returns from that class of land, but in a field overflowed each spring, the third crop of Timothy gave a return of 2½ tons per acre, it appears as if this grass is suitable here for low lands or retentive soils, but in other locations it is uncertain.

A considerable quantity of grass seeds have been saved which will be available for distribution or for sale.

YIELD OF GRASSES.

Name of Variety.	Crop.	Size of plot.	Height.	When cut.	Weight per acre dry.	
			Incs.		Tons.	Lbs.
Western Rye Grass (A. tenerum)	1st.	1/8 acre.	18	Aug. 1..	2	1,166
" "	2nd.	1/2 "	28	" 2..	2	1,215
" "	3rd.	1/10 "	16	July 17..	1	1,400
Bald Rye Grass (E. virginicus)	1st.	1/8 "	19	" 2..	1	250
" "	2nd.	4½ "	25	" 30..	1	1,755
American Rye Grass (E. americanus)	2nd.	2 "	26	" 30 .	2	1,374
" "	3rd.	1/10 "	15	" 17..	1	1,000
Awnless Brome Grass (B. inermis)	2nd.	1/2 "	18	" 2..	1	950

EXPERIMENTS WITH CORN.

The cool temperature of the early summer months of the past season greatly retarded the growth of this crop, and the frost of August 20th caught the plants when full of sap, freezing them to within three feet of the ground, materially reducing both the weight and quality of the crop.

STORING DRY FODDER CORN.

The fodder corn crop of 1894, being larger than could be utilized as ensilage, a trial was made of storing it between layers of straw, and with excellent results.

The corn was cut and bound with a grain binder at the usual time, and at once stooked in 300-lb. conical shocks, the top of each shock being tied with a band of binder twine, during November it was stacked by placing a three-inch layer of corn between a foot thick layer of mixed grain straw, these layers were continued until a stack containing about 50 tons was made. On opening the stack in December the corn was found to be well preserved, free from mould, and the straw was strongly impregnated with the odour of the corn, on separating, it was found that the mixture contained 60 per cent by weight of corn, and 40 per cent of straw, when run through the cutting-box the mixture was readily eaten by both cattle and horses.

In the absence of a silo, this mode of preserving fodder corn may be recommended, as it has the following advantages :—

1st. The fodder is preserved in good condition.

2nd. The expense of a silo is avoided.

3rd. The work of stacking is postponed until after the rush of fall ploughing and threshing is over.

4th. A portion of the abundant supply of grain straw can thus be made more palatable for both horses and cattle.

FODDER CORN—TEST OF VARIETIES.

All were sown after barley, no manure was used; soil rich sandy loam; size of plots, two rows, each one chain long; sown May 23, with a press drill, drills three feet apart, plants one foot apart in the drill, also in hills 3 feet apart each way; kept clean with a one-horse cultivator; cut on September 9th and immediately weighed.

FODDER CORN.—Test of Varieties.

Name of Variety.	Description of variety.	Height.	Leafiness.	When Tasselled.	In Silk.	Early Milk.	Late Milk.	Condition when cut.	Weight per acre grown in rows	Weight per acre grown in hills.
		Inch.							Tons—Lbs.	Tons—Lbs.
Compton's Early	Yellow Flint.	68	Fairly leafy	Aug. 12	Aug. 20	Aug. 25	Sept. 1	Late milk	15 800	13 1,500
Red Cob Ensilage	White Dent.	75	Few leaves	Sept. 1				In tassel	15 250	12 750
Angel of Midnight	Yellow Flint.	65	Fairly leafy	Aug. 13	Aug. 20	Sept. 1		Early milk	14 600	10 350
Canada White Flint	White Flint.	65	Very leafy	do 15	do 20	do 1		do	14 600	12 200
Longfellow	Yellow Flint.	65	Fairly leafy	do 13	do 20	do 1		do	14 50	11 1,100
Sanford Flint	White Flint.	67	do	do 22				In tassel	13 1,500	11 1,100
Thoroughbred White Flint	do	65	Fair to good	Sept. 1				do	13 1,500	12 750
Giant Prolific Ensilage Sweet.	White Dent.	70	Few leaves	Aug. 20	Aug. 22			In silk	13 1,500	13 400
Mitchell's Early	White Flint.	58	Very leafy	do 2	do 8	Aug. 15	Aug. 20	Late milk	13 1,500	12 1,850
New White Cap Yellow Dent.	Yellow Dent.	70	Fairly leafy	do 25				In tassel	12 640	10 900
Mammoth eight-rowed Flint.	Flint	70	do	do 14	Aug. 20	Sept. 1		Early milk	12 200	11 1,650
North Dakota Flint White	White Flint.	63	Quite leafy	do 7	do 12	Aug. 22	Sept. 1	Late milk	11 1,650	11
do do Yellow	Yellow Flint.	62	do	do 7	do 12	do 22	do 1	do	11 1,650	11
Canadian Dent	Dent	70	Few leaves	do 13	do 20			In silk	11 1,100	9 1,800
Champion White Pearl Dent.	White Dent.	75	do	do 25	Sept. 1			do	11 500	9 1,250
Pride of Dakota	White Flint.	54	Very leafy	do 6	Aug. 12	Aug. 20		Early milk	11 500	10 1,450
Extra Early Huron Dent	Yellow Dent.	70	Few leaves	do 15	do 20			In silk	11	7 1,400
Minnesota White Flint	White Flint.	70	Fairly leafy	do 15	do 20	Sept. 1		Early milk	10 900	10 350
Minnesota King	Yellow Dent.	70	do	do 12	do 20	do 1		do	10 350	9 700
Dakota Dent	do	70	Few leaves	do 10	do 15	Aug. 20	Sept. 1	Late milk	9 1,800	8 1,050
Pearce's Prolific	Yellow Flint.	70	Quite leafy	do 13	do 20	Sept. 1		Early milk	9 1,800	9 1,250
Country Gentleman	White Dent.	56	Very leafy	do 20				In tassel	9 1,800	5 1,550
Rustler	White Dent.	65	Few leaves	do 15	Aug. 20	Aug. 24		Early milk	9 700	9 150

SILOS.

The silos continue to give satisfaction, the ensilage from last year's crop proved to be of excellent quality and the silos were again filled this year. The corn was injured by fall frosts, and it will be interesting to note what effect a severe freezing has upon the ensilage made from this crop.

EXPERIMENTS WITH FIELD ROOTS.

The past season was an ideal one for root crops of all kinds, and as a consequence nearly all parts of the province is in the enjoyment of the largest yield known in its history.

INJURIOUS INSECTS.

The turnips on this farm were seriously injured by a small green caterpillar the larva of the Diamond back moth (*Plutella cruciferarum*) which perforated the leaf shortly after the plants were thinned out, this gave them a very serious check from which they never fully recovered.

Complaints of injury to root crops from cut worms, were also common. Information on the life-history of cut-worms will be found in the report of the Entomologist and Botanist in the annual report of the Experimental Farms for 1893.

From the general average given for each sowing of roots it will be seen that the earliest sown have again given the largest average yield.

Since the publishing of the report for 1894, several farmers in the province have tested the sowing of a portion of their root crop earlier than the usual time, and all agree that the yield is largely increased by early sowing.

TURNIPS.

Two new and promising varieties of turnips, were tested for the first time this year, and head the list for productiveness viz., American Purple Top and Cow Horn, the first named has much the appearance of the other purple top varieties, and is apparently a good keeper, the shape of the Cow Horn is similar to the Long Red mangel, it is white in colour and not likely to prove a good keeper.

Yield of turnips sown at two differnent dates, previous crop carrots, land manured and ploughed in the fall, seed drilled in on flat drills 30 inches apart, soil rich sandy loam, estimate of yield made from product of one row 66 feet long.

The first plots were sown May 22nd the second two weeks later, all were pulled October 5th.

Name of Variety.	Yield per Acre, 1st Sowing.		Yield per Acre, 1st Sowing.		Yield per Acre, 2nd Sowing.		Yield per Acre, 2nd Sowing.	
	Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
American Purple Top	23	464	774	24	19	280	638	....
Cow Horn	23	200	770	....	23	728	778	48
Jumbo or Monarch	21	1560	726	....	13	400	440	....
Purple Top Swede	18	432	607	12	14	1040	484	....
Carter's Elephant	17	1376	589	36	11	440	374	....
Skirvings Swede	17	320	572	....	15	360	506	....
Hartleys Bronze	17	320	572	....	14	776	479	36
East Lothian	14	1568	492	48	13	928	448	48
Lord Derby	14	1304	488	24	11	704	378	24
Rennie's Prize Purple Top	13	1720	462	....	13	400	440	....
Champion Purple Top	13	400	440	....	11	440	374	....
Imperial Swede	12	552	409	12	13	400	440	....
Elephants Master	10	328	338	48	12	1080	428	....

	Bush.	Lbs
Average yield from all the sowings of 22nd May, per acre	557	6
do do 8th June do	477	39

MANGELS.

These very useful roots have this year given the largest returns in the history of the farm; the Mammoth Long Red as usual heading the list with a yield of 1,214 bushels per acre, from the first sown plot; the roots were also of first rate quality.

We find that the mangel is less liable to injury from insect enemies than the turnip, and the roots can be fed at any time without risk of injury to the flavour of milk.

Yield of mangels sown at two different dates, the first set of plots were sown May 22nd and the second on June 8th, all were pulled September 30th, sown after turnips on rich sandy loam; land manured and ploughed in the fall; sown on flat drills 30 inches apart.

In every case the first sown gave the largest yield. The yields have been estimated from the product of one row 66 feet long.

Name of Variety.	Yield per Acre. 1st Sowing.		Yield per Acre. 1st Sowing.		Yield per Acre. 2nd Sowing.		Yield per Acre. 2nd Sowing.	
	Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
Mammoth Long Red (Evans)	36	864	1214	24	28	1024	950	24
Giant Yellow Intermediate	31	304	1038	24	19	544	642	24
Conqueror Yellow Globe	30	456	1007	36	21	1560	736	
Gate Post	30	192	1003	12	23	1256	787	36
Canadian Giant	29	1400	990		26	1856	897	36
Mammoth Long Red (Webb)	28	1024	950	24	26	800	880	
" (Sharpe)	25	1744	862	24	21	1560	736	
Red Fleshed Tankard	25	160	836		22	1672	761	12
Golden Tankard	24	1632	827	12	23	992	783	12
Champion Yellow Globe	22	1408	756	48	16	1528	558	48
Red Globe	21	1032	717	12	15	1680	528	
Warden Prize Orange Globe	20	128	668	48	14	1568	492	48
Yellow Fleshed Tankard	19	1864	664	24	15	1152	519	12

	Bush.	Lbs.	Per Acre.
Average yield from all the sowings of 22nd May	778	26	
" " 8th June	713	19	

SUGAR BEETS.

These roots are found to be very useful for feeding purposes, especially for calves, by which they are preferred to any other roots.

Yield of sugar beets sown at two different dates on rich sandy loam treated the same as mangels. The first plots were sown on May 22nd and the second on June 8th. All were pulled on Sept. 30th; the yield has been calculated from the produce of one row, 66 feet long.

Name of Variety.	Yield per Acre. 1st Sowing.		Yield per Acre. 1st Sowing.		Yield per Acre. 2nd Sowing.		Yield per Acre. 2nd Sowing.	
	Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
Vilmorin's Improved	21	1296	721	36	15	888	514	48
German White Sugar	19	1072	651	12	14	248	470	48
Austrian Electoral	19	808	646	48	18	960	616	
French White	17	320	572		11	1232	387	12
Klein Wanzleben	17	320	572		16	472	541	12
do from Calgary	14	1832	497	12	14	1304	488	24

	Bush.	Lbs.	
Average yield from all the sowings of 22nd May	610	8	per acre.
" " 8th June	503	4	"

Carrots.

During the long winters here when horses are often confined to the stables with very little exercise, carrots furnish a ration which is very beneficial, and one greatly relished by the horses.

Until very deep fall-ploughing was adopted the yield of field carrots here was quite small. The plan now adopted is to spread the manure, and plough the land ten inches deep in the fall; then harrow and roll. In the spring the land is simply harrowed. As will be seen from the returns of this and last year, the yield is now quite large.

Yield of carrots sown at two different dates on rich sandy loam deeply ploughed, the previous crop was turnips, sown in flat drills 18 inches apart. The first plots were sown on May 21st and the second June 8th. All were pulled October 3rd. The yields have been calculated from the product of one row 66 feet long.

Name of Variety.	Yield per Acre. 1st Sowing.		Yield per Acre. 1st Sowing.		Yield per Acre. 2nd Sowing.		Yield per Acre. 2nd Sowing.	
	Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
Mammoth White Intermediate	18	1840	630	40	11	440	374	
Improved Half Long White	17	320	572		11	880	382	20
do Short White	15	360	506		13	840	447	20
Giant Short White Vosges	14	600	476	40	14	600	476	40
Iverson's Champion	14	600	476	40	10	680	344	40
Early Gem	11	1760	396		13	1720	462	
Carter's Orange Giant	11	1760	396		15	360	506	
White Belgian Selected	11		366	40	15	360	506	
Yellow Intermediate	10	680	344	40	6	1200	220	
Scarlet do	10	240	337	20	9	40	300	40
Long Orange or Surrey	9	480	308		11	440	374	
Long Scarlet Altringham	9	40	300	40	9	480	308	

	Bush.	Lbs.
Average yield from all sowings of 21st May	425	56 per acre.
" " 8th June	391	55 "

Summary.

1st. All field roots should be sown as early as spring frosts will permit.
2nd. Land for carrots should be ploughed not less than eight inches deep.
All classes of live stock are benefited by a few roots in winter.

POTATOES.

The past season has been a favourable one for all kinds of root crops, and the yield of potatoes is above the average, both in quantity and quality.

Owing to the late arrival of some of the varieties, planting of the uniform test plots was delayed until the 28th May, fully two weeks too late, for this district: on this account very few of the varieties were fully matured when fall frosts set in, and the yields were lessened.

Sixty-three varieties were planted and of these twenty-five were new sorts. None of these new varieties have proven equal, in both quality and productiveness, to some of the older sorts, but they will probably improve when fully acclimatized.

Carman's No. 1 is the most productive of the new sorts, but this year it was poor in quality.

Not a rotten potato was found in any of the plots and very little scab.

POTATOES, test of Varieties.

All planted 28th May, on rich sandy loam; dug 28th Sept. The yield per acre has been estimated from the product of one row, 66 feet long.

Name of Variety.	Average Size.	Quality.	Total Yield per Acre.		Yield per Acre of marketable.		Yield per Acre of Unmarketable		Colour.
			Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
Pearce's Extra Early	Med. to large	Fairly good	403	20	385		18	20	Light pink.
Early Norther	Small to med	Wet, poor	392	20	344	40	47	40	"
Pearce's Prize Winner	Med. to large	Dry, good	381	20	355	40	25	40	White.
Polaris	"	do	374		344	40	29	20	"
Carman's No. 1	"	Wet, poor	374		348	20	25	40	"
Thorburn	"	Dry, good	363		344	20	18	20	Dark pink.
Sharpe's Seedling	"	"	363		355	40	7	20	Light pink.
Lee's Favourite	"	Fair, good	363		348	20	14	40	"
Early Harvest	"	Dry, good	359	20	333	40	25	40	White.
Crown Jewel	"	"	355	40	348	20	7	20	Light pink.
Dreer's Standard	"	"	352		341		11		White.
Early Rose	"	"	352		337	20	14	40	Light pink.
Everett	"	Yellow, good	348	20	330		18	20	Dark pink.
Empire State	"	Wet, poor	341		322	40	18	20	White.
World's Fair	Small to med	Dry, good	333	40	311	40	22		"
Early Six Weeks	Med. to large	"	333	40	319		14	40	Pink.
Pride of the Market	do	Fair	330		315	20	14	40	White.
Northern Spy	Small to med	Good	362	20	304	20	22		Dark pink.
Early White Prize	Med. to large	Dry, good	326	20	308		18	20	White.
Pride of the Table	Small to med	Wet, poor	322	40	308		14	40	Dark pink.
Burpee's Extra Early	Med. to large	Dry, good	322	40	304	20	18	20	Light pink.
Henderson's Late Puritan	"	"	322	40	311	40	11		White.
Early Puritan	"	"	319		308		11		"
Great Divide	"	Damp	319		308		11		"
Ideal	"	Fairly good	315	20	304	20	11		Pink.
Troy Seedling	Small to med	Wet, poor	311	40	271	20	40	20	White.
New Queen	"	Dry, good	311	40	282	20	29	20	Light pink.
Early Ohio	Med. to large	"	308		289	40	18	20	"
Freeman	Small to med	Fairly good	304	20	289	40	14	40	White.
Money Maker	Large	Wet, poor	300	40	282	20	18	20	"
Puritan, C.E.F.	Small to med	Dry, good	297		275		22		"
State of Maine	"	"	293	20	271	20	22		"
Daisy	Large	Fair	293	20	275		18	20	Light pink.
London	Med. to large	"	289	40	264		25	40	"
Dakota Red	Medium	Dry, good	289	40	286		3	40	Red.
Nameless No. 3	Large	Fair	287	50	286		1	50	Light pink.
Clark's No. 1	"	Dry, good	286		275		11		"
Rochester Rose	Med. to large	"	282	20	264		18	20	Dark pink.
Lizzie's Pride	"	"	278	40	271	20	7	20	Light pink.
Wonder of the World	"	"	276	40	262		14	40	"
Blue Nose	Small to med	Wet, poor	276	40	225	20	51	20	Dark pink.
Irish Daisy	"	"	275		245	40	29	20	White.
Beauty of Hebron	Large	Dry, good	271	20	249	20	22		Light pink.
Algoma No. 1	Medium	"	271	20	238	20	33		"
I. X. L	Med. to large	Wet, poor	271	20	253		18	20	"
Lightning Express	Small to med	Dry, good	264		253		11		Dark pink.
Early Sunrise	Med. to large	"	263		252		11		Light pink.
Maggie Murphy	Medium	Fair	262	10	253		9	10	"
Nameless No. 1	Large	Dry, good	262		247	20	14	40	
American Beauty	Medium	"	262		254	40	7	20	
White Beauty	Med. to large	"	260	20	242		18	20	White.
Harbinger	Small	Wet, poor	253		128	20	124	40	Pink.
Rural Blush	Medium	Fair	249	20	227	20	22		Dark pink.
Holborn Abundance	"	Wet, poor	245	40	234	40	11		White.
Brownell's Winner	Med. to large	Damp	223	40	212	40	11		Red.
Prize Taker	Small to med	Dry, good	210	50	187		23	50	Light red.
Wonderful Clay Rose	"	"	205	20	179	40	25	40	"
Peerless Junior	Med. to large	Little damp	190	40	176		14	40	White.
Victor Rose	"	Dry, good	176		172	20	3	40	Pink.
Stourbridge Glory	Small	Wet, poor	172	20	132		40	20	
Record	"	Fair	139	20	121		18	20	White.
Orphans	"	Wet, poor	113	40	110		3	40	"
Nameless No. 2	Large	Wet, poor	97	10	95	20	1	50	Light pink.

AVERAGE YIELD OF POTATOES DURING THREE YEARS.

Potatoes are among the most variable of crops and it is impossible to reach a conclusion regarding the merits of a variety from one year's results.

Twenty-six of the varieties named have been tested for three successive years, and the average yield and quality are here given.

With some sorts such as Sharpe's Seedling, Lee's Favourite and Early Rose, the quality is always good, other varieties such as Prize Winner and Polaris vary in quality with the season, the drier the season the better the sample.

The three varieties which have given the most general satisfaction when distributed are Sharpe's Seedling, Lee's Favorite and Early Ohio. The last mentioned is specially valuable for early use, it being by far the earliest potato tested here.

Name of Variety.	Dryness.	Flavour.	Average Yield per Acre of Three years Tests.	
			Bush.	Lbs.
Pearce's Prize Winner	Varies	Varies	264	40
Everett	Dry	Good	255	20
Polaris	Varies	Varies	249	40
Sharpe's Seedling	Dry	Good	243	40
Lee's Favourite	do	do	231	
Daisy	Fair	Fair	229	40
Crown Jewel	Dry	Good	228	40
Pearce's Extra Early	do	do	224	40
Early Rose	do	do	222	20
Burpee's Extra Early	do	do	221	
Dakota Red	Varies	Varies	217	40
Freeman	do	do	216	
Northern Spy	Wet	Poor	212	20
Chicago Market	Varies	Varies	210	20
Algoma No. 1	Dry	Good	208	
Holborn Abundance	Wet	Poor	206	
Empire State	do	do	205	
Early Puritan	Fair	Fair	204	20
State of Maine	Varies	Varies	201	20
Early Ohio	Dry	Good	201	
L X. L	Wet	Poor	200	40
Harbinger	Varies	Varies	196	40
Lizzie's Pride	Dry	Good	188	
Early Sunrise	do	do	180	20
Clarke's No. 1	Fair	Fair	171	
Rural Blush	do	do	151	40

TREATING POTATO SEED FOR SCAB.

Of late years many kinds of fungous diseases attacking farm produce have increased surprisingly, of these potato scab has perhaps made the greatest headway here: so prevalent was it in 1894 that it was almost impossible to find in this part of the province a sample of potatoes perfectly free from it.

This disease not only injures the appearance of the tuber but entails some loss in its removal.

In this experiment, three plots were planted with very scabby Early Rose potatoes. The whole tubers in plot No. 1 were treated with a solution of corrosive chloride of mercury (corrosive sublimate), made by dissolving 2 oz of corrosive sublimate in fifteen gallons of cold water; the potatoes were allowed to stand in this liquid for 2 hours, drained, then cut into two eye sets and planted.

Plot No. 2, was planted with potatoes treated with a liquid composed of 1 lb. of Bluestone (sulphate of copper) dissolved in three pails of water, the whole tubers were immersed for 2 hours in the liquid then cut up and planted.

Plot No. 3, was planted in the same manner with the untreated tubers. The following table gives the yield per acre and the per cent of scabby and clean potatoes: it will be seen that none of the treated potatoes were seriously affected, in fact none would have been considered scabby by the average purchaser.

The bluestone treatment was found to seriously injure the germination of the seed potato, and only about 40 per cent grew, hence the small yield. Next year it is proposed to add lime to the bluestone to lessen its caustic effects.

The produce of the untreated potatoes were the largest tubers, but all were more or less scabby.

The size of the plots, was one row, 66 feet long. The land had never been used for potatoes before.

How Treated.	Per cent Very Scabby	Per cent Slightly Scabby.	Per cent Clean.	Yield per Acre Marketable.		Yield per Acre Unmarketable.		Total Yield per Acre.	
				Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
No. 1. Corrosive sublimate treatment..	None.	51	49	247	20	14	50	262	10
No. 2. Bluestone treatment	do	52	48	95	20	1	50	97	10
No. 3. Not treated	51	44	None.	268	..	1	50	267	50

Although the corrosive sublimate treatment did not completely eradicate the scab, the injury was very slight. The treatment with bluestone was nearly as effective in preventing scab as the corrosive sublimate; but the germination of the tubers was so badly injured that the crop was greatly reduced. Corrosive sublimate is a virulent poison when swallowed by man or beast, and great care should be used to prevent accidents, but no injury results from handling the fluid of the strength given in the formula.

CATTLE.

The cattle on the farm have been healthy during the year, and there has been no losses through sickness.

Since my last report we have received from the Experimental Farm at Indian Head one Shorthorn bull, also one Ayrshire bull from the Central Experimental Farm, Ottawa. The herd now consists of the following:—

Shorthorns.—1 bull, 1 heifer.

Ayrshires.—1 cow, 1 bull.

Holsteins.—1 cow, 1 bull, 1 bull calf, 1 heifer.

Polled Angus.—1 bull.

Grades.—2 cows, 1 heifer, 2 calves.

In addition to these, eight steers were bought last fall for feeding experiments, and re-sold this spring for the English market.

Feeding Cattle.

The export of beef cattle from Manitoba and the North-west has increased surprisingly this year; it is estimated by good authorities that 45,000 head were shipped out of the North-west, an increase of fully fifty per cent over any previous year.

The chief complaint made by cattle exporters is that they find great difficulty in buying well matured stall fed cattle in the spring and early summer months, later in the season the ranch cattle are fit to ship, but stall fed cattle are the only ones in condition to export in the early part of the season.

This is the Manitoba farmer's opportunity, with abundance of cheaply raised fodder and coarse grain, a healthy climate, and abundant leisure in winter, they have everything to assist them in making cattle feeding a success, and only necessity should induce a farmer to sell lean cattle, especially in the fall.

An error commonly made in this country, where grain is so plentiful, is to feed too much grain in the ration, with the result that a large proportion passes through the animal undigested, and is so much waste, with a well balanced ration, from 6 to 10 lbs. of grain per day is all that can be utilized by a 1100 lb. steer.

To succeed with stall fed cattle they must be kept in a healthy condition which is readily known by a loose hide, and silky hair, this is best maintained by feeding a well balanced ration.

In view of the importance of this industry a test was made last winter of feeding one pair of steers with native wild hay, ensilage and grain, and a second pair with oat sheaves, ensilage and grain, the steers which were very evenly matched, were Shorthorn grades, purchased from neighbouring farmers in February at 2 cents per lb., live weight, and sold for export in May at 4 cents per lb. live weight, these were the prevailing prices at the seasons mentioned.

The four steers were divided into as nearly matched pairs as possible and fed for 72 days all they would eat clean of the following rations.

FIRST PAIR OF STEERS.

Cut native hay	20 lbs.
Corn ensilage	30 "
No. 3 frozen wheat chop	5 "
Barley chop	2 "

SECOND PAIR OF STEERS.

Oat sheaves cut	20 lbs.
Corn ensilage	30 "
No. 3 frozen wheat chop	5 "
Barley chop	2 "

The oat sheaves were cut just as the top-most oat in the head was turning brown; both hay and oat sheaves were run through a straw cutter; and the grain was all ground.

FEED CONSUMED.

The total amount, and estimated value of the feed consumed during the feeding period (72 days) was as follows:—

FIRST PAIR OF STEERS.			$ cts.
2,710 lbs.	cut native hay	at $5.00 per ton	6 77
4,129 "	corn ensilage	" 2.00 " "	4 12
814 "	wheat chop	" ½ cent per lb	4 07
334 "	barley chop	" 20 cents per bushel	1 39
			$16 35

SECOND PAIR OF STEERS.			$ cts.
2,310 lbs.	oat sheaves	at $7.50 per ton	8 67
3,792 "	corn ensilage	" 2.00 " "	3 79
702 "	wheat chop	" ½ cent per lb	3 51
289 "	barley chop	" 20 cents per bushel	1 20
			$17 17

SUMMARY OF RESULTS.

Summary of results.	First cost of steers.	Value of feed.	Price sold for.	Profit.	Daily gain of each steer.
	$ cts.	$ cts.	$ cts.	$ cts.	Lbs. oz.
First pair of steers, hay, ensilage, wheat, barley..	44 70	16 35	99 20	38 15	1 11
Second " oat sheaves, ensilage, wheat, barley	43 10	17 17	98 20	37 93	2 1

For a farmer to sell lean cattle at any season means a heavy loss, more especially in the fall, when prices are low and opportunities for stall feeding good. The feeder may make from 50 to 100 per cent. profit in a few months on the carcass which took the farmer nearly three years to raise. This is done by improving the quality of the meat, or as it is generally called "ripening" the steer. The feeder also gets paid well for the additional flesh put on the animal during the winter. Exporters are always anxious to buy at good prices a well fed ripe steer, but will not purchase lean stock.

Where native hay is not procurable, oat sheaves cut before ripe, makes an excellent substitute. The yield of dry oat sheaves on this farm ran from two and a half to four tons per acre this year.

FEEDING OF MILCH COWS

FODDER CORN AND STRAW COMPARED WITH NATIVE HAY.

In another part of this report, mention is made of the successful curing of fodder corn by stacking it between layers of straw. A test of the suitability of the mixture for feeding to milch cows was made during the past year.

The feeding experiment was conducted in three periods, for the first sixteen days the fodder corn mixture was fed as roughage, for the next period of thirty-eight days native hay was used, and the corn mixture was again used for the third period of sixteen days, this plan was necessary owing to the natural shrinkage of the milk flow as the calving period approached.

The corn mixture was composed of 60 per cent of fodder corn and 40 per cent of straw.

The native hay used was of good quality, well cured, and consisted principally of Native Red Top (*Poa serotina.*)

The cows used for the experiment were Dandy, a pure bred Aryshire, and Leda a pure Holstein.

The rations or proportion in which the feed was mixed were as follows:—

Corn Ration.

Fodder corn and straw	40 lbs.
Corn ensilage	60 "
Wheat chop No. 1 hard	10 "
Barley chop	4 "
	114 lbs.

Hay Ration.

Native marsh hay	40 lbs.
Corn ensilage	60 "
Wheat chop No. 1 hard	10 "
Barley chop	4 "
	114 lbs.

As much of the above mixtures as they would eat up clean was fed at three meals each day.

FOOD CONSUMED AND MILK PRODUCED.

Average amount of food consumed daily during corn feeding period by the two cows :—

Fodder Corn.	Ensilage.	Wheat.	Barley.
	Lbs. oz.	Lbs. oz.	Lbs. oz.
36 lbs. 12 oz	51 13	9 6	3 12

Average amount of food consumed daily during hay feeding period by the two cows :—

Native Hay.	Ensilage.	Wheat.	Barley.
	Lbs. oz.	Lbs. oz.	Lbs. oz.
34 lbs. 14 oz	54 3	9 3	3 10

Average daily yield of milk for two cows with corn feed, 42 pounds 2 ounces.

Average daily yield of milk for two cows with hay feed, 41 pounds 5 ounces.

From the results of this experiment it would appear that farmers living at a distance from hay marshes may find fodder corn a good substitute for hay in feeding cows.

SWINE.

NEW PIGGERY.

A frame building for this purpose, 24 feet by 40 feet, has been erected during the year.

The building is on a stone foundation and is double boarded inside and out, with building paper between each layer of boards.

The interior is divided into seven pens 10 x by 10 feet, and a feed room of the same size; a passage four feet wide runs through the centre with gutters on each side for the liquid manure.

The feed troughs and other interior fittings are similar to those shown on page 59 of the Experimental Farms Report for 1890, and seem to be very suitable for the purpose.

There are four yards, each 10 x 64 feet on the south side of the building, for sows; and three yards each 13 x 50 on the north side for boars.

So far the building and yards have proved very satisfactory and convenient for the purpose.

The amount of coarse grain exported from Manitoba to the Eastern Provinces and fed there to swine is very large, and increasing each year. A considerable part of the cured meat is shipped back into this province, necessitating the paying of freight charges each way, this represents a heavy drain on the people which should as far as possible be avoided.

With the object of testing the value of home grown products as pig feed, and also for the purpose of testing the suitability of the different breeds of swine for the climate, a pair of young pigs of each of the following breeds, have been imported from Ontario.

One Berkshire Boar, Barron—3560, bred at the Central Experimental Farm, Ottawa.

One Berkshire Sow, Christie—4140, bred by J. G. Snell & Bro., Edmonton, Ont.

One Tamworth Boar, Major—388, bred at the Central Farm, Ottawa.

One Tamworth Sow, Amber Belle—457, bred by John Bell, Amber, Ont.

One Improved Yorkshire Boar, Oak Lodge Maxum, No. 2,131 bred by J. E. Brethour, Burford, Ont.

One Improved Yorkshire Sow, Sunflower—2071, bred at Central Farm, Ottawa.

POULTRY.

The breeds kept during the past year were Barred Plymouth Rocks, White Leghorns, Black Minorcas and common barn-yard fowl.

Owing no doubt to a liberal use of ground green bone no soft-shelled eggs were laid.

Beef heads were largely used for bone, these were ground during winter with a bone cutter driven by wind power ; in a moderate breeze, 60 lbs. per hour can be finely ground, during winter. 1 ounce per day is fed to each fowl.

POULTRY FOOD.

Soft food consisting of half boiled roots and half ground wheat, wet with skim milk, is fed in the morning, dry grain is used in the evening, this generally consists of 25 per cent of barley, 25 per cent of oats and 50 per cent of wheat, a liberal allowance of luttuce is fed during summer and is much relished.

Fresh water, lime and grit were kept constantly before the fowls, and the dry grain being scattered among chaff ensures plenty of exercise.

HATCHING.

Hens only were used for hatching. The first chickens were hatched on 25th April and the last on the 9th of July. These late chicks were not well feathered when cold weather set in, and the latter date is too late for hatching chickens in this country.

The White Leghorn eggs were the most fertile, closely followed by Black Minorca and Plymouth Rock.

Thirty-six chicks of White Leghorns, 12 Black Minorcas and 40 Plymouth Rocks were raised. The White Leghorn chicks feathered very quickly and for that reason are the easiest to raise. The Black Minorca come next, while the Plymouth Rock, being very slow to feather, have a higher death rate as chicks, but are very healthy after full feathering.

Ready sale has been found for all the surplus stock of poultry raised on the farm.

All breeds have been very free from disease. There were two cases of "crop bound" among the White Leghorns. The crops were cut open, cleaned, and then sown up, and when the disease had not progressed too far, the fowls recovered.

EGGS.

The following table gives the average number of eggs obtained each month from each hen of the different breeds, when kept in confinement. No doubt the eggs would be more numerous if the birds were allowed full range.

The bottomless nest spoken of in my last report was again successful in preventing egg eating. I find that this vice is very prevalent throughout the province. At a season when eggs are high priced, this might be avoided by using the proper kind of nest.

Breed.	December, 1894.	January, 1895.	February.	March.	April.	May.	June.	July.	August.	September.	Total.
	Eggs.	Eggs.	Eggs.	Eggs.	Eggs.	Eggs.	Eggs.	Eggs.	Eggs.	Eggs.	Eggs.
Barred Plymouth Rock.....	$1\frac{8}{10}$	$3\frac{4}{10}$	$4\frac{7}{10}$	$6\frac{8}{10}$	$18\frac{3}{10}$	$20\frac{7}{10}$	$16\frac{4}{10}$	$12\frac{1}{10}$	$16\frac{6}{10}$	$12\frac{1}{10}$	$112\frac{8}{10}$
White Leghorn.....	$4\frac{9}{10}$	$8\frac{1}{10}$	6	$13\frac{5}{10}$	21	$22\frac{4}{10}$	$20\frac{4}{10}$	$14\frac{2}{10}$	$9\frac{2}{10}$	1	$120\frac{7}{10}$
Black Minorca.....	....	.....	$2\frac{3}{10}$	$14\frac{3}{10}$	$20\frac{8}{10}$	$20\frac{8}{10}$	$17\frac{8}{10}$	14	7	2	$98\frac{4}{10}$

The following are the live weights reached by fowls of the different breeds :—

Name of Breed.	Age.	Weight.	
	Months.	Lbs.	Oz.
Barred Plymouth Rock, cock	17	9	8
do cockerel	$5\frac{1}{2}$	5	4
do hen	17	6	3
do pullet	$5\frac{1}{2}$	4	4
Black Minorca, cock	17	7	..
do cockerel	6	5	4
do hen	17	4	3
do pullet	6	3	8
White Leghorn, cock	14	4	12
do cockerel	6	4	8
do hen	14	3	8
do pullet	6	3	..

TABLE FOWLS.

Although the White Leghorns are excellent layers they are under weight for table fowl, and having prominent breast bones their shape is also against them for that purpose. The Plymouth Rocks sell readily as table fowls. The Black Minorcas appear to be in many respects midway between the White Leghorns and Plymouth Rocks.

APPLES.

No success can yet be reported in the cultivation of standard apples on this farm. Of the varieties of Russian origin, which were planted in 1889 and succeeding years, many are still alive, but each year are severely killed back. Even the trees planted under the protection of the forest tree shelter belt, and where each winter they are almost entirely covered by snow, are nearly all dead.

The two Peerless apple trees from O. F. Brand, of Faribault, Minnesota, planted in 1894, although tested under very favourable circumstances, have nothing to recommend them for this province, they were killed to the snow line last winter.

Below will be found a list of trees which have survived, of those tested, but these are all killed to the snow line each winter, and the chances of their bearing fruit seems very small :—

Anis Red.
Anis Yellow.
Antonovgka.
Ben Davis.
Canada Baldwin.
Duchess of Oldenburg.
Wealthy.
Little Hat.
Saccharine.
Borsdorf.
Winter Stripe.
Grandmother.
Liebig.
Switzer.
Winter St. Lawrence.
German Calville.
Silken.
Gipsy Girl.
Sugar Sweet.
Silken Leaf.
White Pigeon.

CRAB APPLES.

The same may be said of the crabs as of the standard apples: very little success can be reported. Some of the Transcendants and other varieties are still alive, but only one is in any way promising.

Sixty Yellow Siberian crab seedlings are doing remarkably well. The seed of these was obtained from the Central Experimental Farm, Ottawa, in 1893. These appear to be, so far, quite hardy, and their development will be watched with interest.

WILD CRAB OF SIBERIA.

The wild Siberian crab (*Pyrus baccata*) received here from the Central Experimental Farm at different times, has not been injured in the slightest degree by frost. There are one hundred of these trees now growing on the farm, seven of which have proved hardy after a test of five years. Ten trees are growing from seed, the seed was obtained from Ottawa in the spring of 1893, these are now vigorous young trees about 24 inches high.

The following additional varieties of *Pyrus baccata* are also being tested, and they all appear to be quite hardy, viz. :—*Sanguinea*, *Macrocarpa*, *Cerasiformis*, *Prunifolia*, and *Auruntiaca*.

PLUMS.

The native plum trees planted in 1890, were again loaded with fruit this year, which appears to improve somewhat in flavour under cultivation.

Some trees obtained from the Brandon Hills in 1893, bore also a fair crop of fruit, on these the fruit was not uniform in quality. The trees bearing the best fruit were marked for future propagation.

The orchard containing the following seedling trees, received from the Central Farm at Ottawa, and planted in 1893, has done well. It contains 127 seedlings of Weaver, 12 of Cheney, 8 of Speer, 6 of De Soto and 34 native seedlings. These trees have all stood the ordeal of one winter and have made a vigorous growth.

Eighty-six plum seedlings of 43 varieties unnamed, were obtained from Mr. Thos. Frankland, Stonewall, Manitoba, in the fall of 1893. These were buried 2 feet deep until spring, and then planted on the hillside west of the arboretum. With the exception of two all are alive. As the native plums vary much in quality, by selecting the best, as they fruit, for future propagation it is believed that the quality may be gradually improved.

Three hundred seedlings of the native plum have been raised on the farm during the present season. These are now about 18 inches high and very vigorous.

The following plum seedlings were added to the list last spring: 5 seedlings of Voronesh (102); 5 of De Soto, from the Central Experimental Farm; and 2 Native Yellow Plums from Portage la Prairie. These are all living and healthy at this date.

TEST OF FALL AND SPRING SOWN PLUM PITS.

A quantity of native plum pits were received from Portage la Prairie in the fall of 1894. One-half of this consignment was packed in damp sand in boxes; the boxes being stored outside where they remained frozen in a solid mass all winter, and were sown the following spring, the other half was sown directly in the seed bed. Of the fall sown pits only 20 per cent have germinated to date, while 95 per cent of the spring sown seed came up in a few weeks, these latter have also made more robust plants.

CHERRIES.

The standard cherries which were new importations from the Central Experimental Farm, and mentioned on page 311 of last year's report, made a thrifty growth during last summer, but all succumbed to the severity of last winter. Many of these varieties have been tried before with the same result.

The present season there was sent from the Central Farm 5 each of seedlings of the six following varieties:—

Bessarabian,
Olivet,
Montmorency,
Red Morello,
Wragg,
Carnation.

These are in a thrifty condition at the present time, and it is hoped they may winter successfully.

The plantation of 200 eastern Sand cherries (*Prunus pumila*) mentioned in last year's report, although slightly injured by winter, are all growing well. Seedlings of this cherry have been received from several different points, which will be planted for comparative test with the native form. As the sand cherry varies very much in quality in different localities, it is hoped that some very good sorts will shortly be obtained.

CURRANTS.

The yield of black currants was very small this year, owing to the drought of the previous year. They entered the winter in a very bad shape, the leaves having all fallen off prematurely, and it was found in the spring that a large percentage of the fruit bearing wood had been killed. Some of the seedling varieties did not suffer so severely from these causes and gave a fair amount of fruit.

Of the old varieties, the Black Naples and Black Champion, withstood the dry season of 1894 and the protracted spring frosts of 1895 much better than Lee's Prolific.

The red and white varieties were not so much injured by drought and frost as the black varieties were, and a fine crop of fruit was gathered. Of the red sorts, Red Grape was the least injured, and has proven itself vigorous, healthy and a prolific bearer. Of the white currants the White Grape still leads the list.

SEEDLING BLACK CURRANTS.

All the seedling black currants, with the exception of one, fruited this season; weights and notes of fruit were carefully taken. Following are the results:

Name of Variety.	Flavour.	Colour.	Weight from 1 Bush.	Size.	Earliness.	Remarks.
Perth	Acid	Black	22 oz.	Medium	Very early.	Vigorous.
Stewart	Good	do	22 oz.	Large	do	do
Ontario	Woody	do	12 oz.	Small	Early	Not thrifty.
Charmer	Poor	do	14 oz.	do	Late	Generally poor.
Henry	Good	do	25 oz.	Medium	Early	Fairly healthy.
Star	Very good	do	30 oz.	Small	Very early.	A fine bearer.
Lewis	Very acid	do	17 oz.	do	do	A shy bearer.
Climax	Excellent	do	32 oz.	Medium	do	Very vigourous.
Lennox	Fair	do	19 oz.	Large	do	Fairly healthy.
Middlesex	Poor	do	6 oz.	Small	do	Unhealthy.
Parker, not fruited yet.						Runs to wood.

NEW CURRANTS.

The list of currants below, were planted in 1893. They all bore fruit and are listed in order of merit.

RED CURRANTS.

Red Dutch, very productive, fine fruit. La Fertile, productive, ripens evenly. Knight's Early Red, productive, acid, fair flavour. La Conde, fairly productive. La Hative, not productive, poor fruit. New Red Dutch, not promising.

WHITE CURRANTS.

White Transparent, productive, fair fruit.

BLACK CURRANTS.

Baldwin, productive, very late. Prince of Wales, fairly productive. Ogden's Black, winter-killed, root and branch.

GOOSEBERRIES.

The Houghton, Smith's Improved, and the Native, had a fair quantity of fruit.

The Houghton has been attacked by a leaf-curling aphis. One row was sprayed with kerosene emulsion, but this seemed to have but little or no effect on the insects, probably owing to the emulsion having been used too late in the season. Unaffected plants have been propagated, and will be removed to a new plantation in the spring. The Smith's Improved and the Native were not badly affected with this insect.

Five bushes of Native Sandhill Gooseberry were received from D. D. Buchanan in 1894, and are making a vigorous growth, but have not yet fruited.

RASPBERRIES.

The cold weather of May injured the raspberry crop on this farm, as it did throughout the province, and very little fruit was obtained, but every variety has made a vigorous growth of well-ripened wood, and there is promise of a good crop next year.

Annexed will be found a list of the raspberries which have been planted in a new plantation on the hillside west of the arboretum. These have all been tested for four years, and found suitable for general cultivation.

RASPBERRIES TESTED FOR FOUR YEARS.

Name of Variety.	Colour.	Productiveness.	Hardiness.
Philadelphia	Red.	Prolific.	Very hardy.
Turner	do	Productive	Hardy.
Sarah	do	do	do
Marlboro	do	Fairly productive	do
Cuthbert	do	do	Half hardy.
Seedling 3-74	do	do	Hardy.
Caroline	Yellow	Productive	Tender.
Reeder	Red.	do	do
Golden Queen	Golden	do	do
Seedling 3-7	Red.	Not productive	Half hardy.
Hilborn	Black	Prolific.	do

GRAPES.

Five native Manitoba grape vines were planted in 1893, and have made a fine growth.

Five vines each of Gibb and Bacchus grape vines, were received from the Central Experimental Farm this spring, these have become well established, and were covered with earth this fall. It is hoped they may survive the winter.

During the past year a considerable number of young fruit bushes have been grown on the farm from cuttings and layers, also about 60,000 young forest trees and shrubs from cuttings, layers and seeds. Many of these will be available for distribution next season for test in different parts of the province.

HEDGES.

Nine new hedges were planted this season in a group north-east of the arboretum, each 60 feet long and 10 feet apart.

Below will be found a list of the names of the trees and shrubs used for this purpose, they were all more or less adversely affected by being planted late.

The *Spiraea opulifolia* and *opulifolia aurea* were obtained from the Central Experimental Farm, but all the others are natives and the young plants were got from the wooded ravines and bluffs about the farm.

Red osier cornel.—*Cornus stolonifera.*
Wolf Willow or silver bush.—*Elœagnus argentea.*
Snowberry.—*Symphoricarpus occidentalis.*
Meadow Sweet.—*Spiræa salicifolia.*
Native Rose.—*Rosa Sayi.*
Saskatoon.—*Amelanchier alnifolia.*
Hazelnut.—*Corylus Americana.*
Pin Cherry.—*Prunus Pennsylvanica.*
Aspen.—*Populus tremuloides.*
Guelder rose-leaved spiræa.—*Spiræa opulifolia.*
Golden-leaved spiræa.—*Spiræa opulifolia aurea.*

One hundred trees of the native White Spruce, *Picea alba*, were obtained from the woods south of Sewell, Man., and planted as a hedge for the protection of fruit trees on the hillside : these are all growing with the exception of two.

Many people are slow to transplant the native spruce from our woods and plains for the reason that in some cases a large percentage have died. But if the trees are obtained from the heavier soils and care taken to select the smaller sized trees and to keep the roots from drying during transplanting either by allowing the soil to adhere to them or by keeping the roots otherwise constantly moist, they may be moved with very little loss.

Two new hedges of box elder were planted this season; one as a wind break for the propagating beds, the other to hide the manure heap. These were planted 2 feet apart in the rows; 2-year-old trees were used for the purpose, and they have already become well established.

NEW TREE PLANTATION.

Last spring a plantation of one and a quarter acre in extent was planted at the west end of the farm near the main road. Two year old box elder and elm seedlings were used for this purpose.

The plot selected was summer-fallow, the soil a sandy loam. It has been found advantageous, to the young trees to plant on summer-fallow because this retains a good supply of moisture, and very little cultivation is necessary to keep the trees free from weeds the first year.

One object in planting this plot was to ascertain the cost of planting and maintaining an acre of trees in this province.

The method of planting was as follows: The plot was harrowed and rolled, a horse marker was then used marking the field both ways from north to south and from east to west, so subdividing the plot into squares, 4 x 4 and making it possible to cultivate both ways. Two men followed, one with a pail of trees the other with a spade. At each angle a hole was made using the spade as a dibler. The young seedlings were then inserted and thoroughly tramped. With a few exceptions these trees are all alive and have become well established.

NEW FOREST TREES AND SHRUBS.

The following new trees and shrubs were received from the Central Experimental Farm, and planted in nursery row. If found hardy, they will be transplanted to permanent quarters in the spring.

50 *Acer glabrum.*
30 *Cornus Sibirica.*
5 *Pinus Cembra.*
80 *Rhamnus Frangula.*
3 *Caragana pygmæa.*
20 *Cotoneaster vulgaris.*
3 *Cercidiphyllum Japonicum.*
10 Douglas Spruce, *Pseudotsuga Douglasi.*

SHRUBS.—Received 1894 and tested one year.

The shrubs mentioned in the list below were received in the spring of 1894 and have been exposed to the test of one winter.

Name of Variety.	When Received.	Number Received.	Number Alive at this Date.	Remarks.
Almond Pink	1894	1	0	Dead, probably drought.
do White	1894	2	0	do do
do Double Rose	1894	1	0	do do
Persian Yellow Rose	1894	2	2	Not healthy.
Berberis sinensis	1894	2	2	Healthy.
Russian euonymus	1894	4	4	do
Prunus Maackii	1894	4	4	do
Prunus Grayana Maxima	1894	2	2	do
Improved Elderberry	1894	5	5	Very healthy.
Hypericum Kalmianum	1894	2	2	Not healthy.
Betula Dahurica	1894	2	0	Did not start.
Pyrus spuria	1894	1	1	Fairly healthy.
Cotoneaster vulgaris	1894	3	3	Very healthy.
Caragana Redowsky	1894	12	12	do do
Caragana pygmæa	1894	12	0	Dead.
Philadelphus	1894	3	1	Healthy.
Rosa rubrifolia livida	1894	8	8	Small growth.
Lonicera chrysantha	1894	5	5	Small, healthy.
Viburnum rugosum	1894	2	2	Healthy.
Cornus mascula elegantissima	1894	2	0	Dead, did not start.
Viburnum pyræfolium	1894	1	1	Unhealthy.
Exochorda grandiflora	1894	1	0	Winter killed.
Weigelia lonerii	1894	1	0	do
do candida	1894	1	0	do
do Hendersonii	1894	1	0	do
Sumach	1894	2	2	Very thrifty.
Elæagnus macrocarpa	1894	4	0	Very dry when received.
do gracilis	1894	4	0	do do
do angustifolia—Wild Olive	1894	3	2	Healthy.
Russian Privet	1894	1	0	Winter killed.
Symphoricarpus racemosus	1894	2	2	Healthy.
Berberis Thunbergii	1894	2	0	Did not start.
Pyrus Toringo	1894	2	0	Winter killed.
Rosemary leaved Willow	1894	2	0	Killed by frost.
Lonicera, 133 Vor	1894	2	1	Badly killed back.
Cratægus sanguinea Schroederi	1894	10	3	Badly affected with drought.
Ligustrum Amurense	1894	25	25	Very healthy.
Rosa rugosa	1894	100	100	do
Basswood—*Tilia Americana*	1894	20	20	do
Acer Ginnala	1894	100	100	do

Two each of 25 varieties of lilac were received from Hoopes Bros., these are all dead with the exception of one shrub each, of Common Purple and Rouge de Marley. These appear to be all grafted on a species of privet, and their loss is probably due to the tenderness of the stocks.

SOME TESTS WITH TREE SEEDS.

Seeds of the native maple (box elder) and ash gathered in 1891, were sown in seed beds last fall to test their germinating qualities, 100 per cent of the box elder germinated and made fine plants, whilst not one of the ash seed spouted,

MAPLE SEED SOWN WET VS. DRY.

Part of the Manitoba maple seed (box elder) sown last spring was soaked in water for one week before sowing, two rows of the wet was tested against two rows of the dry;

both lots were sown on summer-fallow, sandy loam soil, in drills 2 inches deep, the wet seed germinated quicker than the dry, the result is given below.

Name of Variety.	How treated	Number grown on two rows.	Present height.	Remarks.
Manitoba Maple or Box Elder, *Negundo Aceroides*	Wet	2,600	15 inches	Very vigorous.
	Dry	1,590	10 do	Fairly vigorous.

CUTTINGS.

Taking this season as a criterion the spring procured cuttings of poplars and currants give the best results, but with buttonwood, willows and artemisias, there is no perceptible difference between spring cuttings and fall cuttings. Very fair results were obtained from cuttings made and planted late in the fall. Of those cut and wintered in sand few struck and these made spindly plants, many of them being killed by the first dry weather.

It has been found here that cuttings should be cut with a sharp knife and not with pruning clippers as the latter bruises the ends of the slips causing them to rot.

Appended will be found the results of experiments with cuttings during the past season.

EXPERIMENTS WITH CUTTINGS.

Name of Variety.	When made.	When planted.	Percentage growing.	Remarks.
Dakota Cottonwood, *Populus monilifera*, large wood	Fall	Spring	80	Wintered in sand.
Dakota Cottonwood, 1-year old wood	do	do	70	do
do do	Spring	do	70	Cut and immediately planted.
Populus Bereolensis	Fall	do	25	Wintered in sand.
do 1-year old wood	Spring	do	95	Very robust.
do 3 do	do	do	75	Cut from trunk of trees.
do	Fall	Fall	45	Fair thrifty.
Artemisia abrotanum, South'n wood	Spring	Spring	100	Very healthy.
do do	Fall	do	100	Wintered in sand.
do do	do	Fall	100	Cut and immediately planted.
Artemisia abrotanum, var. Tobolskianum	do	Spring	100	Wintered in sand.
do do	Spring	do	100	Very healthy.
Salix acutifolia	Fall	do	100	Wintered in sand.
do	Spring	do	100	Healthy.
Salix Voronesh	Fall	do	100	Wintered in sand.
do	Spring	do	100	Thrifty.
Lonicera tatarica	do	do	25	Three-year old wood.
do	do	do	5	One season's growth wood.
Ribes aureum	do	do	50	Three-year old wood.
do	do	do	25	One-year old wood.
do	Fall	Fall	2	Weak growth.
Lee's Prolific Black currant	do	do	10	do
do do	Spring	Spring	90	Healthy growth.
do do	Fall	do	15	Wintered in sand.
Raby Castle Red currant	do	do	35	do
do do	Spring	do	90	Robust.
do do	Fall	Fall	15	Weak growth.

AVENUES.

This season the native maples (box elder) were attacked by the Box Elder Aphis *(Chaitophorus negundinis)*. Having only a hand sprayer at the time, the trees being large, it was impossible to subdue them with any insesticide. Many of the trees were so badly infested that it is feared some will succumb. Many other trees in this vicinity have also been badly injured by this insect. With a larger spray pump, which will be available for use in the spring, we hope to be able to keep this pest in subjection.

FOREST TREES AND SHRUBS.

Last spring many additions were made to the arboretum around the superintendents' house; and, the season being favourable, most of them have done well. Some of these were transplanted from nursery rows, and some were obtained from the woods. The new native trees are :—

Basswood (*Tilia americana*).
Native Larch (*Larix americana*).
Native Hawthorn (*Cratægus coccinea*).
Native Alder (*Alnus incana*).
Manitoba Mountain Ash (*Pyrus americana.*)
Swamp Birch (*Betula pumila*).
Climbing Bitter Sweet (*Celastrus scandens*).

For the instruction of visitors and convenience of identification, each tree in this plantation has been provided with a zinc label, the name being written with an indelible ink. This ink is made by dissolving common bluestone (sulphate of copper) 1 ounce in about half a pint of water, to which is added a little ink to give it colour; to prevent oxidation of the zinc the label is given a coat of shellac, after the name is written.

The trees and shrubs in this plantation now number 827, of 107 varieties.

Some planting was done on the gravel hill on the north-west corner of the arboretum, from which nearly all the surface soil was taken when grading; specimens of the following varieties were planted as a test of their suitability for a poor gravelly soil.

Artemisia abrotanum. var. Tobolskianum.
do do (Southernwood.)
Populus Bereolensis.
Spiræa opulifolia.
Manitoba maple (*Negundo aceroides.*)
Dakota Cottonwood (*Populus monilifera.*)
Native White Spruce. (*Picea alba.*)

Most of these trees are growing fairly well. The artemisias have made good growth and are apparently suitable shrubs for this kind of soil.

FOREST TREE DISTRIBUTION.

The distribution of forest tree seedlings and cuttings has been continued, 291 parcels, each containing 100 cuttings, were sent out during the year, these were nearly all varieties of Russian poplars and willows which are hardy here.

Ninety collections of rooted trees were also sent to individuals and public institutions, who were willing to pay the express charges on them.

REPORTS FROM PARTIES SUPPLIED WITH TREES IN 1894.

Since my last report, the circulars sent out with the tree distribution in 1894, have been returned and their contents compiled.

From the accompanying summary it will be seen that the parties receiving trees have hadair success for such an exceptionally dry year; the results of the distribution of 1895 will probably be still more satisfactory as the season has been a favourable one.

A number of farmers are already growing young trees for themselves and neighbours by means of cuttings, taken from the poplars and willows distributed in former years, and thus the usefulness of this good work is being extended.

ANALYSIS OF TREE REPORTS.

Number of reports received	143
No. reported as having received the parcels in good condition	89
do do do do fair condition	24
do do do do bad condition	17
do do as having had good success with the trees	95
do do do fair do do	20
do do do poor do do	28

DISTRIBUTION OF TREE SEEDS.

Two hundred and twenty-six, one pound packages of Manitoba maple tree seeds, were distributed during 1895, and from the few reports already received it is evident that the season has been a favourable one for the seedlings.

The following summary has been compiled from the reports received from the tree seed distribution of 1894. Although the summer of 1894 was unfavourable for the germination of tree seeds, it will be seen that the average number grown from a pound package of seed was 847; the particulars given show the advantage of thoroughly cultivating the land before sowing the seed.

TREE SEED DISTRIBUTION.

Number of reports received	72
do favourable reports	56
do unfavourable reports	13
do failures from dry weather	11
do do due to injury from cut worm	1
Average height of seedlings in the fall	12 inches.
Average number of seedlings from one pound of seed	847

BEST RESULTS OBTAINED BY THE MOST CAREFUL GROWERS.

Number of Seedlings from one pound of seed.	How land was prepared.	When sown.	Height in fall.
5000	New land fallowed	May 15	6 to 18 inches.
3000	Garden land	do 12	6 to 15 do
2745	Potato land	do 10	31 do
3000	Cattle corral	June 1	24 do
2200	Well cultivated	May 9	12 do

DISTRIBUTION OF SEED GRAIN AND POTATOES.

The following quantities were sent to applicants from this farm, in the spring.

Wheat in 2 bushels or more	32 lots
Barley " "	29 "
Oats " "	11 "
Grain of all kinds in three pound bags	149 "
Potatoes in two pound bags	48 "

THE VEGETABLE GARDEN.

On the whole, the past season has been favourable to the growth of vegetables. Although rains came late, this was compensated for by the copious showers which fell. Late spring frosts hurt some of the earlier sown vegetables, such as pease, radish, lettuce, etc., and the early fall frosts, combined with the rather cool summer, adversely affected those requiring heat, such as tomatoes, cucumbers, corn, etc. Onions did very well, as did also cabbage, cauliflower, beets, carrots, etc.

Following will be found the results of this year's varietal tests:

CARROTS.

Six varieties of carrots were sown outside in drills 18 inches apart, on 1st May, and all germinated. The roots were all remarkably clean and free from rot. *Pearce's Scarlet Model* was certainly the best variety, closely followed by *Danver's Half Long.* All varieties were lifted on 17th September.

Name of Variety.	Shape.	Diameter at Top.	Colour.	Flavour.	Average Weight.	Yield per Acre.
		In.			Oz.	Bush. Lbs.
Pearce's Scarlet Model	Stump rooted	2½	Scarlet	Excellent	11	487 40
Danver's Half Long	do	2¼	do	Very good	8	440
Early English Horn	Long	2	do (Orange centre).	Fair	5	366 40
Henderson's Intermediate	Half long	1¾	Scarlet	Good	5	322 40
Cooper Taber's Exquisite	Long	1½	Yellow	Fair	5	219 5
St. Valery	do	2	Scarlet (Orange centre).	Good	4	205 20

CORN.

Seventeen varieties of corn were tested this season. All were sown on May 23, with "Planet Junior" hill-dropping drill, hills 3 feet apart. Thirteen of the varieties came to a condition fit for table use, and one variety, viz., Squaw Corn, ripened its seed. The exceptionally cool summer was rather detrimental to this vegetable, and the early frosts cut back some of the varieties that would otherwise have ripened their seed. Following are a few remarks on the most promising of the varieties:—

Squaw Corn.—An old variety here: can be depended on to ripen its seed, even in the most adverse seasons. A coloured flint corn, sweet and productive.

Mitchell's Extra Early (Home grown.)—A white, flint corn of fair flavour and productiveness, early. An improvement by selection of Squaw Corn.

Burpee's First of All.—A 10-rowed dent variety of good flavour, fairly early and very productive: a desirable sort for this province.

Early Cory.—An 8-rowed dent corn; of good flavour and fairly early.

CORN, Test of Varieties.

Name of Variety.	Ready for use.	Variety.	Length of Cob.	Weight per Dozen.	Flavour.
			Inches.	Lbs.	
Squaw Corn	Aug. 15..	8-rowed flint	5½	2	Good.
Mitchell's Extra Early (own seed)	do 23..	do	7	3	Fair.
Cory (own seed)	do 30..	8-rowed dent	8½	3 4/16	Good.
Burpee's First of All (own seed)	do 23..	10-rowed dent	6½	3 4/16	do
Extra Early Vermont (own seed)	do 30..	do	6½	3 8/16	do
Extra Early Marblehead	Sept. 5..	do	8	4 2/16	do
Ford's Early Sugar	do 5..	8-rowed dent	6½	3	do
Mitchell's Extra Early (new seed)	Aug. 26..	8-rowed flint	6¼	2½	Fair.
Nameless Variety No. 1	do 28..	do	7	2 8/16	do
do No. 2	do 30..	do	7	2 7/16	do
Brandon Hybrid No. 1	do 30..	8-rowed mixed	9	3 8/16	do
do No. 2	do 30..	do	7	3 4/16	do
do No. 3	Sept. 2..	do	8	3	do

NOTE.—The first five and the last three on this list were grown from seed ripened on the Experimental Farm, Brandon.

PEASE.

Sixteen varieties of pease were sown—nearly all suffered severely from spring frosts, and on 10th May they were cut so badly that it was thought necessary to make another sowing, but after a time they recovered, and the second sowing was hoed out. The only variety not injured by frost was Telegraph.

Sunol (Home grown seed).—An early, round pea, of fair flavour and productiveness, has again proven itself the earliest variety tested.

American Wonder (Home seed).—One of the earliest of the wrinkled pease, only a few days behind Sunol and of much better flavour. Height, 6 inches.

Juno (Home seed).—A second early pea, of good flavour. Pods large and well filled.

Prince of Wales (Home seed).—A late pea, of good flavour, and very productive. A first class variety.

Burpee's Profusion (Home seed).—A late wrinkled pea, of good flavour and very productive. A good variety.

Yellow, for split purposes (Home seed).—Although this was sown rather late, enough seed has ripened to sow a larger plot in 1896.

Telegraph.—A late pea, of good flavour and very productive. Combined with its hardiness, this makes it one of the best varieties tested.

Shropshire Hero.—A late pea, of good flavour and very prolific.

All sown in drills 4 feet apart.

PEASE, Test of Varieties.

Name of Variety.	Date Sown.	Date ready for use.	Average length of Pod.	Number of Peas.	Flavour.
			Inches.		
Sunol (own seed)	April 5..	July 2..	2	7	Fair.
American Wonder (own seed)	" 5..	" 4..	2	6	Good.
Juno (own seed)	" 15..	" 10..	2½	7	"
Prince of Wales (own seed)	" 15..	" 15..	3	7	Very good.
Burpee's Profusion (own seed)	" 15..	" 12..	3	6	Good.
Yellow for split purposes (own seed)	May. 16..	.....	2½	6	
Early variety (no name)	Apr 5..	July 8..	2¼	7	Very poor.
Little Giant	" 15..	" 6..	2	6	Good.
Hair's Dwarf Mammoth	" 15..	" 31..	2¼	5	Fair.
New Heroine	" 15..	" 30..	3	8	Good.
Stratagem	" 15..	" 27..	2¼	6	"
Telegraph	" 15..	" 15..	3	8	Excellent.
Juno (new seed)	" 15..	" 15..	2½	7	Good.
Maud S	" 22..	" 5..	2	6	Fair.
Sunol (new seed)	" 22..	" 4..	2	6	"
Shropshire Hero	" 22..	" 30..	3½	8	Very good.
C.P.R. Pea	.....	.....	.....	.....	Only about 5 p.c. of this variety germinated.

CABBAGE.

Twelve varieties of cabbage were sown, but only 10 germinated, the varieties known as *Dwarf York* and *Manchester Red Drumhead* not coming up. All were sown in hotbed on 20th April and planted in the open on May 27. Most of the varieties did very well, and though no very large heads were produced, all were of an average size and well formed. Of the early varieties, *Early Jersey Wakefield* was the best, and *Vandergaw* the best of the late varieties.

Early Jersey Wakefield.—An early, well flavoured cabbage of fine texture. Heads pointed and solid; a very desirable early variety.

Henderson's Early Summer.—A flattish, late cabbage of fair flavour and substance.

Early Winningstadt.—An intermediate cabbage of good texture and flavour. Heads pointed and solid.

Vandergaw.—The best late cabbage tested of the Drumhead type, firm and solid. A first rate variety.

Dark Red Erfurt.—A red cabbage of good flavour and texture. Although the heads were not large yet they were very firm and solid.

Filderkraut.—A long taper-pointed cabbage of good flavour and, substance, a desirable variety.

Name of Variety.	Date First Ready.	Percentage Headed out.	Average Weight.	Shape.	Flavour.
			Lbs.		
Early Jersey Wakefield	July 25....	100	5	Pointed	Good
Henderson's Early Summer	Aug. 10....	95	6	Round.....	do
Early Winningstadt	do 20....	100	7	Pointed	do
Henderson's Succession	Sept. 5....	98	10	Flat.....	do
Drumhead Savoy	do 13....	50	4½	Round.....	Fair.
Vandergaw	do 23....	90	9	Flat.....	Good.
Dark Red Erfurt	do 23....	90	4½	Round.....	do
Filderkraut	do 23....	100	6	Pointed	do
Express	July 30....	50	4	Round.....	Fair.
Etampes	do 20....	90	4	Pointed	do

CAULIFLOWER.

Seven varieties of cauliflower were sown in hot-bed on April 20th, and all germinated. They were planted in the open on June 3rd, most of the heads produced were of good size, although some of them were of poor colour and texture.

Henderson's Early Snowball.—This was the best variety tested. Heads of good size and colour, very close grained, and of good flavour.

Dwarf XXX Erfurt.—A good variety. Heads dense and very white, flavour good.

Early French Demi-Dur.—Has a good close grained head, very white in colour. A desirable variety.

Selected Early Erfurt.—Only a fair variety. Heads dense, but rather poor in colour.

Name of Variety.	Date First Headed.	Percentage Headed Out.	Average Weight.	Colour.	Flavour
			Lbs.		
Snowstorm	July 15	80	2¼	Poor	Poor
Early Snowball	do 10	90	2¾	do	Fair
Dwarf XXX Erfurt	do 13	100	2⅞	Good	Good
Selected Early Erfurt	do 13	100	2¼	Poor	Fair
Walcheren	do 30	50	2¾	do	do
Early French Demi-Dur	do 16	90	2¼	Good	Good
Henderson's Early Snowball	do 20	100	2¾	do	do

ONIONS.

Nine varieties of onions were sown in drills twelve inches apart. All germinated with one exception, viz., *Giant Spanish Yellow.* This year gives additional evidence that onions are one of the most paying vegetables grown. All varieties averaged over 400 bushels per acre, and as they usually command a good price, few vegetables will give the same return. Many growers leave onions too long in the ground, and the frost injures them before they are dried. It is best to pull them a little on the green side rather than leave them to ripen in the ground. The best keeping onion of the varieties tested last year, was *Large Red Globe*, which when looked over on April 12th, 1895, were as sound as when stored. This year taking all points into consideration, *Yellow Globe Danvers* and *Red Globe Danvers* were the two best varieties.

Silverskin.—A medium sized white onion of mild flavour, irregular in shape, and having a loose moist skin, which will probably detract from its keeping qualities.

Red Wethersfield.—A Red Globe onion, much later in arriving at maturity than the others, and inclined to be thick-necked.

Yellow Globe Danvers.—Although not a very heavy yielder, its thin neck, and early ripening qualities, make it a variety that can always be relied on here, globe shaped, light yellow in colour.

Yellow Flat Danvers.—A flat onion, similar in colour to Globe Danvers, but later and more thick-necked than that variety.

Red Danvers.—A red globe onion of fine colour and appearance, ripens early, and has a thin neck. One of the best varieties tested.

Southport Red Globe.—A red globe onion of good size, but has a tendency to thick-neck.

Southport Yellow Globe.—A yellow globe onion of good form and substance, a heavy yielder, and produces few thick-necked onions.

Mammoth Silver King.—A flat white onion of good flavour, but having the loose skin and irregularity of Silverskin, not desirable.

Shallots.—A potato onion, very useful on account of its early ripening.

Garlic.—This seems to do well here. From 1 lb. of sets, was produced 6 lbs., also 1 quart of top sets.

ONIONS, Test of Varieties.

Name of Variety.	Date Sown.	Date Pulled.	Date Ripened.	Colour.	Yield per Acre. Bush.	Lbs.
Large Red Wethersfield	April 10..	Sept. 16..	Sept. 30..	Red	605	
Southport Yellow Globe	do 11..	Aug. 28..	do 16..	Yellow	479	53
Southport Red Globe	do 22..	do 28..	do 16..	Red	469	33
Red Globe Danvers	do 11..	do 28..	do 16..	Bright red	448	15
Yellow Flat Danvers	do 11..	do 28..	do 16..	Yellow	435	52
Yellow Globe Danvers	do 10..	do 23..	do 9..	do	357	17
Mammoth Silver King	do 10..	do 28..	do 16..	White	345	49
Small Silverskin	do 11..	do 20..	do 16..	do	329	
Shallots	do 12..	July 30..	Aug. 20..		45 lbs. from 3 lbs.	
Garlic Sets	do 12..	Sept. 17..	Sept. 30..		6 lbs. from 1 lb. and 1 quart tops.	
Giant Spanish Yellow	This variety did not germinate.					

CELERY.

Twelve varieties of celery were sown in boxes, in hotbed, on 3rd April. All varieties germinated well, and were transplanted into boxes on 3rd May, and planted outside on June 21. The old plan of planting, by digging a trench, was not adopted, as too much of the rich soil is removed by this operation. Only enough soil was taken out to admit of holding water, and having had a larger water supply than last year, this vegetable grew stronger and better in every way. All were lifted on 3rd October.

White Plume.—A white self-blanching celery of excellent flavour, and very early.

Giant Golden Heart.—Of a pale yellow colour when ready for use. Excellent flavour, and very vigorous.

New Rose.—A light Pink variety of good flavour and appearance, and a strong grower.

Paris Golden Yellow.—A yellow self-blanching variety, of a habit resembling *White Plume*, a desirable sort.

Turkish Giant Purple.—A vigorous growing variety of a deep pink colour, flavour good, evidently a fine late sort.

Name of Variety.	Length of Head.	Weight per Dozen.	Colour.	Flavour.
	Inches.	Lbs.		
Giant Golden Heart	23	17	Light yellow	Good
New Rose	16	18	Light pink	Good
New Giant Pascal	15	16	White	Fair
New Red Pascal	14	14	Light pink	Good
White Plume	13	14	White	Very good
Sheppard's Dwarf Rose	16	14	Light pink	Good
Large Ribbed White	15	14	White	Fair
Turkish Giant Purple	18	16	Deep pink	Good
Dwarf White	14	15	White	Fair
White Solid	16	17	White	Good
Carter's Dwarf Crimson	14	15	Deep pink	Good
Paris Golden Yellow	13	14	Light yellow	Very good

BEETS.

Seven varieties of beets were tested all sown in drills 18 inches apart on 1st May. Some of the varieties were inclined to small branching roots, but on the whole the crop was a success. The best variety tested was *Improved Early Blood Turnip* followed by *Whyte's Very long Deep Blood.* All were lifted on 17th September.

Improved Early Blood Turnip.—A turnip shaped beet of a splendid dark colour, and even size, matures early.

Whyte's Very long deep Blood Red.—A long beet of good colour and flavour, one of the best varieties tested.

Rennie's Intermediate.—A long beet of good colour, containing a little white, a good variety.

Lentz.—A turnip beet of fair colour, contains a small quantity of white.

Name of Variety.	Shape.	Colour.	Average Weight.	Yield per Acre.
Bassano Flat Red	Flat	Poor; nearly all white	1 2/16 lbs.	1,144 bush.
Whyte's Very Long Deep Red	Long	Good; no white	2 lbs.	1,173 23/60 do
Rennie's Intermediate	do	do	1 14/16 lbs.	806 48/60 do
Evan's Medium	do	Fair; some white	1 1/16 lbs.	792 do
Lentz	Turnip	do	1 lb	616 do
Improved Early Blood Turnip	do	Very good	12 ounces	528 do
Ne Plus Ultra	Long	Fair; some white	14 do	498 48/60 do

LETTUCE.

Nine varieties of lettuce were sown, and all germinated with one exception, viz., *Big Boston.* All were sown on 1st May in drills 18 inches apart. This vegetable did remarkably well this year, all varieties retaining their crispness longer than usual, although nipped slightly with spring frosts, this did not seem to injure them, and they all made good hearts of excellent texture.

California All Heart.—Cabbage lettuce, well curled, and of splendid flavour, large heart, cool, crisp and juicy, the best variety tested.

Early Curled Silesia.—Cabbage lettuce, fairly well curled, and of fair flavour.

Early Ohio.—A well curled cabbage lettuce, fair sized, heart of good flavour.

Simmer's Nonpariel.—Cabbage lettuce of good flavour and appearance.

New Blonde Beauty.—A well curled cabbage lettuce of splendid flavour, cool, crisp, juicy and sweet, one of the best sorts tested.

Name of Variety.	Date Tested.	Date went to Seed.	Average Weight.	Flavour.
			lbs.	
Early Curled Silesia	June 30	Aug. 1	1	Fair.
Early Ohio	do 30	July 31	1	Good.
Simmer's Nonpariel	do 30	do 31	1	Excellent.
California All-Heart	do 30	Aug. 2	1 3/4	do
Imperial Cabbage	do 30	July 31	1	Poor.
Early Hanson	do 30	Aug. 3	1 2/16	Fair.
New Blonde Beauty	do 30	July 31	1 3/4	Excellent.
Defiance	do 30	do 31	1 1/4	Fair.
Big Boston	This variety did not germinate.			

FALL SOWING OF LETTUCE.

The variety selected for this test was California All Heart. Home grown seed. While the fall sown plants gave the largest seed grain weight, there was no other appreciable difference, and it would appear that it is immaterial whether lettuce is sown in the fall or spring.

BEANS.

Eight varieties of beans were sown in drills 2 feet apart on 23rd May, with one exception, Broad bean.

Early Mazagan.—Sown on June 1st. Two varieties did not germinate viz., *Dwarf Triumph* and *Royal Dwarf Kidney*. None of the varieties ripened seed.

Emperor William.—This was the earliest of the varieties tested. A green bean of good flavour and susbtance, very productive.

Thorburn's Early Refugee Wax.—A light yellow bean of good flavour. Early and very productive, one of the best varieties tested.

Speckled Wax.—A deep yellow bean of good flavour and fairly productive ; a desirable variety.

Mammoth Red German Wax.—Colour deep yellow, of good flavour and fairly prolific.

Broad Bean Early Mazagan.—Broad bean of splendid flavour and very productive. A number of the pods, however, did not fill.

Name of Variety.	Date Ready.	Colour.	Length of Pod.	No. of Beans.	Productiveness.	Flavour.
			In.			
Emperor William (own seed)....	July 30.....	Green.....	7	5	Prolific....	Good.
Thorburn's Early Refugee Wax.	Aug. 3.....	Light Yellow.	4½	5	Very prolific	do
Emperor William (own seed)....	do 2.....	Green.....	7	5	Prolific.....	do
Speckled Wax.....	do 10.....	Deep Yellow..	7½	5	Very prolific	do
Mammoth Red German Wax....	do 8... ...	do ..	7	5	Prolific.	do
Broad Bean Early Mazagan.....	do 13.....	.....	7½	4	Fr'ly prolific	do

RADISHES.

Ten varieties of radishes were tested all sown in the open, in drills, 12 inches apart. The first sowing was made in April, and was completely frozen on 10th May. A second sowing was made on 4th June, with results as given below. None of the varieties ripened their seed.

Rosy Gem.—A round radish of good flavour and appearance.

New Rosy Gem.—This variety has again proven itself one of the best grown here. Round, crimson, tipped with white, of excellent flavour.

Brightest Long Scarlet.—An intermediate variety of excellent flavour. Colour, brilliant scarlet with white tip. Valuable for market purposes on account of its fine appearance.

Ne Plus Ultra.—A round radish of a deep scarlet colour, flavour good, a desirable variety.

Name of Variety.	Date Ready.	Date Went to Seed.	Colour.	Shape.	Flavour.
French Breakfast.....	June 29	July 15	Pink and white	Half long.	Good.
Rosy Gem.....	do 28	do 15	Scarlet	Round ...	do
Round Rose.....	do 28	do 18	Deep red	do ...	do
Half Long Scarlet.....	do 29	do 15	Red	Half long.	Fair.
New Rosy Gem.....	do 28	do 20	Bright crimson, white base.	Round ...	Very good
Brightest Scarlet.....	do 29	do 20	Deep scarlet, white base...	Long.....	Good.
Scarlet Button.....	do 29	do 15	do	Round ...	Fair.
Ne Plus Ultra	do 29	do 15	do	do ...	Good.
Golden Turnip.....	July 5	do 12	Yellow	Half long.	Very poor.
China Rose..... ..	do 5	do 14	Rose	Long.....	do

TOMATOES.

Owing to the cool summer and early fall frosts, tomatoes were not a success this season, only 5 out of 13 varieties tested having ripe fruit.

Name of Variety.	Date first ripened.	Weight of ripe fruit.	Weight of green fruit	No. of plants	Shape.	Flavour.
Earliest of All (own seed)	Aug. 26	7 ounces	15 lbs.	6	Wrinkled	Fair.
Early Ruby (own seed)	Sept. 5	10 "	20 "	6	"	Good.
Dwarf Champion (own seed)	None	None	1 lb	1	Smooth	
Everbearing (own seed)	"	"	9 lbs.	8	"	
Dwarf Aristocrat (own seed)	"	"	1 lb	1	"	
Early Ruby (new seed)	"	"	72 lbs.	23	Wrinkled	
Perfection	"	"	8 "	28	Smooth	
Canada Victor	"	"	19 "	27	"	
Early Mayflower	"	"	12 "	24	Wrinkled	
Mitchell's No. 1	"	"	13 "	23	Smooth	
Acme	Sept. 6	4 ounces	6 "	23	"	
Ponderosa	None	None	6 oz.	31	Wrinkled	
Earliest of all (new seed)	Aug. 19	$3\frac{1}{16}$ lbs.	49 lbs.	28	"	
Strawberry, or Husk	None	None	Frozen			
Early Ruby	Aug. 26	$28\frac{8}{16}$ lbs.	23 lbs.	40	Wrinkled	

CUCUMBERS.

The cool season affected the cucumbers adversely. Ten varieties were tested, and of these only two (both forcing sorts) gave any returns. These were started in hotbeds with good bottom-heat. Those started in spent hotbeds, and outside, did not mature cucumbers. The forcing variety *Telegraph*, was very productive, its long and smooth straight fruit, being produced in great profusion. Flavour excellent.

Noa's Forcing.—Rather crooked. Smooth neck, the lower half spiny. Of good flavour and fairly productive.

PEPPER.

One variety was tested, viz., Long Red Cayenne. This was sown in boxes in hotbed on 15th April, and transplanted into boxes on 27th April. Planted in a spent hotbed on June 3, with the sash removed, it produced fruit in great profusion. Fruit about 7 inches long of a brilliant scarlet colour, and good flavour.

ASPARAGUS.

Three varieties of this vegetable are under cultivation here, viz., Conovers Colossal, Barr's Mammoth and Giant Argenteuil the best as yet is Conovers Colossal. The plants were put out when two years old from seed, in rows 1 foot apart. Asparagus is a hardy perennial vegetable which does very well here. This season it was nipped several times with spring frosts.

HERBS.

The following varieties of savory herbs, were sown outside on 1st May, in drills 18 inches apart. *Broad-leaved Sage, Sweet Basil, Mint, Sweet Marjoram, Summer Savory, Thyme, Dandelion and Parsley.* All germinated with the exception of Dandelion and Mint, grew very well, and were dried in due course and thus preserved for future use.

EGG PLANT.

One variety was tested, and produced some ripe fruit. Shape, long-oval; colour, deep purple. Sown in hotbeds on 1st April, transplanted into boxes on 27th April, and planted out on 11th June.

TOBACCO.

Seed of this was received from Ottawa, and sown in hotbeds on 15th April, transplanted into boxes on 27th April, and planted outside on 11th June. The plants were very strong when planted out, and produced large leaves, which however were cut badly during a hail storm.

SPINACH.

One variety (*Improved Victoria*) was tested. Sown outside in drills 18 inches apart on 10th April, and ready for use on 10th May. Very tender and of excellent flavour. This is a useful vegetable as it comes in when few others are to be had.

THE FLOWER GARDEN.

The flower garden this year was a decided success, and all varieties made a good show. In annuals we would call particular attention to a few varieties not generally grown, which have done so well here that we think they are worthy of general cultivation.

Salpiglossis variabilis.
Gaillardia Lorenziana.
Scabiosa major
Antirrhinum dwarf

The above are easy of cultivation and give splendid results. Among perennials the following have been found specially useful and desirable. They are all hardy and free bloomers :—

Name of variety.	Period of flowering.
Delphinium grandiflorum	26th June to 20th August.
Aguilegias, mixed colours	1st June to 12th July.
Pæonies	28th June to 10th July.
Hemerocallis flava—Day lily	16th July to 30th August.
Perennial Phlox	5th August to 1st September.
Coreopsis lanceolata	1st July to 5th September.
Lychnis chalcedonica	20th June to frost.
Achillea the Pearl	3rd July to 6th September.
Papaver nudicaule—Iceland Poppy	27th May to 29th August.
Platycodon grandiflorum	10th August to 30th August.
" " album	10th August to 30th August.
Lilium tigrinum—Tiger lily	24th August to frost.
" umbellatum	8th July to 3rd August.

Hibiscus crimson eye has been tried, but the season here is not long enough to bring it into blossom.

GLADIOLI.

One hundred Gladiolus bulbs were received this year from the Central Experimental Farm. They were potted on arrival into small pots, and put into hotbed, and after having made a good growth were planted outside. They all flowered well, and some very large spikes were obtained. It is necessary to lift these bulbs in the fall, and store them in a cool (though frost proof) cellar, planting out again early in the spring.

ROSES.

This year we have had some success with roses. As will be seen on page 329 of last year's report, 13 varieties were alive in the fall of 1894, one of which, *Madame Bruant*, had stood the severity of the previous winter. This plant, together with another of the same variety received last summer, came through the winter of 1894 without injury, and flowered fairly well this summer. Another variety, *Gem of the Prairies*, a climbing rose, planted in the summer of 1894, survived the winter all right and made good growth, but did not flower.

Bulbs Planted Fall, 1894.

The following bulbs were planted in the fall of 1894 :—

Tulips, single and double mixed.
Hyacinths, single and double mixed.
Iris, English.
do Spanish.
Scilla, Sibirica.
Narcissus, mixed.
Lilium, candidum.
do auratum.
do do Wittei.
do concolor.
do cordifolium.
do Batemani.

Of the above the tulips and scillas and Spanish Iris came up and flowered fairly well. The remainder did not start, and later in the season the lily bulbs were examined and were found to have all decayed.

CANNAS.

Nine varieties of cannas were received from the Central Farm this year, and were planted outside. All made a vigorous growth, and 5 of them flowered. They are well worth growing if only on account of their beautiful foliage. All were packed in sand in the cellar this fall.

Name of Variety.	Date Planted.	Flowering Period.	Height.	Remarks.
Canna Robusta Perfecta.....	May 7, 1895.	August 6th to frost.....	3 feet.....	Fine for centres of beds; splendid foliage, and flowers of vivid coloring.
do O. de grand Rouge....	do ..	Did not flower.....	18 inches.....	
do Brimmingsii.....	do ..	do	2 feet	
do Antoine Crozy.....	do ..	July 30th to frost.....	1 foot.....	
do Admiral Courbet.....	do ..	Did not flower.....	18 inches.....	
do Princess of Nice.....	do ..	August 3rd to frost.....	2 ft. 6 inches..	
do Jules Chrétien.....	do ..	July 25th to frost.....	18 inches.....	
do Brilliantissima..... ..	do ..	July 22nd to frost. ..	2 feet.....	
do Adolphe Weicke	do ..	August 10th to frost....	18 inches.....	

DAHLIAS.

Fourteen varieties of the above were received this year from the central farm and planted outside. Most of them flowered before frost and some of them produced some splendid blooms. The most conspicuous and one of the most successful sorts was Mrs. Langtry. Next year it is proposed to start them in hot-beds and get a good growth on them before planting out; this will bring them nto flower much earlier. They were lifted in the fall and stored dry in the cellar.

HOPS.

In the spring of 1894, 50 hop sets of the Kentish Golden variety were received from British Columbia and were planted in hills, eight feet apart. Twenty of these were winter killed; the remainder were poled this spring. They made a growth of about 12 feet and produced an average of one pound of small hops per hill.

Last spring several hills of native Manitoba hops were planted, for the purpose of comparing with the imported ones.

TILE DRAINING.

I take pleasure in reporting that the tile drains laid during 1893 and 1894 have worked very satisfactorily. Fields that were formerly covered in spring with water were this year quite dry and produced large crops of grain.

Many farmers have expressed their opinion that the severe frost in winter would destroy any tile placed less than eight feet below the surface. When they are properly laid, and have a reasonable fall, no water lodges in them; and hence there is no reason to expect any injury from this source.

FARMERS' INSTITUTE MEETINGS.

Since my last report, institute meetings were attended by invitation at the following places, and addresses given at each of them, the meetings were in nearly every instance well attended and more than usual interest shown in the Experimental Farm work:

January 19, Portage la Prairie, 26, Blythe, 29, Neepawa, 31, Gladstone; February 15, Elkhorn; March 2, Little Stony Mountain, 12, Hamiota, 13, Oak River, 14, Rapid City, 28, Glenboro, 29, Belmont, 30, Brandon; June 13, Wawanesa, 20, Bradwardine, 21, Arrow River, 22, Birtle, 24, Russell, 26, Strathclair, 27, Hamiota, 28, Oak River, 29, Rapid City. Twenty meetings in all.

VISITS TO THE FARM AT STONY MOUNTAIN PENITENTIARY.

Under your instructions and at the request of the Minister of Justice, I made two visits during the year to the farm at Stony Mountain Penitentiary, for the purpose of conferring with the warden regarding the most improved methods of carrying on the farm work there, and of rendering any assistance in my power. My second visit made in company with yourself was just after harvest, and it was gratifying to see the fine crops which had been gathered there.

ACKNOWLEDGMENTS.

I beg to acknowledge with thanks the following donations to this farm during the year:—

Bright Nesbit, seed wheat.
S. C. Young, Fort William, Ont., Mountain Ash Trees.
D. D. England, Winnipeg do do
A. A. Brooke, Barnsley, Man., vegetable seeds.
Wm. Summerton, Oxbow, N.W.T. do
Prof. Green, St. Anthony's Park, Minn., U.S., Willow Cuttings.
Calgary *Herald*, Sugar Beet Seed.
R. Waugh, Winnipeg, Grass Seed.
John Parkinson, Portage la Prairie, Plums.
A. Stevenson, Nelson, Man., Tree Seeds.

METEOROLOGICAL.

Below will be found the maximum and minimum thermometer readings for the past year, also the amount of rainfall and sunshine for the growing season:

TEMPERATURE.

Months.	Maximum.			Minimum.		
1894.						
November	49° above zero on		6th	25° below zero on		28th.
December	37°	do	14th	32°	do	27th.
1895.						
January	28°	do	14th	37°	do	8th.
February	35°	do	28th	46°	do	4th.
March	56°	do	26th	35°	do	13th.
April	88°	do	11th	18° above zero on		26th.
May	79°	do	3rd	21°	do	11th.
June	84°	do	15th	29°	do	10th.
July	92°	do	2nd	35°	do	17th.
August	88°	do	15th	27°	do	31st.
September	95°	do	2nd	19°	do	23rd.
October	74°	do	12th	4°	do	31st.

RAINFALL.

	Inches.
April	·1
May	2·9
June	1·5
July	4·2
August	1·3
September	1·5
Total	11·5

SUNSHINE.

	Hours.
March	215·1
April	201·5
May	207·9
June	191·5
July	230·3
August	268·6
September	159·6
Total	1,474·5

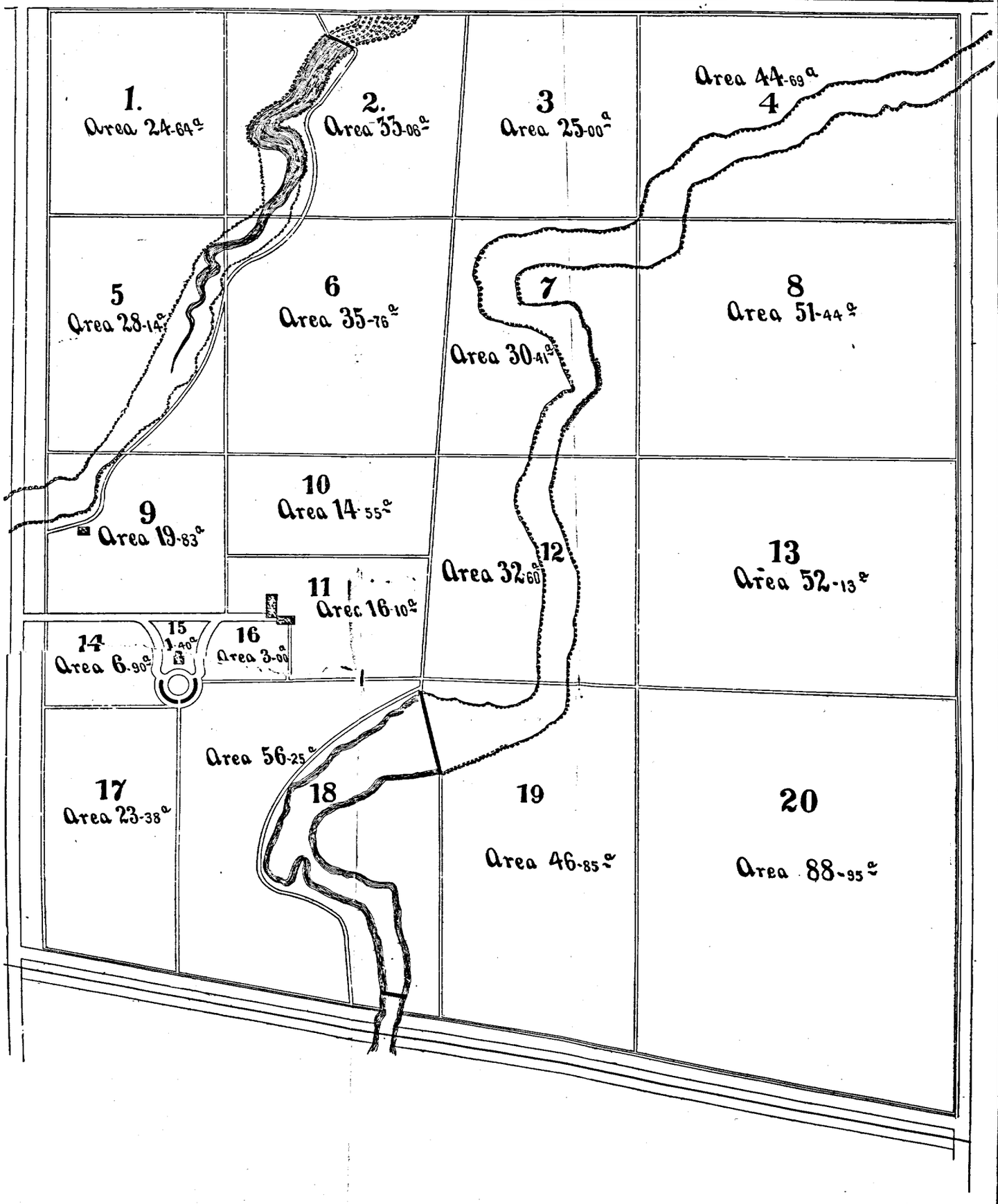
CORRESPONDENCE.

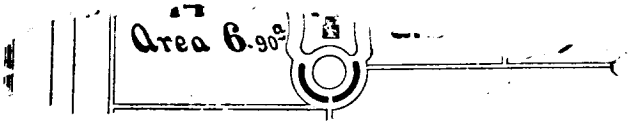
Since my last report, 2,162 letters have been received and 1,918 letters despatched from this office; this is irrespective of about 680 circulars sent out.

I have the honour to remain, sir,
Your obedient servant,

S. A. BEDFORD,
Superintendent.

EXPERIMENTAL FARM
INDIAN HEAD




Area 6.90

EXPERIMENTAL FARM FOR THE NORTH-WEST TERRITORIES.

REPORT OF A. MACKAY, SUPERINTENDENT.

EXPERIMENTAL FARM, INDIAN HEAD, N.W.T.
30th November, 1895.

To WM. SAUNDERS, Esq.,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith, to you, the eighth annual report of operations on the Experimental Farm for the North-west Territories, at Indian Head, Assa., during the year 1895.

Like all preceding years, the season just past has been an exceptional one. Spring opened out in the latter part of March with very warm weather, so much so that seeding was general in the first week in April, and by 1st May trees were all out in leaf—three weeks earlier than usual. Winds were almost continuous during the month of May. On the 10th a cold wave passed over the country; the temperature on the Experimental Farm falling to 21° F. or 11° F. of frost, and on the following day to 18° F. or 14° F. of frost, with the result that fruits of all kinds were almost totally destroyed, and oats, barley, pease and garden stuff cut back, in many cases to the ground.

The weather continued dry, windy and cold to the end of the month, and on the 20th May, another frost of 13° F. cut the grain back for the second time. However, a very heavy general rain fell on the 31st, which made a wonderful change in everything in a very short time. Up to this time many fields of grain had not started to grow, many others were partially up but very thin, and very few were looking at all promising for a good crop.

Throughout June the rains were frequent and heavy, and they continued to the middle of July. The growth of the crops was wonderful over almost the whole of the North-west Territories, but danger was to be anticipated from so much rain. Several times in July the thermometer fell to near the frost line, and with such a rank growth of grain, a very few degrees would have been fatal. Cold waves passed over the country each week from July 18 to the latter end of August. In some places, tender vines, corn etc., were nipped, but grain escaped till August 20, when several degrees of frost visited some districts, while others escaped. The first frost on the Experimental Farm occurred on August 30. Previous to this date cold waves had passed over the Farm, nipping corn, etc., but not injuring the grain.

The crop throughout the Territories the past season, has been a very large one, but the sample does not equal that of last year on account of rank growth and damage sustained by frost.

Smut in wheat has not been bad throughout the country, although all districts had a little. In oats and barley, however it was very prevalent, and has caused considerable loss in yields in these crops.

The root crop on the Experimental Farm was, strange to say, for such a year, a poor one. The roots came up well, and for some time gave great promise, but on account of worms, flies and winds, that promise was not fulfilled, and when taken up the crops of turnips, mangels, carrots and potatoes were found to be very small. Throughout the Territories, however, the crop of roots and vegetables has been a large one. The failure on the experimental farm was mainly due to repeated winds, as in plots protected by hedges and wind-breaks, the same varieties produced yields three times greater than those grown in the open fields.

For tree-culture the season was very favourable. Starting to grow early in April, everything was in leaf by 1st May. The heavy frosts about middle of that month, however, killed all young and tender shoots, putting them back considerably, but the check was of very short duration, and in no previous year has the progress made by all the trees growing on the farm, been so satisfactory.

Weeds have been very troublesome the past year on this farm, especially the Tumbling Mustard (*Sisymbrium Sinapistrum*), which seems to have a special liking for the hedges and shelter belts on the farm, and it has required an endless amount of labour to keep it within bounds.

Several very bad weeds are obtaining a foothold in almost every district in Assiniboia; the principal of which are, Tumbling Mustard (*Sisymbrium Sinapistrum*), Hare's Ear Mustard (*Erysimum orientale*), and French or Stink weed (*Thlaspi Arvense*).

The rain fall during the growing season was largely in excess of the average for the past six seasons. A very rank growth of straw was the result, making harvest work and threshing heavy and expensive.

EXPERIMENTS WITH WHEAT.

The wheat tests on the Experimental Farm, the past year, were on the whole satisfactory. In no year have we had better samples or anything approaching such large yields. The straw as a rule was not badly lodged, and the heads were large and well filled. A few plots were injured slightly by frost, but not enough to decrease the yield.

In fields and acre tests, the results in all cases were not very satisfactory. A field of thirty acres was badly blown when the grain was just above ground, one-half of the field being injured to such an extent, that when frost came on 30th August the grain was still green. The yield on this portion was small, and the grain a very poor sample. On the part that escaped injury the return was a large yield of excellent grain.

Acre lots of Ladoga, Red Fern and Wellman's Fife were not seriously injured by winds and gave good returns, but Stanley, Alpha, Percy, Mars, White Connell and White Fife, in the same test, were so much hurt, and the growth retarded so long, that frost overtook them before they came to maturity.

All the new cross-bred varieties did well, producing large yields of very fine grain.

Following will be found the tests in detail, with remarks on results:—

WHEAT FIELD LOTS.

Thirty acres of Red Fife were sown on one field of fallowed land, on 8th April. The soil was a good sandy loam.

Fifteen acres of the field were exposed to winds and suffered greatly by them; not only were large portions blown out but considerable areas were covered with dust from other parts of the farm. Where the grain was not so injured the crop was a good one.

One-tenth acre of a fair average of the crop on the portion that escaped the winds, was cut and threshed separate from the field to determine the difference, if any, between the yield of one-tenth acre and of the whole field.

The one-tenth acre plot gave 252 lbs. of grain or 42 bushels per acre; the portion of the field not injured by winds yielded 41·20 bushels, and the whole field, 30 acres, 35 bushels per acre. The grain grown on the injured 15 acres was badly frozen and is a poor sample. There was no rust or smut in the field.

Name of Variety.	Size of Plot.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw, per acre.	Yield per Acre.	Weight per Bushel.
	Acres.			Inches.		Inches.		Lbs.	Bush. lbs.	Lbs.
Red Fife—Drill	15	Sept. 7..	152	48	Fair.....	3½	Bald...	5,850	28 40	59
do do	5	do 7..	151	48	do	3½	do ...	6,240	41 20	62
do —Press drill.	10	Aug. 22..	135	49	do	3½	do ...			

WHEAT—TEST OF VARIETIES.

Thirty-seven varieties were sown on same day, 16th April, on one-tenth acre plots, and six sorts, the last on the list, on one-eightieth acre plots. The soil was clay loam. All were put in by an ordinary drill on fallow, with no harrowing before or after seeding.

All the varieties produced a very heavy crop of straw, and a few of the bearded sorts whose straw was weak, lodged slightly, necessitating cutting one way, but in no case was the yield affected by lodging.

The sample of grain in the cross-bred varieties is much heavier than any ever before grown on the farm, and the yield per acre is also ahead of any previous year.

One variety, Colorado, shelled considerably before being cut, which is the cause of its small yield.

No rust or smut affected any of the varieties in this test.

WHEAT—Test of varieties, all sown same date.

Name of Variety.	Date of Ripening.	Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre.	Yield per Acre.	Weight per Bushel.
			In.		In.		Lbs.	Bush. lbs.	Lbs.
Beaudry	Aug. 30	136	49	Weak	3½	Bald	6,390	52	64
Huron (cross-bred)	Sept. 1	138	50	Fair	3½	Bearded	6,220	51 20	64
Emporium	do 1	138	48	do	3	do	6,780	48 40	60½
Crown (cross-bred)	do 1	138	50	do	3½	do	6,210	46 40	61¾
Preston do	do 1	138	57	do	3	do	6,800	45 40	64
Alpha do	Aug. 29	135	47	do	3½	do	6,250	45 30	63½
Red Fife	do 30	136	55	Stiff	3¾	Bald	6,300	45	62¾
Herisson Bearded	Sept. 1	138	44	do	4½	Bearded	6,020	44 40	65½
Pringle's Champlain	Aug. 30	136	46	do	3	do	6,130	44 30	63
Blenheim (cross-bred)	Sept. 1	138	48	do	3¼	do	6,190	44	61¼
Advance do	do 1	138	58	Fair	4	do	6,300	43 50	62¾
Dion's	Aug. 29	135	46	do	3	do	6,210	43 20	61¼
Rideau (cross-bred)	do 30	136	49	Weak	3½	Bald	6,340	43 20	64
Wellman's Fife	Sept. 1	138	56	Stiff	4	do	6,000	42 40	61½
Old Red River	do 1	138	50	do	2¾	do	6,420	42 20	63½
Red Fern	do 1	138	48	Weak	3½	Bearded	6,270	42 20	62¾
White Fife	do 3	140	51	Stiff	4	Bald	6,000	42 10	63
Stanley (cross-bred)	Aug. 29	135	48	Fair	3¾	do	6,090	42	63
Rio Grande	do 29	135	47	do	4	Bearded	6,140	41 40	62
Ladoga	Sept. 1	138	47	do	3½	do	6,100	41 35	63½
Black Sea	Aug. 30	136	50	Weak	4	do	6,500	41 10	63
Campbell's White Chaff	do 30	136	45	Stiff	2¼	Bald	6,210	40 20	63
Percy (csoss-bred)	do 29	135	44	Fair	3	do	5,900	39 40	62½
Major do	do 30	136	55	do	3¾	Bearded	6,440	37	60½
White Russian	Sept. 1	138	46	do	2½	Bald	5,980	36 10	61¾
Gehun	Aug. 26	132	48	do	3¼	do	3,800	36	65½
Monarch	Sept. 1	138	49	do	4	do	5,980	36	60½
Ottawa (cross-bred)	Aug. 19	125	52	do	3½	Bearded	6,200	35 40	61
A No. 1 do	do 19	125	50	do	3¾	do	6,120	35 40	61¾
Hungarian Bearded	do 27	133	46	Weak	3½	do	6,400	35 20	60
White Connell	Sept. 3	140	52	Stiff	3	Bald	5,900	35 20	61
Admiral (cross-bred)	do 1	138	48	Fair	3½	do	5,900	35 10	62
Mars	do 1	138	43	Stiff	2¾	do	6,020	35	63
Prince (cross-bred)	Aug. 19	125	54	Fair	4	Bearded	6,500	34 50	63½
Goose	do 29	135	47	do	3¼	do	6,000	33 20	62¾
Golden Drop	Sept. 2	139	51	Stiff	3	Bald	5,950	33 10	63
Colorado	Aug. 27	133	46	Fair	3¾	Bearded	6,000	29 10	64½
Captor (cross-bred)	do 30	136	47	do	3¾	do	6,300	28	62
Vernon do	Aug. 29	135	46	Stiff	3	do	Not weighed.	42 37	61½
Progress do	Sept. 2	139	44	Weak	3½	Bald		28 52	59½
Dufferin do	do 2	139	43	do	3½	Bearded		24 35	60
Countess do	do 2	139	40	Fair	2⅞	Bald		23 22	61½
Dawn do	do 2	139	34	do	3	do		20 37	60

WHEAT—RESULTS OF EARLY, MEDIUM AND LATE SOWING.

In the above test, two varieties of wheat were sown; the first seeding being done at the earliest possible date and repeated on the same day each week for six sowings.

The land was a good sandy loam which was summer-fallowed and in good condition; the seed was sown by the ordinary drill and no harrowing done either before or after seeding. The size of the plots was one-tenth of an acre each.

The three first seedings gave the most satisfactory returns. The fourth and fifth plots were slightly touched by frost and the last sown considerably so. No rust or smut affected any of these plots.

The average of four years is in favour of early seeding, but the best results from a point of yield have been obtained by sowing about one week after the season opens up; the land then being in better condition.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.	Weight per Bushel.
				Inches.		Inches.		Lbs.	Bush. lbs.	Lbs.
Red Fife....	Apr. 2.	Aug. 23..	143	54	Stiff.....	4	Bald ...	637	44	62
do	do 9.	do 27..	140	50	do	3¾	do	629	45 50	61½
do ...	do 16.	do 29..	135	52	do	3¾	do	630	43 5	62
do	do 23.	do 30..	129	48	do	3½	do	635	38 10	61
do	do 30.	Sept. 5..	128	49	do	3¼	do	620	39	60
do	May 7.	do 9..	125	47	do	3¾	do	684	35 50	57
Stanley.....	Apr. 2.	Aug. 19..	139	50	do	3¾	do	600	39	63½
do	do 9.	do 27..	140	46	do	3½	do	621	41 40	61½
do	do 16.	do 27..	133	47	do	4	do	617	39 10	61½
do	do 23.	do 30..	129	48	do	3½	do	630	38 20	60
do	do 30.	Sept. 5..	128	47	do	3¼	do	625	34 20	60
do	May 7.	do 9..	125	46	do	3¾	do	640	34 40	56

ACRE LOTS OF WHEAT.

Nine varieties of wheat were sown on plots of one acre each. The soil varied in character from sandy to clay loam.

Two of these were so badly injured by winds that they were cut for fodder. Ladoga, Red Fern and Wellman's Fife were not hurt, and were ripe when frost came; but the balance—Stanley, Alpha, White Connell and White Fife—were late, and were more or less frozen. No rust or smut affected any of these varieties.

Name of Variety	Date of sowing.	Date of ripening.	No. of days maturing.	Length of straw.	Character of straw.	Length of head.	Kind of head.	Weight of straw per acre.	Yield per acre.	Weight per bushel.
									Bus. lbs.	Lbs.
Wellman's Fife.	April 11	Aug. 31	142	50	Fair....	3½	Bald ...	5,100	36 6	61
Red Fern.....	" 11	" 29	140	49	Weak ..	4	Bearded	5,100	34 48	62½
White Fife.....	" 11	Sept. 2	144	47	Fair....	3½	Bald ...	4,900	34 14	63
Alpha.....	" 13	" 2	142	51	" ...	3	" ...	4,950	32 41	63
Ladoga.....	" 11	Aug. 29	140	48	" ...	3	Bearded	5,000	31 24	63
Stanley.....	" 15	" 31	138	52	" ...	4½	Bald ...	5,000	30 ...	62
White Connell..	" 11	Sept. 7	149	45	" ...	3	" ...	4,900	28 30	61½
Percy	" 13	" 7	147	52	" ...	4	" ...	cut for feed.		
Mars	" 11	" 7	149	53	" ...	4	" ...	"	"	

TEST OF BLUESTONE AS A PREVENTIVE OF SMUT.

In this test $\frac{1}{10}$th acre plots of summer-fallow were sown by drill on 17th April.

Good clean seed and seed very badly affected by smut were used; the smutty seed being the product of untreated smutty wheat sown in 1894 and was totally unfit for feed or for commercial purposes.

Three plots of ground were sown with good seed, one was sprinkled with the solution of bluestone, one was dipped and one was untreated.

One pound of bluestone was dissolved in 1½ pails of water, and the solution sprinkled over 8 bushels of seed, which was then turned five or six times or until thoroughly mixed. In dipping, bluestone and water in the same proportions were put in a barrel and the grain in bags dipped in the solution until soaking wet, then allowed to drip from the top of the barrel for a few minutes and afterwards dried in bags. As will be seen dipping gave the more satisfactory result.

The result of the test of sowing very smutty seed proves the efficiency of bluestoning as a preventive of smut. While the untreated was more than one-half smut, the product of the same seed treated contained 40 times more good than smutty heads; the yield per acre was also greater of the treated, 36·30 bushels of No. 1 Hard wheat and of the untreated, 17·40 bushels of grain and smut unfit for feed or market.

Name of Variety.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw, per acre.	Yield per acre.	Weight per bushel.	Good and Smutty heads on 6 feet square of plot.	
			Inches.		Inches.	Lbs.	Bush. lbs.	Lbs.	Good.	Smutty.
Good Seed from treated crop 1894.										
Red Fife, Sprinkled 1 lb. to 8 bus.....	Aug. 28.	133	47	Stiff.....	3¾	6310	40	60½	1709	5
Red Fife, Dipped 1 lb to 8 bus.....	do 28..	133	49	"	3¾	6500	42	60½	1525	0
Red Fife, untreated	do 28..	133	48	"	3¾	6000	40 10	61½	1589	34
Smutty Seed from untreated crop 1894.										
Red Fife, 1 lb. to 8 bush.....	do 31..	136	40	"	4½	599	36 30	60	1626	41
Red Fife, untreated	do 31..	136	48	Fair.....	4	580	17 40	48	718	833

WHEAT.—Test of sowing different quantities per acre. Sown 17th April on good, sandy loam, on plots of $\frac{1}{10}$th acre each.

Name of variety.	Date of ripening.	No. of days Maturing.	Length of straw.	Character of straw.	Length of head.	Kind of head.	Weight of straw per acre.	Yield per acre.	Weight per bushel.	Proportion rusted.	
					In.		Lbs.	Bush. lbs.	Lbs.		
Red Fife, 1 bush..	Sept. 1...	137	46	Stiff..	3½	Bald.	5900	37 50	60	No rust; no smut.	
do 1¼ " ..	do 1...	137	50	Stiff..	3½	Bald.	6550	44	60½	"	"
do 1½ " ..	do 1...	137	45	Stiff..	3¼	Bald.	6210	42 20	60	"	"

As shown in the above test, 1¼ bushels per acre gave the best yield of grain and straw. The average result for four years is also in favour of 1¼ bushels of seed per acre.

AVERAGE YIELD FOR 4 YEARS.

Name of Variety.	1892.		1893.		1894.		1895.		Average yield.	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
Red Fife—1 bushel per acre.....	38	50	28	20	14	30	37	50	29	52
do 1¼ bushels per acre.....	40		28		11	40	44		30	55
do 1½ bushels per acre.....	39	40	26	30	13	20	42	20	30	27

WHEAT.—Test of sowing wheat at different depths. Sown 17th April on clay loam in plots of $\frac{1}{10}$th acre each.

Name of Variety.	Date of ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of head.	Kind of Head.	Weight of Straw per acre.	Yield per acre.	Weight per bushel.
			Inches.		Inches.		Lbs.	Bush. lbs.	Lbs.
Red Fife—									
2 inches deep...	Aug. 28..	133	46	Stiff.....	4	Bald.....	6410	45	62
3 inches deep....	Aug. 28..	133	46	Stiff.....	4	Bald.....	6000	37 30	61½

In the above test the difference between sowing wheat 2 inches deep and 3 inches deep is very marked. In wet seasons the result has invariably been in favour of 2 inches deep; whereas, 3 inches deep has usually produced better returns in dry seasons.

AVERAGE FOR 4 YEARS.

Name of Variety.	1892.		1893.		1894.		1895.		Average yield.	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush	Lbs.	Bush.	Lbs.
Red Fife—2 inches deep.....	27		41	20	15	20	45		32	10
do 3 inches deep.....	22	30	37	10	18		37	30	28	47

WHEAT—Test of Press drill *vs.* ordinary drill, sown 17th April on good sandy loam: size of plots $\frac{1}{10}$th acre each.

Name of Variety.	Date of Ripening.	No of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per acre.	Yield per acre.	Weight per bushel.	Proportion rusted.
			In.		In.		Lbs.	Bush. lbs.	Lbs.	
Red Fife—										
Press drill.....	Aug. 28..	133	50	Stiff..	3¼	Bald..	6820	45	60½	No rust or smut.
Ordinary.....	Sept. 1..	137	45	Stiff..	3¼	Bald..	6400	44	60	" "

As will be seen in the result given, the press-drill produced one bushel more grain and 420 lbs. more straw per acre than ordinary drill, and the grain matured 4 days earlier.

AVERAGE YIELD FOR 4 YEARS.

Name of Variety.	1892.		1893.		1894.		1895.		Average yield.	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
Red Fife—Press drill.....	30	20	38	20	18	40	45		33	5
do Ordinary drill.....	24		36	18	17	50	44		30	32

FALL *vs.* SPRING-PLOUGHING AND SUMMER FALLOW.

In this test, Red Fife wheat was used.

One-half acre was ploughed in the fall of 1894 and sown on 9th April, 1895, at the rate of 1½ bushels per acre.

A second half acre was first sown at the rate of 1½ bushels per acre, also on 9th April, then gang-ploughed 3 inches deep and well harrowed.

For comparison one-half acre of Red Fife on fallow sown on same date, is given though this was not grown in the same field. The soil in each instance was a good sandy loam.

The result is greatly in favour of fallow. As between fall and spring-ploughing the returns are very considerably in favour of fall ploughing. This was caused by the grain on the fall ploughing coming up at once and continuing to grow until ripe; while that sown on the half acre ploughed this spring did not come up until the first week in June (after the rains came) and although it produced a good crop of straw the grain was caught by the frost on 30th August and greatly damaged.

Name of Variety.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw, $\frac{1}{10}$-acre.	Yield per Acre.		Weight per Bushel.	Proportion Rusted.
			In.		In.		Lbs	Bush.	Lbs.	Lbs	
Red Fife—Fall ploughing..	Aug. 27.	140	48	Stiff..	3½	Bald .	520	33	45	61	No smut; no rust.
do —Spring do	Sept. 7.	151	46	do ..	3¼	do ..	500	22	30	60	do do
do —Summer fallow ..	Aug. 22.	135	49	Fair..	3½	do ..	624	41	20	62	do do

EXPERIMENTS WITH BARLEY.

Barley was an exceptionally good crop the past season, some varieties producing very large yields of both grain and straw.

One field of six and a half acres of Odessa barley was particularly fine and a 3 acre field of Carter's Prize Prolific was extra good but lodged badly and contained a considerable quantity of smut. Smut was very bad in many of the varieties, especially among the 6 rowed sorts in the test of varieties sown on the same date. One plot, Phœnix, was so bad that when cut it was not fit to thresh. Little or no smut, however, was found in any of the varieties, the seed of which had been treated with bluestone.

Frosts on 10th and 11th May cut the barley crop to the ground and it was again frozen back on 20th of same month. On the 28th May, a very heavy rain, followed by warm weather caused the crop to make rapid growth, and succeeding rains helped to insure the largest yield of grain and straw ever raised on the farm.

BARLEY, FIELD LOTS.

Seven varieties of barley were sown in fields of from one to five acres in extent. All were sown by drill on fallow, the soil was a good sandy loam.

The yield of grain and straw in all cases was very large and the grain is a good sample.

Two varieties, Newton and Prize Prolific were smutty, the others were free from smut, none of them were rusted.

Name of Variety.	Size of plot.	Date of sowing.	Date of ripening.	Number of days maturing.	Length of straw.	Character of straw.	Length of head.	Kind of head.	Weight of straw per acre.	Yield per acre.		Weight per bushel.
	Ac.				In.		In.			Bus.	Lbs.	Lbs.
Odessa	5	April 30	Aug. 19	120	44	Fair	3	6 rd	5,890	64	18	53
Prize Prolific	3	May 2	Sept. 4	125	43	Weak	4¾	2 "	6,010	60	30	49
California Prolific	4	do 3	Aug. 17	106	48	Stiff	3	2 "	5,900	56	15	52½
do	3	do 3	do 30	119	54	do	3	2 "	6,170	55	25	52
Gold thorpe	2	do 1	do 27	118	40	do	3	2 "	5,950	53	22	51¾
Kinver	1	do 1	Sept. 4	126	40	Weak	5	2 "	6,000	52	28	50½
Oderbruch	2	do 3	Aug. 27	116	40	Stiff	3	6 "	5,890	50	17	52½
Newton	2	do 1	do 27	118	41	do	3	2 "	5,950	48		52½

BARLEY—RESULTS OF EARLY, MEDIUM, AND LATE SOWING.

In this test two sorts were sown, Canadian Thorpe, a two-rowed variety, and Oderbruch, a six-rowed sort. The first seedingwas done on April 16, and subsequently on the same day each week for six sowings.

The tests were made on fallow land, a good sandy loam, in plots of one-tenth acre each, sown by ordinary drill, without harrowing before or after seeding.

The first three seedings were well up on May 10, when they were cut back by frost. These were again, with fourth and fifth seedings, cut back by the next frost on May 20.

Little or no difference could be observed in any of the plots, so far as the crop of straw was concerned and all were late in maturing. The two-rowed sorts were from six to nine days longer in coming to maturity than the six-rowed varieties. There was no rust or smut affecting any of these plots.

The results of this test indicate the first and second week in May as being the best time to sow barley, which is also the time indicated by tests carried on during the past four years.

BARLEY.—Test of Early, Medium and Late Sowings.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
				In.		In.		Lbs.	Bus.	lbs.	Lbs
Oderbruch	April 16	Aug. 27	133	44	Stiff	3	6 rowed	320	46	42	51
do	do 23	do 27	126	44	do	2¾	do	364	47	34	50
do	do 30	do 27	119	45	do	2¾	do	375	48	46	50
do	May 7	do 27	112	43	do	2½	do	399	53	6	50
do	do 14	do 24	102	40	do	2¾	do	405	56	12	51
do	do 21	do 24	95	41	do	2¾	do	385	48	26	51
Canadian Thorpe	April 16	Sept. 4	141	42	do	2½	2 rowed	360	53	16	48
do	do 23	do 2	132	46	do	2¾	do	375	41	42	50
do	do 30	do 4	127	49	do	2¼	do	380	45	30	50
do	May 7	do 2	118	47	do	2½	do	378	52	14	47
do	do 14	do 5	114	45	do	2½	do	390	56	12	47
do	do 21	do 4	106	46	do	2¼	do	400	45	90	46

BARLEY, TEST OF VARIETIES.

Thirty-six varieties of barley were sown in this test, all on the same date, 1st May, 18 of them two-rowed and 18 of six-rowed.

The test was made on one-tenth acre plots of fallow land, soil a good sandy loam; sown by ordinary drill and not harrowed before or after seeding.

All the sorts were several inches high when cut back by frost on 10th and 20th May. Winds also injured several of the six-rowed varieties but the two-rowed sorts escaped, they being on less exposed ground.

As previously stated, smut was very prevalent in several of the two-rowed, and especially so, in the six-rowed varieties.

The small returns from the six-rowed sorts, in comparison with the two-rowed, were caused principally by winds blowing the earth off the roots, thereby allowing frost to kill the plants—while young.

BARLEY, Six-rowed—Test of Varieties all sown on same date.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw per acre.	Yield per Acre		Weight per Bushel.	Proportion Smutty.
			In.		In.	Lbs.	Bush.	Lbs.	Lbs.	
Rennie's Improved	Sept. 5	128	43	Weak	5	3,000	62	14	52½	A little smut.
Odessa	Aug. 24	116	40	Fair	3	4,660	54	28	53½	Smutty.
Success	" 16	108	39	Stiff	2¾	2,750	45	40	49½	"
Trooper	" 30	122	37	"	3	2,700	45	40	52½	"
Mensury	" 24	116	46	Fair	3½	4,200	43	36	51	A little smut.
Nugent	" 27	119	38	"	2¾	3,820	42	34	51¾	"
Royal	" 26	118	39	Stiff	3¾	2,200	41	42	52½	Smutty.
Stella	Sept. 2	125	38	"	3	2,320	41	32	51½	A little smut.
Excelsior	Aug. 19	111	39	"	3¼	2,910	41	32	47½	"
Common	" 24	116	42	"	3	4,600	41	20	52½	Smutty.
Summit	" 30	122	38	"	3½	2,400	40	30	52½	"
Baxter's	" 24	116	44	"	2¾	3,910	40	20	52¾	"
Oderbruch	" 24	116	43	"	3	3,940	40		52	A little smut.
Surprise	" 30	122	38	"	3½	2,750	38	26	52½	Smutty.
Vanguard	" 24	116	38	"	3½	2,890	37	24	52	"
Champion	" 19	111	40	"	3½	3,320	37	24	46	A little smut.
Petschora	" 20	112	38	Fair	3	3,220	31	29	51¾	Smutty.
Phœnix	" 30	122	39	"	2½	.....	.....		.....	Discarded; ¾ smut.

BARLEY, Two-rowed—Test of Varieties all sown on same date.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw per Acre	Yield per Acre		Weight per Bushel.	Proportion Smutty.
			In.		In.	Lbs.	Bush.	Lbs.	Lbs.	
Prize Prolific	Sept. 4	127	40	Weak	4	6,000	59		49¼	Smutty.
Kinver Chevalier	" 4	127	32	"	4½	5,750	56	22	50	A little smut.
Thanet	" 4	127	38	"	4	5,800	54	40	51⅜	Smutty.
French Chevalier	" 2	125	35	"	5½	5,440	54	38	49½	A little smut.
Danish Chevalier	" 2	125	38	"	4½	5,800	54	18	49¼	"
Beaver	" 2	125	37	Stiff	3½	4,850	52	4	51½	No smut.
Canadian Thorpe	Aug. 30	122	41	"	3	5,550	50	6	52¼	Smutty.
Rigid	" 27	119	40	"	3	2,320	48	16	52½	"
Newton	" 30	122	40	"	4	5,400	48	5	52½	"
California Prolific	" 30	122	40	"	3½	5,000	48		52½	"
Bolton	Sept. 2	125	42	Weak	4	4,800	46	10	52½	"
Improved Chevalier	" 2	125	43	Fair	4½	5,800	45	10	52	A little smut.
Goldthorpe	" 2	125	40	Stiff	2¾	5,650	45		52½	Smutty.
Golden Melon	" 5	128	40	Weak	4½	5,910	45		49½	A little smut.
Duck-bill	Aug. 31	123	38	Stiff	3	5,000	45		53	Smutty.
Sidney	" 29	121	37	Fair	4	5,000	42	44	51½	A little smut.
Pioneer	" 30	122	40	"	4	4,800	38	10	52¾	Smutty.
Monty (feed)	" 30	122	32	Weak	4	2,000	30	10	61½	No smut.

TEST OF SPRING *vs.* FALL-PLOUGHING AND SUMMER FALLOW.

California Prolific barley was used in the above test. All the plots were sown on 3rd May.

One-half acre of stubble was ploughed in fall of 1894, and sown by drill on 3rd May, 1895 Another half acre stubble was sown by drill and ploughed on same date, and one-half acre was sown on fallow.

The crop of straw on all the plots, was heavy, but the heads were small and the sample of grain only fair on spring and fall ploughing..

From the following table it will be seen that in comparison with the same variety grown on fallow the yields of fall and spring ploughing are very small. No rust or smut was found on any of these plots.

Name of Variety.	Date of Ripening.	Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per acre.	Yield per acre.		Weight per bushel.
			In.		In.		Lbs.	Bush.	Lbs.	Lbs.
California Prolific (spring ploughing)	Aug. 23.	112	39	Weak	2½	2 rowed	5,000	33	36	50
California Prolific (fall ploughing)	do 23.	112	42	Stiff	3	do	5,450	31	32	49
California Prolific (fallow)	do 17.	106	48	do	3	do	5,900	56	15	52

EXPERIMENTS WITH OATS.

Forty-nine varieties of oats were tested during the past season; 5 black and 44 white varieties.

Like the barley, the crop was cut back by frosts on the 10th, 11th and 20th of May. Wind also did considerable damage to a few varieties; and smut caused a reduced yield in sorts not bluestoned.

On the whole, however, the crop was the best ever harvested on the Experimental Farm.

OATS—TEST OF EARLY, MEDIUM AND LATE SOWING.

Two varieties of milling oats were used in this test and sown by ordinary drill on fallow. The soil was a good sandy loam and the size of the plots one tenth of an acre each.

All but the last sowing were cut back by frosts on the 10th, 11th and 20th May. The growth was so even afterwards that, while growing, no difference could be observed in any of the plots, and when threshed the yields of grain and straw varied very slightly.—No rust or smut was seen on any of these plots.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per acre.	Yield per Acre.		Weight per Bushel.
				In.		In.		Lbs.	Bush.	Lbs.	Lbs.
Banner	April 16..	Sept. 3...	140	51	Stiff....	11	Branch.	6,000	81	16	38
do	do 23..	do 5...	135	50	do	11	do ..	6,300	82	22	38
do	do 30..	do 5...	128	52	do	10½	do ..	6,400	88	8	38½
do	May 7..	do 3...	119	51	do	10	do ..	6,000	86	16	38½
do	do 14..	do 1...	110	49	do	10½	do ..	6,400	93	18	38
do	do 21..	do 1...	103	48	do	11	do ..	6,130	80	..	39
Abundance	April 16..	do 2...	139	54	do	9½	do ..	5,710	85	10	38
do	do 23..	do 5...	135	52	do	10½	do ..	5,990	81	6	38
do	do 30..	do 2...	125	56	do	10	do ..	6,020	85	11	38½
do	May 7..	do 5...	121	54	do	10	do ..	6,300	80	10	38
do	do 14..	do 2...	111	55	do	10½	do ..	6,300	89	4	37
do	do 21..	do 2...	104	54	do	11	do ..	6,410	87	2	38½

FIELD CROPS OF OATS.

Six varieties of oats were sown on fields of from 2 to 18 acres each. Soil all good sandy loam.

Eighteen acres of Banner were sown in one field, on fallow land. The field was gang-ploughed, then sown by drill at the rate of 2½ bushels per acre; then harrowed and after the grain came above ground another stroke of the harrow was given. One-tenth acre of this field, cut and threshed separately, gave a yield of 99·30 bushels per acre, and the whole 18 acres, when threshed, produced 1,710 measured bushels, or 95 bushels per acre, weighing 38 lbs. per bushel. By weight the yield will exceed 106 bushels per acre.

Another field of Banner, 8 acres, the seed of which had not been bluestoned, drilled in on fallow, was so smutty as to be almost worthless. A large crop of straw was grown, but the yield was comparatively small, though the grain was a good sample. All the other fields were free from smut and no rust was observed on any of them.

The grain in all these fields was well up early in May but was cut back twice by frost in that month.

OATS—Field Lots.

Name of Variety.	Size of Plot.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per acre.	Yield per Acre.		Weight per Bushel.
	acre				In.		In.		Lbs	Bush.	lbs.	Lbs
Banner, on fallow, ganged first, drilled	18	April 19	Aug. 29	132	58	Fair..	10	Branch.	6300	95		39
Welcome, on fallow, drilled in..	5	do 22	do 29	129	48	do ..	9	do ..	5800	79	10	44
Hazlett's Seizure, fallow, drilled in	2	do 23	Sept. 3	132	58	do ..	10	do ..	6210	60	24	43
Cluster, fallow, drilled in	5	do 22	Aug. 29	129	54	do ..	10½	Side....	5990	70		45
Bonanza, meadow land, fallowed 1894, drilled	2	do 23	do 22	121	54	Weak	9	Branch.	6210	80	17	44
English White, meadow land, fallowed 1894, drilled	2½	do 24	do 17	116	49	Fair..	10	do ..	5950	75	32	43
Banner, fallow, drilled	8	May 4	do 22	111	48	do ..	9	do ..	6110	45		39

ACRE LOTS OF OATS.

Nine varieties of oats were sown on plots of one acre each.

The winds and frosts in May cut them all back so badly that only four varieties were worth saving for the grain and the others were cut for fodder. The yields were small in comparison with other tests with oats.

The nine varieties were sown on fallow land beside a field of Banner oats that yielded 95 bushels per acre, but were on an exposed portion of the field and suffered greatly from winds.

No rust was observed on any of these plots, but the varieties known as Flying Scotchman and Golden Beauty were considerably affected with smut.

Name of Variety.	Character of Soil.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per acre.	Yield per acre.		Weight per bushel.
					Inch.		Inch.		Lbs.	Bush.	Lbs.	Lbs.
Black Champion	Sandy loam.	May 4	Aug. 27.	115	45	Fair....	9½	Side....	6,150	56	30	37
Black Tartarian	" ..	" 4.	" 27.	115	46	Weak...	9	" ...	6,200	52		35
Flying Scotchman	Clay loam ..	Apr. 30.	Sept. 3.	126	42	Fair....	9½	Branch.	5,800	50	19	42½
Golden Beauty	Sandy loam.	" 30.	" 3.	126	42	" ...	10	" .	6,090	45	21	39
White Russian	Clay loam ..	" 30.	Cut for feed.									
Scottish Chief	" ..	" 30.										
Early Gothland	" ..	" 30.										
Oderbruch	" ..	" 30.										
Royal Doncaster	" ..	" 30.										

OATS—TEST OF VARIETIES.

In this test forty-nine varieties were sown side by side, all on the 23rd of April, by drill on fallow land. The soil was sandy loam of good quality and the size of the plots was one tenth acre each.

All were cut back twice by frost in May, but made a very heavy growth of straw afterwards, and with the exception of five varieties produced large yields of fine grain.

The five sorts giving less than 60 bushels per acre were greatly injured by frost on 20th May, many of the plants being killed, and the crop was thus so delayed that autumn frosts occurred 30th August, before the grain was matured, hence it was light in weight. Four of the varieties yielded over 100 bushels per acre. No rust or smut was observed on any of these plots.

OATS—Test of Varieties, all sown on same date.

Name of Variety.	Date of Ripening.	Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre.	Yield per Acre.		Weight per Bushel.
			In.		In.		Lbs.	Bush.	lbs.	Lbs.
Abundance	Sept. 7	137	54	Fair	10	Branching	6,300	108	28	38¼
Golden Beauty	do 3	133	50	Weak	10½	do	6,210	104	4	40
Columbus	do 7	137	51	do	9¾	do	6,200	102	2	38
American Beauty	do 4	134	50	Fair	9	do	6,230	101	16	40
White Schonen	Aug. 31	130	47	Weak	9	do	6,030	99	22	39
Oderbruch	Sept. 7	137	50	Fair	10½	Sided	5,900	99	14	43
Challenge	Aug. 31	130	48	Weak	9½	Branching	6,200	91	6	43½
Banner	do 31	130	50	do	11	do	5,980	90	..	40¾
Holstein Prolific	Sept. 7	137	51	do	10½	do	6,150	89	24	39½
Wide-awake	do 6	136	56	Fair	10	do	6,020	89	14	40
Early Archangel	Aug. 31	130	47	do	9	do	6,050	88	8	43¼
Improved Ligowo	Sept. 3	133	48	Weak	9	do	6,080	87	22	42¼
Siberian	do 7	137	58	do	10½	Sided	6,130	86	26	37
Flying Scotchman	Aug. 31	130	56	Fair	9	Branching	6,000	86	16	43
Improved American	Sept. 11	141	52	Stiff	10	do	6,280	85	20	38
Bonanza	do 3	133	48	Weak	11	do	6,130	85	10	43¾
American Triumph	do 6	136	46	Fair	10	do	6,220	85	..	38½
Cream Egyptian	Aug. 31	130	51	Weak	9½	do	6,000	82	32	43½
Abyssinia	Sept. 7	137	50	Fair	10½	Sided	6,000	82	22	39½
Rosedale	do 7	137	58	Weak	9	do	6,130	81	16	40
Welcome	do 4	134	54	Fair	8	Branching	6,150	81	16	43
Winter Grey	Aug. 29	128	54	do	9½	do	5,940	81	6	45½
Golden Giant	Sept. 7	137	59	Weak	10¾	Sided	6,170	80	30	36¾
Hazlett's Seizure	do 3	133	52	do	11	Branching	6,200	79	14	43
Joanette	do 2	132	39	do	9	do	5,870	78	28	36½
Victoria Prize White	Aug. 30	129	50	do	9½	do	5,990	78	28	44½
Cave	Sept. 7	137	47	Fair	9	Sided	6,020	78	28	39¼
Scottish Chief	do 3	133	55	Weak	9	Branching	5,950	77	22	42¼
Bavarian	do 3	133	51	Fair	9	do	6,250	76	16	39¼
White Russian	do 7	137	52	Weak	9	do	6,000	75	.	41½
Early Blossom	do 7	137	45	Fair	10	Sided	6,170	75	..	39
Lincoln	do 1	131	48	do	10	Branching	5,900	73	28	40
Prize Cluster	Aug. 29	128	48	Weak	9	do	5,980	73	28	45
Early Golden Prolific	Sept. 7	137	48	Fair	10½	Sided	6,110	73	18	37¾
Prolific Black Tartarian	do 3	133	51	Weak	9	do	5,950	72	22	36
White Wonder	Aug. 31	130	54	do	9½	Branching	6,100	71	16	42
Giant Cluster	Sept. 7	137	58	do	11	Sided	6,200	70	..	35¼
White Monarch	do 7	137	48	Stiff	10	Branching	6,100	69	24	39
Early Doncaster	do 7	137	49	Weak	8	do	5,990	69	4	40¼
Poland White	do 7	137	58	Stiff	9½	do	5,970	69	4	43¼
Rennie's Prize White	do 6	136	56	do	12	do	6,210	67	13	40¼
California Prolific Black	do 3	133	44	Weak	8¾	Sided	5,920	67	12	35
Wallis	do 7	137	57	do	9	Branching	6,210	67	12	39½
Imported Irish	Aug. 30	129	61	Stiff	9	do	6,310	63	8	46¾
Coulommiers	Sept. 11	141	44	Fair	9	do	5,890	57	12	35½
Early Gothland	Aug. 31	130	45	Stiff	10½	Sided	5,900	53	18	39½
Early Maine	Sept. 11	141	40	do	9	Branching	5,950	51	6	35½
Early Etampes	do 4	134	34	do	8¾	do	4,900	50	10	36¼
Scotch Hopetown	do 7	137	50	Weak	10	do	5,900	45	20	39

OATS—FALL *vs.* SPRING PLOUGHING AND SUMMER FALLOW.

The same test was made with oats as with wheat and barley.

One-half acre of stubble was ploughed in fall of 1894, and sown on 16th April, 1895, at the rate of 2½ bushels per acre. One-half acre of stubble was sown on 16th April, at the rate of 2½ bushels per acre, and then ploughed and well harrowed. For comparison ½ acre of the same variety of oats, sown on fallow, on 19th April, was cut and weighed. The fallow was separated from the stubble plots by a road only. The stubble sown had produced a crop of oats in 1894, and was fallowed the previous summer. The soil was a good sandy loam. No rust or smut was observed on either of these plots.

Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per acre.	Yield per acre.	Weight per bushel.
				In.		In.		Lbs.	Bush. Lbs.	Lbs
Banner (fall ploughing)....	Apr. 16.	Aug. 28.	134	48	Fair ...	9	Branching	5,950	35 29	38½
do (spring ploughing)	do 16.	do 28.	134	48	do ...	9	do ...	6,000	40 10	38
do (summer fallow) ..	do 19.	do 29.	132	58	do ...	10	do ...	6,300	95 ..	39

EXPERIMENTS WITH PEASE.

Test of varieties, all sown same date.

Nine varieties were sown in this test, but unfortunately a high wind which occurred on September 23rd, shortly after the pease were pulled, mixed the varieties so badly that no accurate results can be given. The samples of pease of all the varieties are good.

Pease.—Test of early, medium and late sowing. In this test two varieties were sown on the same day, each week, for six weeks. They escaped being mixed by the wind but were badly threshed out on the ground, so that the yields are much smaller than they otherwise would have been. The soil was a good sandy loam and the size of the plots was one-tenth acre each.

The pease were well up early in May and suffered considerably from frosts in that month, so much so, that the weeds got a good start which was maintained till harvest.

Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Character of Growth.	Length of Straw.	Length of Pod.	Size of Pea.	Yield per acre.	Weight per Bushel.
					In.	In.		Bush. Lbs.	Lbs
Mummy	April 16	Sept. 5	142	Strong .	48	2½	Large ..	13 20	65
do	do 23	do 5	135	do ..	48	2⅝	do ..	15	65
do	do 30	do 7	130	do ..	46	2¾	do ..	20 15	65
do	May 7	do 9	125	do ..	49	3	do ..	21 40	65
do	do 14	do 10	119	do ..	50	2½	do ..	19 10	65
do	do 21	do 10	112	do ..	49	2½	do ..	18 40	65
Golden Vine.....	April 16	do 2	139	do ..	50	2	Small ..	17 50	64
do	do 23	do 5	135	do ..	51	1⅝	do ..	18 40	64
do	do 30	do 2	125	do ..	50	1¾	do ..	21 35	64
do	May 7	do 5	121	do ..	48	2	do ..	22 20	64
do	do 14	do 2	111	do ..	45	2	do ..	19 40	64
do	do 21	do 2	104	do ..	46	2¼	do ..	19 10	64

EXPERIMENTS WITH AWNLESS BROME GRASS.

Awnless Brome Grass (*Bromus inermis*) did exceedingly well the past year. Early in the season the prospects for a good crop were not bright but after the rain during the last week in May, the growth was very satisfactory.

The greater portion of the crop was saved for seed which has given an excellent sample and a large quantity of good seed will now be available for use on the farm and for the next distribution. In the neighbourhood of 30 acres is now under grass; and the coming year, with the large lot of seed on hand, the acreage will be greatly increased.

Five acres were sown in August last, and a good catch was obtained.

Several methods have been tried in sowing the grass but it has been found that on this farm (owing to winds) ploughing stubble early in May, then sowing grass seed by hand and harrowing well afterwards, has given the best results. It may be necessary to go over fields with a mower the first year, to cut the weeds and keep them from going to seed. Where winds are not troublesome sowing on a good clean fallow is recommended.

Reports from the Calgary district, show that large crops of this grass were obtained there the past year: in one case as much as five tons per acre having been grown.

YIELD of Five Acres of Awnless Brome Grass.

Variety.	No. of Acres.	Cured Hay per acre. Tons.	Lbs.	Date Cut.
Bromus Inermis	4	2	1,200	July 24.
do	1	3	1,200	do 13.

EXPERIMENTS WITH MIXED GRAIN FOR FODDER.

Five tests were made with different mixtures of grain sown for fodder.

The two mixtures of oats and pease produced the best feed; while a combination of equal parts of oats and barley gave the largest crop. The mixture of equal parts of wheat, oats and barley turned out a smaller crop of poor feed.

All were sown by drill on fallow on plots of one-tenth acre each.

	Mixture per Acre.	Sown.	Cut for	Date Cut.	Weight per Acre Green. Tons.	Lbs.	Weight per Acre Dry. Tons.	Lbs.
I.	1 bush. Oats—Banner 2 do Peas—Multiplier	May 2.	Feed....	Aug. 13.	6	800	3	500
II.	1 do Oats—Banner 1 do Peas—Multiplier	do 2.	do ...	do 13.	6	1,800	3	1,200
III.	1 do Oats—Banner 1 do Barley—Cal. Prolific	do 2.	do ...	do 13.	7	1,900	4	200
IV.	1 do Wheat—Red Fife 1 do Oats—Banner 1 do Barley—Cal. Prolific	do 2.	do ...	do 13.	4	600	2	1,400
V.	1½ do Spring Rye	do 2.	do ...	July 24.	4	100	2	700

EXPERIMENTS WITH MILLETS, &c.

Four varieties of millet, also Hungarian grass and Canary grass were tested for fodder.

Two sorts of millet were ploughed under, as winds injured them and weeds began to get the start, the other two varieties did not fully mature but gave medium crops of hay.

Hungarian grass also gave a fair crop.

Canary grass produced a good crop of feed and is worthy of a more extended trial not only as a hay crop but for the seed, which fully matures in our seasons and is of excellent quality. Sown any time in May, it will come to maturity before the wheat harvest.

Fig. 1. Flax plant.

Name of Variety.	Date Sown.	Cut for	Date Cut.	Weight per Acre Dry.	
				Tons.	Lbs.
Millet—Common .	May 13....	Hay...	Aug 22....	1	1,145
do Golden...	do 13....	do	do 22....	1	800
do German..	do 21....	Ploughed under.			
do French...	do 21....	Ploughed under.			
Hungarian Grass..	do 13....	Hay.....	Aug 22....	1	900
Canary Grass.....	do 18....	do	do 17....	2	1,800

EXPERIMENTS WITH FLAX.

One plot of two acres and two plots of one-tenth acre each were sown on 6th and 13th May respectively.

The two acre plot was very weedy but gave a good crop of straw and a yield of 12 bushels per acre. The ground was manured in fall of 1893 and fallowed in 1894.

The one-tenth acre plots were almost entirely killed by winds and frosts in May, and were ploughed up. Figure 1 represents a flax plant in bloom.

EXPERIMENTS WITH RAPE.

A field of five acres was sown with rape seed for fodder on May 22nd.

Manure was spread over this field in the fall of 1894 and after the rush of seeding this spring, the field was deeply ploughed, then harrowed and sown with rape seed at the rate of 2lbs per acre. The crop was a heavy one. Cattle were turned on for a few hours each day, in the last week in August, and at this date, November 10th, continue to find good feed. Nothing grown on this farm has given better satisfaction as a fodder crop for fall use.

EXPERIMENTS WITH CORN.

Seventeen varieties of corn were sown and planted for fodder.

All the varieties were sown on fallowed land, in drills, three feet apart by drills using 2 spouts. They were also planted in hills three feet apart each way. The corn planted in hills produced a larger crop than that sown in rows.

Several times during the season cold winds cut the top leaves of the corn back, on one occasion over one foot. This with cold nights made the season a very unfavourable one for corn, and in consequence, all the varieties tested gave small returns.

In addition to the above tests, 10 acres were sown by drill for ensilage. One field of five acres was on spring-ploughing and the balance on summer fallowed land. This crop, like that of the test plots was a poor one.

CORN.—Test of Varieties—All sown on same date; soil, clay loam; size of plots, $\frac{1}{20}$th acre each.

Name of Variety.	Date of Sowing.	Height.	When Tasselled.	In Silk.	Condition When Cut.	Weight per acre Grown in Rows.		Weight per acre Grown in Hills.	
		In.				Tons.	Lbs.	Tons.	Lbs.
Longfellow	May 21.	34	Aug. 22.	.....	In tassel.....	6	1,200	8	200
Canada White Flint	do 21.	36	Not....	.....	.....	6	600	6	....
Angel of Midnight	do 21.	40	Aug. 22.	.. ..	In tassel.....	6	....	8	800
Champion White Pearl	do 21.	36	Not....	.....	....	5	1,400	6	600
Country Gentleman	do 21.	36	Aug. 22.	.....	In tassel.....	5	1,200	5	200
Mitchell's Early	do 21.	35	do 13.	Aug. 22.	In silk.....	5	800	6	600
Mammoth 8-rowed Flint	do 21.	36	Not....	.....	.....	5	800	9	500
Compton's Early	do 21.	36	do	.....	.....	5	800	6	1,200
New White Cap Yellow Dent	do 21.	36	do	.....	....	4	1,600	5	800
Extra Early Huron Dent	do 21.	35	do	.....	.....	4	100	6	....
Giant Prolific	do 21.	36	do	.....	.....	3	1,800	6	600
Red Cob Ensilage	do 21.	38	do	.....	.....	3	1,800	6	1,800
Sanford White Flint	do 21.	37	do	.....	.....	3	1,200	5	800
Pearce's Prolific	do 21.	37	do	.....	.....	3	600	3	1,200
Canadian Dent	do 21.	38	do	.....	.....	3	600	4	400
Thoroughbred White Flint	do 21.	39	do	.....	.....	3	....	6	....
North Dakota	do 21.	40	Aug. 13.	Aug. 22.	In silk.....	2	1,300	5	800

EXPERIMENTS WITH POTATOES.

Seventy varieties were tested. The crops were not as large as was expected, considering the favourable season. The land was well fallowed the year previous and was in good condition. The soil was a good sandy loam, the size of the plots was $\frac{1}{60}$th of an acre each. They were all planted on the 15th May and dug 4th October. No rotten potatoes were found in any of the varieties in this test.

A great many of the varieties were very scabby last year and part of the seed of each sort planted this spring was treated with bi-chloride of mercury 1 oz. dissolved in 15 gallons water and soaked for 1½ hours, before being planted. Little or no difference could be observed between the treated and untreated parts and those that were scabby last year were scabby still.

Nine of the seventy kinds were also planted in the garden. Before planting, the seed was soaked for 15 minutes in a solution of copper sulphate (bluestone 1lb dissolved in 1½ pails of water (with the result that the crop is entirely free from scab.

Following are names of varieties, yield per acre, size, shape, colour, etc.

POTATOES—Test of varieties.

Name of Variety.	Character of Growth.	When Matured.	Average Size.	Quality.	Yield per Acre.				Form and Colour.
					Total.	Sound	Marketable.	Unmarketable.	
					Bush.	Bush.	Bush.	Bush.	
American Giant	Very strong.	Late	Large	Good.	352	352	320	32	Round, white.
White Beauty	Strong	do	Medium	do	332	332	312	20	Long, do
Lizzie's Pride	Very strong.	Medium	do	do	324	324	292	32	do do
Primrose	Strong	Early	Large	do	306	306	300	6	do pink.
London	Fair	Late	Medium	do	304	304	280	24	do do
Toronto Queen	Strong	do	do	do	296	296	280	16	do do
Early Harvest	do	Early	do	do	296	296	268	28	do white.
Late Puritan	do	Late	do	do	288	288	268	20	do do
Early Gem	do	Early	do	do	284	284	264	20	do pink.
Vanier	do	Late	do	do	280	280	252	28	do do
Early White Prize	Very strong.	do	do	do	280	280	240	40	Round, white.
Rochester Rose	do	do	do	do	272	272	240	32	Long, pink.
State of Maine	Fair	do	do	do	264	264	236	28	Round, white.
Everett	Strong	Medium	Large	do	264	264	240	24	Long, pink.
Monroe Co.	Very strong.	Late	Medium	do	260	260	240	20	do do
Pearce's Prize Winner	Fair	Medium	do	do	260	260	224	36	do white.
Pearce's Extra Early	Strong	do	do	do	253	253	232	20	do pink.
Empire State	Very strong.	Late	do	do	248	248	232	16	do white.
Morning Star	Strong	Medium	do	do	236	236	220	16	do pink.
Sharpe's Seedling	do	Early	do	do	232	232	216	16	do do
Carman No. 1	do	Late	do	do	228	228	200	28	Round, white.
Clarke's No. 1	Very strong.	Medium	Large	do	224	224	200	24	Long, pink.
Polaris	Strong	Early	do	do	224	224	204	20	Round, white.
Dakota Red	do	Late	Medium	do	224	224	204	20	do red.
Chicago Market	Fair	do	do	do	220	220	200	20	Long, pink.
Crown Jewel	do	Medium	do	do	220	220	208	12	do do
Northern Spy	Strong	do	Large	do	216	216	200	16	Round, pink.
Rural Blush	do	Late	Medium	do	216	216	188	28	do do
Algoma No. 1	Fair	Medium	Small	do	212	212	192	20	do do
Beauty of Hebron	Strong	Early	Medium	do	208	208	188	20	Long, pink & white
Early Norther	do	Medium	Small	do	204	204	188	16	do do
Victor Rose	do	Late	Medium	do	200	200	184	16	Round, pink.
Early Sunrise	do	Medium	Small	do	196	196	184	12	Long, do
Early Ohio	Fair	Early	Medium	do	196	196	180	16	Round, do
Early Puritan	Strong	Early	Medium	do	196	196	184	12	Long, white.
Irish Daisy	Fair	Late	do	do	196	196	180	16	Round, do
Puritan	do	do	do	do	192	192	176	16	Long, do
Holborn Abundance	Very strong.	do	do	do	192	192	172	20	Round, white.
Thorburn	Fair	Early	Small	do	188	188	168	20	do pink and white
Ideal	Very strong.	Late	Medium	do	188	188	180	8	Long, pink.
Prize Taker	do	do	do	do	184	184	144	40	Round, do
Daisy	Fair	Medium	do	do	184	184	172	12	Long, do
Dreer's Standard	do	do	do	do	184	184	172	12	Round, white.
Vanguard	Weak	do	do	do	184	184	172	12	do pink.
Early Rose	Fair	Early	Small	do	180	180	160	20	Long, do
I. X. L.	Strong	Late	Medium	do	176	176	152	24	do pink and white
Freeman's	Fair	Medium	do	do	176	176	164	12	Round, white.
American Wonder	Very strong.	Late	do	do	176	176	152	24	Half long, do
Lee's Favourite	do	Early	do	do	176	176	160	16	Long, pink.
Seedling No. 214	Fair	Medium	do	do	172	172	144	28	Round, white.
Burpee's Extra Early	Strong	do	do	do	168	168	152	16	Long, pink.
Wonder of the World	do	Early	do	do	164	164	140	24	do
Clarke's Extra Early	Fair	do	do	do	164	164	152	12	do
Stourbridge Glory	Very strong.	Late	do	do	164	164	136	28	Round, white.
Late Puritan	Strong	do	do	do	160	160	152	8	Long, do
Pride of the Market	do	do	do	do	160	160	144	16	Round, do
Maggie Murphy	Fair	Medium	do	do	160	160	152	8	do pink.
New Queen	do	do	do	do	152	152	144	8	Long, do
Early Sunrise	Strong	Late	do	do	152	152	144	8	do do
Brownell's Winner	do	do	do	do	152	152	140	12	Round, do
Early Six Weeks	do	Early	do	do	148	148	128	20	do do
Orphans	Very strong.	Late	do	do	148	148	128	20	Long, white.
Money Maker	Fair	Medium	do	do	148	148	132	16	Round, do
Troy Seedling	Strong	Late	do	do	148	148	140	8	do do
Clay Rose	do	do	do	do	140	140	112	28	do pink.

POTATOES—Test of varieties—*Continued.*

Name of Variety.	Character of Growth.	When Matured.	Average Size.	Quality.	Yield per Acre. Total.	Sound.	Marketable.	Unmarketable.	Form and Colour.
					Bush.	Bush.	Bush.	Bush.	
Lightning Express..	Fair	Medium	Medium	Good.	140	140	128	12	Long, white.
Harbinger.....	Strong.....	Early .	do .	do .	140	140	128	12	do pink.
Peerless Junior.....	Fair	Late ...	do .	do .	136	136	112	24	Round, white.
Pride of the Table...	Strong.....	do ...	Small ..	do .	124	124	108	16	Long, pink & white
Great Divide.....	Fair	Medium	Medium	do .	108	108	100	8	do white.

EXPERIMENTS WITH ROOTS.

Notwithstanding the large amount of rain which fell early in the growing season, the average yield of roots was light. The soil on which they were sown was clay loam, and the size of the plots $\frac{1}{20}$th acre each. All the varieties came up evenly, and after they were thinned out, they gave promise of a great crop. Shortly after this, however, they were attacked by flies and caterpillars, which injured the foliage and weakened the plants.

The following tables record the results of the tests with turnips, mangels, carrots and sugar beets :—

TURNIPS—Test of varieties.

Name of Variety.	Character of Growth.	1st Plot Sown.	1st Plot Pulled.	Yield per Acre. 1st Plot. Tons.	Lbs.	Yield per Acre. 1st Plot. Bush.	Lbs.	Yield per Acre. 2nd Plot. Tons.	Lbs.	Yield per Acre. 2nd Plot. Bush.	Color and Shape of Variety.
Purple Top Mammoth or Improved Greystone ...	Even...	May 25.	Oct. 4..	43	640	1444	..	29	1400	990	Uniform.
Skirving's Swede.....	do ...	do 25.	do 4..	20	800	680	..	12	....	410	do oval.
East Lothian.....	Uneven	do 25.	do 4..	18	1200	620	..	11	800	380	do do
Hartley's Bronze	do .	do 25.	do 4..	17	1280	588	..	14	620	477	Long-necked.
Imperial Swede.....	Even...	do 25.	do 4..	17	1040	584	..	12	1920	432	do
Jumbo or Monarch.....	do ...	do 25.	do 4..	17	1040	584	..	12	....	400	do
Rennie's Prize Purple Top..	do ...	do 25.	do 4..	17	560	576	..	12	1200	420	Uniform; oval.
Lord Derby.....	Uneven	do 25.	do 4..	17	500	575	..	14	1280	488	Long-necked.
Carter's Elephant.....	Even...	do 25.	do 4..	16	1600	560	..	11	1640	394	do
Purple Top.....	Uneven	do 25.	do 4..	16	1120	552	..	15	....	500	Uniform; oval.
Elephant's Master.....	do .	do 25.	do 4..	14	800	480	..	9	1200	320	Long-necked.
Giant King	do .	do 25.	do 4..	13	160	436	..	10	820	347	Uniform.
Champion Purple Top.....	do .	do 25.	do 4..	10	1120	352	..	9	1260	321	Long-necked.

MANGELS—Test of varieties.

Mammoth Long Red-Webb	Even ..	May 25.	Sep. 25.	16	880	548	..	12	600	410	Red ; uniform.
Golden Tankard	do ..	do 25.	do 25.	16	400	540	..	15	....	500	Golden do
Mammoth Long Red-Evans	do ..	do 25.	do 25.	13	160	436	..	12	560	426	Red do
Conqueror Yellow Globe...	do ..	do 25.	do 25.	12	1200	420	..	12	600	410	Yellow do
Red Fleshed Tankard.....	do ..	do 25.	do 25.	12	720	412	..	11	1940	399	Red do
Giant Yellow Intermediate.	do ..	do 25.	do 25.	12	680	411	20	12	....	400	Yellow; bad.
Mammoth Long Red.....	do ..	do 25.	do 25.	11	560	376	..	10	1300	355	Red ; long tap root
Yellow Fleshed Tankard ..	do ..	do 25.	do 25.	11	520	375	20	11	500	375	Yellow; uniform.
Warden Prize Orange Globe	do ..	do 25.	do 25.	11	40	367	20	8	1940	299	Orange do
Mammoth Long Red-Sharpe	do ..	do 25.	do 25.	10	1360	356	..	9	480	308	Red ; long tap root
Champion Yellow Globe...	do ..	do 25.	do 25.	10	680	344	40	10	400	340	Yellow ; uniform.
Red Globe	do ..	do 25.	do 25.	9	1680	328	..	9	600	310	Red do
Gatepost	do ..	do 25.	do 25.	9	240	304	..	12	....	400	do do

CARROTS—Test of Varieties, one Seeding only.

Name of Variety.	Character of Growth.	1st Plot Sown.	1st Plot Pulled.	Yield per Acre.		Yield per Acre.	Colour and Shape of Variety.
				Tons.	Lbs.	Bush.	
Iverson's Champion	Strong	May 14	Oct. 16	9	1,200	320	White; uniform.
Giant Short White Vosges	Fair	do 14	do 16	9	960	316	do do
White Belgian	Strong	do 14	do 16	8	1,760	296	do do
Yellow Intermediate	do	do 14	do 16	8	1,280	288	Yellow do
Scarlet do	do	do 14	do 16	8	1,280	288	Scarlet do
Long Orange	do	do 14	do 16	8	800	280	Orange do
Carter's Orange Giant	do	do 14	do 16	8	800	280	do long.
Improved Half Long	Fair	do 14	do 16	8	80	268	White; uniform.
do Short White	Strong	do 14	do 16	7	1,600	260	Green and white; short.
Short White	Fair	do 14	do 16	7	1,360	256	White; uniform.
Mammoth White Intermediate	do	do 14	do 16	7	400	240	do do
Early Gem	Strong	do 14	do 16	7	400	240	Scarlet do

SUGAR BEETS—Test of Varieties, one Seeding only.

German White	Strong	May 25	Oct. 16	14	320	472	
French White	do	do 25	do 16	13	400	440	
Klein Wanzleben	Very strong.	do 25	do 16	12	1,440	424	
Vilmorin's Improved	Strong	do 25	do 16	11	320	372	
Utah	do	do 25	do 16	9	1,200	320	
Austrian Electoral	Very strong.	do 25	do 16	9	1,200	320	

VEGETABLE GARDEN.

Most vegetables were a good crop; onions, cabbage, beets, cauliflower, celery, lettuce, and radish, were extra good; cucumbers, melons, citrons, pumpkins, squash and tomatoes, however, on account of the cold nights, did not do so well.

Following are the names of varieties of all kinds of vegetables grown, with results of tests:—

Artichokes.—Sown 17th April; made a top growth of about 4 feet, but tubers were small.

Asparagus.—Conover's Colossal—In use from 15th May to 15th July. An excellent crop; good quality.

Donald's Elmira, Early Argenteuil, Mammoth White Columbus, Barr's Mammoth.—Sown 1894; made good growth, but were not old enough to cut this year.

BEETS—Test of varieties. All sown 29th April.

Name of Variety.	Up.	Fit for use.	Lifted.	Bushels per acre.	Shape.	Size.	Colour.	Remarks.
Eclipse	May 20	June 1	Sep. 26	1089	Round	Very large	Clear light	
Dreer's Half-long	" 20	" 15	" 26	1008	Half long	"	" red	
Rennie's Intermediate	" 20	" 15	" 26	1008	"	"	Dark red	Best long cut.
Long Dark Red	" 20	" 15	" 26	847	Long	Large	Clear red	
Columbia	" 20	" 15	" 26	806	Round	"	Light streaked	
Arlington's Favourite	" 20	" 1	" 26	685	"	"	Red "	
Edmund's Blood Turnip	" 20	" 1	" 26	564	"	Medium	Dark red	Best turnip variety.
Nonsuch	" 20	" 15	" 26	322	Half long	Small	Very dark red	Best quality, but small.

BEANS—Test of varieties.

Name of Variety.	Sown.	Up.	Fit for Use.	Remarks.
Broad Windsor	April 17..	May 25..	Aug. 1..	Good crop, well podded and filled.
First Seeding.				
Wardell's Kidney Wax	April 30..	May 10..	Aug. 4..	Good crop; well filled pods; the best early bean.
Crystal Wax	" 30..	" 10..	" 4..	Fair crop.
Golden-eyed Wax	" 30..	" 10..	" 10..	Poor crop.
White Wax	" 30..	" 10..	" 4..	Poor crop.
Dwarf German Wax	" 30..	" 10..	" 6..	Fair crop.
Rennie's Rust-proof	" 30.	" 10..	" 4..	Fair crop, good quality.
Second Seeding.				
White Wax	May 7..	May 17..	Aug. 20..	Good crop.
Dwarf Mohawk	" 7..	" 17..	" 20..	Poor crop; not well filled.
Emperor William	" 7..	" 17..	" 25..	Very small crop.
Crystal Wax	" 7..	" 17..	" 15..	Small crop.
Dwarf Giant Wax	" 7..	" 17..	" 20..	Good crop.
Golden-eyed Wax	" 7..	" 17..	" 20..	Good crop.
Wardell's Kidney Wax	" 7..	" 17..	" 20..	Good crop—the best.
Giant White Runner	" 7..	" 17..	.....	Too late; did not pod.
Early China	" 7..	" 17..	" 15..	Very good crop.

CELERY.—Test of Varieties.

Name of Variety.	Sown.	Transplanted in Hot-bed.	Transplanted to Garden.	Fit for Use.	Lifted.	Size.	Quality.	Colour.
Rennie's Giant White	Mar. 25	May 29	June 29	Aug. 25	Oct. 3	Very large..	Good...	White.
Paris Golden Yellow	do 25	do 29	do 29	do 25	do 3	Medium....	Extra..	Yellow.
Evan's New Triumph	do 25	do 29	do 29	do 25	do 3	Large.....	do ..	White.
DeCandolle	do 25	do 29	do 29	do 25	do 3	do	Coarse..	Went to seed.
Henderson's Golden Dwarf	do 25	do 29	do 29	do 25	do 3	do	Fair...	White.
Vaughan's Giant Golden Heart	do 25	do 29	do 29	do 25	do 3	do	do ...	do
Pink Plume	do 25	do 29	do 29	do 25	do 3	Small	Extra..	Pink.
White Plume	do 25	do 29	do 29	do 15	do 3	Medium....	do ..	White.
Giant Pascal	do 25	do 29	do 29	do 25	do 3	Large.....	Good...	do

TABLE CARROTS.—Test of Varieties.

Name of Variety.	Sown.	Up.	Fit for Use.	Lifted.	Bushels per acre.	Remarks.
Early Very Short	April 18	May 15	July 5	Oct. 8	625	Almost round; coarse and badly split.
Henderson's Intermediate	do 18	do 15	do 15	do 8	625	Good crop; fair quality.
Half-long Scarlet Nantes	do 18	do 15	do 15	do 8	605	Extra crop; the best garden carrot.
Scarlet Intermediate stump-rooted	do 18	do 15	do 15	do 8	524	Good crop.
Early French Short-horn	do 18	do 15	do 10	do 8	524	Good crop.
Half-long Scarlet Carentan	do 18	do 15	do 15	do 8	363	Small but of good quality.

TABLE CORN.—Test of Varieties.

Name of Variety.	Sown.	Up.	Fit for Use.	Ripe.	Remarks.
Native	May 7	June 1	Sept. 1	Sept. 20	Small ears but fair crop.
Talbot's First and Best	do 7	do 1	.....	.....	None fit for use; did not come up till June.
Adam's Early	do 7	do 1	.....	.....	do do do
Burpee's First of All	do 7	do 1	.....	.....	do do do
Mitchell's White Flint	do 16	May 20	Aug. 24	.....	Fair crop.
Mitchell's Extra Early	do 16	do 20	do 24	.....	do
Dreer's First of All	do 16	do 20	do 24	.....	do
Early Cory	do 16	do 20	Sept. 1	.....	do
Burpee's First of All	do 16	do 20	do 1	.....	do
Extra Early Vermont	do 16	do 20	do 1	.....	do

NOTE.—The six varieties sown on 16th of May were watered in the hills at time of seeding. Germinating quickly, they produced much better results than the same varieties sown 7th May. The corn did not ripen but was a fair crop for cooking.

CUCUMBERS.—Test of Varieties.

Name of Variety.	Sown.	Transplanted into Frame.	Fit for Use		Duration of Fitness for Use.	Size.	Remarks.
			From	Till			
					Months.		
Japanese Climbing	April 6	May 6	.....	.....	.....	.....	Of no value; none formed.
Pride of Canada	do 6	do 6	July 12	Aug. 22	1⅓	Large	Very fine. Large fruit.
White Wonder	do 6	do 6	do 20	do 20	1	Small	Good crop.
Giant Pera	do 6	do 6	do 12	do 22	1⅓	do	Fair.
Giant White	do 6	do 6	do 10	do 20	1⅓	do	Poor.
Paris Pickling	do 6	do 6	Aug. 1	do 30	1	do	Not true to name.
Thoroughbred White Spine	do 6	do 6	July 20	do 20	1	do	Very poor.
Siberian	do 6	do 6	do 20	do 20	1	do	Poor.
White Wonder	do 6	do 6	do 12	do 22	1⅓	do	Good quality.

CITRONS.

Common	April 6	May 6	Sept. 10	.....	.....	.....	Fruit very small and poor crop on account of cold nights.
Colorado	do 6	do 6	do 10	.....	.....	.....	

CABBAGE.—Test of Varieties. All sown in hot-bed, March 25.

Name of Variety.	Transplanted in Hot-bed.	Transplanted in Garden.	Fit for Use.	Taken Up.	Average Weight of Heads.	Remarks.
					Lbs.	
Large Late Drumhead	April 16	May 25	Sept. 10	Oct. 12	13	Extra—the best cabbage grown this year.
Lauderback's All the Year Round	do 16	do 25	do 15	do 12	8	Fair—hardhead—fair quality.
Early Winningstadt.	do 16	do 25	July 27	do 12	8	do do but small.
Burpee's All Head	do 16	do 25	Aug. 5	do 12	16½	Extra—one of the best.
Drumhead Savoy	do 16	do 25	July 27	do 12	8	Fair—good small heads.
Large Red Drumhead	do 16	do 25	Sept. 20	do 12	10	Extra—the best red cabbage.
Autumn King	do 16	do 25	do 20	do 12	18	do good late cabbage.
Surehead	do 16	do 25	do 20	do 12	16½	Good—the best heads.
World Beater	do 16	do 27	Aug. 20	do 12	13	do large heads—medium quality.
Henderson's Summer	do 16	do 27	July 30	do 12	10½	do good early cabbage.
Vandergraw	do 16	do 27	Sept. 15	do 12	12	do large.
Nonsuch	do 16	do 27	Oct. 1	do 12	13½	do late.
Bruce's Winter	do 16	do 27	do 1	do 12	15	Extra—late.

CAULIFLOWER.—Test of Varieties.

Name of Variety.	Sown.	Up.	Transplanted in Hot-bed.	Transplanted in Garden.	Fit for Use		Duration of Fitness for Use.	Remarks.
					From	Till		
							Mos.	
Autumn King	Mar. 25	April 1	April 17	May 25	Sept. 15	Oct. 15	1	Very large, but almost too late.
Bruce's Selected Erfurt	do 25	do 1	do 17	do 27	June 24	Aug. 25	2	Extra fine heads; good quality.
Autumn Giant	do 25	do 1	do 17	do 25	Sept. 15	Oct. 15	1	Very large, but late.
Earliest Dwarf Erfurt	do 25	do 1	do 17	do 25	July 1	Aug. 1	1	Very good.
Gilt Edge	do 25	do 1	do 17	do 25	June 24	July 14	⅔	Good quality, but small heads.
Giant White Pearl	do 25	do 1	do 17	do 25	July 1	Aug. 15	1½	Extra fine; one of the best.
King of the Earliest.	do 31	do 4	do 17	do 27	do 1	do 15	1½	Good quality, bu small heads.
Early Whitehead	do 31	do 4	do 17	do 27	June 24	do 24	2	Extra fine; one of the best.
Early Favourite	do 31	do 4	do 17	do 27	July 1	do 20	1⅔	Fair.

LETTUCE—Test of varieties.

Name of Variety.	Sown.	Transplanted in hot-bed.	Fit for use.	Remarks.
Sown in Hot-bed.				
Simpson's Early Curled	Mar. 28..	May 1..	May 25..	Fair size.
Gardener's Favourite	" 28..	" 1..	" 25..	Large, loose heads; good.
Denver Market	" 28..	" 1..	" 25..	Large heads; very good.
Sown in Garden.				
Bruce's Nonpareil	April 29..		June 1..	Very good.
Gardener's Favourite	" 29..		" 1..	"
Denver Market	" 29..		" 1..	"
The Deacon	" 29..		" 1..	One of the best.
Grand Rapids	" 29..		" 1..	Extra good; curly.
Defiance	" 29..		" 1..	"
Big Boston	" 29..		" 1..	Very large, solid heads.
New Cos	" 29..		" 1..	Fair.
Golden Queen	" 29..		" 1..	Extra fine; small, hard heads.
Toronto Queen	" 29..		" 1..	Very good.
The last-mentioned ten varieties were again sown on	June 11..		July 10..	All varieties produced a large crop of excellent quality and kept in condition for use till first severe frost.

MELONS—Test of varieties.

Name of Variety.	Sown.	Transplanted.	Remarks.
MUSK.			
Our own seed	April 6..	May 6..	A failure on account of cold nights.
Evan's Superb	" 6..	" 6..	
Newport	" 6..	" 6..	
WATER.			
Phinney's Early	" 6..	" 6..	Only two melons formed, and these did not ripen.
Early Canada	" 6..	" 6..	

PARSNIPS—Test of varieties.

Name of Variety.	Sown.	Up.	Fit for use.	Bushels per acre.	Remarks.
Hollow Crown	April 18..	May 15..	Sept. 1..	443	Good quality and shape.
Maltese	" 18..	" 15..	" 1..	705	Large crop; extra quality and shape.

KALE—Test of varieties.

Name of Variety.	Sown.	Up.	Transplanted in hot-bed.	Transplanted in garden.	Fit for use.	Lifted.	Remarks.
Tall Green	Mar. 25	April 2	April 16	May 27	Oct. 1	Oct. 12	Very fine.
Plumage	" 25	" 2	" 16	" 27	" 1	" 12	"

ONIONS—Test of varieties.

Name of Variety.	Sown in hot-bed.	Up.	Transplanted to garden.	Fit for use.	Lifted.	Bushels per acre.	Remarks.
Transplanted.							
Prize Taker	Mar. 25	April 5	May 27	July 1	Sept. 25	625	Extra fine crop; good onions. Quality, the best.
" (our own seed)	" 25	" 5	" 27	" 1	" 25	625	Extra fine crop; good onions.
Red Victoria	" 25	" 5	" 27	" 1	" 25	605	Extra fine crop; good onions. Quality: very good; even.
Blood Red Wethersfield	" 25	" 5	" 27	" 1	" 25	605	Extra fine crop; good onions.
Worldbeater "	" 25	" 5	" 27	" 1	Oct. 1	564	" "
Early Red (our own seed)	" 25	" 5	" 27	" 1	" 1	524	" "
Yellow Globe Danvers	" 25	" 5	" 27	" 1	" 1	504	" "
Giant Rocca	" 25	" 5	" 27	" 1	Sept. 25	484	" "
Yellow Danvers	" 25	" 5	" 27	" 1	Oct. 1	484	" "
Fancy Yellow Danvers	" 25	" 5	" 27	" 1	" 1	484	" "
Oregon	" 25	" 5	" 27	" 1	" 1	484	" "
Red Wethersfield	" 25	" 5	" 27	" 1	" 1	443	" "
Southport White Globe	" 25	" 5	" 27	" 1	Sept. 25	403	" "
Large Red Globe	" 25	" 5	" 27	" 1	Oct. 1	403	" "
Large Red Globe (our own seed)	" 25	" 5	" 27	" 1	" 1	403	" "
Oxonian Prize	April 5	" 15	" 27	Aug. 1	" 1	322	Very small but firm.
Ailsa Craig	" 5	" 15	" 27	" 1	" 1	322	"

ONIONS—Test of varieties.

Name of Variety.	Sown.	Up.	Fit for use.	Lifted.	Bushels per Acre.	Remarks.
Sown in Open Ground.						
Red Globe	April 18	May 6	July 10	Oct. 1	524	Good crop of fine onions. Quality, very fine.
Salzer's King of Earlies	" 18	" 6	" 10	" 1	443	Good crop of fine onions.
Early Red (our own seed)	" 18	" 6	" 10	" 1	443	" "
Red Globe "	" 18	" 6	" 10	" 1	423	" "
Yellow Danvers "	" 18	" 6	" 10	" 1	423	" "
Red Wethersfield	" 18	" 6	" 10	" 1	423	" "
Yellow Danvers	" 18	" 6	" 10	" 1	423	" " Quality, the best.
Prize Taker	" 18	" 6	" 10	" 1	403	Good crop of fine onions.
Prize Taker (our own seed)	" 18	" 6	" 10	" 1	403	" "
Southport White Globe	" 18	" 6	" 10	" 1	363	" "
Small Silver Skin	" 18	" 6	" 10	Aug. 21	201	" " Quality, good pickler.
New Queen	" 18	" 6	" 10	" 21	181	Good crop of fine onions. Quality, the best pickler.

GARDEN PEASE—Test of Varieties.

Name of Variety.	Sown.	Up.	Fit for use.	Pulled.	Remarks.
1st Seeding.					
Rennie's Extra Early	April 17	May 1	July 9	.....	Very early; heavy crop; small pease.
Alaska	" 17	" 1	" 9	.....	" " "
American Wonder	" 17	" 1	" 12	.....	Good early pea.
Horsford's Market Garden	" 17	" 1	" 29	.....	Good quality; large cropper.
Wm. Hurst	" 17	" 1	" 29	.....	Early; good cropper; quality good.
Burpee's Profusion	" 17	" 1	" 29	.....	Good quality.
Nott's Excelsior	" 17	" 1	" 29	.....	Fair cropper.
Shropshire Hero	" 17	" 1	Aug. 1	.....	The best quality.
Anticipation	" 17	" 1	" 4	.....	Large pods; good quality; late.
C. P. R.	" 17	" 1	" 6	.....	" "
Prince of Wales	" 17	" 4	" 4	.....	" "
Juno	" 17	" 4	" 4	.....	" "
Stratagem	" 17	" 1	" 1	.....	Very good cropper; fine quality.
2nd Seeding.					
American Wonder	May 7	May 17	Aug. 4	Sept. 1	Very good.
Alaska	" 7	" 17	" 4	" 1	"
Rennie's Extra Early	" 7	" 17	" 6	" 1	"
New Victoria	" 7	" 17	" 25	Not ripe	Very fine; large pods, but late.
Stratagem	" 7	" 17	" 20	Sept. 1	" "
Wm. Hurst	" 7	" 17	" 6	" 1	" dwarf pea.
Anticipation	" 7	" 17	" 20	Not ripe	Very good; large pods, but late.
Shropshire Hero	" 7	" 17	" 20	Sept. 1	"
C. P. R.	" 7	" 17	" 20	" 1	"
Yorkshire Hero	" 7	" 17	" 18	" 1	"

PARSLEY.

Name of Variety.	Sown.	Up.	Fit for use.	Remarks.
Moss Curled	April 18..	May 15..	June 15..	Good crop.

RADISH—Test of varieties.

Name of Variety.	Sown.	Up.	Fit for use.	Remarks.
Sown in Hot-bed.				
In and Out	Mar. 28..	Apr. 3..	Apr. 22..	Most even and best of the four.
Lily White	" 28..	" 3..	" 22..	Good
Rosy Gem	" 28..	" 3..	" 22..	do
Scarlet Globe	" 28..	" 3..	" 25..	do
1st Seeding in Garden.				
Scarlet Globe	May 22..	May 28..	June 28..	Good.
Rosy Gem	" 22..	" 28..	" 28..	do
Rennie's White Tipped	" 22..	" 28..	" 28..	do
New Pearl	" 22..	" 28..	July 1..	Extra fine, long white, fit for use longer than others.
French Breakfast	" 22..	" 28..	June 28..	Good.
New White Lady Finger	" 22..	" 28..	July 1..	Extra fine, long white.
2nd Seeding in Garden.				
French Breakfast	June 11..	June 15..	July 10..	Good.
Lily White	" 11..	" 15..	" 12..	do
Rosy Gem	" 11..	" 15..	" 10..	do
New White Lady Finger	" 11..	" 15..	" 20..	Very fine, long white.
Scarlet Globe	" 11..	" 15..	" 10..	Good, longest in use of any of the Turnip varieties.
Rennie's White Tipped	" 11..	" 15..	" 10..	Good.
White Pearl	" 11..	" 15..	" 20..	The best long white.
White Turnip	" 11..	" 15..	" 12..	Good.
In and out	" 11..	" 15..	" 10..	One of the best.
3rd Seeding in Garden.				
Rennie's White Tipped	July 2..	July 8..	Aug. 2..	All did well. No perceptible difference.
French Breakfast	" 2..	" 8..	" 2..	
New Rosy Gem	" 2..	" 8..	" 2..	
Lily White Turnip	" 2..	" 8..	" 2..	
In and Out	" 2..	" 8..	" 2..	

SPINACH.

Name of Variety.	Sown.	Remarks.
Victoria	Apr. 18..	Frozen down.
" (Re-sown)	May 22..	Did well, made good growth but ran to seed very quickly.

SQUASH, (under glass)—Test of varieties.

Yellow Mammoth	May 14..	Two set and made 18 and 20 lbs. respectively.
Faxon	" 14..	None set.
Crookneck	" 14..	Two set, did not grow.
White Scallop	" 14..	Very small.
Yellow Scallop	" 14..	None set.
Eng. Vegetable Marrow	" 14..	A few good marrows.
Long White Bush Marrow	" 14..	Fair crop, some fit for use August 1st.
Bush Marrow	" 14..	Very few set, small.

Tomatoes.—Nine varieties were sown, but none ripened.
Pumkins.—Three varieties were sown, but none ripened.

RHUBARB.

Name of Variety.	In Use		Remarks.
	From	Till	
Victoria	May 1.	Sep. 1.	Fine large stalks.
Linnæus	do 1.	do 1.	do do do
Stott's Mammoth	do 10.	do 1.	Very large.

Kohl-rabi.—Sown in hotbed, March 25. Transplanted, May 25. Yield, 510 bushels per acre.
Sage.—Sown April 18. Good crop.

TABLE TURNIPS.—Test of Varieties.

Name of Variety.	Sown.	Yield per acre.
		Bush.
1st Seeding.—		
Early White Stone	June 14.	806
Golden Ball	do 14.	403
2nd Seeding.—		
Early White Stone	do 18.	594
Golden Ball	do 18.	418

FLOWER GARDEN.

The flower garden the past year was the finest we have ever had, not only in variety, but in length of time the flowers were in bloom, and in richness of colour.

Stocks, phlox, mignonette, asters, dianthus, petunias, pansies, and sweet pease were especially fine.

Following are varieties grown:—

ANNUALS.

Name of Variety.	Sown.	Transplanted.		In Flower.		Remarks.
		Hot-bed.	Garden.	From.	Till.	
Petunias, five varieties	Mar. 30.	May 1.	June 6.	July 1.	Frozen.	All extra fine; one of the first flowers in bloom, and made a good show all season.
Pyrethrum, Golden	do 30.	do 1.	do 6.	.....	.....	Made a good edging for beds.
Phlox Drummondii, four varieties	do 30.	do 1.	do 6.	July 15.	Frozen.	Very fine; all did well.

ANNUALS—*Continued.*

Name of Variety.	Sown.	Transplanted.		In Flower.		Remarks.
		Hot-bed.	Garden.	From.	Till	
Marigolds—						
African	April 12	May 6	June 6			Very fine; showy.
French	do 12	do 6	do 6			Showy.
Salpiglossis	Mar. 30	do 1	do 7			Extra fine; in flower all season.
Abronia umbellata	do 30	April 24	do 4	July 15	Frozen	Fine.
Anagallis	do 30	do 24	do 4	do 10	do	do
Anterrhinum Majus	do 30	do 24	do 5	do 10	do	Very fine.
Asters—						
Double Dwarf Chrysanthemum Flowered	do 30	do 24	do 5	do 20	do	Fine.
Snowball	do 30	do 24	do 5	do 10	do	do
Dwarf Cream Crimson	do 30	do 24	do 5	do 10	do	Extra fine.
New Triumph	do 30	do 24	do 5	do 10	do	do
Harlequin	do 30	do 24	do 5	do 20	do	Poor.
Pæony Flowered	do 30	do 24	do 5	do 20	do	Fine.
Vick's New Branched	do 30	do 24	do 5	do 20	do	do
Balsam, Camelia Flower	do 30	do 24	do 5			Did not do well; too tender to stand winds.
Carnation, Marguerite	do 30	do 24	do 5	Aug. 20	Frozen	Fine.
Calendula	do 30	do 24	do 5	July 20	do	Very fine show.
Calendrina Grandiflora	do 30	do 24	do 5	Aug. 1	Sept. 1	Fair.
Ice Plant	do 30	May 1	do 7			Very pretty.
Everlastings.						
Helichrysum	do 30	April 24	do 7	July 1		Did well; flowered freely all season.
Xeranthemum	do 30	do 24	do 7	do 1		do do
Acroclinium	do 30	do 24	do 7	do 1		do do
Helipterum	do 30	do 24	do 7	do 1		do do
Linum—Grandiflorum.						
Scarlet and Rose	April 6	May 1	do 7	All season		Both very fine.
Godetia—						
Mixed (from Ex. F. Agassiz)	Mar. 30	do 1	do 7	do		Did well, and made one of the most showy beds in the garden.
Queen of Fairies	do 30	do 1	do 7	do		
Lady Satin Rose	do 30	do 1	do 7	do		
Scabiosa	do 30	do 1	do 7	do		Extra fine.
Clarkia Elegans	Mar. 30	April 24	do 5	Aug. 1	Sept. 1	Fine.
Chrysanthemum Dunetti	do 30	do 24	do 5	do 1	do 1	Coarse but showy.
Agrostemma	April 6	do 24	do 6	July 1	do 1	Very showy; did well.
Calliopsis	do 6	do 24	do 6	do 7	Frozen	Very fine and showy.
Datura Cornucopia	do 12	May 1	do 10			Too tender for this climate.
Dianthus, five varieties	Mar. 30	April 24	do 7	July 1	Frozen	All did well and flowered freely.
Gaillardia Picta	April 6	May 1	do 7	do 1	do	Very fine.
Gilia Tricolor	do 6	do 1	do 7	do 1	do	Good for sowing in clumps.
Verbena Hybrida	Mar. 30	do 10	do 7			Very fine; one of our best flowers.
do Mammoth	do 30	do 10	do 7			Extra fine; one of our best flowers.

ANNUALS—*Concluded.*

Name of Variety.	Sown.	Transplanted.		In Flower.		Remarks.
		Hot-bed.	Garden.	From	Till	
Pansies—						
Premium	Mar. 29..	May 1..	do 1..	.....	Frozen ...	Very fine.
From Ex. F. Agassiz..	.....	do 1..	do 1..	.....	do ...	do
Choice, from Ewing...	April 5..	do 1..	do 1..	.....	do ...	Extra fine.
Yellow, Black Eye....	do 5..	do 1..	do 1..	.....	do ...	Small but true to name.
Henderson's Mam. Butterfly	do 6..	do 1..	do 1..	.....	do ...	do do .
Giant Trimardeau.. ..	do 6..	do 1..	do 1..	.....	do ...	Extra fine, large flowers.
Tagetes..	do 12..	do 6..	do 6..	.....	.....	No good.
Mirabilis Jalapa.....	do 12..	do 6..	do 6..	.....	.....	Did not do well.
Viscaria.....	do 12..	do 6..	do 6..	.....	.....	Fair for sowing in clumps
Stocks—						
Double Dwarf German, 10 weeks.....	Mar. 30..	do 1..	do 7..	.....	.....	Very fine
German 10 weeks	do 30..	do 1..	do 7..	.....	.....	do
Henderson's Colossal..	April 12..	do 1..	do 7..	.....	.....	Extra fine
Double Large Flowering	do 12..	do 1..	do 7..	.....	.....	do
Dwarf Bouquet.....	do 12..	do 1..	do 7..	.....	.....	do
Zinnia Elegans.....	do 10..	do 12..	do 7..	.....	....	Extra fine.

One of the best flowers for N. W. T.

ANNUALS—SOWN IN OPEN GROUND.

Phlox Drummondii.—Sown 12th May ; very good. Equal to plants from hot-bed.
Schizanthus.—Sown 12th May ; very showy.
Sweet Alyssum.—Sown 12th May ; extra fine for borders. Flowered all season.
Candytuft.—Sown 12th May ; very fine. Flowered all season.
Mignonette.—Sown 12th May ; very fine.
Scarlet Flax.—Sown 12th May ; very fine. Better than plants from hot-bed.
Poppy.—Sown 12th May ; very showy.
Eschscholtzia.—Sown 12th May ; one of the best annuals.
Mallow.—Sown 12th May ; one of the best annuals.
Whitlavia.—Sown 12th May ; good border plant.
Lavatera.—Sown 12th May ; very showy and hardy.
Viscaria.—Sown 12th May ; very good but tender.
Nasturtium.—Sown 12th May ; very good but tender.
Sweet Peas.—Sown 12th May ; good show. Did well, but no seed ripened.

PERENNIALS.

Yellow Flax.—Very fine yellow flower.
Larkspur.—One of the best perennials.
Veronica.—Very showy.
Scarlet Lychnis.—Very showy.
Sweet William.—Very hardy. One of the best perennials.
Phlox Perennial.—Very fine.
Iceland Poppy.—Very showy and hardy.
Pæony.—Hardy. Flowered.
Clematis Flammula.—Growth four feet.
Hibiscus.—Growth three feet. Buds killed by frost.
Common Flowering Flax.—Did well. Excellent for borders.

FRUIT BUSHES.

The wild fruit crop was almost a complete failure in many portions of the Territories, the past season. Heavy frosts in May caught the bushes when in full blossom, and destroyed the crop.

Cultivated fruits on this farm suffered greatly from the same cause. In currants, black, red and white, about three-quarters of the blossoms were killed, the raspberries were nearly all destroyed, and very few gooseberries and strawberries escaped. Sand cherries and Manitoba plums were in full bloom when the frost came, and all were destroyed.

Some additions were made the past season to the fruit plantations on the farm. Eighty-one plum trees from Stonewall, Manitoba, and twenty-two seedling wild plums grown from seed planted on the farm were set out in an orchard. These trees were planted seven feet apart each way.

The plantation put out in the spring of 1894, with seedlings of the Weaver plum, is doing well. Eighty trees were planted, and 73 are now alive and making a vigorous growth.

One tree of Buffalo-berry (*Shepherdia argentea*) produced a nice crop of fruit this season.

FOREST TREES.

The past season was a favourable one for forest trees. Although all sorts suffered a set back in May from frosts, they speedily recovered and made a strong growth, aided by the large amount of rain which fell during June and July. The new growth hardened well before winter set in, and the trees are in good condition to stand cold weather.

In the spring, Manitoba maple (box elder) trees were planted on each side of the road running north and south through the centre of the farm for three-quarters of a mile and two cross avenues of one-quarter mile each in length, were set out with Russian poplar. Manitoba maple trees were also planted on one-half mile of south boundary of farm. Dead trees were removed from existing avenues and replaced. With very few exceptions, all trees are living now and have made a very satisfactory growth.

With a view of ascertaining the cost of planting out forest trees and the amount of work necessary to keep them clean and in a thrifty condition, until they are able to do without further work, plantations were set out the past spring as follows:—

½ acre of	Manitoba maple trees,	2½ feet	apart each way.
"	"	3 feet	"
"	"	3½ feet	"
"	"	4 feet	"
½ acre of	ash trees	2½	"

½ acre each of Man. maple and ash seed was sown. The land, which had produced a crop of corn the preceding year, was deeply ploughed and well harrowed before the trees were planted. The Manitoba maple trees used were 1 year seedlings and the ash were 3 years old.

The method followed in taking up and replanting the trees was as follows:—One deep furrow was ploughed alongside the young trees, and the long roots cut by a second furrow, which enabled the men following to gather the trees in armfuls without any difficulty. The roots are carefully protected from sun and wind by being covered with damp earth as soon as they are taken up, and when required for planting are taken out in a tub half filled with thin mud.

In planting, a furrow is made with the plough going twice in same place as deeply as possible, and the furrows as far apart as necessary. One, two or three men, according to the length of the furrow, follow, as soon as the furrow is made, and plant the trees by placing the roots in the bottom of the furrow and drawing the earth from both sides with the feet, and tramping it well.

The long tap root on young maples is cut off before the trees are planted. The armful carried by men is first dipped in water and then well sprinkled with dry earth to protect the roots from sun and winds while they are being set out. As soon after planting as possible, the furrows are filled in by a plough, and the planting is finished.

Following is amount of labour which has been required the first year in connection with the above mentioned plantations:—

No. 1.

One-half acre maples planted 2½ feet apart each way—

Planting trees—1 team and 3 men	5 hours.
Scruffling—1 horse and 1 man	3½ do.
Hoeing—2 men	4½ do.

No. 2.

One-half acre maples planted 3 feet apart each way.

Planting trees—1 team and 3 men	4 hours.
Scruffling—1 horse and 1 man	3 do.
Hoeing—2 men	6 do.

No. 3.

One-half acre maples planted 3½ feet apart each way.

Planting trees—1 team and 3 men	3 hours.
Scruffling—1 horse and 1 man	3 hrs. 5 min.
Hoeing—2 men	4 do 10 do.

No. 4.

One-half acre maples planted 4 feet apart each way.

Planting trees—1 team and 3 men	3 hrs. min.
Scruffling—1 horse and 1 man	2 do 45.
Hoeing—2 men	3 do 30.

No. 5.

One-half acre ash planted 2½ feet apart each way.

Planting trees—1 team and 3 men	6 hours.
Scruffling—1 horse and man	2 hrs. 55 min.
Hoeing—4 men	2 do.

No. 6.

Sowing ½ acre ash seed, rows 3 feet apart, and keeping clean first season.

Marking out—1 team and man	2 hours.
Sowing seed—2 men	2 do.
Covering—2 men	3 do.
Scruffling—1 horse and 1 man	1½ do.
Hoeing—2 men	5 do.

No. 7.

Sowing ½ acre maple seed, rows 3 feet apart, and keeping clean first season.

Marking out—1 team and man	2 hours.
Sowing seed—2 men	2 do
Covering—2 men	3 do
Scruffling—1 horse and 1 man	1½ do
Hoeing—4 men	2¼ do

Labour, digging trees for five half-acre plots set out—1 team and 3 men for 7½ hours.

SHRUBS.

The following is a list of shrubs planted in the spring of 1894 and those living this fall:—

Thirty-five varieties of lilac were planted but only two varieties survived, viz.: the common white and common purple. These were on their own roots, while the other varieties were grafted on what appeared to be a species of privet. The loss of these shrubs in this instance was probably due to the tenderness of the stock.

Name of Variety.	No. Planted	No. Living.	No. Dead.	Name of Variety.	No. Planted	No. Living.	No. Dead.
Cornus elegantissima	2	....	2	Prunus Maackü	2	2	
Exochorda Grandiflora	1	....	1	Lonicera splendens	2	2	
Weigelia lonerii	1	....	1	Improved Elderberry	2	2	
do candida	1	....	1	Hypericum Kalmianum	2	....	2
do Hendersonii	1	....	1	Betula Dahurica	2	1	1
do rosea nana var	1	....	1	Pyrus spuria	2	2	
Almond Double rose	2	....	2	Prunus Grayana maxima	2	2	
do white rose	2	....	2	Cotoneaster vulgaris	3	2	1
Persian Yellow rose	2	1	1	Caragana Redowsky	11	2	9
Hardy Hibiscus Common	1	....	1	do pygmæa	12	...	12
Elæagnus longipes	12	....	12	Berberis sinensis	2	2	
Elæagnus macrophylla	2	2		Spiræa rotundifolia	3	3	
Berberis cerasua	2	2		Rosa rubrifolia livida	7	7	
do laciflora	2	2		Lonicera chrysantha	5	....	5
do Fischeri	2	2		Viburnum rugosum	2	....	2
do macrophylla	2	2		Crataegus Sanguinea schroderi	13	10	3
Russian Snowball	4	4		Ligustrum Amurense	25	13	12
Lonicera media	2	2		Rosa rugosa	21	17	4
do Germanica	2	2		Spiraea opulifolia	7	5	2
do Vor 133	3	....	3	Acer Ginnala	15	14	1
Russian Euonymus	2	2			262	111	151

ARBORETUM.

An arboretum was commenced the past spring, in which two specimens of all the varieties of trees and shrubs hardy enough to stand the climate of this country, will be grown.

The following were planted as a start and will be added to each spring as trees and shrubs prove hardy.

Acer Ginnala Ginnalian maple.
Artemisia Abrotanum Southernwood.
" " Tobolskianum. Russian artemisia.
Betula alba. European white birch.
Caragana arborescens. Siberian pea-tree.
" frutescens.
" Redowsky. Redowsky's caragana.
Elæagnus argentea. Silvery elæagnus.
" angustifolia. Russian olive.
Fraxinus pubescens. Red ash.
" sambucifolia. Black ash.
" viridis. Green ash.
Juniperus virginiana. Red cedar.
Negundo aceroides. Box elder.
Picea alba. White spruce.
" excelsa. Norway spruce.
" pungens. Rocky Mountain blue spruce.

Pinus Mughus. Mountain pine.
" sylvestris. Scotch pine.
" " rigaensis. Riga pine.
Populus alba. White poplar.
" balsamifera. Balsam poplar.
" bereolensis.
" monilifera. Cottonwood.
" Sibirica. Siberian poplar.
" Wobstii. Riga.
Prunus Pennsylvanica. Pin cherry.
" serotina. Choke cherry.
Pesudotsuga Douglasi. Douglas' spruce.
Quercus macrocarpa. Burr oak.
Salix acutifolia. Sharp leaved willow.
" voronesh. Voronesh willow.
Sheperdia argentea. Buffalo berry.
Spiraea opulifolia. Guelder rose leaved spiræa.
Symphoricarpus racemosus. Snowberry.
Syringa vulgaris alba. White lilac.
" chinensis rothamagensis. Chinese lilac.
" Josikæa. Josika's lilac.
Thuja occidentalis. Common arbor-vitæ.
Ulmus Americana. White elm.
Viburnum opulus. High bush cranberry.

HEDGES.

Fifteen varieties of trees, and shrubs, were planted out in hedges the past spring, viz.:

Negundo aceroides, Box elder;
Fraxinus viridis, Green ash;
Populus balsamifera, Balsam poplar;
Salix acutifolia, Sharp leaved willow;
Populus monilifera, Cottonwood;
Caragana arborescens, Siberian pea-tree;
Spiræa opulifolia, Guelder rose leaved spiraea;
Elæagnus angustifolia, Russian olive;
Acer Ginnala, Ginnalian maple;
Artemisia Abrotanum v. Tobolskianum, Russian artemisia;
Elæagnus argentea, Silvery elæagnus;
Symphoricarpus racemosus, Snowberry;
Cratægus crusgalli, Cockspur thorn;
Amelanchier alnifolia, Saskatoon;
Prunus pennsylvanica, Pin cherry.

All made a good start. The plants were small, and were set out about 15 inches apart in the rows. The hedges are 50 feet long and 9 feet apart. The object of this test was to find out what are the best trees or shrubs to use for this purpose for the North-west Territories. Other varieties will be added next spring.

LIVE STOCK.

Cattle.—The cattle on the farm are in a healthy and thriving condition. No losses have taken place since my last report, and since then six pure-breds have been added to the herd by births.

No feeding tests were conducted last winter on account of the general scarcity of feed.

Swine.—Since my last report, one Berkshire and two young Tamworth sows have been received from Ontario. The Berkshire sow from Snell Bros., Edmonton, one Tamworth from Central Experimental Farm, and one from John Bell, Amber, Ont.

Feeding tests with the various breeds are being carried on at present, the result of which will be given in the report for 1896.

POULTRY.

Very great success cannot be reported in poultry raising during the past year.

Four breeds, Plymouth Rocks, Houdans, Light Brahmas and White Leghorns were kept over last winter, but two of these, the Houdans and Light Brahmas, having done very poorly the year previous, were discarded and White Wyandottes and Black Minorcas substituted this spring.

The birds now in stock are 12 Plymouth Rocks, 26 Black Minorcas, 17 White Wyandottes and 17 White Leghorns. These will be sufficient to make up good pens in the coming spring and better success is then anticipated.

Ten sittings were sent to applicants. Two hundred eggs were set and from them 82 chickens were hatched and 60 raised.

STALLION.

The stallion "Gallant Modele," from the Haras National Co., Montreal, was on the farm from May 11th to August 11 and served 21 mares during that time.

DISTRIBUTION OF SAMPLES OF GRAIN, POTATOES, FOREST TREES, &c.

During the months of March, April and May the following distribution was made of products all of which, with the exception of the tree seeds, were grown on the Experimental Farm.

Samples Distributed.	Number.	Total Number.
Grain—		
Wheat, 3 lb. bags	186	
Barley, 3 lb. bags	165	
Oats, 3 lb. bags	244	
Rye, 3 lb. bags	38	
Pease, 3 lb. bags	164	
		797
Forest Trees—		
Manitoba Maple, (box elder)	4,762	
White Elm	90	
Green Ash	75	
Willows	550	
Poplars	50	
Cottonwoods	155	
Artemisia Abrotanum, Tobolsk. (cuttings)	11,125	
Caragana arborescens (seedlings)	2,450	
Lilacs	70	
Evergreens	23	
		19,350
Small Fruits—		
Raspberries		3,550
Currants		3,800
Tree Seeds—Maple, 1 lb. bags	360	360
Bromus Inermis Grass, 1 lb. bags	335	335
Potatoes—Var. Sorts, 3 lb. bags	340	340
Canary Seed—Small pkgs.	150	150
Asparagus Roots	1,950	1,950
Rhubarb Roots	198	198
Flower Seeds—Pkgs.	107	107
Vegetable Seeds—Collections in bags	129	129

SUMMARY OF DISTRIBUTION.

Samples Distributed.	Packages.	Bags.	Seedlings, Roots or Cuttings
Grain		797	
Grass Seed	150	335	
Potatoes		340	
Forest Trees and Artemisia Cuttings			19,350
Small Fruits			7,350
Vegetable Roots			2,148
Tree Seeds		360	
Vegetable Seeds—Collections		129	
Flower Seeds	107		
Totals	257	1,961	28,848

The demand for samples of all kinds was largely in excess of the supply available for distribution.

Alberta sent in fully 60 per cent of the applications received, a large number of which were from the new settlements on the Calgary and Edmonton Branch Railway.

REPORTS received from Samples distributed, 1894.

WHEAT.

Variety.	Reports received.	Results—3 lbs. sown.
Gehun	2	Did well, Assiniboia and Alberta.
Johnston's	1	M. Dubois, Duck Lake, 40 lbs. from 3 lbs.
Pringle's Champlain	3	Average from 3 lbs.—22 lbs.
Colorado	1	Good yield and sample, Alberta.
Ladoga	1	Destroyed by gophers.
Great Western	1	Failure from drought, Alberta.
Stanley	1	H. W. Thompson, Moosomin, reports 8 days earlier than Red Fife.
Black Sea	1	R. McKernan, Edmonton, reports 10 days earlier than Red Fife.
Australian	1	Good crop and sample, Alberta.
White Russian	1	Good yield, Alberta.
Campbell's Triumph	1	Good sample, Alberta.
Golden Drop	1	Failure, Alberta.
Herisson Bearded	1	do
White Fife	1	M. Dubois, Duck Lake, reports 39 lbs. from 3 lbs. sown.
Wellman's Fife	8	One failure from drought, 2 failures from gophers, 5 good crops. J. B. Miller, Pincher Creek, reports 57 lbs. from 3 lbs. sown.
Azima Russian	1	R. McKernan, Edmonton, reports 33 lbs. from 3 lbs. sown.
Red Fife	13	Two failures from drought, 1 from gophers, 10 good crops. D. Ambler, Wetaskiwin, reports 180 lbs. from 3 lbs. sown.

BARLEY.

Petschora	1	Good crop, Alberta.
Common six-rowed	1	Failure, Alberta.
New Zealand	1	do
Danish Chevalier	3	One failure, 2 good crops, J. E. Dawson, Oxbow, reports 47 lbs. from 3 lbs. sown.
Garden Melon	1	Good crop, Alberta.
Goldthorpe	4	All report good crops. M. Dubois, Duck Lake, reports 60 lbs. from 3 lbs. sown.
Duck-hill	1	Good crop, Assiniboia.

BARLEY—*Concluded.*

Variety.	Report received.	Result of 3 lbs. sown.
Baxter's six-rowed	1	Good crop, Alberta.
California Prolific	1	do
Newton	2	Both good crops. D. Ambler, Wetaskiwin, reports 68 lbs. from 3 lbs. sown.
Odessa	2	Both report good crop, Alberta.
Thanet	4	Did well, Assiniboia and Alberta.
Kinver Chevalier	15	Five report crop eaten by gophers, 2 killed by drought and 8 good crops. J. B. Miller, Carievale, grew 81 lbs. from 3 lbs. sown.
Two-rowed Naked	1	Good crop for feed.
Oderbruch	1	Failure from drought, Alberta.

OATS.

Banner	10	1 killed by drought, 9 did well. Average yield 46 lbs. Largest yield 107 lbs. grown by A. E. Cox, Pincher Creek.
Improved Ligowo	4	2 killed by drought, 2 did well, largest yield 51 lbs. grown by Jas. Primeau, Pincher Creek.
Prize Cluster	9	2 killed by gophers, 7 did well, largest yield 56 lbs. M. Dubois, Duck Lake.
Bonanza	19	3 killed by gophers, 2 by drought, 15 did well, largest yield 93 lbs. A. E. Cox, Pincher Creek.
Winter Grey	5	All did well, early and good samples, largest yield 64 lbs. M. Dubois, Duck Lake.
Black Tartarian	3	All did well, good sample.
White Wonder	1	W. G. Morrison, Wapella, reports yield 30 lbs.
Rennie's Prize White	2	W. Barrowman, Edwell, " " 24 lbs
Welcome	1	Good crop, excellent sample.
Rosedale	1	do
Early Etampes	1	Failure, drought, Alberta.
Imported Irish	1	do
Abyssinia	1	Good sample, small yield.
Victoria Prize White	1	Heavy crop, good sample, early.
White Russian	1	Good crop, Alberta.
Golden Beauty	1	Light crop, do
Columbus	1	Bright straw, good sample, Alberta.
Abundance	1	Best of 15 varieties tried by R. McKernan, Edmonton.
Scottish Chief	1	Good sample and yield.

PEASE.

Mummy	8	1 Hailed out, 7 did well, largest yield 50 lbs. grown by J. McKenzie, Coalfields.
Crown	1	Eaten by gophers.
Pride	9	2 Hailed out, 1 killed by drought, 6 did well, largest yield 30 lbs. A. E. Cox. Pincher Creek.

BROMUS INERMIS GRASS.

Bromus inermis	14	3 Failures from extreme dry weather, 11 did well and growers report an excellent catch and grass in good condition and in good shape for winter.

SPRING RYE.

Spring Rye	5	2 Failures, 3 did well, Average yield 33 lbs. Largest yield 56 lbs. grown by Jas. Le Becker, Olds, Alberta.

Ensilage.

The ensilage last winter, though small in quantity was of excellent quality being very much the best so far made on this farm. This, no doubt, was due to the corn being further advanced when cut, than usual.

A large quantity has been put up this season but it is feared that on account of the corn being very backward, when it had to be cut (on account of frost) the ensilage will not be equal to that of last season. Mixed grain crops grown for fodder were also cut and put in silo.

Farmers' Meetings.

Early last spring farmers' meetings were attended at the following places and addresses given on Experimental Farm work and results:—Moose Jaw, Estevan, Alameda, Oxbow, Carnduff, Carievale and Gainsboro.

Correspondence.

During the twelve months, from 1st November, 1894, to 31st October, 1895, 2,751 letters were received and 3,114 dispatched from this farm. In letters received, reports on grain and other samples are not counted; and in letters despatched, circulars of instruction" *re* grain and other samples, are not included.

The increase over same period 1893-94 indicates a growing interest in the work of the farm. The number of reports applied for and sent out is also much in excess of any previous year.

Acknowledgments.

I beg to acknowledge, with thanks, the following donations to farm:—

Rev. John McKay, Elphinstone—Tree seeds, Native fruit bushes, Primrose potato. Calgary Herald, Calgary, Sugar beet seed.

Exhibitions.

From 29th September to 7th August the Territorial Exhibition was held in Regina, Assiniboia, at which a large collection of Experimental Farm products were exhibited.

The exhibit consisted of 200 varieties of grain in specimen jars; 169 varieties grain in straw; 23 varieties of cultivated grasses; 55 varieties of native grasses; 85 varieties of vegetables grown 1895; 21 varieties of fruits in specimen jars, and 40 varieties of flowers.

On account of the labour and expense in connection with the above exhibit no other fairs were attended this fall.

Visitors to Farm.

Visitors from a distance were not so numerous as in preceding years, but the number of local visitors was largely in excess of any previous year.

Among the distinguished visitors were:—His Excellency the Earl of Aberdeen, Governor-General of Canada; Honourable J. A. Chapleau, Lieut.-Governor of Quebec, and ex-Lieut. Governor of N. W. T., Honourable Jos. Royal.

Meteorological observations.

Temperature, maximum and minimum for 12 months; average temperature for growing season; also range of temperature, sunshine, rainfall and direction of wind for growing season.

Location.—Longitude 102° west. Latitude, 52° north Altitude, about 2,000 feet.

TEMPERATURE.

Maximum and Minimum for 12 months from November 1, 1894 to October 31, 1895

Months.	Maximum.		Minimum.	
1894.				
November	On	12th 51°	On	27th—21°
December	"	20th 35°	"	27th—34°
1895.				
January	"	14th 32°	"	23rd—33°
February	"	27th 41°	"	4th, 7th, 8th—38°
March	"	31th 50°	"	11th—20°
April	"	13th 75°	"	18th 24°
May	"	22nd 78°	"	11th 17°
June	"	30th 87°	"	9th 33°
July	"	2nd, 3rd, 4th 95°	"	17th 34°
August	"	15th 89°	"	31st 28°
September	"	2nd 87°	"	29th 19°
October	"	2nd 70°	"	29th— 5°

AVERAGE TEMPERATURE FOR GROWING SEASON, APRIL 1 TO SEPTEMBER 10.

Months.	Monthly Average.	
April	46·5°	Daily Average, 53·8°
May	50·5°	
June	56°	
July	61·5°	
August	58·5°	
September 1 to 10	50°	

RANGE OF TEMPERATURE—GROWING SEASON, APRIL 1 TO SEPTEMBER 10.

Months.	Date.	Greatest Daily Range.		Degrees.	Average Daily Range
		From.	To.		
April	13	75	29	46	29°
May	30	77	28	49	29°
June	28	81	44	37	25°
July	2	95	60	35	24°
August	20	80	33	47	30°
September, 1 to 10	2	70	45	42	26°

Average range (season), 27°·1.

SUNSHINE.

Hours of bright sunshine from April 1 to September 10, and number of days in which there was no sunshine.

Month.	Hours.	No Sunshine. No. of Days.
April	178·3	5
May	257	2
June	178·2	5
July	234·9	3
August	249·1	5
September 1 to 10	43·5	2
Total	1,141	22

Average daily, 7 hours.

RAINFALL.

From April 1 to September 10, rain fell on 19 days as follows :—

Months.	No. of Days.	Inches.	Total.
April	0	0	
May	2	2·1	
June	8	3·95	
July	5	3·83	
August	3	·6	
Sept 1 to 10	1	·6	11·08
And on 4 days from September 10 to October 31, depth of			1·2
Total			12·28

Greatest depth in one day, 2 inches, on July 5th.

WIND.

Direction—Three observations each day, at 8, 14 and 20 o'clock. Times observed.

Months.	W.	N. W.	N.	N.E.	E.	S.E.	S.	S.W.
April	35	9	2	5	18	5	9	7
May	25	10	2	20	8	10	7	9
June	34	17	10	10	7	6	4	2
July	19	12	7	16	12	5	20	2
August	20	40	3	8	3	5	10	4
September 1 to 10	8	15	1	1	1	1	2	1
	141	103	25	60	49	32	52	25

I have the honour to remain, sir,
Your obedient servant,

ANGUS MACKAY,
Superintendent.

EXPERIMENTAL FARM FOR BRITISH COLUMBIA.

REPORT OF THOMAS A. SHARPE, SUPERINTENDENT.

AGASSIZ, B. C., 30th November, 1895.

To WM. SAUNDERS, Esq.,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit my report of the work done on the experimental Farm at Agassiz during 1895.

The year began with very high north winds which continued for nearly two weeks. The temperature did not go very low at any time but the wind being from a cold quarter and very drying, had a bad effect on almost all evergreen shrubs, and trees, even on hardy varieties such as the Arbor-vitæ of the East, which were browned and in many instances killed to the ground. Many other young shrubs and trees suffered much from the same cause. The evergreens, however, were most injured. At the same time, other varieties of shrubs of a tender nature passed the winter uninjured.

The weather in February was very warm and spring-like, the lowest recorded temperature being two degrees of frost. March was much colder, and the cool weather continued until nearly the end of April.

May was cool and rainy, with a sharp frost on the night of the fifth, which affected some of the more tender fruits, causing the almonds, which were then as large as marrowfat pease, to drop. June was warm, with showers in the first part of the month, and quite dry during the latter half, with scarcely any rain during July and August, which lessened the yields of grain and early potatoes, wherever the land was of a light or sandy nature. September was wet, over six inches of rain falling during that month, but the weather was warm, and October was warm also, and dry, with almost uninterrupted sunshine, which was so favourable to the root crops, that they have been very much better than was expected earlier in the season.

About twelve acres of valley land have been brought under cultivation this year, and the underbrush and lying timber removed from about as much more, which is being cleared of fir stumps as rapidly as possible, and as soon as cleared will be ploughed and got ready for a crop next spring.

The live stock on the Experimental Farm has done well this year. There have been no losses, and young animals have been in demand for breeding purposes.

A pair of Tamworth pigs, a boar and sow, have been added to the stock. The Haras National Co. sent out the Percheron stallion "Bonne Chance," but owing to the low prices realized of late for horses, and the scarcity of money, the stallion received very little patronage this season.

HEDGES.

All of the hedges mentioned in my last report have made a fine growth, except the different varieties of Arbor-vitæ and the Retinosporas, aurea and plumosa. The cold, dry winds of January shrivelled the foliage and twigs, as if they had been scorched by a fire. Many of the plants died, and all the others were cut back, in most cases to the ground. The English Holly was injured in the foliage at the time, but has since quite

recovered its greenness and vigour. The Deutzias Pride of Rochester and Gracilis bloomed very profusely; the latter during the last week of May and the former in the second week in June. The Double White and Double Pink Deutzias did not flower so profusely as usual, but made a vigorous growth. The Ginnalian Maple made a vigorous growth. It looked well all summer, and in autumn assumed very gorgeous colours. The Purple Barberry has grown well, and is very much admired. Thunberg's Barberry also looks well in the summer, and has made a very even growth, and in autumn is still more attractive when the leaves turn to a brilliant red. Hedges of Dwarf Mugho Pine, English Yew, Irish Black Thorn, Darwin's Barberry, and Amur Privet, were planted this spring, and are now well established. The Osage Orange hedge, planted as a farm hedge along the north-western boundary of the farm wintered better last winter than in previous years, and has made a fair growth during the summer.

The native Arbor-vitæ, along the railway fence, has made a rapid growth, and will soon present a very fine appearance.

BELTS OF FOREST TREES.

The trees in the shelter belt have grown so much that they shade nearly all the ground, and a row of potatoes planted alternately with the rows of trees was almost a failure owing to lack of sunshine. The forest trees planted on the mountains have in many cases made a fair growth, many of the walnuts planted there in the fall of 1893 and of 1894 have grown, but owing to the dense undergrowth of ferns, are making slow progress. The maple trees along the avenue, from the Hot Springs road to the buildings, and the elms along the Hot Springs road, have made a very strong growth, and many of them are now over 20 feet high.

The ornamental shrubs and trees planted along the road and near the Superintendent's residence, have made a vigorous growth, and the flowering varieties have furnished a succession of bloom from early in April up to the present time. The blooming of shrubs began with the Forsythias early in April, and ended with the pendulus Desmodium, which was a mass of flowers all through September and the first half of October. The roses, bulbs and annuals have bloomed very well all summer, having furnished a fine show of flowers from March, when the snow-drops appeared, up to the present time. The Phlox Drummondii, Sweet Peas, Pansies and Verbenas are still in bloom, apparently very little injured by the frosts we have had.

A large number of 3-lb. bags of grain and potatoes have been distributed to farmers throughout the province, and sample packages of strawberry plants and raspberry and blackberry canes; most of these having been sent to parties in the interior, especially to those districts where the conditions are not so favourable for fruit growing and where very little has been done in this way in the past. The reports received up to the present time have been very satisfactory.

Quite a number of applications have been received this season for samples of grain, small fruit plants, grape cuttings and scions of fruit trees, these are being supplied as far is practicable, as other work will permit.

The advantages of the seed distribution are being shown in the varied reports received; some of the varieties of grain and potatoes, giving very fine returns in some localities and poorer yields in others. This is to be expected, where there is such a diversity of climate as is to be found in British Columbia.

EXHIBITIONS.

Exhibits of fruits, the product of the experimental farm, were made at Victoria, Mission City, Ashcroft, Kamloops and Vernon. At Victoria ninety-three varieties of apples, thirty-five of plums, ten of pears, ten of peaches and two of grapes were exhibited. Quite a number of the earlier varieties of pears, plums and peaches were out of season before the exhibitions opened; and the plums, peaches and some of the early apples which were shown at Victoria were out of season and unfit for exhibition at any of the later shows.

FARMERS' CONVENTION.

The summer meeting of the Fruit Growers Association combined with the Dairymen's Association and Central Farmers Institute was held at the experimental farm 1st and 2nd of August. His Honour Lieutenant Governor Dewdney presided. Addresses on various subjects of interest to fruit growers, dairymen and farmers were delivered by the Honourable the Lieutenant Governor, Hon. Col. Baker, the Director of Experimental Farms, Mr. W. Saunders, the Entomologist and Botanist, Mr. James Fletcher, and a number of others. The meeting was well attended by representative men from different parts of the province.

ACKNOWLEDGMENTS.

I beg to acknowledge with thanks the receipt of fruit trees, scions and seeds as follows :—

Messrs McGill and McDonald, Salem, Oregon. Trees of the Bing, Deacon and Centennial cherries, Roberson apple, Lincoln Coreless, Winter Bartlett, and La Belle Ruth pears, and seedling pear trees,

C. F. Pound, St. Elmo, B.C. Scions of seedling apple, Owen Jones.

Wm. Knight, Popcum, B.C. Scions of Ella and Peach seedling plums.

R. M. Palmer, Victoria, B. C. Scions of Wickron plum.

Richard Layritz, Victoria, B.C. Trees of Annie Spathe plum.

T. G. Earle, Lytton, B.C. Scions of seedling apple.

Prof. Shinn of Berkeley Agricultural College, Cal., scions of seven varieties of peaches, 12 varieties of plums, 7 varieties of apricots, 4 varieties of nectarines and ten of pears, also packages of 2 and 4 rowed barley.

Mrs. Jane MacQuarrie, Yale, B.C., packets of grains and vegetable seeds.

VISITORS.

The number of visitors to the farm is increasing every year. Very many of those who come are interested in the orchards on the bench lands on the mountain.

Their Excellencies Lord and Lady Aberdeen honoured the farm with a visit this year. His Excellency, being a fruit grower in British Columbia, was much interested in the orchards, and appeared to be well pleased with the appearance of the trees, many of which were loaded with fruit at the time of his visit.

EXPERIMENTS WITH FALL WHEAT.

Twenty-six varieties of fall wheat were sown on $\frac{1}{20}$th acre plots, using seed at the rate of 90 lbs per acre. The soil was gravelly loam, and all plots suffered more or less from the high winds in January, which blew portions of the light soil off, exposing the roots. None of the varieties rusted.

FALL Wheat, test of varieties.

Name of Variety.	Date of Sowing.	Date of Ripening.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per acre.	Yield per Acre.	
			Ins.		Ins.		Lbs.	Bush.	Lbs.
Hungarian	Oct. 9	July 24	33 to 40	Soft	3 to 3½	Bearded	5,400	34	10
Early Red Clawson	do 9	do 24	32 to 40	Weak	2 to 3½	Beardless	4,680	23	28
Carter's F	do 9	do 24	40 to 44	do	2½ to 3	do	4,100	21	15
Willits	do 9	do 24	38 to 42	Stiff	3 to 3½	do	3,800	20	52
Stewart	do 9	do 24	36 to 40	do	2½ to 3½	do	2,800	20	28
Carter's K	do 9	Aug. 1	30 to 36	do	2 to 3½	do	3,020	20	27
Manchester	do 9	July 24	28 to 36	do	1½ to 3½	do	3,800	20	25
Johnson	do 9	do 24	36 to 40	do	2 to 3½	Bearded	3,200	20	
Carter's H	do 9	do 24	42 to 48	Weak	3 to 4	Beardless	3,200	20	
Golden Cross	do 9	do 24	42 to 50	Stiff	2 to 4	Bearded	4,700	19	47
Carter's G	do 9	Aug. 1	36 to 40	do	3 to 3½	Beardless	3,500	19	35
Carter's J	do 9	July 24	40 to 46	Weak	3 to 3½	do	3,000	19	35
Carter's D	do 9	do 24	36 to 40	Stiff	3 to 3½	do	3,300	18	20
Volunteer	do 9	do 26	30 to 40	do	1 to 4	Bearded	3,200	17	55
White Queen	do 9	Aug. 1	24 to 36	do	1 to 3	Beardless	2,600	17	47
Martin's Amber	do 9	July 26	30 to 36	do	1½ to 3½	do	3,400	17	42
Canadian Velvet Chaff	do 9	do 24	32 to 38	do	1½ to 4	do	2,500	16	52
Fill Measure	do 9	Aug. 1	28 to 36	Weak	1½ to 2½	do	2,700	16	37
Tasmania	do 9	July 24	36 to 40	do	1 to 2½	Bearded	3,000	16	15
Democrat	do 9	do 21	30 to 42	Stiff	2 to 3	do	3,060	16	15
Royal Prize Red	do 9	Aug. 1	24 to 30	do	1½ to 2	Beardless	2,300	15	7
Carter's B	do 9	July 30	32 to 36	do	2 to 3	do	2,700	14	53
Carter's E	do 9	do 30	30 to 33	do	2 to 2½	do	2,700	13	32
Carter's C	do 9	Aug. 1	30 to 36	do	2½ to 3	do	2,720	14	28
Square Head	do 9	do 1	18 to 30	Weak	1 to 2	do	1,900	13	23
Carter's A	do 9	July 30	36 to 40	do	2½ to 3	do	2,300	10	6

EXPERIMENTS WITH SPRING WHEAT.

Thirty-two varieties of spring wheat were tested under similar conditions, all being sown on the 19th April, except Red Fern and White Fife, which were sown three days later. They were sown broadcast at the rate of 90 lbs. per acre. The soil was a sandy loam and the size of the plots one-twentieth acre each.

The yield is light in most cases, but owing to the dry summer and harvest the grain is harder and brighter than usual. None of the varieties rusted.

Six varieties, one lb. each, of new cross-bred wheats from the Central Experimental Farm, were sown alongside and at the same rate of seed per acre. The yield in each case was good and some of these new varieties are promising, the straw being stiff and the heads well filled with plump, bright grain.

SPRING WHEAT—Test of varieties.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre.	Yield per Acre.	
				Inches.		Inches.		Lbs.	Bush.	Lbs.
Rio Grande	April 19	Aug. 26	128	36 to 40	Stiff	4 to 4½	Bearded	4,900	33	10
White Fife	" 22	" 26	128	33 to 36	"	3½ to 4	Beardless.	4,800	30	55
Beaudry	" 19	" 19	111	30 to 31	"	3 to 3½	Bearded	3,500	22	40
Advance	" 19	" 19	111	31	"	3 to 4	"	3,180	21	
Herisson Bearded	" 19	" 17	109	30 to 33	Weak	3 to 3½	"	3,500	21	
Admiral	" 19	" 19	111	30	Stiff	3 to 4	Beardless.	2,860	20	
Alpha (bald)	" 19	" 14	106	30 to 32	"	3 to 3½	"	2,800	19	30
Rideau	" 19	" 20	122	30 to 34	"	3 to 3½	"	2,600	19	30
Dion's	" 19	" 19	111	36 to 40	Medium	3 to 3¼	Bearded	3,800	19	15
Campbell's W. Chaff	" 19	" 17	109	36 to 40	Stiff	2 to 2½	Beardless.	3,100	19	10
Captor	" 19	" 19	111	33 to 36	"	2½ to 2¾	"	3,040	17	50
Red Fife	" 19	" 20	112	33 to 36	"	2 to 3	"	2,400	17	25
Old Red River	" 19	" 17	109	35 to 40	"	2 to 2½	"	2,700	17	20
Huron	" 19	" 13	105	36 to 40	"	2¾ to 3	Bearded	3,300	17	10
Blenheim	" 19	" 20	112	30 to 33	"	3 to 4	"	2,400	17	10
Abundance	" 19	" 14	106	33	"	3 to 3½	"	3,100	16	40
Red Fern	" 22	" 17	119	30 to 34	Weak	2½ to 3	"	2,900	16	40
Preston	" 19	" 17	109	36 to 42	Stiff	2½	"	2,500	16	40
Wellman's Fife	" 19	" 17	119	36 to 40	"	3 to 3½	Beardless.	2,300	16	40
Golden Drop	" 19	" 14	106	34 to 36	"	3 to 3¼	"	3,200	16	30
Crown	" 19	" 17	109	30 to 34	"	3 to 3½	Bearded	2,400	16	
Major	" 19	" 20	112	30 to 36	"	2 to 2½	Beardless.	2,200	15	40
Alpha (bearded)	" 19	" 20	112	28 to 30	Weak	2½ to 3	Bearded	2,100	15	30
Monarch	" 19	" 20	122	36 to 42	Stiff	3 to 3½	Beardless.	2,760	15	20
Goose	" 19	" 20	112	30 to 33	"	2 to 2½	Bearded	2,700	15	20
Ladoga	" 19	" 12	104	30 to 34	"	2 to 3	"	2,600	15	10
Pringle's Champlain	" 19	" 17	109	34 to 36	Medium	2 to 2½	"	2,300	14	40
Percy	" 19	" 17	109	32 to 36	Stiff	2 to 2½	Beardless.	2,300	14	20
Gehun	" 19	" 19	111	30 to 32	"	2 to 2½	"	3,000	14	10
White Connell	" 19	" 20	122	30 to 33	"	3 to 3½	"	1,900	14	
Emporium	" 19	" 20	122	36 to 42	"	3½ to 3¾	Bearded	2,700	13	50
Stanley	" 19	" 17	119	30 to 33	"	2 to 2½	Beardless.	2,000	13	20

SPRING WHEAT.—$\frac{1}{10}$th Acre Plots of Cross-bred Sorts.

Vernon	1 lb.	April 27	Aug. 26	121	33 to 36	Stiff and bright.	3 to 4	Bearded	5,400	32	37
Beauty	"	" 27	" 26	121	33 to 40	"	3 to 4	Beardless.	6,915	32	15
Progress	"	" 27	" 20	115	33 to 36	"	3 to 3½	"	5,130	31	30
Countess	"	" 27	" 20	115	30 to 36	"	3 to 3½	"	4,950	28	52
Dawn	"	" 27	" 20	115	28 to 34	"	3 to 3½	"	3,870	26	15
Dufferin	"	" 27	" 20	115	30 to 36	"	2 to 3	Bearded	4,770	21	45

EXPERIMENTS WITH BARLEY.

Thirty-five varieties of barley were tested, 17 of these were two-rowed and 18 six-rowed; $\frac{1}{10}$th of an acre of each was sown, and the same amount of seed was used in each case, about two bushels per acre. All were sown on loamy soil, on the 24th of April. The two-rowed varieties, as will be seen by the accompanying table, have averaged the highest yields. No rust was observed in any of the plots.

TWO-ROWED BARLEY.—Test of Varieties.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw per Acre.	Yield per Acre.
				Inches.		Inches.	Lbs.	bush. lbs
Goldthorpe	April 24	Aug. 16	114	28 to 36	Stiff	2½ to 3½	5,600	44 8
Duck-bill	" 24	" 15	113	30 to 34	"	3 to 3½	4,700	43 46
Canadian Thorpe	" 24	" 15	113	26 to 32	"	3 to 3½	4,300	41 32
Danish Chevalier	" 24	" 15	113	30 to 36	"	3½ to 4	4,720	39 28
Monck	" 24	" 16	114	30 to 36	"	3 to 3½	4,400	38 26
French Chevalier	" 24	" 12	110	24 to 30	"	3½ to 4	3,300	38 16
Beaver	" 24	" 15	113	28 to 34	"	3 to 4	4,300	36 2
Newton	" 24	" 15	113	26 to 30	"	3 to 3½	3,500	34 8
Prize Prolific	" 24	" 16	114	.....	"	.....	3,520	33 16
Golden Grains	" 24	" 14	112	30 to 34	"	3 to 3½	3,900	32 34
Thanet	" 24	" 16	114	30 to 33	"	3 to 3½	3,500	32 24
Bolton	" 24	" 12	110	28 to 30	"	2½ to 3	4,700	30 25
Kinver Chevalier	" 24	" 16	114	26 to 30	"	2½ to 3½	3,200	28 16
Victor	" 24	" 12	110	30 to 34	"	3 to 3½	4,160	27 34
Sidney	" 24	" 12	110	26 to 32	"	2½ to 3	4,100	27 14
Rigid	" 24	" 16	114	26 to 30	"	2 to 2½	3,500	26 12
California Prolific	" 24	" 15	113	24 to 30	"	3½ to 3¾	2,200	24 30

SIX-ROWED BARLEY—Test of Varieties.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw per Acre.	Yield per Acre.
				Inches.		Inches.	Lbs.	Bush. Lbs.
Odessa	April 24	Aug. 9	107	28 to 34	Stiff....	2 to 2½	4,500	38 36
Oderbruch	" 24	July 30	97	20 to 24	"	2½ to 3½	4,400	36 27
Trooper	" 24	Aug. 9	106	22 to 26	"	2 to 3½	5,400	33 46
Petschora	" 24	July 29	96	22 to 28	"	1½ to 2½	3,800	33 16
Stella	" 24	Aug. 9	106	28 to 36	"	3 to 3½	5,500	32 4
Vanguard	" 24	" 2	99	30 to 36	"	2 to 2½	3,800	31 12
Royal	" 24	July 30	97	24 to 36	"	2½ to 3	3,900	29 38
Summit	" 24	Aug. 9	106	20 to 24	"	2 to 2½	3,300	29 33
Phœnix	" 24	" 6	103	24 to 28	"	2½ to 3½	4,300	28 41
Rennie's Improved	" 24	July 30	97	24 to 30	"	2 to 3	4,000	28 16
Common Six-rowed	" 24	Aug. 9	106	18 to 26	Weak ..	1½ to 2½	3,500	28 6
Champion Beardless	" 24	July 29	96	28 to 36	" ..	2 to 3	3,600	27 47
Mensury	" 24	" 30	97	28 to 36	Stiff....	2 to 3	3,500	27 44
Success (Beardless)	" 24	" 29	96	28 to 36	Weak ..	2 to 3½	3,300	26 37
Surprise	" 24	Aug. 9	106	24 to 28	Stiff....	2 to 3½	4,100	24 14
Nugent	" 24	" 9	106	24 to 30	"	2½ to 3	2,500	24 8
Pioneer	" 24	July 30	97	28 to 30	"	2½ to 3½	5,100	23 46
Excelsior (Beardless)	" 24	Aug. 2	100	28 to 34	"	2 to 3	3,300	22 24

EXPERIMENTS WITH OATS.

Forty-eight varieties of oats were tested on land which had produced a crop of corn in 1894. The character of the soil was loamy and very even throughout, and all the plots except Electric and Early Maine, were sown on the same day, and all on plots of $\frac{1}{10}$th acre each, except Electric, of which $\frac{1}{80}$ acre only was sown.

Early Gothland and Banner have done well again this year. These varieties have given the best average yield for a number of years, and as both are good milling oats and the straw stands up well, they may be considered two of the best oats yet tested here.

Owing to delay in procuring seed, the Early Maine was not sown for a month after the other plots, which accounts for the poor yield. No rust was observed on any of the varieties.

OATS.—Test of Varieties.

Name of Variety.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per acre.	Yield per Acre.	
				Inches.		In.		Lbs.	Bush.	Lbs.
Early Gothland	April 23	Aug. 19	118	36 to 42	Stiff	9½	Sided	5,600	59	14
New Electric	do 27	do 26	121	34 to 38	do	7½	Branching	3,110	56	32
Hazlett's Seizure	do 23	do 19	118	40 to 46	do	8½	do	4,400	52	32
Cream Egyptian	do 23	do 16	115	40 to 46	do	6½	Sided	4,160	49	14
Early Archangel	do 23	do 19	118	40 to 46	Medium	9	Branching	3,400	48	28
Early Golden Prolific	do 23	do 21	120	30 to 34	Stiff	9	do	3,700	48	18
Banner	do 23	do 21	120	33 to 40	do	8	do	2,800	48	3
Golden Beauty	do 23	do 22	121	30 to 36	do	9	do	3,900	47	12
Lincoln	do 23	do 21	120	30 to 36	do	8½	do	4,020	46	26
Abyssinia	do 23	do 22	121	36 to 40	do	8	Sided	4,000	46	6
Early Blossom	do 23	do 22	121	30 to 36	do	8½	Half-sided	4,000	45	20
Bonanza	do 23	do 21	120	30 to 36	Medium	9	Branching	3,400	44	24
Abundance	do 23	do 21	120	30 to 36	Stiff	7½	do	3,700	43	28
American Beauty	do 23	do 21	120	32 to 36	do	8	do	3,400	42	22
Bavarian	do 23	do 21	120	32 to 36	Medium	7½	do	4,000	42	12
Poland White	do 23	do 16	115	36 to 40	do	7	do	3,700	41	6
Improved Ligowo	do 23	do 19	118	40 to 46	Stiff	7½	do	2,900	40	30
Black Brie	do 23	do 26	125	24 to 30	do	8½	do	4,300	40	15
Prolific Black Tartarian	do 23	do 19	118	30 to 36	do	6½	Sided	3,900	40	10
Coulommiers (Black)	do 23	do 26	125	30 to 36	do	8	Branching	4,100	40	
White Wonder	do 23	do 16	115	36 to 42	Medium	8½	do	4,200	39	24
Columbus	do 23	do 21	120	26 to 30	Stiff	7½	do	2,700	38	8
Joanette (Black)	do 23	do 21	120	24 to 30	do	6½	do	3,500	37	32
Rosedale	do 23	do 19	118	24 to 30	do	7½	Half-sided	3,100	37	32
California Prolific (Black)	do 23	do 26	125	30 to 36	do	7	do	3,400	37	22
Flying Scotchman	do 23	do 16	115	36 to 40	Fair	8	Branching	3,000	36	16
Prize Cluster	do 23	do 16	115	40 to 48	Stiff	7½	do	3,500	36	14
Early Etampes	do 23	do 21	120	24 to 30	Weak	7½	do	3,000	36	7
Giant Cluster	do 23	do 21	120	30 to 34	Stiff	8½	Sided	3,500	36	6
White Monarch	do 23	do 21	120	30 to 34	do	5½	Branching	4,100	35	30
White Schonen	do 23	do 23	122	36 to 40	do	6	do	3,700	35	30
Cave	do 23	do 21	120	24 to 28	do	7	Sided	2,800	35	30
Imported Irish	do 23	do 16	115	30 to 34	do	6½	Branching	2,820	35	20
Wallis	do 23	do 21	120	36 to 40	do	6	do	3,200	35	10
American Triumph	do 23	do 26	125	36 to 42	Medium	7	do	2,800	34	26
White Russian	do 23	do 26	125	36 to 40	Stiff	6½	Half sided	3,000	34	24
Rennie's Prize White	do 23	do 19	118	36 to 40	do	7½	Branching	2,800	34	24
Scottish Chief	do 23	do 19	118	34 to 40	Medium	6	do	2,600	34	24
Holstein Prolific	do 23	do 21	120	34 to 40	Stiff	6½	do	2,800	33	18
Doncaster Prize	do 23	do 22	121	30 to 34	Medium	6	do	2,820	32	2
Winter Grey	do 23	do 16	115	34 to 40	do	7	do	3,000	31	6
Oderbruch	do 23	do 26	125	32 to 36	Fair	7	Half sided	3,000	30	30
Welcome	do 23	do 21	120	30 to 36	do	7½	Branching	3,300	30	20
Siberian	do 23	do 26	125	30 to 36	do	5½	Half sided	4,000	30	
Wide Awake	do 23	do 21	120	30 to 36	Stiff	....	Branching	2,300	28	8
Victoria Prize	do 23	do 16	115	30 to 36	Medium	5	do	2,800	24	24
Early Maine	May 29	Sept. 14	107	30 to 34	Stiff	5	Sided	2,320	23	28
Scotch Hopetown	Apr. 23	do 19	118	26 to 30	Medium	4½	Branching	2,500	17	2

EXPERIMENTS WITH PEASE.

Twelve varieties of field pease were tested under the same conditions as to soil and treatment. The soil was sandy loam, which was seeded to clover with the pease. The clover made a rank growth which has lessened the yield, but as all were alike in that respect, the value of the test for comparison is not materially affected. The size of the plots was $\frac{1}{20}$th of an acre each. All the varieties made a strong growth.

PEASE—Test of Varieties.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Weight of Straw.	Length of Pod.	Size of Pea.	Yield per Acre.		Remarks.
				In.	Lbs.	In.		Bush.	Lbs.	
Multiplier	Apr. 25.	Aug. 30.	127	48 to 60	350	2 to 3	Small ..	33	20	Pods very plentiful and well filled.
Golden Vine	" 25.	" 23.	120	43 to 54	195	2½ to 3	Small ..	28	20	Very well podded and pods filled to end.
Crown	" 25.	" 19.	116	30 to 36	180	2½ to 3	Small ..	26	25	Pods well filled and very plentiful.
Prince Albert	" 25.	" 30.	127	36 to 48	240	2½ to 3	Small ..	25	5	Pods plentiful and fairly well filled.
Prussian Blue	" 25.	" 29.	126	33 to 40	170	2½ to 3½	Medium	24	40	Pods well filled.
Mummy	" 25.	" 23.	120	33 to 40	154	2 to 3	Above medium	22	50	Pods did not fill well.
Black-eyed Marrowfat	" 25.	" 19.	116	40 to 48	160	3 to 3½	Large ..	22	40	Not very well podded.
New Potter	" 25.	" 23.	120	33 to 48	165	1½ to 2½	Large ..	22	30	Pods short, but well filled.
White Marrowfat	" 25.	" 29.	126	36 to 48	175	3 to 3½	Large ..	21	25	Pods not filled to end.
Centennial	" 25.	" 30.	127	28 to 36	150	1½ to 2½	Medium	21	..	Pods not well filled to end.
Pride	" 25.	" 13.	110	30 to 36	140	2 to 3	Large ..	20	..	Pods long, but not well filled.
Canadian Beauty	" 25.	" 29.	126	30 to 36	135	3 to 3½	Large ..	18	..	Pods not filled to end.

RESULTS OF EARLY, MEDIUM AND LATE SOWINGS.

OATS—EARLY, MEDIUM AND LATE SOWING.

The Abundance and Banner were the varieties chosen for this test. The late sown plots averaged a higher yield than those earlier sown, but this may partly be accounted for by additional cultivation, as all the unsown plots received a thorough harrowing as each successive plot was sown. The soil was of a loamy character, and the size of the plots was $\frac{1}{20}$th acre each ; no rust was observed on any of them.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.	
				Inches.		Inches.		Lbs.	Bush.	Lbs.
Abundance	Mar. 16	Aug. 8	145	30 to 36	Stiff	8	Branching	2,900	37	22
"	" 23	" 10	140	30 to 36	"	7	"	2,500	36	16
"	" 30	" 12	135	30 to 36	"	7	"	2,560	36	26
"	April 6	" 14	130	28 to 30	"	5½	"	2,400	31	8
"	" 13	" 17	126	30 to 34	"	6 to 7	"	2,600	41	6
"	" 20	" 20	122	30 to 34	"	6 to 7	"	2,900	43	8
Banner	Mar. 16	" 8	145	33 to 36	"	7 to 8	"	3,800	49	4
"	" 23	" 10	140	33 to 36	"	7 to 8	"	3,500	48	28
"	" 30	" 12	135	33 to 36	"	7 to 8½	"	3,560	54	14
"	April 6	" 14	130	33 to 36	"	7 to 8½	"	3,800	55	5
"	" 13	" 17	126	30 to 36	"	7½ to 8½	"	3,200	55	10
"	" 20	" 20	122	30 to 36	"	7 to 7½	"	3,000	49	14

BARLEY—EARLY, MEDIUM AND LATE SOWINGS.

Oderbruch six-rowed and Canadian Thorpe two-rowed were again used for this test. The land was part of an old timothy meadow which had been cropped for a number of years, and was in very poor condition. It had received a light dressing of barnyard manure once since we began working the farm and had yielded a light crop of clover in 1894; the second growth was turned under and the field is improving, but is still rather poor, as will be seen when the yields of the plots are compared with the same varieties under different conditions. The soil was sandy loam and the size of the plots $\frac{1}{10}$th acre each. No rust was observed on any of these plots.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre.	Yield per Acre.	
				Inches.		Inches.		Lbs.	Bush.	Lbs.
Oderbruch	Mar. 16	July 29	135	18 to 30	Weak	1½ to 2½	6-rowed	2,700	15	40
"	" 23	" 30	129	18 to 24	"	1½ to 2½	"	2,300	16	2
"	" 30	Aug. 1	124	18 to 24	"	1½ to 2½	"	2,360	16	22
"	April 6	" 6	122	20 to 28	"	2 to 2½		2,500	16	42
"	" 13	" 8	117	20 to 28	"	2 to 2½		2,700	21	12
"	" 20	" 10	112	24 to 30	"	2 to 2½		3,200	21	2
Canadian Thorpe	Mar. 16	" 15	152	24 to 30	Medium	1½ to 2	2-rowed	2,800	13	36
"	" 23	" 17	147	20 to 24	"	1½ to 2	"	2,200	14	23
"	" 30	" 19	142	24 to 30	Stiff	1½ to 2	"	2,800	15	40
"	April 6	" 21	147	24 to 30	"	1½ to 2	"	2,600	15	10
"	" 13	" 22	141	28 to 34	"	2 to 2½	"	3,600	16	22
"	" 20	" 23	135	30 to 36	"	2½ to 3	"	4,800	24	18

WHEAT—EARLY, MEDIUM AND LATE SOWINGS.

These test plots were sown along side of, and on land similar to, the early, medium and late barley tests, and the yield was affected by the same cause. This field is again, in clover and another clover sod turned under will, it is expected, bring it up to fair condition, as the catch has been a good one and the growth luxuriant. The varieties of wheat chosen for this test were Stanley and Red Fife. The size of the plots was $\frac{1}{10}$th acre each; no rust was seen on any of them.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre.	Yield per Acre.	
				Inches.		Inches.		Lbs.	Bush.	lbs.
Stanley	Mar. 16	Aug. 12	149	30 to 36	Stiff	1 to 2	Beardless	1,800	10	30
"	" 23	" 14	144	30 to 36	"	1½ to 2	"	2,600	16	30
"	" 30	" 16	139	30 to 36	"	1½ to 2	"	2,300	16	50
"	April 6	" 19	135	30 to 36	"	2 to 3½	"	3,400	23	10
"	" 13	" 21	130	30 to 36	"	2 to 3½	"	3,600	23	30
"	" 20	" 23	125	30 to 36	"	2 to 3	"	2,800	17	10
Red Fife	Mar. 16	" 17	154	26 to 30	"	1 to 1½	"	1,640	9	30
"	" 23	" 20	150	26 to 30	"	1 to 1½	"	1,720	10	10
"	" 30	" 22	145	26 to 30	"	1 to 1½	"	1,600	8	35
"	April 6	" 24	140	30 to 34	"	2 to 2½	"	3,000	19	40
"	" 13	" 26	135	30 to 36	"	2 to 2½	"	2,800	18	30
"	" 20	" 27	129	30 to 36	"	1 to 2	"	2,500	15	40

PEASE—EARLY, MEDIUM AND LATE SOWINGS.

Mummy and Golden vine were the varieties chosen for this test. The soil was loamy and the size of the plots $\frac{1}{20}$th acre each. The land had been in crop for four years previously, and had received no manure, and as manure was not available it was thought better to seed with red clover, which was done with this crop, and a good catch obtained. The first plots of each variety gave a comparatively small yield, perhaps, owing to the cold wet weather at the time, but pease require a considerable time to ripen, and if wet weather sets in at harvest time are difficult to cure. For this reason early sowing here is preferable for pease.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Character of Growth.	Length of Straw.	Weight of Straw per Acre	Length of Pod.	Size of Pea.	Yield per Acre.	Remarks.
					Inches.	Lbs.	In.		Bus. Lb.	
Mummy....	Mar. 18..	Aug. 6..	141	Fair ...	26·33	3,240	2—3	Above medium	28 20	Vines healthy & well podded.
"	" 25..	" 8..	136	Strong .	32·36	4,100	2—3	" .	33 40	"
"	April 1..	" 10..	131	" ..	32·36	4,000	2—3	" .	31 20	"
"	" 8..	" 13 .	127	" ..	32·36	3,600	2—3	" .	29 ..	"
"	" 15..	" 16..	123	Fair ...	32·36	3,400	2—3	" .	29 40	"
"	" 22.	" 19..	119	Strong .	32·36	3,900	2—3	" .	29 ..	"
Golden Vine	Mar. 18..	" 6..	141	Fair ...	30·40	3,100	2–2½	Small..	27 40	Vines healthy, pods not evenly filled.
" .	" 25..	" 8..	136	Strong .	36·44	4,600	2—3	" ..	36 ..	Pods well filled.
" .	April 1..	" 10..	131	Medium	36·40	3,800	2—3	" ..	30 20	"
" .	" 8..	" 13..	127	" .	36·40	3,300	2–2½	" ..	28 20	Not as well filled as plots two and three.
" .	" 15..	" 16..	123	" .	36·40	3,400	2—3	" ..	27 40	"
" .	" 22..	" 19..	119	" .	30·36	4,000	2–2½	" ..	29 ..	Pods very well filled.

VETCHES—TEST OF VARIETIES.

Name of Variety.	Character of Soil.	Size of Plot.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Character of Growth.	Length of Straw.	Weight of Straw.	Length of Pod.	Size of Seed.	Yield per Acre.
							Inches.	Lbs.	Inches.		Bush.
White.....	Loam	$\frac{1}{20}$	April 29	Sept. 6..	130	Strong .	40—48	185	2½—3	Very s'l	32
*Black.....	"	$\frac{1}{20}$	" 29	Oct. 8..	162	Medium	36—40	.....	2½—3	"	18

* The black vetches ripened so late that it was difficult to cure them.

MIXED GRAIN GROWN FOR HAY.

Mixture Sown.		Soil.	Size of Plot.	Sown.	Cut.	Weight, green, per acre.		Weight, dry, per acre.	
No. 1 Mixture.						Tons.	Lbs.	Tons.	Lbs.
1 bush. Golden Vine Pease. 1 do Red Fife Wheat... 1 do Banner Oats.....	per acre..	Sandy loam.	$\frac{1}{10}$ acre..	April 30	Aug. 1	6	700	3	700
No. 2 Mixture.									
1 do Golden Vine Pease. 1 do Prize Prolific Barley 1 do Banner Oats.....	do ..	do ..	do ..	do 30	do 1	6	1,800	3	50

EXPERIMENTS WITH CORN.

The land for this test had been cleared and ploughed the winter previous, and although ploughed three times and carefully harrowed each time it was not in good condition for corn, but as it was to be planted with apple trees, it was thought desirable to give the trees the benefit of a hoed crop. The corn crop is a very light one. Eighteen varieties were in the test, one of which the North Dakota from seed raised on the experimental farm at Brandon, Man,, did not germinate well. The soil was sandy loam, the drills were 36 inches apart and plants about 12 inches apart in the rows. The hills were 3 feet apart each way, with 2 to 4 plants in each hill. They were all sown from the 23rd to 25th of May, and the yield per acre has been calculated from the product of two rows, each 66 feet long. Mitchell's Extra Early was the only variety in this test that produced glazed corn.

CORN—Test of Varieties.

Name of Variety.	Height.	Leafiness.	When Tasselled.	In Silk.	Condition when cut.	Weight per acre grown in rows.		Weight per acre grown in hills.	
	Inches.					Tons.	Lbs.	Tons.	Lbs.
Country Gentleman.....	60 72	Leafy.....	Aug. 18..	Aug. 30..	Ears formed	12	800	12	200
Rural Thorough-bred White Flint.....	84—96	Very leafy..	" 20..	Sept. 16..	do ..	12	200	12	860
Angel of Midnight.....	70—80	Leafy.....	Sept. 2..	" 10..	do ..	9	1140	9	920
Extra Early Huron Dent.	80—90	"	" 16..	.....	Tasselled....	7	1620	7	520
Pearce's Prolific	66—72	"	Aug. 2..	Aug. 12..	Late Milk..	7	1180	7	740
Champion White Pearl...	84—96	Fairly leafy.	" 20..	Sept. 8..	Ears formed	7	960	7	80
Red Cob Ensilage.	84—96	Leafy.....	Sept. 8..	.....	Tasselled....	7	740	6	1640
Canada White Flint.....	72—84	Very leafy..	Aug. 18..	Sept. 12..	Ears formed	7	300	6	760
Longfellow	84 100	" ..	" 10.	Aug. 22..	Early Milk..	7	80	7	300
Sanford White Flint.....	60—72	Leafy.....	" 18..	Sept. 2..	Ears formed	6	1800	6	1340
Compton's Early.....	72—84	"	" 12..	Aug. 25..	Early Milk.	6	980	6	320
Mammoth Yellow Flint..	84—96	"	" 20..	Sept. 1..	Cobs formed	6	540	6	1200
Giaut Prolific Ensilage....	86—95	"	Sept. 18..	.....	Tasselled....	5	560	5	1440
Canadian Dent.	95-105	Not leafy...	Aug. 15..	Aug. 30..	Ears formed	5	230	5	560
Mitchell's Early.....	44—54	Fairly leafy.	" 2..	Sept. 10..	Matured...	4	1020	4	800
North Dakota..	60—66	Leafy	" 15..	Aug. 28..	Cobs formed	4	800	5	1980
do Manitoba Seed	48—66	"	" 15..	" 28..	do ..	3	1150	3	600
White Cap Yellow Dent..	80—90	"	" 14..	" 28..	Ears formed	.....		10	680

MIILLETS.

Small plots, each of German Golden, and White French Millets were sown 27th April. The soil was a warm sandy loam which had only produced one crop.

The German Golden yielded the best, the stalks being longer and leafier and the heads were longer and more compact. Both were cut when the seed was in the milk.

Yield per acre, when dried.	Tons.	Lbs.
German Millet	3	780
French "	2	1440

YIELD OF HAY AND MIXED GRAIN, CUT FOR FODDER.

	Tons.	Lbs.
Total hay crop	27	1681
Mixed grain cut and cured for feed	8	881

CRIMSON CLOVER.

A few pounds of crimson clover seed were received in the spring and sown at once. It made a growth of from eight to twelve inches, but did not stool freely. The crop would not yield over one ton per acre of cured feed, but as it was wanted for ploughing under to fit the land for small fruits it was not cut.

COW GRASS OR PERENNIAL RED CLOVER.

A small package of seed of this clover was received and sown last spring. It grew luxuriantly and covered the ground. The stalks being from 18 to 30 inches long, and estimated to yield nearly three tons of cured hay. This may prove a desirable addition to the list of fodder plants.

JAPANESE CLOVER.

A package of this seed was sown in May. It has grown from two to three inches but has not blossomed. This may be useful for pasture, but is not promising.

SACCHALINE.—*(Polygonum Sacchalinense.)*

One hundred young seedlings of this new fodder plant were received from the Central Experimental Farm in June. The weather was very dry and hot, and the plants being succulent were in very poor condition when received. Only a few of them made a feeble growth, and there was not enough to test the feeding qualities of this largely advertised fodder plant.

LATHYRUS SYLVESTRIS WAGNERI.

Seed of this fodder plant has been distributed in small packages to farmers residing in the interior of British Columbia and in the drier portions of Alberta. A few have reported that the seed germinated and made the usual growth of from 8 to 15 inches, and that the plants will be transplanted early next spring. Instructions were sent with each package of seed as to sowing, and subsequent treatment, and reports were asked for of its growth from year to year.

EXPERIMENTS WITH TURNIPS.

Two sowings were made, at an interval of 14 days, of each of the twelve varieties tested. The soil was a sandy loam and had been in crop for the five previous years, and had only had one light dressing of stable manure. None of the test plots gave as large

a crop as the field crop which was sown on heavier land. The first set of plots was sown on the 20th of May, the second on the 3rd June, in rows 2½ feet apart, and both were pulled on 5th November. The yield was estimated from the product of two rows each 66 feet long.

TURNIPS—Test of varieties.

Name of Variety.	Yield per Acre.								Description of Variety.
	1st Plot.		1st Plot.		2nd Plot.		2nd Plot.		
	Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.	
Partley's Bronze Top	13	576	442	56	12	816	213	36	Globe, bronze top.
East Lothian	13	400	440		8	896	281	36	Globe-sh'p'd, purple top
Carter's Elephant	12	1,344	422	24	8	720	278	40	Oblong, purple top.
Rennie's Prize Purple Top	12	640	410	40	11	1,232	387	12	Globe sh'p'd, purple top
Champion Purple Top	11	1,232	337	12	10	1,120	352		Globe-shaped, red top.
Lord Derby	10	1,120	352		9	1,712	328	32	Globe, purple top.
Jumbo or Monarch	10	64	334	24	11	1,760	396		Globe shaped, red top.
Skirving's Swede	9	1,008	316	48	8	1,428	290	28	do purple top.
Imperial Swede	8	1,248	287	28	7	1,840	264		do do
Purple Top Swede	8	544	275	44	8	1,600	293	20	do do
Giant King	7	80	234	40	6	1,728	228	48	Oval do
Elephant's Master	6	1,200	220		6	1,024	217	4	do do

EXPERIMENTS WITH MANGELS.

Thirteen varieties of mangels were tested. The soil was loamy and fairly uniform in quality, but all the varieties were not sown at the same time, because the seed was not on hand. Two sowings of each sort were made at an interval of fourteen days. Those sown last, have, in several cases, made as good a return as the earlier tests. This was probably owing to the dry summer, during which time none of the plots made much growth, and to the exceptionally favourable weather in autumn after copious rains had fallen, when all had an equal chance. Mangels, as a rule, give better yields when sown as early in spring as the land can be got into good condition. The mangels on all the plots were pulled on the 30th October. The yields per acre have been estimated from the product of two rows, each 66 feet long.

MANGELS—Test of varieties.

Name of Variety.	1st Plot Sown.	2nd Plot Sown.	Yield per Acre.								Description of Variety.
			1st Plot.		1st Plot.		2nd Plot		2nd Plot		
			Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.	
Mammoth Long Red (Webb)	May 28.	May 4.	32	416	1073	36	17	1200	586	40	Long red.
Red Fleshed Globe	April 27.	do 11.	31	832	1047	12	16	1792	563	12	Round red.
Canadian Giant	May 20.	June 3.	27	1440	924	..	25	1216	853	36	Long red.
Golden Tankard	April 27.	May 11.	26	1856	897	36	21	240	704	..	Oblong yellow.
Gate Post	do 27.	do 11.	26	800	880	..	21	416	706	56	Long red.
Red Fleshed Tankard	do 27.	do 11.	26	800	880	..	26	624	877	4	Oblong red.
Mammoth Long Red, (Evans)	May 4.	do 18.	24	643	810	32	18	960	616	..	Long red.
Champion Yellow Globe	April 27.	do 11.	23	1520	792	..	21	1296	721	36	Yellow globe.
Warden Orange Globe	do 27.	do 11.	22	1408	756	48	27	560	909	20	Orange globe.
Giant Yellow Intermediate	do 27.	do 11.	22	192	736	32	28	320	938	40	Yellow globe.
Conqueror Yellow Globe	May 14.	do 28.	21	768	712	48	15	1680	528	..	Yellow globe.
Yellow Fleshed Tankard	do 28.	June 11.	18	1960	632	40	14	1920	498	40	Oblong yellow.
Mammoth Long Red (Sharpe)	do 14.	May 28.	15	1856	530	56	20	1516	691	56	Long red.

EXPERIMENTS WITH CARROTS.

Ten varieties of carrots were tested. Two sowings of each sort were made at an interval of fourteen days. The land selected for these plots had been summer-fallowed in 1894 and manured with barn-yard manure. The soil was sandy loam. The yield has been a very fair one, but no doubt it would have been heavier but for the drought during summer. The yield has been calculated from the crop of one row 66 feet long. The seed was sown in flat drills 18 inches apart, and the plants thinned to about four inches in the row. The plots were not all sown at the same time, for the reason that the seed was not all received at the time of the first sowing. All were pulled on the 28th of October.

CARROTS—Test of Varieties.

Name of Variety.	1st Plot Sown.	2nd Plot Sown.	Yield per Acre, 1st Plot.	Yield per Acre, 1st Plot.	Yield per Acre, 2nd Plot.	Yield per Acre. 2nd Plot.
			Tons. Lbs.	Bush. Lbs.	Tons. Lbs.	Bush. Lbs.
Mammoth White Intermediate	April 27..	May 11..	30 720	1,012	23 347	772 27
Improved Short White	do 27..	do 11..	25 160	836	14 226	470 26
Early Gem	do 27..	do 11..	19 1,848	664 8	21 827	713 47
Giant Short White Vosges	do 27..	do 11..	19 1,600	660	17 613	576 53
Carter's Orange Giant	May 4 .	do 18..	19 720	645 20	13 1,867	464 27
Long Scarlet Altringham	April 27..	do 11..	18 961	616 1	15 1,213	520 13
Improved Half Long White	do 27..	do 11..	17 1,787	596 27	14 1,333	488 53
Long Orange or Surrey	do 27..	do 11..	17 1,787	596 27	12 1,813	430 13
Yellow Intermediate	May 14..	do 28..	15 680	528	11 880	381 21
Iverson's Champion	do 14..	do 28..	8 1,600	293 20	9 1,947	332 27

EXPERIMENTS WITH SUGAR BEETS.

Five varieties of sugar beets were tested. Two sowings each were made, the land chosen being alongside of the mangels and similar in character and quality. The first sowing was made on the 20th of May, the second on the 3rd of June, in rows 18 inches apart, and both were pulled on the 31st of October. The French White is the best for a feeding crop, as it yields the most, and being smoother at the bottom than any of the others, is more easily harvested. The yield has been calculated from the product of two rows, each 66 feet long.

SUGAR BEETS—TEST OF VARIETIES.

Name of Variety.	Yield per Acre. — 1st Plot.	Yield per Acre. — 1st Plot.	Yield per Acre. — 2nd Plot.	Yield per Acre. — 2nd Plot.
	Tons. Lbs.	Bush. Lbs.	Tons. Lbs.	Bush. Lbs.
French White	21 240	704 ..	14 160	469 20
German White	20 128	668 48	15 1,680	528 ..
Austrian Electoral	17 848	580 48	13 400	460 ..
Vilmorin's Improved	15 1,680	528 ..	15 900	515 ..
Klein Wanzleben	13 400	460 ..	13 1,456	477 36

TOTAL YIELD OF FIELD ROOTS FOR 1895.

Variety.	Tons.	Lbs.	Bushels.	Lbs.
Turnips	48	1,830	1,630	30
Mangels	11	1,830	397	10
Carrots, field	8	410	273	30
Sugar beets	3	1,890	131	30
Total	72	1,960	2,432	40

EXPERIMENTS WITH POTATOES.

Seventy-one varieties of potatoes were planted in warm sandy loam, and as there was very little rain from the time of planting until the earlier varieties were matured, the yield was affected somewhat. There was no scab, and only one variety showed any rot, this was the variety known as "State of Maine," and about five per cent only of these were affected. The potatoes were all planted from the 21st to 25th of May and dug from the 9th to 14th of October.

Seedlings—Nos. 3, 5, 7, 23 and 25 were planted in this test. No. 7 yielded well, is at the head of the list, and is very fair in quality. This is probably the only one of the five varieties worthy of further test.

POTATOES—Test of varieties.

Name of Variety.	Character of Growth.	When Matured.	Average Size.	Quality.	Total Yield per Acre		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Form and Colour.
					Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
Seedling No. 7	Strong..	Oct. 2	Large ..	Fair	327	4	268	29	58	35	Long, red.
Delaware	" ..	Sept. 18	" ..	Good ...	324	8	299	40	24	28	Long, white.
Beauty of Hebron	" ..	Oct. 4	" ..	Fair	294	52	261	14	33	38	Oblong, pink.
Dakota Red	" ..	" 4	" ..	Good ...	293	42	271	18	22	24	Round, red.
Carman's No. 1	" ..	Sept. 20	" ..	" ..	293	20	268	40	25	40	Round, white.
Chicago Market	Medium	" 16	" ..	" ..	283	4	240	28	42	38	Oblong, pink.
Late Puritan	Strong..	" 28	Large ..	" ..	281	36	235	54	55	40	Long, white.
Earliest of All	" ..	Aug. 28	" ..	Fair	281	36	232	9	49	27	Oval, pink.
Troy Seedling	" ..	Sept. 13	" ..	Good ...	271	10	228	34	43	36	Round, white
Clay Rose	" ..	" 4	" ..	" ..	264	60	213	..	51	..	Round, red.
Vanier	" ..	" 28	" ..	Fair	246	24	202	49	43	35	Long, red.
Early White Prize	" ..	Aug. 18	" ..	" ...	244	34	186	..	58	34	Round, white.
Rural Blush	Medium	Oct. 1	" ..	Good ...	239	4	202	40	36	24	Round, pink.
Prize Taker	Strong..	Sept. 14	" ..	" ...	234	40	191	12	43	28	Round, red.
Orphans	" ..	" 20	" ..	Poor ...	234	40	173	20	61	20	Long, white.
Dahiels	" ..	" 24	Medium	Fair	227	20	187	35	39	45	Oblong, white.
Early Ohio	" ..	" 4	" ..	Good ...	225	52	180	12	45	40	Oval, pink.
Daisy	" ..	" 20	Large ..	" ...	220	..	178	35	41	25	Round.
Money-Maker	" ..	" 11	" ..	Poor ...	220	..	171	30	48	30	Long, pink.
State of Maine	Medium	" 15	" ..	Good ...	208	16	168	28	29	22	Long, white.
American Giant	Strong..	" 14	" ..	Medium	202	56	187	29	15	27	Long, white.
Peerless, Jr	Medium	" 14	" ..	Good ...	198	8	154	18	43	50	Round, white.
Empire State	Strong .	Sept. 16	Large ..	Fair	190	40	152	30	38	10	Long, white.
Early Gem	" ..	" 6	" ..	"	190	40	148	30	42	10	Oval, pink.
London	" ..	" 11	" ..	"	189	12	145	54	43	28	Long, pink.
Early Rose	Medium	" 8	Medium	Good ...	187	34	156	51	30	43	Oblong, pink.
Thorburn	Strong .	Oct. 1	Large ..	Fair	183	20	164	50	18	30	Long, pink.
Early Harvest	Medium	Aug. 24	Medium	"	183	20	110	40	73	20	Long, white.
Seedling No. 3	Strong .	Oct. 11	" ..	Poor ...	181	8	130	15	50	53	Long, red.
Maggie Murphy	" ..	Sept. 20	Large ..	Good ...	178	56	144	26	34	30	

POTATOES—Test of varieties—*Concluded.*

Name of Variety.	Character of Growth.	When Matured	Average Size.	Quality.	Total Yield per Acre.	Yield per Acre of Marketable.	Yield per Acre of Unmarketable.	Form and Colour.
					Bush lbs	Bush lbs	Bush. lbs.	
Pride of the Market	Medium	Sept. 20	Medium	Good...	177 28	153 16	24 12	Flat, white.
Lee's Favourite	"	" 28	" ..	Fair....	176 ..	132 10	43 50	Long, pink.
Irish Daisy	Weak ..	" 10	Small...	Poor ...	176 ..	81 ..	95 ..	Round, white.
Harbinger	Strong..	" 7	Large ..	"	173 4	157 ..	22 4	Round, pink.
New Variety No. 1	Medium	" 24	Medium	Good.	173 4	138 4	35 ..	Round, white.
White Beauty	" ..	" 24	Small...	Medium	173 4	123 37	50 27	Oval, white.
Lizzie's Pride	" ..	" 15	Medium	" ..	168 40	144 17	24 23	Oval, pink.
Stourbridge Glory	Weak ..	" 28	Small...	Poor ...	167 32	66 48	100 44	Long, white.
Rochester Rose	Strong .	" 14	Large ..	Good...	164 16	143 30	20 44	Round, pink.
Early Norther	" ..	" 20	Medium	" ...	164 16	131 25	32 25	Long, pink.
Victor No. 1	" ..	" 20	Large ..	Fair....	161 20	128 40	32 40	Long, red.
Pearce's Prize Winner	" ..	" 20	" ..	Good...	158 24	136 43	21 41	Long, white.
Early Six Weeks	Medium	Aug. 22	Medium	" ..	156 56	113 36	43 20	Round, red.
Seedling No. 25	Strong .	Oct. 4	" ..	Poor ...	152 32	130 44	21 48	Long, white.
Northern Spy	" ..	Sept. 4	Large ..	Good...	152 32	129 48	22 44	Round, red.
Freeman	" ..	" 10	Medium	" ...	149 36	108 20	41 16	Round, white.
Clarke's No. 1	Medium	Sept. 20	Medium	Fair....	148 8	125 53	22 15	Long, pink.
Holborn Abundance	Strong..	Oct. 6	" ..	Poor ...	140 48	125 14	15 34	Long, white.
Great Divide	" ..	Sept. 24	Large ..	Fair....	140 48	107 ..	23 48	Round, white.
Early Sunrise	Medium	" 14	Medium	Good...	139 20	119 50	19 30	Oblong, pink.
Burpee's Extra Early	Strong..	" 2	Large ..	" ...	139 20	106 33	32 47	Long pink.
Pride of the Table	Weak ..	" 15	Medium	" ...	133 28	112 40	20 48	Long, red.
Seedling No. 23	Strong..	" 20	" ..	Fair....	132 ..	116 48	15 12	Oblong, purple.
Crown Jewel	" ..	" 28	Small ..	" ...	132 ..	103 22	28 38	Oval, pink.
New Queen	Medium	" 16	Medium	" ...	129 4	107 30	21 34	Long, red.
I. X. L	Strong..	" 20	" ..	Poor ...	124 40	99 . 44	24 56	Long, pink.
Record	Weak ..	" 22	Small ..	" ...	120 16	48 45	71 31	Long, white.
Lightning Express	Medium	" 6	Medium	Fair....	117 30	96 40	20 50	Round, red.
Early Puritan	" ..	Aug. 30	" ..	" ...	117 20	95 35	21 45	Long, white.
Ideal	Weak ..	Sept. 25	" ..	Poor ...	117 20	85 40	31 40	Long, red.
Sharpe's Seedling	Strong..	" 2	" ..	Fair....	102 40	88 15	14 25	Long, pink.
Pearce's Extra Early	Medium	Aug. 30	" ..	Good...	102 40	87 30	15 10	Long, pink.
Dreer's Standard	" .	Sept. 9	" ..	" ...	102 40	78 35	24 5	Long, white.
Polaris	" .	" 8	Small ..	Poor ...	99 44	85 24	14 20	Long, white.
Seedling, 214	Weak ..	" 18	" ..	Fair....	95 20	68 40	26 40	Round, white.
Seedling No. 5	Strong..	Oct. 10	" ..	Poor ...	93 52	48 ..	45 52	"
American Wonder	" ..	Sept. 20	" ..	" ...	88 .	54 38	23 22	"
Monroe County	" ..	" 10	" ..	Fair....	73 20	65 35	7 45	Long, pink.
Everett	Weak ..	" 8	" ..	Poor ...	73 20	61 50	11 30	"
Wonder of the World	" ..	" 2	" ..	" ...	52 48	43 30	9 18	Long, pink.

ORCHARD EXTENSION.

Since my last report about 7½ acres have been added to the apple orchard and a number of additional varieties to the orchards of pears, plums, peaches and cherries.

Another orchard of about 3½ acres has been planted on the mountain, at a height of about 1,050 feet—200 feet higher than the highest previously planted. The land was cleared of brush and standing timber, but not grubbed or cultivated. A hole was dug for each tree, leaving the remainder of the land in its natural state. A small circle about each tree has been kept loose and free from weeds and the remainder of the orchard mowed over twice during the summer, cutting down the second growth of brush. The expense for this was very trifling, and the trees have become well established. As the soil is a fine, warm loam, free from rocks or gravel, they will no doubt make a good showing in a year or two.

The older bench orchards, lower down on the mountain, have made a satisfactory growth, and the peaches and plums are coming into bearing.

The grapes, black and red raspberries, gooseberries, currants, peaches and plums that have fruited on the mountain have all ripened earlier than the same varieties planted on the level. The difference in time varies from four days in the plums to nearly two weeks in grapes, and the fruit was as large and fine as the same varieties on the valley land. Those on the mountain had no cultivation and but little care in preparing the land or keeping it in order. There are now very nearly 60 acres in all in large and small fruits on the Agassiz Experimental Farm.

APPLES.

The past season has been a fairly good one for apples. Old orchards as a rule did not give a heavy crop, but as spraying has been pretty generally practiced throughout the country, the apples have been fairer and of better quality than heretofore and young orchards have, where properly cared for, given a fairly good yield.

Spraying with the Bordeaux mixture has been of very great benefit on the experimental farm. Some varieties that were badly damaged by the fungus in previous years were almost entirely free from it this year, and the fruit was larger and handsomer and kept better. Some varieties appear to be much more difficult to protect than others. The Gravenstein seems to be one of this class. Some other sorts planted alongside and treated in every respect the same as regards spraying, were this year almost exempt from injury, while the Gravensteins were rather badly spotted both in leaf and fruit. There is, however, evidence of progress in checking the fungus even in this variety, for the fruit was larger and the growth of the trees stronger than last year, and the foliage was much cleaner and healthier.

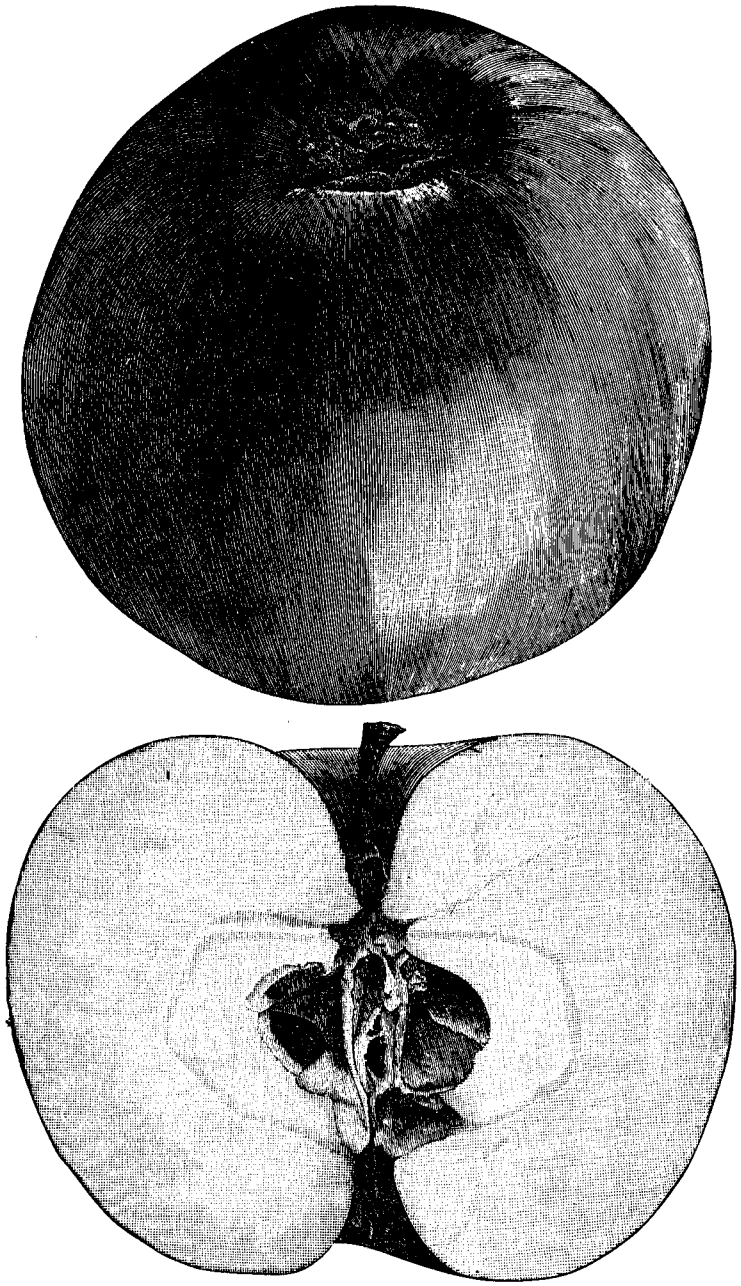
Ninety-three varieties of apples were shown in the Experimental Farm exhibit at the Victoria Agricultural Exhibition. A numher of these were well known sorts, but many others were new to this district. Following will be found notes on those varieties which have fruited for several years and are considered to be of sufficient merit to warrant the recommending of them for more general planting.

CANADA BALDWIN—Tree a strong upright grower; fruit medium size; skin, greenish white with red stripes, and splashes on sunny side; flesh white, tender and juicy, mild sub-acid; season January and February.

CHENANGO STRAWBERRY—Tree a moderate spreading grower, very productive; fruit of medium size, oblong conical shape; skin yellowish white, shaded and splashed with crimson; flesh white, tender, juicy, mild sub-acid; very good; season latter part of August.

BELLE DE BOSKOOP—Tree a vigorous grower, spreading and productive; fruit above medium size, roundish; skin greenish yellow shaded with red over most of the surface, and slightly russeted; flesh white, crisp, tender juicy, sprightly sub-acid; season late fall and early winter.

BLENHEIM ORANGE—Tree a vigorous spreading grower, and fairly productive; fruit large, roundish; skin orange russet with a dark red cheek; flesh yellow, breaking, with a pleasant sub-acid flavour; very good; season last of October to December.



BLENHEIM ORANGE, NATURAL SIZE.

COOPER'S MARKET—Tree a vigorous spreading grower, and productive; fruit of medium size, oblate conic; skin yellowish white shaded with red; flesh white, tender, with a brisk sub-acid flavour; season winter.

COLVERT—Tree a strong spreading grower, and productive; fruit large, oblate, conic; skin greenish shaded with red in the sun; flesh greenish white, brisk sub-acid; a good cooking apple; season October to December.

EARLY HARVEST—Tree a strong, vigorous grower, and moderately productive; fruit of medium size, roundish; skin light yellow; flesh yellow, tender, juicy and crisp, rich flavour, sub-acid; season last of August.

EARLY STRAWBERRY—Tree a moderate and upright grower, moderately productive; fruit small to medium; skin yellowish white, nearly covered with red; flesh white with a tinge of red next the skin, tender, brisk, sub-acid with a pleasant aroma; season last of August and first of September.

GRIMES' GOLDEN—Tree a moderate and spreading grower, and very productive; fruit oblong and slightly conical; skin a greenish russet-yellow with small grey dots; flesh yellow, tender, crisp, juicy, with a spicy, aromatic flavour sub-acid; one of the best; season December to March.

HURLBUT—Tree a vigorous grower, and productive; fruit about medium size, oblate, slightly conic; skin greenish yellow, shaded with dark red; flesh white, crisp, tender, juicy, mild, sprightly sub-acid flavour; good; November and December.

HAWLEY—Tree a vigorous, upright grower and productive; fruit large, roundish, oblate conic; flesh whitish, tender, juicy, sub-acid rich with a mild but pleasant flavour; season September.

JERSEY SWEET—Tree a moderate, spreading grower, and a regular bearer; fruit of medium size, roundish; skin greenish, with light red nearly over the whole surface; flesh tender juicy, sweet, with a pleasant flavour; good both for dessert and cooking; season last of August to November.

JONATHAN—Tree a moderate grower and a regular and free bearer; fruit small to medium; skin greenish with red over nearly the whole surface; flesh white, tender, juicy, sub-acid with a very pleasant vinous flavour; too small for a profitable market apple, but one of the best dessert apples; season from December to last of March.

KESWICK CODLIN—Tree a moderate but spreading grower, and a very regular and abundant bearer; fruit above medium size, conical; skin greenish yellow; flesh yellowish white rather acid with a pleasant flavour, one of the best cooking apples; season August and September.

MCMAHANS WHITE—Tree a strong and spreading grower, and an early and regular bearer; fruit large, round, obovate; skin white with a faint blush; flesh white, fine grained, acid, crisp and tender, very good for cooking; season December and January.

RIBSTON PIPPIN—Tree a vigorous spreading grower and a regular bearer; fruit above medium size, round; skin greenish yellow, mixed with russet and dull red on the sunny side; flesh yellow, firm and crisp mildly acid, with a rich aromatic flavour, very good; season December to March.

ST. LAWRENCE—Tree a vigorous and upright grower; fruit large, oblate in form; skin greenish yellow, striped and splashed with dull red; flesh white, crisp, tender, juicy, with a pleasant vinous flavour; season October and November.

SALOME—Tree a strong grower and productive; fruit of medium size, roundish, conical; skin reddish yellow with dark red over nearly the whole surface; flesh whitish yellow, juicy, tender, mild, sub-acid; season January to March.

SWEET BOUGH—Tree a very vigorous spreading grower and productive; fruit large to very large; skin smooth, yellow; flesh tender, juicy, rich and sweet with a pleasant flavour; season last of August and first of September.

SUTTON BEAUTY—Tree an upright, vigorous grower and productive; fruit above medium size and very uniform; in form roundish, oblate, conical; skin pale yellow splashed with crimson; flesh whitish, juicy, pleasant, sub-acid; season December and January.

WELLINGTON—Tree a strong, vigorous, spreading grower and very productive; fruit medium to large; form roundish; skin yellow with a blush; flesh yellow, crisp, tender, brisk acid, perfumed, a very fine kitchen apple; season January and February.

WOLF RIVER—Tree a strong spreading grower; fruit large to very large; form roundish oblate; skin greenish yellow with a considerable proportion of red; flesh white, coarse, juicy, mildly acid; season October and November.

WINTER ST. LAWRENCE—Tree a vigorous grower; fruit large, oblong, slightly conic; skin greenish yellow striped and splashed with red; flesh white, crisp, tender, of a mild and pleasant flavour, sub-acid; season December to February.

WARNER'S KING—Tree a vigorous, upright and spreading grower; fruit very large; form roundish ovate; skin deep yellow with a few greyish dots, and sometimes a slight blush; flesh white, tender and juicy, a very fine cooking apple; Tree productive and the fruit does not drop readily from the tree.

STARK—Tree a very vigorous grower, and productive; fruit large, oblong, inclining to conic; skin green, covered with dark red or nearly purple; flesh yellowish, juicy, mild sub-acid; season, January to April.

The following varieties have been added to the collection this year.

Roberson, Owen Jones, Earle, Celestia, Autumn Bough, Black Annette, Broadwell Sweet, Coffelt, Cook's Seedling, Cooper's Early White, Cullen's Keeper, Dr. Walker, Early Colton, Early Ripe, Indian, Kinnairds Choice, Lady Sweet, Marshall Red, Masons Orange, Nansemond Beauty, Pa. Red Streak, Osceola, Poorhouse, Primate, Rainbow, Romanite, Little Red Romanite, North Carolina Limbertwig, Early Joe, Yates Winter, Moscow, Springdale, September, Aikin, Colton, Chickasaw, Golden Beauty, Clyman Pippin, Red Winter Sweet, Calville Rouge Royal, Calville Rouge, Calville Blanc, Calville St Sauveur, Cadeau de Général, De Chataignier, Doux d'Argent, Perle d'Angleterre, Pomme d'Eve, Reinette de Caux, Rambourg d'Hiver, Reinette Franche, Reinette Franche Gris, Reinette de Lettre, Reinette d'Angleterre, Rallay d'Hiver, Rambourg d'Eté.

Fifty-six varieties, making now nearly six hundred in the collection of apples.

PEARS.

The pear trees have made a healthy growth and nearly all varieties that have been planted over two years blossomed, but only a few produced fruit, in previous years the leaves of many of the pear trees had been infested with the pear leaf mite, and many washes had been tried on a small scale to kill the pest, but without much apparent benefit. This year the trees were carefully sprayed with a mixture of lime, sulphur and salt, with very satisfactory results.

This mixture is made as follows:

Lime 30 lbs., sulphur 20 lbs., salt 15 lbs. Put all the sulphur, 10 lbs. of the lime and 20 gallons water in a boiler, and boil briskly for two hours, place the remainder of the lime in a barrel or other vessel and slack thoroughly, add the salt and dissolve; then add this to the sulphur and boil all together for a half hour longer; then add enough water to make 60 gallons, spray, in spring before growth begins, using the liquid luke warm.

The foliage on trees treated with this mixture was almost entirely free from the pest. This insect appears to be very generally distributed, for nearly all the pear trees received this season as in former years had more or less of the insect in the leaves. Since the foliage has become clean, the growth has been much stronger than formerly.

The following varieties have fruited during the past season:

DOYENNE D'ÉTE—Ripe July 18th, fruit small, roundish, skin yellow with a blush, flesh white, sweet, juicy and of very pleasant flavour, tree a moderately vigorous grower, productive.

MADELAINE—Ripe July 28th; fruit of medium size, smooth and handsome; skin pale yellow; flesh yellow, sweet, juicy and of fine flavour; tree a vigorous grower.

DEARBORN'S SEEDLING.—Ripe August 10th; fruit small, roundish; skin, smooth, bright yellow with a few small dots; flesh white, very juicy, melting and sweet, very good; tree a strong compact grower, productive.

MARGARET or PETITE MARGUERITE.—Ripe August 15th; fruit of medium size; skin greenish yellow with a reddish cheek, and many greenish dots; flesh white, buttery, juicy and sweet perfumed; tree a moderately strong grower and productive.

SUMMER BELLE.—Ripe last of August; fruit large, bell shaped; skin yellowish green; flesh white, soft and juicy, slightly astringent, of poor quality; tree a very stout and healthy grower, fairly productive.

DULA MEDVIEDEVKA.—Ripe August 13th; fruit of medium size; skin green with a shading of yellow; flesh white, juicy, sprightly with a pleasant vinous flavour; tree a very vigorous healthy grower. This is the second year this variety has fruited and it promises to be productive and of considerable value.

GLIVA KURSKAYA.—Ripe August 28th; fruit medium size; skin golden russet; flesh yellowish color, juicy, melting, sprightly and very pleasant; flavour good; tree a strong vigorous grower.

BESSEMIANKA.—Ripe September 10th; fruit above medium, very regular and even in size; skin a russet yellow with a reddish cheek; handsome, of poor quality, only fit for cooking; tree an upright vigorous grower, and promises to be very productive.

? SAPIEGANKA.—Ripe September 10th; fruit medium size; skin green; flesh greenish white, juicy, but of poor quality, slightly acid; the tree makes a strong and vigorous growth.

SOUVENIR DE CONGRESS.—Ripe September 15th; fruit very large; shaped like the Bartlett; skin yellow with a bright red blush; flesh juicy, sweet and of very pleasant flavour; tree a vigorous and upright grower.

HOWELL.—Ripe in October and keeps till November; fruit above medium size, very regular and even; skin golden yellow; flesh white, juicy and of a brisk, pleasant flavour; tree a vigorous upright grower and productive.

LE CONTE.—Ripe last of September; fruit medium size, bell shaped; skin a pale yellow, a handsome cooking pear; tree a vigorous and upright grower and productive.

The following pears produced a few specimens each, which were placed in the collection for exhibitions and were spoiled before an opportunity occurred for testing their quality.

MT. VERNON.—Fruit of medium size, roundish; skin light yellowish russet with a dull red blush.

LAWRENCE.—Fruit of medium size, obtuse pyriform; skin pale yellow with brown dots.

TYSON.—Fruit small, acute pyriform, dull russet with a bright red cheek.

SHELDON.—Fruit above medium size, roundish obtuse obovate; skin, yellowish green.

DEMPSEY—Fruit large, shaped very like Bartlett. Tree a vigorous upright grower.

DR. JULES' GUYOT—Fruit large, shaped like Bartlett. Skin smooth, yellow, with a little blush. Tree vigorous.

DURONDEAU—Fruit large, skin russet yellow, with a reddish cheek. Tree vigorous.

PRINCESS (Rivers)—Above medium size, pyriform, skin green. Tree a strong upright grower.

GOODALE—Fruit above medium size, oblong, pyriform, skin russet yellow, with a red cheek. Tree a very moderate grower.

BEURRE DE CAPIAUMONT—Fruit of medium size, quite long and tapering to the stem. Tree a strong spreading grower.

THOMPSON—Fruit of medium size, pyriform. Skin greenish yellow. Tree vigorous.

KNIGHT'S MONARCH—Fruit small medium, roundish. Skin green with russet dots. Tree vigorous.

BEURRE BROWN—Fruit above medium size, oblong. Skin greenish yellow, with a slight reddish blush. Tree a moderate spreading grower.

The following well-known varieties fruited:—

Bartlett, Anjou, Angouleme, Clairgeau, Seckel, Winter Nelis, Keiffer, Clapp's Favourite, Vicar of Winkfield, and Louise Bonne de Jersey.

The Williams Bonchretien (or Bartlett) brought from England in the spring of '93 fruited this year. There is no difference in appearance of tree or fruit between it and the Bartlett planted in the spring of 1890.

The following varieties of pears have been added this season :—

La Belle Ruth, Winter Bartlett, Sutton's Great Britain, Victor, Fique d'Alençon, Beurre d'Angleterre, Beau Present Espargne, La France, Soldat Laboureur, Brockworth Park, Bonne d'Ezée, Augustus Dana, Louis Vilmorin, Beurre Gris d'Hiver, Zoe, Forelle and Marshall Vaillant.

PLUMS.

The plum crop has been a very fine one this year, it is one of the most satisfactory as well as profitable fruits to grow west of the Cascades. The climate and soil appear to suit this fruit admirably, and it very seldom fails to yield a fair crop and generally a heavy one, and if picked in season the plums will bear shipping to considerable distances. Forty varieties fruited with us this year.

The following is the order of ripening with notes on those considered most desirable to plant, either for home consumption or for market :—

Drap d'Or.—Ripe 26th July. Fruit below medium size; skin yellow with reddish specks. Flesh yellow, sugary, rich and pleasant. Tree very productive.

Saunders.—Ripe 2nd August. Fruit above medium size. Bright yellow; flesh juicy, and of fair quality. One of the best for preserving. Tree a close upright grower, vigorous and productive.

Peach.—Ripe 6th August. Fruit large; red flesh, rather coarse. Tree not very productive.

Niagara.—Ripe August 13th. Fruit large to very large, reddish purple; flesh a little coarse, sweet, juicy and pleasant. Tree an upright strong grower, productive.

Bradshaw.—Ripe August 22nd. Fruit large reddish purple, with a blue bloom; flesh juicy, pleasant and good. Tree a strong upright grower, productive.

Victoria.—Ripe August 22nd. Fruit large, pale red, of fine flavour and good quality. Tree a spreading grower, very productive.

Washington.—Ripe August 24th. Fruit large, yellow with blush, very handsome; flesh sweet and juicy. Tree a strong grower and very productive. Trees planted in the spring of 1890 averaged this year 200 pounds each of merchantable fruit.

Large Golden Prolific.—Ripe August 22nd. Fruit above medium size, golden yellow, flesh juicy, sweet and of pleasant flavour. Tree a vigorous grower, moderately productive.

Columbia.—Ripe August 22nd. Fruit very large, round, dark purple with lighter coloured dots; flesh yellow, course, sweet and of good quality. Tree a vigorous grower and productive.

Jefferson.—Ripe August 20th. Fruit of medium size or above medium, yellow with a whitish bloom, flesh deep yellow, juicy, rich and of very fine quality. Tree a vigorous grower and productive, one of the best for dessert.

American Violet.—Ripe August 24th. Fruit large, light purple with a bluish bloom, round, flattened at the end; flesh yellowish, sweet, juicy, and of very fine flavour, Tree a strong grower and productive, an excellent shipper.

Hudson River Purple Egg.—Ripe 24th Aug. Fruit large, oval, skin deep purple with a blue bloom; flesh juicy, sweet, with a very pleasant flavour. Tree a vigorous grower and productive. Plum a very fine shipper.

Imperial Gage.—Ripe 21st Aug. Fruit of medium size, greenish yellow, with a white bloom; flesh greenish, juicy, sweet, and melting with a rich flavour; tree a vigorous grower, very productive.

Moore's Arctic.—Ripe 25th Aug. Fruit of medium size; skin nearly black with a heavy blue bloom; flesh greenish yellow, sweet and juicy; tree a moderate grower, productive.

Smith's Orleans.—Ripe 23rd Aug. Fruit above medium size, oval; skin dark purple, with a blue bloom; flesh yellow, juicy, firm with a sprightly pleasant flavour; an excellent plum for dessert and a good shipper; tree a strong grower and very productive.

Shipper's Pride.—Ripe 24th Aug. Fruit above medium size; skin purple with a light blue bloom; flesh yellow, sweet and juicy, of fair quality, a good shipper; tree a strong upright grower and productive.

MOYER.—Ripe 24th Aug. Fruit small to medium; reddish purple, with a light blue bloom; flesh yellow, sweet, juicy and good, a good shipper; tree a fair grower, and very productive.

REINE CLAUDE.—Ripe 26th Aug. Fruit small, round, green with a yellowish tinge; flesh yellow sweet, juicy with a rich pleasant flavour; tree a moderate grower and moderate bearer.

SUGAR PLUM.—Ripe 28th Aug. Fruit small, nearly black; flesh rich sweet and of pleasant flavour; tree a vigorous upright grower but not productive.

GUEII.—Ripe 1st Sept. Fruit large, oval; skin deep purple, with a blue bloom; flesh yellow, firm, juicy and sweet; a good shipper; tree vigorous, and a regular and heavy bearer.

LOMBARD.—Ripe 1st Sept. Fruit reddish purple, above medium in size. Flesh yellow, juicy and pleasant. Tree a vigorous grower and a heavy bearer, fruit liable to fall off unless thinned.

PETERS' YELLOW GAGE.—Ripe 2nd Sept. Fruit of medium size, round, skin pale yellow, with a thin light bloom. Flesh yellowish, juicy, sweet. Tree a moderate grower, but not a free producer.

BITTERN.—Ripe 4th Sept., fruit above medium size, very similar in appearance to Gueii, skin reddish purple with a thick blue bloom; flesh yellow, sweet juicy, firm, and promises to be a good shipper.

SARATOGA.—Ripe 4th Sept. Fruit of medium size, roundish oval; skin reddish purple with a light bluish bloom; flesh yellow, juicy, sweet and pleasant. Tree a strong grower.

DUANE'S PURPLE.—Ripe 4th Sept. Fruit of medium size, oval; skin, pale reddish purple, covered with a bluish bloom; flesh semi-transparent yellow, juicy, moderately sweet, with a pleasant flavour. Tree a vigorous grower and very productive.

GENERAL HAND.—Ripe 4th Sept. Fruit large, golden yellow; flesh pale yellow, juicy sweet, and of a pleasant flavour; tree a very strong grower and moderately productive.

ITALIAN PRUNE.—Ripe 5th Sept. Fruit of medium size, oval; skin dark blue and covered with a blue bloom, flesh yellow, juicy, sweet and rich; tree a moderate grower and productive.

COE'S GOLDEN DROP.—Ripe 5th Sept. Fruit large to very large, oval; skin pale yellow; flesh yellow, sweet and very good; tree a fair grower and productive.

MONROE.—Ripe 5th Sept. Fruit below medium size, of fair quality, but too small for profitable cultivation; tree a vigorous grower and productive.

CLUSTER DAMSON.—Ripe 6th Sept. Fruit oval, nearly 1 inch long, dark blue or nearly black with a thick blue bloom; tree a vigorous grower and very productive.

KING OF DAMSONS. Ripe 6th Sept. A little larger than the Cluster, but very similar to that variety.

DAMSON.—Ripe 6th Sept. Fruit very similar to Cluster Damson, but not so productive as either Cluster or King.

BLEEKER'S GAGE.—Ripe 6th Sept. Fruit of medium size, roundish, oval; skin yellow with whitish specks, and a thin bloom; flesh yellow, sweet, juicy, very rich and pleasant; tree a vigorous grower and productive.

POND'S SEEDLING.—Ripe 6th Sept. Fruit very large, oval, tapering to the stalk; skin pale red, with a thin bloom; flesh yellowish, coarse, juicy and sweet; tree a vigorous grower and moderately productive.

RED EGG.—Ripe 6th Sept. Fruit above medium size, oval; skin reddish purple, with a bluish white bloom; flesh yellowish green, juicy, rather coarse, slightly acid; tree a vigorous upright grower and productive.

YELLOW EGG.—Ripe 8th Sept. Fruit very large, oval, tapering towards the stalk; skin yellow; flesh juicy, coarse, and not high flavoured; tree a fair grower and moderately productive.

PRUNE D'AGEN.—Ripe 9th Sept. Fruit small to medium, oval; skin purple, with a thick bloom; flesh greenish yellow, juicy, sweet, rich and very pleasant; tree a moderate grower and productive.

GERMAN PRUNE.—Ripe 9th Sept. Fruit long, oval; skin purple, with a thick, blue bloom; flesh greenish, sweet, firm and pleasant; tree a fair grower and productive.

PRUNUS SIMONI.—Ripe 12th Sept. Fruit above medium size, round, flattened at both ends, 1¼ inches deep by 1½ to 2¼ in diameter; colour bright red; juicy with a rather disagreeable flavour; tree a slender upright grower, not productive.

The following 30 varieties have been added to the collection of plums during the past season:—

Ella, Seedling Peach, Wickson, Annie Spathe, World Beater, Gold, Missouri Green Gage, Stark Green Gage, Pooles Pride, Missouri Apricot, Ironclad, Yellow Japan, Caddow Chief, White Honey (damson), Hughes Late, Roulette, Reine de Mirabelle, St. Catherine, President Courcelles, Reine Claude Transparent, Reine Claude Verte, Monsieur Jeune, Petite Mirabelle, Reine Claude Bazaimbaud, Blood plum of Satsuma, Paymore d'eté Prune, Tibbets Plum, Golden Prune, Evans Seedling, Satsuma, Normands Yellow, Barbat d'Ente (prune), Lot d'Ente (prune), Blake's Prune, Blue Diamond, Thompsons, Splendor.

CHERRIES.

The cherry trees have all made a healthy growth this year, and forty-one varieties of those planted in the years 1890-91 and 1892 fruited, also two of the trees received from France in the spring of this year.

ELTON.—Fruit large pointed, reddish yellow, flesh tender, juicy, and very pleasant. Ripe 24th June.

WILLAMETTE.—Fruit large, light red, pleasant juicy, sweet. Ripe 24th June.

BLACK HEART.—Fruit large, black, juicy, sweet, rich flavour. Ripe 24th June.

FLORENCE.—Fruit large, reddish colour, firm, sweet and juicy. Ripe 26th June.

EARLY RICHMOND.—Fruit of medium size, round, dark red, juicy, acid, Ripe 25th July.

PARENT.—Fruit below medium, round, dark red, firm, juicy, slightly acid. Ripe 27th June.

LOVE APPLE.—Fruit large, round, light red, tender, juicy, sweet. Ripe 27th June.

DYEHOUSE.—Fruit of medium size, deep red, juicy, pleasant acid. Ripe 27th June.

COE'S TRANSPARENT.—Fruit large, round, pale yellow, red in the sun, flesh juicy, sweet, very pleasant. Ripe 27th June.

CUMBERLAND.—Fruit large; yellow red, tender, juicy, sweet, pleasant flavour; ripe 28th June.

CHAMPAGNE.—Above medium size, bright red, juicy, sweet, firm, very pleasant flavour: ripe June 28th.

KNIGHT'S EARLY BLACK.—Large, black, tender, juicy. Ripe 28th June.

LIEB.—Fruit small, round, flesh tender, juicy, sweetish sub-acid. Ripe 30th June.

LOUIS PHILIPPE.—Fruit large, round, black red colour, flesh tender, juicy, mild acid; ripe 5th July.

BLACK TARTARIAN.—Fruit large, black, juicy very fine quality; ripe 5th July.

GOVERNOR WOOD.—Above medium size, reddish yellow colour, juicy, rich and sweet; ripe 5th July.

YELLOW SPANISH.—Fruit very large, yellow, firm, sweet and very good; ripe 4th July.

OSTHEIM.—Fruit medium size, dark red, flesh tender, juicy, mild sub-acid; ripe 6th July.

BESSARABIAN.—Fruit below medium, dark red colour, flesh tender, juicy, sub-acid; ripe 8th July.

LUTOVKA.—Fruit small, flesh firm, tender, juicy, sweet; ripe 8th July.

BELLE DE CHOISEY.—Medium size, yellow with a blush on sunny side, sweet, juicy, and very finely flavoured; ripe 9th July.

LUELLING.—Above medium size, very dark, flesh firm, juicy, very pleasant flavour, quality good; ripe 9th July.

BLACK EAGLE.—Large, nearly black, flesh tender, uicy and of very rich flavour; ripe 9th July.

EMPRESS EUGENIE.—Above medium size, deep red colour, flesh tender, rich and juicy, quality good; ripe 10th July.

DOWNER'S LATE RED.—Fruit large, light red, juicy, sweet and of very fine quality; ripe 10th July.

BLACK REPUBLIC.—Fruit large, colour black, flesh firm, dark red, sweet, highly flavoured, good; ripe 11th July.

WINDSOR.—Fruit large, dark purple, flesh firm, moderately juicy, of a rich flavour, one of the best; ripe 11th July.

MEZEL.—Fruit very large, nearly black, flesh firm, dark red, juicy, sweet and high flavoured; ripe 13th July.

MONTMORENCY.—Fruit of medium size, colour bright red, flesh tender, juicy, sub-acid and of good quality; ripe 15th July.

LATE DUKE.—Fruit large, light red colour; flesh juicy, sub-acid, of fair quality; ripe 16th July.

ROYAL AMERICAN.—Fruit very large, light red with darker red on sunny side, flesh firm yellowish white, juicy, high flavoured, quality very good; ripe 16th July.

NAPOLEON.—Fruit very large, colour deep yellow mottled with red, flesh very firm, juicy, sweet. In quality this is one of the best. Ripe 16th July.

LITHAU.—Below medium in size, round, dark red; flesh dark red, firm, juicy, sub-acid, quality good; ripe 17th July.

BELLE MAGNIFIQUE.—Fruit large, roundish, light red, juicy, firm, sub-acid good; ripe 20th July.

GREAT BIGARREAU.—Resembles Mezel, but did not ripen for a week later than that variety; ripe 20th July.

REINE HORTENSE.—Fruit large, bright red; flesh tender, juicy, firm and very good; ripe 20th July.

CENTENNIAL.—Fruit very large, pale red; flesh firm, tender, juicy, sweet and rich; very good; ripe 20th July.

ENGLISH MORELLO.—Medium size, dark red; juicy, acid; ripe 21st July.

CARNATION.—Fruit large, yellowish red; flesh tender, juicy, slightly acid; ripe 22nd July.

OLIVET.—Fruit large, deep red; flesh tender, juicy, sub-acid, good; ripe 24th July.

VLADIMIR.—Fruit medium size, round, pale red; flesh juicy, tender, sub-acid, slightly astringent; ripe 24th July.

DUCHESS DE PALLAU.—Fruit of medium size, round, flattened, deep red; flesh rather firm, juicy, slightly acid; ripe 28th July.

MONTMORENCY COURTE QUEUE.—Fruit large, round, flattened, bright red; flesh tender, juicy, pleasantly acid; ripe 30th July.

The following varieties have been received since my last report:—

Mercer, Deacon, Bing, Abbesse, Thompson's Black Tartarian, California Advance, Suda Hardy, Ida, Montmorency (large), Schmidts Bigarreau No. 2, De Planchoury, Duchesse de Pallau, Angleterre Tardive, Montmorency Courte Queue, Angleterre Hative, making 15 new varieties this year.

DWARF ROCKY MOUNTAIN CHERRY.

The Dwarf Rocky Mountain or Sand Cherry bushes produced a few cherries. The fruit varied in size, shape and quality, the size ranging from small to medium, and almost to large, and the shape from round flattened to oval; skin dark red to nearly black, flesh dark red, juicy, mildly acid. Ripe 15th August; hangs long on the bushes, until September 15th; not valuable where other cherries can be grown.

REMEDY FOR APHIDES ON FRUIT TREES.

A number of different mixtures have been tried for killing the woolly, green and black aphides so common and troublesome on fruit trees. The cheapest, most effective

and simplest remedy we have tried is tobacco water. One pound of cigar makers refuse will make six gallons of mixture. This has never failed in our experience, when properly and thoroughly applied by spraying all parts of the tree. As it is harmless to the foliage, it is not necessary to be exact as to the strength of the wash, and four or five pounds of stems and waste, left to soak in a barrel of water for 24 hours, makes an effective and safe preparation.

PEACHES.

A large number of the peach trees blossomed this year, but those that bloomed earliest did not set fruit, and the crop was a very light one on those that did bear. They were sprayed with Bordeaux mixture before leafing out, and again when the leaves were nearly full grown; and those sprayed had very little curl leaf. A few trees of several varieties were left unsprayed, and the leaves were nearly all destroyed with the curl, and the trees made a very feeble growth, while those which had been sprayed made a very strong and healthy growth. The following varieties fruited:

AMSDEN.—Grown on bench. Fruit medium size, very handsome, and of very fine quality. Ripe 31st July.

HILBORN.—Grown on bench. Fruit medium size, and of very fine flavour. Ripe first week in August.

ALEXANDER.—Grown on bench. Fruit medium size, of very fine quality. Ripe first week in August.

EARLY BARNARD.—Grown on bench. Above medium size, and of good quality. Ripe early in August.

MOUNTAIN ROSE.—Grown on bench. Fruit small to medium in size; of very fine flavour. Ripe early in August.

GOLDEN CLING.—Grown on level. Fruit above medium size, very handsome, and of good quality. Ripe middle of August.

REID'S EARLY GOLDEN.—Grown on level. Fruit above medium size, very handsome, and of good quality. Ripe last of August.

FOSTER.—Grown both in valley and on bench. Fruit large, very handsome, and of very fine flavour. Ripe, on the bench, last of August; on the level, in September.

EARLY SILVER.—Grown on level. Fruit large, very handsome, and of fair quality. Ripe early in September.

PRINCESS OF WALES.—Grown on level. Fruit of medium size, and fair quality. Ripe early in September.

EARLY YORK.—Grown on level. Fruit above medium size, very handsome, and of fine quality. Ripe early in September.

EARLY CRAWFORD.—Grown on level. Fruit large, handsome, and of good quality. Ripe early in September.

LEMON.—Grown on level. Fruit above medium. Too late; did not ripen.

Several other varieties produced one or two peaches.

The following varieties have been added this year to the collection, either as trees or scions for budding:—Heath, Washington, Peninsula Yellow, Red River, Summer Snow, Northern Apricot, Poole's Large Yellow, Rouge de Mai, Madeline de Courson, Brandywine, Dr. Pilkington, Lone Star, Princess Royal, Pride of Idaho, Higgins' Seedling, Phillips, Crimson Beauty, and two unnamed British Columbia seedlings, said to be of considerable merit; making nineteen varieties added to the list in 1895.

NECTARINES.

A number of the nectarine trees blossomed this year, but none fruited. The blossoms fell off before the fruit formed. Two applications of Bordeaux mixture, as in the case of the peaches, prevented the curl leaf, and the trees have made a strong, healthy growth. Scions of the following varieties were received from Mr. Charles E. Shinn, B. A., of California Agricultural College:—Advance, Humboldt, Alsopp's Late, and De Coulonge. Two of these were in the collection before.

APRICOTS.

None of the apricots fruited freely. The following varieties produced each a few specimens :—

SHENSE.—Fruit large, 2 x 1¾ inches; very handsome, and of fine quality. Ripe 22nd July.

ALBERGE DE MONTGAMET.—Medium size, fair quality. Ripe early in August.

BREDA.—Fruit small, handsome, and of good quality. Ripe first week in August.

CANINO GROSSO.—Above medium size, and of good quality. Ripe early in August.

ALEXANDER.—Fruit small, juicy, rich in flavour, and of good quality. Ripe early in August.

GIBB.—Fruit small, flesh tough and stringy, of a pleasant flavour, and fair quality. Ripe last of July.

J. L. BUDD.—Fruit small, rich, sweet, of a pleasant flavour, good. Ripe last of July.

CATHERINE.—Fruit small, pleasant flavour, quality good. Ripe last of July.

Alexander, Gibb, J. L. Budd, and Catherine are very similar in size, appearance, and quality. The Shense is the best of those which have fruited.

Apricots received in 1895 :—Briggs' White, Allen's Seedling, Brigetti's French, Kaisha, Blenheim, Hemskirk, Noonday, Sunrise, Luizette.

MULBERRIES.

The mulberries all fruited this year, and some of the trees had a fair crop. The berries vary in size, in the different varieties, from ¾ to 1⅛ inch long by ¼ to ½ inch at the greatest diameter. The fruit is sweet, juicy and pleasant, but without much flavour, and falls from the trees when fully ripe. Downing's Everbearing has the largest fruit.

QUINCES.

Several of the quince bushes blossomed, but have not borne fruit. The growth is strong and healthy.

FIGS.

The figs have made a strong growth, but only one variety—the Early Violet—bore fruit. Several figs formed, and grew to be as large as walnuts, but dropped off before ripening.

MEDLARS.

Two more varieties of medlars were received from France last spring ; these have made a vigorous, healthy growth. There are now three varieties of this fruit in the collection: the Royal, Nottingham, and Dutch.

FILBERTS.

All the varieties of filberts mentioned in my previous reports have fruited again this year. They were very small bushes when received in the spring of 1890, and have been transplanted once since that time, but they have made a strong growth each year, and have borne fruit for the last four years. They have not been injured as yet by insect or fungous enemies, and I have no doubt that they would do as well planted on rough mountain slopes, wherever there is plenty of soil. The nuts are large, well-filled and sweet. The only enemy a planter would have in planting bench lands, would be

squirrels. The following seven additional varieties were received this fall, and will be planted in the spring, bringing the collection up to fourteen varieties :—

Corylus avellana,	Aveline anglaise.
do	Coque tendre.
do	Merveille de B. Willer.
do	Fertile d'Angers.
do	Peticule rouge.
do	purpurea.
do	pendula.

GRAPES.

Over sixty varieties of grapes fruited this year. The season was very favourable for grapes. August was warm with almost continuous sunshine; September was showery but warm, and October was a very fine, warm, sunny month, days bright and clear and the nights warm. Where the same varieties have been planted in the vineyard, on the level land, and on the mountain, those on the mountain ripened from 12 to 20 days earlier than those on the level. The following varieties ripened before the frost came :—

White or nearly White.

JESSICA.—Ripe on bench, 15th Sept.; in vineyard, 2nd Oct.
NIAGARA.—Ripe on bench, 30th Sept.; in vineyard, 15th Oct.
SAUNDERS' SEEDLING No. 1.—Ripe on bench, 18th Sept.; in vineyard, 10th Oct.
ELVIRA.—Ripe on bench, 5th Oct.; in vineyard, 24th Oct.
EMPIRE STATE.—Ripe in vineyard, 24th Oct.
LADY.—Ripe on bench, 25th Oct.; in vineyard, did not fully ripen.
POCKLINGTON.—Ripe on bench, 30th Oct.; not ripe in vineyard.

Black.

BACCHUS.—Ripe on bench, 4th Oct.; in vineyard, 28th Oct.
HARTFORD.—Ripe in vineyard, 12th Oct.
MOORE'S EARLY.—Ripe in vineyard, 22nd Oct.
CONCORD.—Ripe in vineyard, 15th Oct.
HERBERT.—Ripe in vineyard, 25th Oct.
WORDEN.—Ripe in vineyard, Oct. 28.

Red.

DELAWARE.—Ripe on bench, 2nd Oct.; in vineyard, 16th Oct.
AMBER QUEEN.—Ripe in vineyard, 10th Oct.
SALEM.—Ripe in vineyard, 7th Oct.
LINDLEY.—Ripe in vineyard, 20th Oct.
VERGENNES.—Ripe in vineyard, 20th Oct.

Martha, Catawba, Wilder, Massasoit, August Giant, Rogers 28, Early Victor, Naomi, Agawam, Rogers 14, Brighton, Rogers 39, Rogers 5, Florence, Arnold's 8, Secretary, Moyer, Eva, Noah, Cottage, Marion, Wyoming Red, Arnold's No. 1, Lady Washington, Cynthiana, Improved Wild, Ulster, Rogers No. 19, Arnold's 2, Goethé, Ives' Seedling, Champion, Telegraph, Rogers 41, Emerald, Missouri Riessling, Eldorado, Rogers 24, Jefferson, Oriental, Clinton with Muscat, all produced fruit, and many were well coloured, but were not quite ripe when frost came.

BLACK CURRANTS.

The following varieties of black currants have fruited during the past season :—

LEE'S PROLIFIC.—Ripe 6th July ; stem long ; berry of medium size, but very uneven ; quality good.

BLACK NAPLES.—Ripe 4th July ; bunch medium ; berry of medium size ; quality good.

BLACK CHAMPION.—Ripe 10th July ; bunch long ; berry of medium size ; quality, fair.

OGDENS BLACK.—Ripe 9th July ; bunch long ; berry of medium size, sweet, and of very good flavour.

BALDWIN.—Ripe 5th July ; bunch medium ; berry above medium size and very even ; very fine flavour.

PRINCE OF WALES.—Ripe 6th July ; bunch extra long ; berry large and even, sweet, of very fine flavour ; one of the best.

CRANDALL.—Ripe 20th July ; only a few berries produced ; very uneven in size.

SAUNDERS' SEEDLING BLACK CURRANTS.

STEWART.—Ripe 25th June ; a feeble grower ; not productive ; bunch short ; berry small ; quality poor.

RULER.—A vigorous grower and productive ; ripe 25th June ; bunch short ; berry medium ; quality poor.

KENTVILLE.—A vigorous grower ; ripe 30th June ; bunch medium ; berry above medium size ; sweet and pleasant.

STIRLING.—A medium grower ; ripe 26th June ; berry small ; bunch long ; flavour good.

HENRY.—A medium grower ; ripe 26th June ; bunch short ; berry above medium, with a very mild and pleasant flavour.

OXFORD.—A strong grower ; ripe 27th June ; bunch long, but well filled out ; berry of medium size ; quality fair.

MIDDLESEX.—A vigorous grower and productive ; ripe 29th June ; berry small, but of good quality ; mild and sweet ; bunch long and well filled.

ETHEL.—A fair grower ; ripe 26th June ; berry large, mild and sweet ; bunch long and well filled.

PARKER.—A weak grower and not productive ; ripe, 28th June ; berry small and of a strong flavour ; bunch short.

CLIMAX.—A vigorous grower and productive ; ripe 27th June ; bunch long, berry large with a sweet and pleasant flavour.

ECLIPSE.—A strong grower and productive ; ripe 26th June ; bunch of medium length ; berry medium to large ; quality very good.

NORTON.—A strong grower, not productive ; ripe 27th June ; bunch short ; berry of medium size ; quality fair.

BELLA.—A moderate grower, not productive ; ripe 26th June ; bunch short ; berry small but of good flavour.

PEARCE.—Bush a moderate grower and productive ; ripe 26th June ; bunch long ; berry large and of very pleasant flavour, mild and sweet.

MONARCH.—A strong grower and productive ; ripe 26th June ; bunch long ; berry large and even ; flavour mild and pleasant.

LENNOX.—A vigorous grower and productive ; ripe 20th June ; bunch of medium length ; berry small ; quality fair.

DOMINION.—A moderate grower, productive ; ripe 26th June ; bunch long ; berry of medium size ; strong flavour and rather acid.

LEWIS.—A feeble grower, not productive ; ripe 27th June ; bunch of medium length ; berry, small and of poor quality.

SUCCESS.—A vigorous grower and productive ; ripe 28th June ; bunch of medium length ; berry of fair size, very sweet and pleasant.

LONDON.—A fair grower, productive; ripe 27th June; bunch of medium size; berry medium in size; quality good.

STAR.—A weak grower, not productive; ripe 29th June; bunch short; berry small; flavour mild and pleasant.

BEAUTY.—A medium grower, productive; ripe 25th June; bunch long; berry above medium size, mild and pleasant.

LANARK.—A weak grower, not productive; ripe 25th June; bunch short; berry small.

CHARMER.—A weak grower, not productive; ripe 26th June; bunch short; berry small; quality medium.

EAGLE.—A strong grower and productive; ripe 27th June; bunch long; berry medium to large; flavour good.

LOUISE.—A vigorous grower and productive; ripe 23rd June; bunch long; berry above medium size; quality good.

ONTARIO.—A strong grower and productive; ripe 27th June; bunch long; berry large, sweet, mild and pleasant.

WOOD.—A vigorous grower and productive; ripe 27th June; bunch long; berry of medium size; fine flavour but acid.

As none of these seedlings have fruited here before, it will be necessary to give them further trial before a correct estimate of their merits can be made. This has been an unfavourable year for them, as they are planted on a gravelly soil which suffered from the drought. Several of the varieties compared favourably in size, quality and productiveness, with the older varieties grown on heavier land.

RED CURRANTS.

Although the drought prevented the berries from attaining their full size, yet the crop of currants has been a very good one during the past season. The following varieties have fruited.

RABY CASTLE.—Ripe 28th June; bunch long; berry of medium size and good quality.

PRINCE ALBERT.—Ripe 29th June; bunch long; berry of medium size, sweet and of pleasant flavour.

RED CHERRY.—Ripe 2nd July; bunch long; berry above medium in size; quality fair.

RED DUTCH.—Ripe 3rd July; bunch long and well filled; berry small; flavour good.

NEW RED DUTCH.—Ripe 5th July; bunch very long; berry small and very acid.

KNIGHT'S EARLY RED.—Ripe 27th June; bunch of medium length; berry small to medium, sweet and pleasant.

FAY'S PROLIFIC.—Ripe 1st July; bunch short; berry of medium size and good quality.

NORTH STAR.—Ripe 28th July; bunch long; berry quite small and acid.

LONDON RED.—Ripe 4th July; bunch long; berry large, sweet and of good quality.

MOORE'S RUBY.—Ripe 1st July; bunch long; berry above medium in size and of pleasant flavour.

VICTORIA.—Ripe 8th July; bunch of medium length; berry large; quality fair.

LA CONDÉ.—Ripe 27th June; bunch long; berry very large, sweet and of pleasant flavour, very good.

LA HATIVE.—Ripe 26th June; bunch long; berry small, sweet and of pleasant flavour.

LA FERTILE.—Ripe 27th June; bunch of medium length; berry large and very even in size; sweet and of pleasant flavour, one of the best.

VERSAILLAISE.—Ripe 29th June; bunch of medium length; berry above medium in size and of good quality.

WHITE CURRANTS.

WHITE DUTCH.—Ripe 2nd July ; bunch long and full ; berry above medium size ; sweet and pleasant.

WHITE GRAPE.—Ripe 27th July ; bunch of medium length ; berry of medium size and very good quality.

WHITE TRANSPARENT.—Ripe 26th June ; bunch long and full ; berry large, sweet and pleasant.

WHITE GONDOIN.—Ripe 3rd July ; bunch short ; berry small ; but of fine flavour.

GOOSEBERRIES.

Nearly all of the varieties of gooseberries growing here fruited this season ; several sorts were free from mildew and all were much cleaner than last year, and it is hoped that with continued spraying we shall be able to raise this fine fruit without mildew.

QUEEN VICTORIA.—Ripe 18th July ; fruit large, green, nearly free from mildew, foliage healthy.

GOVERNESS.—Ripe 10th July ; foliage and fruit nearly free from mildew ; berries 1 to 1⅛ inches long by ¾ to ⅞ inch diameter ; green in colour when ripe ; sweet and of very pleasant flavour.

KING OF TRUMPS.—Ripe 16th July ; very little mildew on fruit, none on foliage ; fruit about same size as Governess ; greenish white when ripe, very rich in flavour.

WHITESMITH.—Ripe 12th July ; quite free from mildew ; fruit large, and very fine ; greenish white when ripe.

RED CHAMPAGNE.—Foliage clean ; berry considerably mildewed.

DUBLIN—Foliage clean and healthy ; very little fruit ; berries mildewed.

HIGH SHERIFF—Ripe 8th July ; Very little mildew on foliage ; berry very large 1 to 1⅜ long ¾ to ⅞ inches diameter ; slightly mildewed ; red and of pleasant flavour.

EARLY SULPHUR—Ripe 1st July ; foliage slightly mildewed ; fruit nearly spoiled with mildew ; berry small, bright yellow and of very fine quality.

BOBBY—Ripe 13th July ; foliage mildewed ; fruit small, red, and a large proportion of it mildewed.

BEAUTY—Foliage healthy ; fruit spoiled with mildew.

BONNIE LASS—Ripe 19th July ; foliage nearly clean ; fruit of medium size ; green colour and of fine quality.

IMPROVED EARLY HEDGEHOG—Ripe 16th July ; foliage clean ; fruit nearly free from mildew ; berry medium to large ; greenish yellow ; very sweet and of fine flavour.

WHITE CHAMPAGNE—Ripe 9th July ; foliage and fruit nearly free from mildew ; fruit of medium size ; yellowish white colour, quality good ; productive.

GREEN OVERALL—Ripe 11th July ; foliage clean ; fruit considerably mildewed ; berry short and full ¾ in. by ¾ ; colour green ; flavour good.

LEVELLER—Ripe 15th July ; foliage clean ; fruit nearly free from mildew ; berry large 1¼ by ⅞ inches ; colour greenish yellow ; quality very good.

BLACKLEY HERO—Ripe 13th July ; foliage nearly clean ; fruit slightly mildewed ; berry very large of a whitish green colour, and very fine quality.

PITMASTON GREEN GAGE—Ripe 10th July ; foliage healthy ; fruit nearly free from mildew ; berry small to medium in size, colour green.

LANCASHIRE LAD—A feeble grower ; foliage healthy ; fruit mildewed.

CROWN BOB—Foliage healthy ; fruit mildewed.

WHENHAM'S INDUSTRY—Ripe 9th July ; foliage nearly clean ; fruit almost free from mildew ; berry very large and of very fine quality.

EVA—Ripe 12th July ; a feeble grower ; foliage and fruit healthy ; berry small and of poor flavour.

OREGON SEEDLING—Ripe 24th July ; vigorous and productive ; no mildew fruit large ; colour greenish yellow ; flavour good.

HOUGHTON—Vigorous and productive ; ripe July 26 ; no mildew ; fruit small ; colour pale red.

DOWNING—A vigorous grower, and very productive; ripe July 28; no mildew; berry of medium size; greenish yellow colour and good quality.

COLUMBUS—Ripe July 28; no mildew; fruit above medium size; greenish yellow colour and very fine quality.

Crown Bob, Queen Victoria, Industry and Whitesmith, planted on the bench, about 600 feet above those on the level, have never shown any trace of mildew on foliage or fruit, and the fruit ripened from six to ten days earlier than the same varieties below.

JUNE BERRIES.

DWARF JUNEBERRY—Bush 3 to 4½ feet high; ripe June 20th; fruited freely, but was attacked by a fungus when the fruit was nearly ripe; fruit mild and sweet, resembles the huckleberry.

TALL JUNEBERRY, (*Amelanchier canadensis*)—Height 8 to 12 feet; does not fruit as freely as the dwarf variety; ripe 20th July; not attacked by fungus; fruit small, sweet and insipid.

BLACKBERRIES.

All the varieties reported on last year, fruited again this season, and several new ones. The drought was so severe that the berries were much smaller than in previous years, and only the earlier portion of the crop matured. In some cases the berries dried up on the bushes. Of the old varieties, Taylor, Agawam, Snyder and Erie continue to prove most satisfactory.

In the following notes, reference is made to both the old and newer sorts:—

LOVETT'S BEST—Only a medium grower, canes productive; ripe 7th August; berry large and handsome, and of very fine quality.

EVERGREEN—Canes very vigorous and of trailing habit; tender, kills back at tips; productive; ripe 20th August; berry very uneven in size, ranging from large to very large; only fair in quality.

THOMPSON'S EARLY MAMMOTH—A very strong grower, but not productive; ripe August 4th; berry of medium size, and very even; firm, of good flavour, but acid.

CHILDS' TREE—Too tender even for this climate; kills back nearly to the ground.

DALLAS—A weak grower and tender; not productive; ripe 6th August; berry below medium size.

BRUNTON—A moderate grower; bore very little fruit; ripe 9th August; berry large and of good quality.

STONE'S HARDY—Vigorous and productive; ripe 4th August; berry large and of good quality.

SNYDER—A vigorous grower and productive; ripe 1st August; berry large and of good quality.

AGAWAM—A vigorous grower and very productive; ripe 4th August; berry, medium to large; sweet.

TAYLOR'S PROLIFIC—A vigorous grower and very productive; ripe 2nd August; berry large, firm and of fine quality.

MINNEWASKA—A feeble grower; not productive; ripe 6th August; berry small.

EARLY CLUSTER—Medium grower and productive; ripe 2nd August; berry large and good.

EARLY HARVEST—A moderate grower; productive; ripe 1st August; berry of medium size; quality good.

TECUMSEH—A feeble grower; not productive; ripe 10th August.

CRYSTAL WHITE—A slender grower and not productive; ripe 13th August; berry small, but of good quality.

KITTATINNY—A strong grower and productive; ripe 4th August; berry medium in size and of very good quality.

WILSON JR.—A straggling slender grower; not productive; ripe 5th August; berry small to medium in size.

WILSON'S EARLY—Very similar to Wilson Jr. in habit of growth and productiveness; ripe 2nd August; berry acid, with a hard core of medium size.

LAWTON—A very vigorous grower and productive; ripe 8th August; berry above medium size, but of poor quality.

ERIE—A stiff, erect grower and fairly productive; ripe 4th August; berry large and of very fine quality.

EARLY KING—A medium grower and fairly productive; ripe 2nd August; berry very uneven in size, ranging from small to large; sweet and of a pleasant flavour.

ELDORADO—Canes stout and healthy; only a few berries produced; ripe 13th August; berry large, firm and handsome; sweet and of a pleasant flavour.

OHMER—Canes stout and of medium length; ripe 13th August; produced a few berries of a large size and good quality.

MAXWELL—A strong grower and fairly productive; ripe 4th July; berry large and of good flavour.

LUCRETIA DEWBERRY—Ripe 29th July; berry large and sweet.

RASPBERRIES.

The drought and hot weather reduced the crop of raspberries. In the early part of the season the berries were of medium size, but later they became much smaller, and the fruit of some of the late ripening varieties dried up on the canes. All those which fruited last year fruited again this season, ripening from eight to fourteen days earlier than last year.

Crimson Beauty fruited this year for the first time. Canes, fairly strong; growth, productive; ripe 1st July; fruit large, round, bright crimson, firm and of very good quality.

ALL SUMMER.—Not a strong grower, but productive, very late in ripening, and continues producing fine berries after other varieties are gone; first berries ripe 16th July; berry large round, bright red, and of fine flavour.

NORTHUMBERLAND FILL-BASKET.—This variety fruited last year. The canes were strong, healthy growers; ripe 28th June; fruit very large; dark red sweet and of fine flavour; same shape as Cuthbert, but much larger, and as productive; firm, and would ship well.

CARTER'S PROLIFIC.—Ripe 28th June; large, and of good quality, but crumbles when picked.

FRANCONIA.—Ripe 2nd July; not a strong grower, but productive; berry large, handsome and sweet, but crumbles more or less when picked.

BAUMFORTH'S SEEDLING.—Ripe 28th June; too small for profit.

BELLE DE FONTENAY.—A vigorous grower and productive; ripe 27th July; fruit very uneven in size, ranging from small to large, of good flavour, but quite acid.

LORD BEACONSFIELD.—Not a strong grower nor productive; ripe 27th June; berry large, conical, dark red acid and of poor quality.

THOMPSON.—Canes feeble and not productive; ripe 28th June; berry very small and of poor quality.

CUTHBERT.—Canes vigorous and productive; ripe 26th June; berry large, conical, bright red and of superior quality.

CHAMPLAIN.—Canes vigorous, healthy and productive; ripe 2nd July; berry large, bright yellow, sweet, and of very fine quality, but too soft for shipping.

WHITE ANTWERP.—A weak grower, but moderately productive; ripe 25th June; berry of fair size, good flavour, pale yellow colour, but is liable to crumble when picked.

CAROLINE.—A strong grower; ripe 26th June; berry small and of poor flavour.

GOLDEN QUEEN.—A very vigorous grower and moderately productive; ripe 26th June; berry large, bright yellow and of very good quality.

SHAFFER'S COLOSSAL.—Canes very vigorous and productive; ripe 9th July; berry, very large, round, dark purple, of good flavour, but rather acid.

BLACK CAP RASPBERRIES.

SOUHEGAN.—Plant vigorous and productive; ripe 8th July; berry large, but of poor quality.

MAMMOTH CLUSTER.—Plant very vigorous and moderately productive; ripe 11th July; berry large and of fair quality but soft.

GREGG.—Canes strong and productive; ripe 14th July; berry large and firm, very handsome and of very good quality.

ADA.—A feeble grower, and not productive; ripe 12th July; berry small but of good quality.

KANSAS BLACK.—Canes strong, vigorous and productive; ripe 30th July; berry large, of good quality, and a good shipper.

CROMWELL.—A strong vigorous grower, but kills back at the tips; ripe 2nd July; berry below medium in size, sweet and of pleasant flavour.

OLDER.—A vigorous grower, but almost tender, killing back at tips every winter; productive; ripe July 12th; berry large, sweet and of good flavour.

PROGRESS.—A vigorous grower, but tender and not very productive; ripe 11th July; berry too small for profitable cultivation.

LOVETT.—A fair grower, but not productive; ripe 5th July; berry very uneven in size, but of a fair quality.

SMITH'S PROLIFIC.—A feeble grower; ripe 6th July; berry of medium size, but poor in quality, seedy and lacks juiciness.

JACKSON'S MAY KING.—A medium grower, not productive; ripe 2nd July; berry small, seedy and lacks juiciness; rather acid.

PALMER.—A strong grower and productive; ripe 3rd July; berry large, handsome, sweet and juicy; one of the best.

EARLY OHIO.—Canes vigorous and productive; ripe 30th June; berry above medium size, firm, sweet and of pleasant flavour.

CARMAN.—Canes vigorous and very productive; ripe 9th July; berry of medium size, and good flavour but rather acid.

NEMAHA.—Canes vigorous and productive; ripe 10th July; berry of medium size, sweet and firm.

STRAWBERRIES.

The strawberry crop was a very good one this year, and during the early part of the picking season the weather was very favourable. The latter part of the season was less favourable, frequent rains and warm weather causing the berries to become soft and easily spoiled, which injured their shipping qualities. The following berries fruited for the first time.

PHILLIP'S SEEDLING.—Strong healthy grower and productive; ripe 11th June; berry large, firm, bright red, of good flavour.

OMEGA.—Plant vigorous, healthy and productive; ripe 12th June; berry of medium size, conical, bright red and fine flavour.

SMITH'S SEEDLING.—Plant healthy, vigorous, and moderately productive; ripe 13th June; berry firm and solid; above medium size, and holds its size to the end of the season, flavour good, a little acid, colour bright red.

IMPROVED JUCUNDA—Plant a strong healthy grower and very productive; ripe June 14; berry long, bright red, of good quality, not firm enough to ship to distant markets, but valuable for those near by.

DAYTON.—Plant a vigorous grower, but foliage is subject to rust; not productive; ripe June 14th; berry of medium size, very light red colour, fair quality, but soft.

GREENVILLE.—Plant a moderate grower; not productive; ripe 13th June; berry very irregular in size, ranging from small to large, not firm.

MAXWELL.—Plant a strong vigorous grower, but the foliage is inclined to rust; productive; Berry above medium in size, very even and handsome, firm and solid, and of very fair quality.

BEVERLY.—Plant vigorous healthy and productive; ripe 22nd June; berry large, bright red, conical, and very even in size throughout the season and it continued in season for some days after all the other berries were gone.

The following is the order of ripening of the berries reported on last year:

Name.	Date.
Warfield	June 6.
Chairs	" 7.
Van Deman	" 7.
Beder Wood	" 7.
Windsor Chief	" 8.
Eclipse	" 8.
Yale	" 8.
Sir Joseph Paxton	" 8.
Dr. Hogg	" 9.
Empress Eugenie	" 9.
Alexander II	" 10.
Hautboise	" 10.
Alpha	" 11.
Parker Earle	" 12.
Daisy	" 12.
Bonnie Lass	" 12.
Iowa Beauty	" 13.
Pine Apple	" 13.
Laxford Hall	" 18.

Of these Warfield and Iowa Beauty have proved to be the most productive, and most desirable berries in that list. The plants are strong healthy growers; productive; and the fruit is even in size, handsome, firm and of very fine quality.

VEGETABLES.

GARDEN PEASE.

Sixteen varieties of garden pease were tested. Bliss's Abundance is the best early pea tried this year. Heroine and Shropshire Hero for medium, and Stratagem with Duke of Albany for late, furnishes a very good selection for the whole season.

Name of Variety.	Sown.	Up.	Fit for table.	Remarks.
Prince of Wales	April 29..	May 8..	July 15..	Vine medium; pods long and well filled; pease large and of very fine flavour.
Duke of Albany	do 29..	do 8..	do 29..	Vine 4½ to 5 ft.; pods medium in length and filled to tip; pease above medium size and of best quality for table.
Horsford's Market Garden	do 29..	do 8..	do 26..	Vines of medium length and very productive; pods long and well filled; pease large and of fine quality.
Burpee's Profusion	do 29..	do 8..	do 16..	Vines of medium length and very productive; pods of medium length and well filled; pea large and of good quality.
Daniel's Matchless Marrow	do 29..	do 8..	do 15..	Vines long, 2 to 2½ ft. and productive; pods 3½ to 4 in. long, well filled; pease large and of fair quality.
Heroine	do 29..	do 8..	do 16..	Vine of medium length and fairly productive; pods 2½ to 3 in. long, well filled; pease large and of good flavour.

GARDEN PEASE—*Concluded.*

Name of Variety.	Sown.	Up.	Fit for table.	Remarks.
Juno	April 30..	May 10..	July 13..	Vines medium in length and productive; pods long and filled to the end with large pease of the first quality.
C. P. R.	do 30..	do 13..	do 28..	Vines 2 to 2½ ft. long, productive; pods from 1½ to 3 in. long and well filled; pea large, quality fair.
Telegraph	do 30..	do 13..	do 15..	Vines 2½ to 3 ft. long, productive; pods 2 to 3 in. long, well filled; pea large and of good quality.
Little Giant	do 30..	do 10..	do 10..	Vines 10 to 15 in. long, very productive; pods well filled; pea of medium size, quality good.
Harris Dwarf Mammoth	do 30..	do 10..	do 27..	Vine 12 in. moderately productive; pod 1½ to 2½ in. long, quality very good.
Stratagem	do 30..	do 13..	do 30..	Vine 1½ to 2 ft. long, productive; pods 2 to 3 in. long; pease of medium size and very good quality.
Maud S	do 30..	do 10..	do 10..	Vine 2 ft. long and fairly productive; pods 1¼ to 2 in. long; pease small, quality fair.
Shropshire Hero	do 30..	do 10..	do 20..	Vines 2 to 2½ ft. long and very productive; pods 2½ to 3 in. long and well filled; pease large and of very good quality.
Sunol	April 29..	do 10..	do 10..	Vines of medium length, 1½ to 2 ft., not productive; pods well filled with large pease of good quality.
Bliss' Abundance	do 29..	do 10..	do 10..	Vines 1 to 1½ ft. long, productive; pods short but well filled; pease large and of very fine quality.

BEANS.

Four varieties of beans were sown in drills 18 inches apart. All were very fine in quality. The Mammoth German wax was the most productive.

Name of Variety.	Planted.	Up.	Fit for use	Remarks.
Emperor William	April 30..	May 18..	July 20..	Crisp and fine; very productive.
Mam. German Wax	do 30..	do 17..	do 26..	Vines vigorous and productive; pods long; crisp, good flavour; one of the best.
Dwarf Triumph	do 30..	do 17..	do 28..	Vines medium; productive; pods fair length; crisp and pleasant.
Speckled Wax	do 30..	do 17..	do 14..	Productive; pods crisp, and of very good quality.

TABLE CORN.

Champion Sweet	May 16..	June 4..	Aug. 20..	Ears 5 to 7 inches long and well filled to tip; grains large, sweet and of very fine quality.
Minnesota	do 16..	do 3..	do 8..	Ears 3 to 5 inches long, slender; medium quality.
Perry's Hybrid	do 16..	do 6..	do 10..	Ears 5 to 6 inches long, well filled out and of good quality.
Ford's Early Sugar	do 16..	do 3..	do 14..	Ears 4 to 6 inches long and well filled; very sweet and remains fit for use nearly 4 weeks.
Marblehead	do 16..	do 5..	do 6..	Ears 3 to 5 inches long and well filled; quality good.
Mitchell's Extra Early	do 16..	do 2..	do 2..	Ears 3 to 5 inches long; quality inferior and becomes hard very soon after it is fit for use.

TABLE TURNIP.

Breadstone.—Medium size, smooth, white and of very good quality; crisp, cooks without stringiness; sown April 29th, fit for table August 12th; a medium cropper; better for table use than Swedes.

TABLE CARROTS.

Seven varieties of this vegetable were tested. Early Gem is one of the best; a good cropper, keeps well and is very sweet and of pleasant flavour.

Seven varieties of table carrots were sown in drills, fifteen inches apart, and the following notes taken as to growth, quality, etc.:

Name of Variety.	Sown.	Fit for Use.	Description.
Mitchell's Half Long	April 27..	July 6...	Red, pointed roots; slender and not of first quality.
Pearce's Scarlet Intermediate	do 27..	do 10...	Red, half-long; medium size; a good cropper; quality good.
Henderson's Intermediate	do 27..	do 3...	Pointed roots, stout; a good cropper; quality fair.
St. Valery	do 27..	do 20...	Long rooted; not a good cropper; quality poor.
Early English Horn	do 27..	June 20...	Short stump-rooted; of very good quality.
Danver's Half Long	do 27..	July 18...	Pointed roots; a good cropper, and of good quality.
Early Gem	do 27..	do 6...	Stump rooted; a heavy cropper, and of very fine quality.

TABLE BEETS.

Five varieties were sown in drills, fifteen inches apart, and thinned to six inches in the row.

Name of Variety.	Sown.	Up.	Fit for Table.	Remarks.
Rennie's Intermediate	April 29..	May 17..	Aug. 10..	Very dark red; very fine quality; medium length; smooth; a good cropper.
Imperial Early Blood Turnip.	do 29..	do 17..	July 16..	Turnip rooted. Very dark red; smooth; of good quality.
Evans' Medium	do 29..	do 19..	Aug. 15..	Pointed rooted, smooth; a fair cropper, but not a dark colour.
Ne Plus Ultra	do 29.	do 17..	do 20..	Pointed rooted, long, very dark red; fine quality.
Whyte's Extra Dark Red	do 29..	do 19..	do 15..	Long pointed roots; medium size; very fine colour; good flavour; not a heavy cropper.

PARSNIPS.

The following varieties of parsnips were sown in drills 18 inches apart:—

Name.	Sown.	Up.	Fit for table.	Remarks.
Maltese	April 26..	May 17..	Sept. 25..	From 10 to 12 in. long, large and fairly smooth; very fine for table.
Half-long Guernsey	do 26..	do 19..	do 10..	Roots 6 to 10 in. long, 1 to 3 in. at crown; smooth and very sweet.
Student	do 26..	do 19..	do 1..	Roots short, 5 to 9 in. long; not a heavy cropper, quality fair.

RADISH.

Seven varieties of Radish were tested, all were sown in open ground, in rows 6 inches apart.

Name.	Sown.	Fit for use.	Shape.	Colour.	Remarks.
Early Forcing	April 27..	June 1..	Turnip.	Pink	Very small, and soon becomes spongy.
Scarlet Butter	do 27..	do 1..	do	Scarlet.	Very sweet aud crisp.
Brightest Long Scarlet.	do 27..	do 15..	Long.	do	Very good; crisp, sweet and pleasant.
White Tipped	do 27..	do 6..	Turnip.	White root..	Crisp, sweet and pleasant.
Golden Turnip	do 27..	do 10..	do	Yellow.	Not crisp; stringy, and soon becomes spongy.
Ne Plus Ultra	do 27..	July 2..	Round	Scarlet.	Crisp and pleasant.
China Rose	Aug. 13..	Nov.	Oblong	Rose.	Winter: large, crisp, mild and sweet.

CABBAGE.

Twelve varieties of cabbage were tested. The Vandergaw made the largest per cent of fine solid heads, but when the rains came in the last of August they burst open and spoiled. The Flat Dutch headed well and none of the heads burst. It is one of the best late varieties we have tested for this district.

Name of Variety.	Sown.	Transplanted.	Headed and Fit for Use.	Remarks.
Henderson's Early Summer..	April 25..	May 25..	July 25..	Heads small, but solid, crisp and very fine.
Express	do 25..	do 25..	Aug. 1..	Heads small and poor.
Savoy	do 25..	do 25..	Sept. 1..	Heads large and solid.
Vandergaw	do 25..	do 25..	do 1..	Heads large and very solid, but bursting open.
Dwarf York	do 25..	do 25..	July 6..	Heads small and soft.
Early Winningstadt	do 25..	June 4..		Did not head.
Fielderkraut	do 24..	do 10..		Heads too small and soft to be of value.
Henderson's Succession	do 24..	do 13..		Heads very small and poor.
Dark Red Erfurt	do 24..	do 6..	Sept. 2..	Heads medium and very solid; dark red.
Early Etampes	do 24..	do 2..	Aug. 22..	Heads small medium, very solid and fine flavour.
Stanley	do 24..	do 6..	do 18..	Heads medium size and fairly solid.
Flat Dutch..	do 24..	do 6..	Sept. 7..	Heads large and very solid.

CAULIFLOWER.

Eight varieties of cauliflower were sown in hot-bed, April 24th, and transplanted as soon as they were fit. The hot dry summer prevented the late varieties from making large, perfect heads.

Name of Variety.	Sown.	Transplanted.	Fit for Use.	Per cent. of Heads.	Remarks.
Extra Early Paris	April 24..	May 20..	Aug. 10..	50	Heads medium size, firm and good quality.
Large Early Dwarf Erfurt	do 24..	do 23..	July 20..	70	Heads very uneven in size; quality very good.
Henderson's Early Snowball	do 24..	do 23..	do 18..	90	Heads large and of very fine quality.
Snowstorm	do 24..	do 23..	do 18..	90	Heads large but loose and imperfect.
Bruce's Selected	do 24..	do 23..	do 25..	80	Heads open and soft.
Walcheren	do 24 .	do 23..	Aug. 24..	30	Heads small and badly formed.
Demi Dur	do 24..	do 23..	do 19..	20	Heads large and very fine, but only a few plants produced heads.

ONIONS.

Onions of the following varieties were sown in drills 15 inches apart, on sandy loam. The dry, hot weather set in before they had much growth and the crop was almost a failure. The Yellow Danvers (Globe) and Red Wethersfield were the two best varieties tested this year.

Name of Variety.	Sown.	Up.	Fit for Use.	Remarks.
Red Globe Danvers	April 25..	May 10..	Aug. 20..	Red globe; did not grow well; mild and pleasant.
Large Yellow Globe Danvers	do 25..	do 10..	do 20..	Medium size; yellow globe; ripened well.
Yellow Flat Danvers	do 25..	do 10..	do 24..	Small, flat; a poor cropper, with a strong flavour.
Southport Red Globe	do 25..	do 10..	do 28..	Red globe; a medium cropper; fair size; ripened well; strong flavour.
Southport Yellow Globe	do 25..	do 10..	do 28..	Yellow globe; a poor cropper; mild flavour.
Red Wethersfield	do 25..	do 10..	do 25..	Red flat; a good cropper and ripens well; has a very strong flavour.
Giant Yellow Spanish	do 25..	do 10..	Sept. 1..	Yellow; did not bottom; very large, coarse tops; mild flavour.
Silver Skin	do 25..	do 10..	Aug. 10..	Small; white; for pickling.

TOMATOES.

Seven varieties of tomatoes were sown in hot-bed and transplanted to warm, sandy loam as soon as the plants were large enough. Owing to the hot, dry weather the tomatoes have done better than in any previous year. Early Mayflower and Canada Victor were the best varieties tested.

Name of Variety.	Sown.	Transplanted.	Ripened.	Description.
Early Mayflower	April 24..	June 4..	Sept. 3..	Medium size, smooth and solid; ripens evenly; good.
Canada Victor	do 24..	do 4..	do 6..	Large; strong grower; productive; solid and of good quality.
Acme	do 24..	do 4..	do 8..	Not a strong grower; not productive; fruit small, medium size; very seedy.
Vaughan's Earliest of All	do 24..	do 4..	do 18..	This rotted before ripening; only a few perfect tomatoes were obtained.
Mitchell's No. 1	do 24..	do 4..	do 18..	A strong grower; fruit very irregular in shape and size; solid and of fair quality.
Ponderosa	do 24..	do 4..	do 20..	A strong, vigorous grower and productive; fruit large; rotted badly before quite ripe.
Strawberry	do 24..	do 13..	do 21..	Vines productive; fruit small, yellow, for preserving.

SQUASH AND PUMPKINS.

Name of Variety.	Planted.	Fit for use	Remarks.
Boston Marrow	April 26..	Sept. 6 ..	Vines vigorous and productive; marrows large and of very fine quality.
Vaughan's Summer Crookneck	do 26..	Aug. 16..	Vines very productive; squash very watery.
White Bush Scallop	do 26..	do 18..	Vines productive; squash large for the variety, but watery and lacking flavour.
Mammoth Squash	do 26..	Oct. 21..	Vines very vigorous and productive; many of the squash weighing over 60 pounds each.
Quaker Pie Pumpkin	do 26..	Sept. 20..	Pumpkin small; vine not productive, quality, fair.
Calhoun Pumpkin	do 26..	do 8..	Vine not productive; pumpkin medium size, quality poor.
Small Sugar Pumpkin	do 26..	Aug. 28..	Vines very productive: pumpkin small, very thick-fleshed and of good quality.

ASPARAGUS.

The asparagus plants received and planted in the spring of 1894 were covered with a mulch of manure in the fall, which was forked into the ground last spring. The growth has been very vigorous this year and will no doubt produce a fine crop next spring.

Seeds of the following varieties were received and sown last spring, Donald's Elmira, Giant and Palmetto, all have made a fine growth and will be transplanted next season.

PARSLEY.

A packet of Taber's exquisite curled parsley was sown April 27th and was fit for use in July. This is a very fine flavoured variety and a vigorous grower.

CELERY.

Eight varieties of Celery were tested, with the following results. The White Plume was the best, being of excellent quality and a vigorous grower:—

Name of Variety.	Seed Sown	Transplanted.	Remarks.
Paris Yellow	April 26..	July 5..	A moderate grower; stalks stout, firm and of good quality.
Giant Turkish Purple	do 26..	do 5..	A feeble grower; quality poor.
White Plume	do 26..	do 5..	Stalks stout and solid; a very compact grower; quality good.
Perfection Heartwell	do 26..	do 5..	A vigorous grower; stalks firm and of very good quality.
White Solid	do 26..	do 5..	Only a medium grower, but stalks white, solid and of very fine quality.
Dwarf Crimson	do 26..	do 5..	Very dwarf; stalks short and slender; quality poor.
Simmers Ribbed Dwarf White	do 26..	do 5..	Not a strong grower; quality poor.
New Rose	do 26..	do 5..	Stalks short and slender; quality poor.

LETTUCE.

Seven varieties of lettuce were tested with results as follows:—

Name of Variety.	Sown.	Fit for use	Remarks.
Early Obii	April 27..	June 2..	Not crisp or sweet.
Imperial	do 27..	do 10..	Loose and open; quality fair.
All Heart	do 27..	do 10..	Heads fairly compact; quality good.
Big Boston	do 27..	do 14..	Coarse; quality poor.
Nonpariel Cabbage	do 27..	do 14..	Heads large, firm and crisp.
Defiance	do 27..	do 16..	Not good; heads soft and leathery.
Silesia	do 27..	do 18..	Heads small, compact and firm; quality good.

MELONS (MUSK).

Four varieties of melons were tested, viz.: Christiana, Hackensack, Osage and Southern Beauty. The melons grew to about half size only on all these varieties and none of them ripened.

CUCUMBERS.

The following eight varieties were tested with results as stated:—

Name of Variety.	Planted.	Up.	Remarks.
Long Green	April 26..	May 20..	Fit for table Aug. 15th, long and crisp, quality good.
Talby's Hybrid	do 26..	do 20..	Fit for use Aug. 20th, vines not productive, medium size, quality fair.
Improved Long Green	do 26..	do 21..	Fit for table Aug. 1st, a vigorous grower and productive, large, crisp and of pleasant flavour.
Lord Kenyon's Favourite	do 26..	.....	Seed did not germinate.
Livingston's Favourite	do 26..	do 20..	Fit for use Aug. 7th, not productive, quality good.
Noah's Forcing	do 26..	do 20..	Not productive, large but inferior in quality tough and leathery.
Rollinson's Telegraph	do 26..	do 20..	Only a few seeds germinated, a feeble grower, small and of poor quality.
Improved White Spine	do 26..	do 21..	Vines very productive, fit for table Aug. 27th, cucumber above medium in size and very crisp and good.

TOBACCO.

A packet of seed of Havana tobacco was received for test from the Commissioner of Dominion Lands, Winnipeg, Man., April 16th. This was sown at once as directed, and transplanted as soon as the plants had grown to sufficient size. They made a vigorous growth and when matured were cut and are being cured in accordance with the instructions accompanying seed.

METEOROLOGICAL RECORD.

1894-95.	Highest Temperature.	Lowest Temperature.	Total Rainfall.	Depth of Snowfall.	Total amount of sunshine.	
			Inches.	Inches.	Hrs.	Min.
December 16th to 31st, 1894	21st 41°	28th 23°	1·11	1½	51	27
January, 1895	12th 49°	7th 15°	4·90	25½	61	12
February	22nd 60°	28th 30°	7·72	None	69	54
March	7th 66°	25th 27°	3·42	2¾	100	30
April	22nd 76°	25th 31°	3·03	None	128	06
May	16th 87°	5th 30°	6·39	do	136	54
June	28th 92°	6th 39°	2·45	do	175	18
July	9th 95°	3rd 40°	·97	do	221	36
August	29th 96°	14th 38°	·70	do	178	42
September	30th 77°	21st 34°	6·67	do	81	36
October	18th 77°	29th 32°	·77	do	165	24
November	15th 61°	4th 29°	5·85	do	56	42
Total for 11½ months			43·98	29¾	1424	81
do 11½ months, 1894			67·23	86	1249	49

I have the honour to be, sir,
Your obedient servant,

THOS. A. SHARPE.

STATEMENT OF EXPENDITURE ON THE DOMINION EXPERIMENTAL FARMS, FOR THE YEAR ENDING 30TH JUNE, 1895.

CENTRAL EXPERIMENTAL FARM—EXPENDITURE, 1894–95.

Live stock	$	704 15
Feed for stock, including veterinary services		1,544 72
Seed grain, seeds, trees, &c		991 43
Implements, tools, hardware and supplies		1,147 72
Draining and drain tiles		275 50
Manure and fertilizers		965 56
Travelling expenses		1,136 65
Exhibition expenses		799 57
Blacksmithing, harness supplies and repairs		391 82
Bee supplies		28 15
Salaries		1,768 24
Wages, farm work, including experimental work with grain and other farm crops; also, salaries of farm foreman and director's assistant in experimental work		5,325 66
Wages, care of stock		2,338 45
Chemical department		766 19
Botanical and Entomological Department		900 20
Horticultural department		4,239 86
Poultry department		1,439 39
Forestry department and care of grounds		2,062 96
Arboretum		504 43
Office help, correspondence branch and messenger service		2,505 91
Printing and stationery		971 40
Seed testing and care of greenhouses		793 07
Dairy department		879 43
Contingencies, including meteorological observations, $72		226 39
Contingencies, books and newspapers		119 19
do telegrams and telephones		91 87
Farm gates, lumber supplies, painting buildings, building tool house, &c		1,287 97
	$	34,205 88

EXPERIMENTAL FARM, NAPPAN, N.S.—EXPENDITURE, 1894–95.

Live stock	6 15
Feed for stock, including veterinary services	170 47
Seed grain, seeds, trees, &c	131 28
Implements, tools, hardware and supplies	216 77
Draining and drain tiles	337 34
Manure and fertilizers	251 69
Travelling expenses	194 00
Exhibition expenses	258 34
Blacksmithing, harness supplies and repairs	69 90

EXPERIMENTAL FARM, NAPPAN, N.S.—EXPENDITURE, 1894-95—*Con.*

Salaries, including proportion of salaries for general work, Ottawa	$	2,431 48
Wages, farm work, including experimental work with farm crops, fruit trees, vines, &c		1,469 54
Wages, care of stock		829 37
Chemical department		446 94
Botanical and Entomological department		345 97
Forestry department		143 93
Poultry department		9 00
Office help		40 00
Seed grain distribution		123 00
Contingencies, (including postage, $40.85)		220 74
do printing and stationery		5 78
do books and newspapers		6 00
do telegrams		1 94
	$	7,709 63

EXPERIMENTAL FARM, BRANDON, MANITOBA.—EXPENDITURE 1894–95.

Live stock	$	6 65
Feed for stock, including veterinary services		102 46
Seed grain, seeds, trees, etc		122 27
Implements, tools, hardware and supplies		552 36
Draining and drain tiles		427 82
Travelling expenses		190 60
Exhibition expenses		63 03
Blacksmithing, harness, supplies and repairs		355 64
Salaries, including proportion of salaries for general work, Ottawa		2,431 48
Wages, farm work, including experimental work with farm crops, fruit trees, vines, etc		2,671 81
Wages, care of stock		586 24
Chemical department		446 94
Botanical and Entomological department		345 97
Forestry		501 32
Poultry Department		10 70
Office help (including delivery of mail, $147.00)		282 00
Seed-grain distribution		365 55
Tree distribution		236 48
Contingencies, (including lumber supplies, repairs and fencing $320.73, postage $50.25, water-supply pipes $39.26, supplies for piggery $98.20)		754 03
do printing and stationery		32 78
do books and newspapers		24 75
do telegrams and telephones		43 38
do legal services re purchase of land		15 26
	$	10,569 52

EXPERIMENTAL FARM, INDIAN HEAD, N.W.T.—EXPENDITURE 1894–95.

Live stock	$	28 33
Feed for stock, including veterinary services		721 78
Seed grain, seeds, trees, etc		136 41

EXPERIMENTAL FARM, INDIAN HEAD, N.W.T., EXPENDITURE, 1894-95—*Con.*

Implements, tools, hardware and supplies	$	388 88
Manure and fertilizers		223 05
Travelling expenses		324 25
Exhibition expenses		138 98
Blacksmithing, harness supplies and repairs		229 36
Salaries, including proportion of salaries for general work, Ottawa		2,431 48
Wages, farm work, including experimental work with farm crops, fruit trees, vines, etc		2,557 26
do care of stock		1,089 45
Chemical department		446 94
Botanical and Entomological department		345 97
Poultry department		63 54
Forestry department		465 33
Office help		429 00
Seed-grain distribution		342 92
Tree distribution		117 61
Contingencies (including postage $108.99, water supply $79.80)		310 68
do printing and stationery		57 67
do books and newspapers		22 50
do telegrams		7 35
	$	10,878 74

EXPERIMENTAL FARM, AGASSIZ, BRITISH COLUMBIA.—EXPENDITURE, 1894-95.

Live stock	$	50 24
Feed for stock, including veterinary services		329 09
Seed grain, seeds, trees, etc		133 08
Implements, tools, hardware and supplies		300 52
Draining and drain tiles		4 00
Manure and fertilizers		59 54
Travelling expenses		215 40
Exhibition expenses		134 66
Blacksmithing, harness supplies and repairs		89 85
Salaries, including proportion of salaries for general work, Ottawa		2,431 48
Wages, farm work, including experimental work with farm crops, fruit trees, vines, etc		2,824 97
Wages, care of stock		271 25
Chemical department		446 94
Botanical and Entomological department		345 97
Poultry department		1 40
Forestry department		101 55
Office help		110 00
Seed grain distribution		74 42
Tree distribution		8 50
Clearing land		722 75
Contingencies (including postage $69.32)		164 17
do printing and stationery		19 76
do books and newspapers		23 50
		$8,863 04

SUMMARY.

Central Experimental Farm		$ 34,205 88
Nappan do		7,709 63
Brandon do		10,569 52
Indian Head do		10,878 74
Agassiz do		8,863 04
Printing bulletins and distribution of bulletins and reports	$1,199 33	
Seed grain distribution	3,358 19	
Forest tree and tree seed distribution	215 67	
	$4,773 19	
Less special sum in estimates for these items.	2,000 00	
	$2,773 19	2,773 19
		$ 75,000 00

Purchase of additional land at Brandon as provided for in estimates $1,000.00.

SUMMARY OF STOCK, MACHINERY, IMPLEMENTS, ETC., ON HAND DECEMBER 31, 1895.

CENTRAL EXPERIMENTAL FARM, OTTAWA.

16 Horses	$ 1,270 00
4 Ayrshire cattle	270 00
2 Devon "	90 00
3 Holstein "	180 00
7 Jersey "	395 00
21 Canadian "	590 00
34 Grade "	958 00
6 Yorkshire swine	160 00
6 Berkshire "	155 00
1 Essex "	25 00
3 Tamworth "	95 00
25 Grade "	105 00
Farm machinery	1,805 00
Farm implements	540 00
Vehicles, including farm wagons and sleighs	1,005 00
Hand tools, hardware and sundries	720 25
Harness	361 00
Dairy department, machinery, etc	811 00
Horticultural department, implements, tools, etc	163 25
Forestry department, implements, tools, etc	374 00
Botanical department, implements, tools, etc	8 00
Poultry department, 314 fowls	438 50
Poultry department, implements, furnishings, etc	106 00
Bees and apiarian supplies	244 30
Chemical department, apparatus and chemicals	2,012 33
Books in the several departments	188 84
Greenhouse plants, supplies, etc	732 55
Office furniture and stationery	1,257 50
Furniture at Director's house	1,500 00
	$16,560 52

EXPERIMENTAL FARM, NAPPAN, N. S.

7	Horses	$ 535 00
3	Durham cattle	170 00
10	Holstein "	453 00
3	Ayrshire "	160 00
36	Grade "	829 50
2	Yorkshire swine	35 00
3	Berkshire "	52 00
2	Tamworth "	27 50
33	Fowls	16 00
13	Vehicles, including farm wagons and sleighs	487 00
	Farm machinery	724 90
	" implements	168 20
	Hand tools, hardware and sundries	344 88
	Harness	153 85
	Furniture for office, reception room, and bed room for visiting officials	328 55
		$ 4,485 38

EXPERIMENTAL FARM—BRANDON, MANITOBA.

10	Horses	$ 850 00
2	Ayrshire cattle	175 00
2	Durham "	175 00
4	Holstein "	320 00
5	Grade "	75 00
1	Polled Angus	100 00
2	Tamworth swine	38 00
2	Yorkshire "	41 00
2	Berkshire "	46 00
145	Fowls	113 80
	Vehicles including farm wagons and sleighs	585 00
	Farm machinery	1,058 00
	" implements	565 00
	Hand tools, hardware and sundries	706 46
	Harness	243 50
	Furniture for reception room and bedroom for visiting officials	224 80
	Furniture, supplies and books for office	219 55
		$ 5,536 11

EXPERIMENTAL FARM—INDIAN HEAD, N. W. T.

11	Horses	$ 1,540 00
6	Durham cattle	405 00
1	Polled Angus cattle	50 00
11	Holstein "	530 00
14	Grade "	355 00
13	Yorkshire swine	100 00
9	Berkshire "	85 00
5	Tamworth "	75 00
	Fowls	76 00
	Vehicles, including farm wagons and sleighs	598 00
	Farm machinery	1,163 00
	" implements	691 00
	Hand tools, hardware and sundries	577 67
	Harness	250 00
	Furniture for reception room and bedroom for visiting officials	309 75
	Furniture supplies and books for office	213 00
		$ 7,018 42

EXPERIMENTAL FARM—AGASSIZ, B.C.

6	Horses	$ 1,050 00
3	Durham cattle	300 00
5	Ayrshire "	330 00
3	Holstein "	300 00
1	Grade "	30 00
6	Dorset horned sheep	180 00
3	Berkshire swine	125 00
1	Yorkshire "	20 00
2	Tamworth "	90 00
29	Fowls	29 00
	Vehicles, including farm wagons	275 00
	Farm machinery	676 00
	" implements	149 00
	Hand tools, hardware and sundries	97 30
	Harness	87 00
	Furniture for reception room and bedroom for visiting officials	286 00
	Furniture, supplies and books for office	119 75
		$ 4,144 05

W. H. HAY,
Accountant.

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