DOMINION OF CANADA

DEPARTMENT OF AGRICULTURE

DOMINION EXPERIMENTAL FARMS

EXPERIMENTAL STATION

KENTVILLE, N.S.

INTERIM REPORT OF THE SUPERINTENDENT

W. SAXBY BLAIR

FOR THE YEAR 1921

The Apiary, Experimental Station, Kentville, N.S.

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EXPERIMENTAL STATION, KENTVILLE, N. S.

REPORT OF THE SUPERINTENDENT, W. SAXBY BLAIR

THE SEASON

The winter of 1920-21 was mild and all plants came through in excellent condition. The spring of 1921 was early, the mean temperature for the first half of April being 4.2 degrees higher than the average. The last snowfall of the season was on April 11, of 3.5 inches. May was bright with a temperature above normal and a normal precipitation. June was bright and dry with much less than the normal precipitation, with the result that grasses and clovers were checked in development. The weather during May and June favoured the putting in of crops and the ground was prepared in excellent condition, but, because of the lack of rain, all crops presented a checked appearance toward the end of June. On the 27th a fall of .61 inches improved conditions materially and on July 15 .92 inches of rain again prevented crops from drying up completely, and this was followed by frequent showers to the end of the month. There were no heavy rains in August, the total precipitation being .93 inches. The August temperature fortunately was lower than normal and this aided very much in lessening evaporation. The dry June and July resulted in a short hay crop, and this followed by a dry August gave little second growth for pasturage. Cereals also suffered and the crop of straw was much lighter than ever before. Rains during the latter part of September and October helped materially in increasing the crop of roots, particularly turnips, but it came too late to be of value in helping out the corn crop which was light and badly dried out on most areas. Potatoes matured prematurely and were only about fifty per cent of a crop. The fall generally was favourable for the gathering of all crops. The first fall frost was on September 21, when 3 degrees was registered. The first heavy frost was on October 27, when the temperature went to 20 degrees. Fall ploughing was possible to November 23, after which little work outside was possible. Sleighing started on November 25, and continued fairly good until March 5. The temperature went to zero on January 4, when 5 degrees below was registered. The only other zero temperature during the winter was on January 24, 25 and 26, when 4, 7 and 9 degrees below respectively was recorded and February 10 and 18, when 5 and 22 degrees below respectively was recorded. The winter on the whole was bright and the temperature normal with considerably more than the normal snowfall. The snow disappeared gradually during early March without any unusual flooding. The meteorological record for the year is given below:—

Months	Temperature Fahrenheit				Precipitation			Bright sunshine
	Maximum		Minimum		Rainfall	Snowfall	Total precipitation	
	Date	Degrees	Date	Degrees	Inches	Inches	Inches	Hours
1921								
January	15	52	1 and 19	− 3	1·14	8·75	2·01	55·6
February	17	43	22	−11	0·65	5·75	4·22	112·15
March	28	65	8	10	2·47	5·5	3·02	129·23
April	28	79	7	13	3·54	3·75	3·91	133·60
May	30	81	1	30	1·91	.....	1·91	238·90
June	11	84	6	35	1·93	.....	1·93	214·20
July	26 and 28	91	5	38	2·04	.....	2·04	207·70
August	30	88	23	40	0·93	.....	0·93	255·40
September	3	91	21	29	1·82	.....	1·82	206·05
October	8	76	27	20	3·10	.....	3·10	166·40
November	20	67	26 and 27	12	4·88	20·0	6·88	47·80
December	18	54	27	− 1	0·39	28·75	3·26	55·55
Total	.....	.....	.....	.....	24·80	102·50	35·03	1,822·58

ANIMAL HUSBANDRY

SHORTHORN HERD

Below will be found tabulated data of feeds consumed and the production of the fourteen Shorthorn cows which completed their lactation period during the past year. As stated in previous reports this herd is managed as a dairy herd but the cows combine as well good beef qualities; an effort being made to retain the beef characteristics and increase the milk production. It will be seen that many of the cows are young and that Hedgyn Susan is the only one which was not reared at this Station.

The aim has been to produce a calf from each cow during the year; it will be noticed, however, that this has not been possible, the average milking period being 281·7 days with a dry period of 109 days, a total of 390 days. This has been mainly due to several of the cows failing to breed as early as had been hoped for.

It will be noticed that the cows were stall fed the whole period except two individuals. Ensilage was fed during the summer followed by clover hay after this was used up. The meal ration for the most part has been made up of 300 pounds bran, 200 pounds crushed oats, 200 pounds cottonseed meal and 100 pounds of oil meal and to this was added one pound of salt to each 100 pounds of meal mixture. The average cost was $2.82 per hundred pounds. This meal is fed on the basis of one pound of meal to each three pounds of milk produced by the cow, and an additional average allowance of one pound of meal per day to each cow during the whole period between calving. This is a matter left to the judgment of the feeder and the condition of the animal, some requiring very little maintenance ration above that given during the milking period.

The hay has been figured on the basis of $18 per ton and roots and ensilage at $5 per ton. It will be noticed that while the herd average good production the profits averaged only 72 cents per cow. It will be seen that the greatest loss was

on Kentville Blossom 4th, which cow failed to breed when she should have and was as well a poor milk producer. The above meal ration at the present time costs as follows:—

300	pounds	bran at $1.75 per cwt.	$ 5 25
200	"	ground oats at $2.10 per cwt.	4 20
200	"	cottonseed meal at $2.65 per cwt.	5 30
100	"	oil meal at $3.55	3 55
8	"	salt	10
			$18 40

or $2.30 per hundred pounds. With meal at this price, hay at $12 per ton and roots and ensilage at $5, the average cost for the herd would be

2,252	pounds	meal at $2.30 per cwt.	$ 51 79
4,389	"	hay at $12 per ton	26 33
11,260	"	roots and ensilage at $5 per ton	28 15
		Average feed cost per cow	$106 27

The average value of product was $132.40, leaving a profit of $26.13 per cow.

From the above it is evident that approximately 1 ton meal, 5 tons of ensilage or roots and 2 tons of hay are required to carry an average producing cow, entirely stable fed, for one year.

The value of butter is based upon the wholesale price of butter as realized by a local creamery. The skim-milk is valued at 20 cents per 100 pounds.

MILK PRODUCTION AND VALUE

Name of Cow	Age, years	Date of dropping calf	Number days dry	Number days milking	Total milk	Daily average yield of milk	Average per cent fat	Pounds of butter produced	Value of butter	Value of skim milk	Total value of product
									$ cts.	$ cts.	$ cts.
Hedgyn Susan	9	May 9, 1921	70	325	9,480·9	29·17	4·06	452·91	177 08	18 19	195 27
Kentville Jessamine	7	Oct. 7, 1920	143	256	6,787·7	26·51	3·66	292·05	159 27	30 29	189 56
Kentville Victoria	6	Feb. 20, 1921	131	191	4,361·4	22·83	3·98	204·36	91 23	14 39	105 62
Kentville Countess	5	Aug. 1, 1920	147	271	4,525·6	16·76	3·83	204·11	120 43	20 01	140 44
Kentville Fairy	4	April 7, 1921	66	298	4,726·8	15·86	4·34	241·69	98 62	9 04	107 66
Kentville Mayflower	4	Mar. 21, 1921	107	271	6,006·3	22·16	4·28	302·71	128 13	14 93	143 06
Kentville Fairy 2nd	3	Mar. 20, 1921	106	281	5,470·5	19·46	4·33	279·06	117 31	12 91	130 22
Kentville Jessamine 3rd	3	Nov. 6, 1920	42	222	2,847·2	12·8	4·02	134·79	70 18	12 34	82 52
Kentville Primrose	3	Feb. 5, 1921	69	296	5,496·1	18·56	4·1	265·2	116 88	15 57	132 45
Kentville Blossom 4th	3	Sept. 11, 1921	285	208	3,283·2	15·78	4·88	188·59	85 06	6 24	91 30
Kentville Molly	2	Dec. 13, 1920	First calf	318	4,751·3	14·94	4·08	228·3	105 11	17 01	122 12
Kentville Susan	3	May 3, 1921	33	272	4,255·5	15·64	4·31	216·02	82 39	8 14	90 53
Kentville Victoria 3rd	2	Mar. 29, 1921	First calf	364	6,909·9	18·98	4·25	345·62	142 67	13 23	155 90
Kentville Lady	2	April 6, 1921	First calf	372	7,780·7	20·91	4·08	373·82	152 03	14 92	166 95
Average			109	281·7	5,477·3	19·43	4·13	266·37	117 59	14·80	132 40

FEED CONSUMPTION AND COST

Name of Cow	Age, years	Date of dropping calf	Amount of meal consumed	Amount of roots and ensilage consumed	Amount of hay consumed	Amount of green feed consumed	Months on pasture	Total cost of feed	Cost to produce 100 pounds milk	Cost to produce 1 pound butter	Profit on 1 pound butter	Profit on cow
								$ cts.	$ cts.	cents	cents	$ cts.
Hedgyn Susan	9	May 9, 1921	3,363	11,100	5,052			162 23	1 71	·358	·034	33 04
Kentville Jessamine	7	Oct. 7, 1920	2,598	13,000	3,312		4	145 27	2 15	·497	·048	44 29
Kentville Victoria	6	Feb. 20, 1921	1,521	11,800	3,864			107 50	2 46	·526	−·079	− 1 88
Kentville Countess	5	Aug. 1, 1920	2,059	16,320	3,264		2¾	139 10	3 07	·681	−·036	1 34
Kentville Fairy	4	April 7, 1921	1,924	9,270	4,472			116 36	2 46	·481	−·073	− 8 70
Kentville Mayflower	4	Mat. 21, 1921	2,541	10,270	4,836			140 10	2 33	·462	−·038	2 96
Kentville Fairy 2nd	3	Mar. 20, 1921	2,265	11,950	4,956			137 51	2 51	·492	−·072	− 7 29
Kentville Jessamine 3rd	3	Nov. 6, 1920	1,236	12,060	3,164			94 26	3 31	·699	−·179	− 11 74
Kentville Primrose	3	Feb. 5, 1921	2,352	10,240	4,692			133 89	2 43	·504	−·064	− 1 44
Kentville Blossom 4th	3	Sept. 11, 1921	2,223	16,210	6,260			162 90	4 96	·863	−·412	− 71 60
Kentville Molly	2	Dec. 13, 1920	1,884	8,920	4,160			114 88	2 41	·503	·042	7 24
Kentville Susan	3	May 3, 1921	1,757	7,230	3,997			102 23	2 40	·473	−·091	− 11 70
Kentville Victoria 3rd	2	Mar. 29, 1921	2,878	9,460	4,660			142 13	2 05	·411	·001	13 77
Kentville Lady	2	April 6, 1921	2,939	9,830	4,770			145 17	1 86	·388	·018	21 78
Average			2,252	11,260	4,389		1·5 wks.	131 68	2 58	·524		0 72

REARING YOUNG STOCK

CALVES

Below will be found a table giving the amount of feeds consumed by forty-three calves from birth to six months of age. The calves are started with from 3 to 4 pounds of whole milk three times per day and after a month they are changed gradually to skim-milk, the amount increased not to exceed 20 pounds per day in three feeds. After six months this is usually discontinued.

When the change is made from new to skim-milk the calf is taught to eat meal made up of equal parts of crushed oats, bran and linseed oil meal. At the end of three months they will take one pound per day to advantage. This is increased gradually to three pounds at the end of the six months' period. Roots are given when the calves are quite young and good clover hay is placed before them at an early age that they may have what can be eaten in a short time. Water is also provided twice a day for drink in addition to the skim-milk, which is not sufficient to satisfy their thirst. The calves have all been reared off pasture, being kept in box stalls and allowed the range of the yard during suitable weather.

Project 9.

FEED CONSUMED BY HEIFERS FROM BIRTH TO SIX MONTHS OF AGE AND GAIN

Name	Date of Birth		Whole milk	Skim-milk	Meal	Hay	Roots	Weight at birth	Weight at six months	Gain
	Month	Year	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.
Kentville Fairy	July	1916	518	1,706	400	147	1,015	72	330	258
Kentville Mayflower	September	1916	386	2,045	357	126	931	50	300	250
Kentville Blossom 3rd	September	1916	368	2,051	347	126	931	75	269	194
Kentville Flower	November	1916	243	2,576	252	84	285	60	380	320
Kentville Jessamine 3rd	January	1917	356	2,438	273	161	360	78	350	272
Kentville Meadow Flower	February	1917	368	2,198	350	224	170	80	380	300
Kentville Princess 2nd	May	1917	521	2,520	406	182	140	75	355	280
Kentville Fairy 2nd	August	1917	305	2,261	294	133	545	70	340	270
Kentville Primrose	December	1917	478	1,862	320	146	260	70	385	315
Kentville Blossom 4th	December	1917	252	2,130	370	196	260	75	340	265
Kentville Molly	February	1918	190	2,148	300	133	310	81	330	249
Kentville Susan	March	1918	236	1,752	349	147	310	84	335	251
Kentville Victoria 3rd	July	1918	392	2,350	371	77	665	80	385	305
Kentville Lady	December	1918	312	2,786	259	210	.....	75	360	285
Kentville Daisy	January	1919	449	2,407	280	217	.....	60	300	240
Kentville Susan 2nd	March	1919	540	2,500	287	210	.....	80	335	255
Kentville Princess 3rd	April	1919	268	2,550	315	252	.....	80	350	270
Kentville Meadow Flower 2nd	May	1919	652	1,684	268	238	.....	80	360	280
Kentville Jessamine 4th	June	1919	658	1,245	259	245	448	82	360	278
Kentville Jessamine 5th	July	1919	546	1,308	273	245	561	73	340	267
Kentville May 2nd	July	1919	546	1,308	273	245	561	70	330	260
Kentville Duchess	December	1919	588	2,010	381	172	655	78	322	244
Kentville Bonnie	December	1919	588	2,010	381	172	655	70	300	230
Kentville Rose	December	1919	588	2,010	381	172	655	75	310	235
Kentville Primrose 2nd	January	1920	682	1,881	287	84	415	70	380	310
Kentville Lass	February	1920	502	1,992	343	126	485	65	315	250
Kentville Susan 3rd	February	1920	502	1,992	343	126	485	75	347	272
Kentville Blossom 5th	February	1920	362	2,092	373	154	555	75	327	252
Kentville Victoria 4th	March	1920	440	1,917	338	189	675	75	300	225
Kentville Jean	May	1920	734	43	206	207	150	75	285	210
Kentville Fairy 3rd	May	1920	476	2,291	268	176	175	82	380	298
Kentville Jessamine 6th	May	1920	476	2,291	268	176	175	79	360	281
Kentville Susan 4th	May	1920	476	2,291	268	176	175	75	330	255
Kentville Countess 2nd	August	1920	261	2,377	258	161	365	70	380	310
Kentville Jessamine 7th	October	1920	574	2,150	336	224	788	75	330	255
Kentville Jessamine 8th	November	1920	530	2,474	224	182	340	70	330	260
Kentville Princess 4th	December	1920	285	2,652	390	186	480	70	350	280
Kentville Molly 2nd	December	1920	326	2,652	390	186	480	70	320	250
Kentville Primrose 3rd	February	1921	560	2,390	273	140	56	83	345	262

Kentville Victoria 5th	*February*	*1921*	*356*	*2,391*	*308*	*182*	56	80	310	230
Kentville Fairy 4th	March	1921	304	2,213	213	125	.....	72	320	248
Kentville Victoria 6th	March	1921	296	2,414	266	167	.....	70	380	310
Kentville Lady 2nd	April	1921	305	2,442	269	188	.....	70	345	275
Average	.....	.....	439	2,111	310	173	363	73·8	339·1	265·3

With milk and other feeds at the prices stated the average cost to six months of age has been as follows:—

439	pounds	whole milk at 2½ cents per pound	$10 97
2,111	"	skim-milk at 20 cents per cwt.	4 22
310	"	meal at $2.50 per cwt.	7 75
173	"	hay at $12 per ton	1 04
363	"	roots at $5 per ton	91
			$24 89

The average gain it will be noted was 265·3 pounds, the average weight at six months being 339·1 pounds and the weight at birth 73·8 pounds. The cost per pound gain was 9·3 cents.

Calves Fed With and Without Roots

Project 188.—The table below gives the average amount of feeds consumed by five heifer calves fed roots as compared with five heifer calves fed no roots to six months of age and their average gain. Roots will replace some of the skim-milk and make it possible to feed more meal without danger to the health of the calf.

With roots—

478.8	pounds	whole milk at 2½ cents per pound	$11 97
1,668	"	skim-milk at 20 cents per cwt.	3 33
309	"	meal at 2½ cents per pound	7 72
201	"	hay at $12 per ton	1 20
499	"	roots at $5 per ton	1 24
		Total cost	$25 46

Average gain, 275 pounds.
Cost per pound gain, 9.2 cents.

Without roots—

444	pounds	whole milk at 2½ cents per pound	$11 10
2,385	"	skim-milk at 20 cents per cwt.	4 77
282	"	meal at 2½ cents per pound	7 05
225	"	hay at $12 per ton	56
		Total cost	$23 48

Average gain, 266 pounds.
Cost per pound gain, 8.8 cents.

Development of Calves Born at Different Periods

Project 189.—The calves raised at this Station have been classified as shown below, those born during the spring, summer, fall and winter months are grouped together showing the feeds consumed and average gain for those born during each of these periods. These records cover the six months period from birth. It will be seen that the spring and summer calves have been reared more cheaply than the fall and winter calves.

Calves born in March, April and May, average of nineteen calves:—

443	pounds	whole milk at 2½ cents per pound	$11 07
2,068	"	skim-milk at 20 cents per cwt.	4 13
304	"	meal at $2.50 per cwt.	7 60
170	"	hay at $12 per ton	1 02
177	"	roots at $5 per ton	44
		Total cost	$24 26

Average gain, 277.3 pounds.
Cost per one pound gain, 8.7 cents.

Calves born in June, July and August, average of thirteen calves:—

436	pounds	whole milk at 2½ cents per pound	$10 90
1,705	"	skim-milk at 20 cents per cwt.	3 41
326	"	meal at $2.50 per cwt.	8 15
177	"	hay at $12 per ton	1 06
665	"	roots at $5 per ton	1 66
		Total cost	$25 18

Average gain, 303.7 pounds.
Cost per one pound gain, 8.2 cents.

Calves born in September, October and November, average of eight calves:—

418 pounds	whole milk at 2½ cents per pound	$10 45
2,235 "	skim-milk at 20 cents per cwt.	4 47
335 "	meal at $2.50 per cwt.	8 37
156 "	hay at $12 per ton	93
777 "	roots at $5 per ton	1 94
	Total cost	$26 16

Average gain, 287.5 pounds.
Cost per one pound gain, 9.1 cents.

Calves born in December, January and February, average of twenty-four calves:—

438 pounds	whole milk at 2½ cents per pound	$10 95
2,190 "	skim-milk at 20 cents per cwt.	4 38
327 "	meal at $2.50 per cwt.	8 17
163 "	hay at $12 per ton	97
354 "	roots at $5 per ton	88
	Total cost	$25 35

Average gain, 272.3 pounds.
Cost per one pound gain, 9.3 cents.

Calves Six Months to One Year Without Skim-milk

The table below gives the quantity of feeds consumed by seventeen heifers from six months to one year of age, reared without having received skim-milk after six months of age. The average cost of these heifers for this period at the prices given below for feeds was

775.7 pounds	meal at $2.50 per cwt.	$19 39
642.8 "	hay at $12 per ton.	3 85
3,027 "	roots and ensilage at $5 per ton.	7 56
	Average cost for six months.	$30 80

The gain for this period was 258·1 pounds for each animal, the average weight at one year of age being 597·5 pounds and the cost per pound gain being 11·9 cents.

Project 10.

FEED CONSUMED BY HEIFERS FROM SIX MONTHS TO ONE YEAR AND GAIN

Name	Year	Meal	Hay	Roots and ensilage	Weight six months	Weight one year	Gain
		Lb.	Lb.	Lb.	Lb.	Lb.	Lb.
Kentville Fairy	1917	868	812	2,395	330	668	338
Kentville Meadow Flower	1917-18	665	945	2,540	380	630	250
Kentville Princess 2nd	1917-18	532	1,022	4,095	355	600	245
Kentville Fairy 2nd	1918	553	378	2,380	340	580	240
Kentville Molly	1918-19	630	427	3,605	330	605	275
Kentville Susan	1918-19	638	466	3,725	335	620	285
Kentville Victoria 3rd	1919	679	427	3,095	385	640	255
Kentville Susan 2nd	1919-20	730	697	2,800	335	590	255
Kentville Princess 3rd	1919-20	856	704	3,360	350	620	270
Kentville Meadow Flower 2nd	1919-20	982	679	3,690	360	675	315
Kentville Jessamine 4th	1919-20	1,050	491	4,290	360	660	300
Kentville Jessamine 5th	1920	1,050	491	4,290	340	595	255
Kentville May 2nd	1920	1,050	491	4,290	3 0	530	200
Kentville Jean	1920-21	791	518	2,390	285	590	305
Kentville Queen	1921-22	630	700	1,050	300	485	185
Kentville Primrose 3rd	1921-22	728	826	1,610	345	560	215
Kentville Victoria 5th	1921-22	756	854	1,855	310	510	200
Average		775·7	642·8	3,027	339·4	597·5	258·1

47966—2½

Calves Six Months to One Year with Skim-milk

The table below gives the quantity of feeds consumed by twenty-six heifers from six months to one year of age, fed skim-milk for a short period after six months of age. The cost of these for this period at the prices given below for feeds has averaged per animal as follows:—

408.3	pounds skim-milk at 20 cents per cwt.	$ 81
734	" meal at $2.50 per cwt.	18 35
717.5	" hay at $12 per ton.	4 30
1,735.7	" roots and ensilage at $5 per ton.	4 33
	Average cost for six months.	$27 79

The average gain for this period was 251.7 pounds, the average weight at one year being 588.8 pounds and the cost per pound gain being 11.04 cents. It is apparent that it would not be fair to lay this lower cost entirely to the 408 pounds of skim-milk fed, as many of the calves receiving skim-milk were evidently reared at a time when succulent feeds were not always available and the milk being available was fed to help out in this particular. Had the 3,027 pounds of roots fed those not receiving skim-milk been available instead of 1,735·7 pounds the feed costs per heifer would have been $3.23 greater or $31.01 per heifer, and the cost per pound of gain would have been about the same, the skim-milk simply taking the place of meal that would have been otherwise fed. It would seem safe therefore to conclude that thrifty heifers can be raised without any milk ration after the six months period and that better gains can be made with than without roots or ensilage. It should be kept in mind that because of lack of pasturage these heifers were stable fed in box stalls during this period.

Project 10.

FEED CONSUMED BY HEIFERS FROM SIX MONTHS TO ONE YEAR OF AGE AND GAIN

Name	Year	Skim-milk	Meal	Hay	Roots and ensilage	Weight six months	Weight one year	Gain
		Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.
Kentville Mayflower	1917	1,040	854	1,064	1,350	300	612	312
Kentville Blossom 3rd	1917	1,040	847	1,050	1,350	269	606	337
Kentville Flower	1917	660	730	955	740	380	610	230
Kentville Jessamine 3rd	1917	123	684	847	1,485	350	571	221
Kentville Primrose	1918	520	554	604	2,670	385	656	271
Kentville Blossom 4th	1918	280	609	518	2,710	340	590	250
Kentville Lady	1919	524	580	770	1,430	360	600	240
Kentville Daisy	1919–20	230	620	827	1,750	300	520	220
Kentville Duchess	1920	91	737	716	1,650	322	585	263
Kentville Bonnie	1920	91	737	716	1,650	300	550	250
Kentville Rose	1920	91	737	716	1,650	310	545	235
Kentville Primrose 2nd	1920–21	286	700	671	2,065	380	645	265
Kentville Lass	1920–21	490	728	640	2,490	315	555	240
Kentville Susan 3rd	1920–21	490	730	640	2,455	347	620	273
Kentville Blossom 5th	1920–21	420	742	641	2,630	327	570	243
Kentville Victoria 4th	1920–21	280	805	661	3,085	300	545	245
Kentville Fairy 3rd	1920–21	126	798	525	2,450	380	690	310
Kentville Jessamine 6th	1920–21	126	790	520	2,450	360	660	300
Kentville Susan 4th	1920–21	126	790	520	2,450	330	570	240
Kentville Jessamine 7th	1921	1,138	770	679	500	330	575	245
Kentville Countess 2nd	1921	492	770	588	1,600	380	650	270
Kentville Jessamine 8th	1921	582	749	707	300	330	540	210
Kentville Princess 4th	1921	212	865	812	695	350	570	220
Kentville Molly 2nd	1921	212	767	770	540	320	505	185
Kentville Fairy 4th	1921–22	578	700	756	1,450	320	550	230
Kentville Victoria 6th	1921–22	368	691	742	1,535	380	620	240
Average		408·3	734	717·5	1,735·7	337·1	588·8	251·7

Average Cost of Calves from Six Months to One Year

The feed consumed by forty-three heifers from six months to one year of age, and the cost at the prices of feeds as given below, averaged as follows:—

246.9	pounds	skim-milk at 20 cents per cwt.	$ 49
750.5	"	meal at 2½ cents per pound.	18 76
687.9	"	hay at $12 per ton.	4 12
2,246.2	"	roots and ensilage at $5 per ton.	5 61
		Average cost for six months.	$28 98

The gain for this period was 252.9 pounds, the average weight at one year being 592.2 pounds. The cost per pound gain was 11.4 cents.

Heifers One to Two Years Old

Below is given the amount of feeds consumed by thirty-two heifers reared at this Station for the period from one to two years old. These heifers have been fed as carefully as possible with due regard to economy, but they were given the amount of feed it was considered necessary in order to carry them in a thrifty growing condition. It will be seen that the meal consumption was 4½ pounds, hay 5½ pounds and roots and ensilage 25 pounds per day when not on pasture, which seems to be as small a ration as really satisfies vigorous growing young stock:—

FEED CONSUMED BY HEIFERS FROM ONE TO TWO YEARS OLD AND GAIN

Name	Year	Meal	Hay	Roots and ensilage	Pasture	Green feed	Weight one year	Weight two years	Gain
		Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.
Kentville Fairy	1917–18	1,106	2,632	5,060	.....	.....	668	1,000	332
Kentville Mayflower	1917–18	1,092	2,000	4,780	4	.....	612	850	238
Kentville Blossom 3rd	1917–18	1,104	2,016	4,780	4	.....	606	855	249
Kentville Flower	1917–18	1,034	1,718	5,495	4	420	610	935	325
Kentville Jessamine 3rd	1918	1,065	1,873	6,615	4	420	575	1,020	445
Kentville Meadow Flower	1918–19	1,065	1,964	7,070	1	420	630	1,022	392
Kentville Princess 2nd	1918–19	1,092	1,813	7,790	.....	3,780	600	940	340
Kentville Fairy 2nd	1918–19	888	1,412	8,065	1	1,400	580	1,000	420
Kentville Primrose	1918–19	757	1,180	6,555	4	.....	656	950	294
Kentville Blossom 4th	1918–19	1,019	1,072	5,980	4	.....	590	900	310
Kentville Molly	1919–20	1,052	1,193	6,370	4	.....	605	880	275
Kentville Susan	1919–20	1,060	1,441	7,565	4	.....	620	1,050	430
Kentville Victoria 3rd	1919–20	2,262	2,251	9,050	.....	210	640	1,045	405
Kentville Lady	1920	1,662	1,558	8,470	2	.....	600	1,030	430
Kentville Daisy	1920–21	1,571	1,453	8,110	2	.....	520	870	350
Kentville Susan 2nd	1920–21	1,562	1,572	8,400	.....	.....	590	985	395
Kentville Princess 3rd	1920–21	1,475	1,379	8,010	1½	.....	620	970	350
Kentville Meadow Flower 2nd	1920–21	1,310	1,409	8,390	1½	.....	675	1,030	355
Kentville Jessamine 4th	1920–21	1,043	1,243	7,130	2¼	.....	660	1,145	485
Kentville Jessamine 5th	1920–21	1,125	811	7,540	3½	.....	595	975	380
Kentville May 2nd	1920–21	1,113	1,381	7,480	2½	.....	530	900	370
Kentville Duchess	1920–21	1,173	1,008	5,565	4¼	.....	585	855	270
Kentville Bonnie	1920–21	1,138	987	5,425	4½	.....	550	850	300
Kentville Primrose 2nd	1921–22	1,173	1,162	5,600	4½	.....	645	980	335
Kentville Lass	1921–22	1,229	1,288	5,870	4½	.....	555	950	395
Kentville Susan 3rd	1921–22	1,236	1,323	5,905	4½	.....	620	1,000	380
Kentville Blossom 5th	1921–22	1,243	1,372	5,870	4½	.....	570	915	345
Kentville Victoria 4th	1921–22	1,257	1,470	5,915	4½	.....	545	900	355
Kentville Jean	1921–22	1,334	1,457	4,260	4½	.....	590	940	350
Kentville Fairy 3rd	1921–22	1,271	2,006	5,600	4½	.....	690	1,075	385
Kentville Jessamine 6th	1921–22	1,271	2,006	5,600	4½	.....	660	990	330
Kentville Susan 4th	1921–22	1,237	1,456	3,890	4½	.....	570	950	380
Average	.....	1,219·3	1,528·3	6,506	3·04	208	605	961	356

Average Cost of Heifers From One to Two Years

With feeds at the price given below the average cost of heifers for from one to two years of age was as follows:—

1,219.3	pounds meal at $2.50 per cwt.	$30 48
1,529	" hay at $12 per ton.	9 17
6,714	" roots, ensilage and green food at $5 per ton. . . .	16 78
3.04	months on pasture at $1 per month.	3.04
		$59 47

The average gain was 368.8 pounds, the weight at two years averaging 961 pounds and the weight at one year 592.2 pounds. The cost for one pound gain was 16.1 cents.

Cost of Heifers From Two Years to Calving

The period from two years to calving has averaged six months. The aim is to have all the heifers with a calf at two and one-half years of age. The actual average was 915 days. The feeds consumed and gain for this period was as given below and is the average of twenty-one heifers which have calved at this Station:—

508	pounds meal at $2.50 per cwt.	$12 70
997	". hay at $12 per ton.	5 98
4,118	" roots and ensilage at $5 per ton.	10 29
2.2	months on pasture at $1 per month	2 20
	Total cost for 6 months	$31 17

The gain for this period averaged 144 pounds. Cost for one pound of gain 21.6 cents. Average weight of cow when calved 1,105 pounds.

FEED CONSUMED BY HEIFERS FROM TWO YEARS OF AGE TO CALVING AND GAIN

Name	Year of birth	Age, days	Meal	Hay	Roots and ensilage	Pasture	Weight at two years	Weight at calving	Gain
			Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.
Kentville Fairy	1916	805	784	1,560	5,660	2½	1,000	1,260	260
Kentville Mayflower	1916	1,188	965	2,250	9,120	5	850	1,100	250
Kentville Blossom 3rd	1916	1,173	930	2,118	8,760	5	855	1,150	295
Kentville Jessamine 3rd	1917	1,061	573	1,139	5,985	5	1,020	1,140	120
Kentville Meadow Flower	1917	1,083	827	1,451	7,605	5	1,022	1,200	178
Kentville Princess 2rd	1917	934	193	348	1,380	5	940	1,050	110
Kentville Fairy 2nd	1917	844	126	210	540	3	1,000	1,040	40
Kentville Primrose	1917	767	184	340	1,500	.....	950	970	20
Kentville Blossom 4th	1917	855	702	844	6,540	.....	900	1,040	140
Kentville Molly	1918	1,030	883	1,210	8,400	4	880	1,200	320
Kentville Susan	1918	817	504	455	4,800	.....	1,050	1,205	155
Kentville Victoria 3rd	1918	998	694	1,930	6,790	2	1,045	1,300	255
Kentville Lady	1918	827	343	735	3,490	.....	1,030	1,160	130
Kentville Susan 2nd	1919	922	342	1,210	2,940	1¾	985	1,100	115
Kentville Princess 3rd	1919	869	216	458	2,070	1¼	970	1,000	30
Kentville Meadow Flower 2nd	1919	859	153	549	320	1¾	1,030	1,080	50
Kentville Jessamine 4th	1919	965	750	1,672	4,160	2¾	1,145	1,230	85
Kentville Jessamine 5th	1919	850	126	420	.....	3	975	1,025	50
Kentville Duchess	1919	807	462	644	2,240	.....	855	965	101
Kentville Bonnie	1919	819	546	784	2,590	.....	850	950	100
Kentville Lass	1920	791	378	616	1,610	.....	950	1,060	110
Average	.....	915	508	997	4,118	2·2	961	1,105	144

AVERAGE COST OF HEIFERS FROM BIRTH TO CALVING

The amount of feeds consumed and the cost of same from birth to calving at two and one-half years is given in the table below:—

Age	Whole milk	Skim-milk	Meal	Hay	Roots and ensilage	Pasture
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Months
Birth to six months	439	2,111	310	173	363	
Six months to one year	.....	246	750	687	2,246	
One year to two years	.....	.....	1,219	1,529	6,714	3·04
Two years to calving	.....	.....	508	997	4,118	2·20
Total	439	2,357	2,787	3,386	13,441	5·24

439	pounds whole milk at 2½ cents per pound	$10 97
2,357	" skim-milk at 20 cents per cwt	4 71
2,787	" meal at $2.50 per cwt	69 67
3,386	" hay at $12 per ton	20 31
13,441	" roots and ensilage at $5 per ton	33 60
5·24	months' pasture at $1 per month	5 24
	Total	$ 144 50

The cost for the different periods and the average gain for the respective periods was as follows:—

—	Gain	Weight	Cost
	Lbs.	Lbs.	$ cts.
Weight at birth	73·8		
Birth to six months	265·2	339	24·89
Six months to one year	252·9	592	28·98
One year to two years	368·8	961	59·46
Two years to calving	144·0	1,105	31 17
	1,104·7	.....	144 50

Cost per one pound gain, 13 cents.

STEERS

Twenty-four steers were carried during the winter. These were purchased in the fall at 5 cents per pound and sold at 6¾ cents. The spread between purchase and selling price was not sufficient to cover cost of feed. These were carried in pens of six each and a selection was made of six of the most typy beef steers in one pen and the six poorest in another pen. These two pens were fed alike and received the same weight of feed. The other two pens were fed on the same meal mixture, but pen 3 was given 35 pounds of corn silage and 10 pounds of hay for each steer per day and pen 4, 20 pounds of corn silage and 15 pounds of hay each per day. The feeding period was for 150 days. It will be seen from the table below that the typy, well developed steers gave the best returns and also that those receiving the light ensilage ration made the best gain and were the most profitable. The clover hay fed was of good quality which no doubt largely accounts for this increase.

Project 4.

BEST VS. POOREST TYPE OF STEERS

	Pen 1 Six best steers	Pen 2 Six poorest steers
Weight at start of test	5,650 pounds	4,690 pounds
Weight at finish of test	7,815 "	6,440 "
Gain in 150 days	2,165 "	1,750 "
Average gain for feeding period	360.7 "	291.6 "
Gain per day	2.4 "	1.94 "
Feed cost, 5,334 pounds meal at $2.30 per cwt.	$122.68	$122.68
Feed cost, 45,000 pounds ensilage at $5 per ton	112.50	112.50
Feed cost, 3,984 pounds hay at $12 per ton	23.90	23.90
Total cost of feed	259.08	259.08
Value at start of test, 5,650 pounds at 5 cents	282.50	.....
Value at start of test, 4,690 pounds at 5 cents	.....	234.50
Selling value, 7,815 pounds at 6¾ cents.	527.51	.....
Selling value, 6,440 pounds at 6¾ cents.	.....	434.70
Increase in value	245.01	200.20
Loss above cost of feed	14.07	59.88
Loss per steer	2.34	9.98

Project 190.

HEAVY ENSILAGE AND LIGHT HAY RATION VS. LIGHT ENSILAGE AND HEAVY HAY RATION

	Pen 3 Heavy ensilage and light hay ration	Pen 4 Heavy ensilage and heavy hay ration
Weight at start of test	5,305 pounds	5,100 pounds
Weight at finish of test	7,130 "	7,120 "
Gain in 150 days	1,825 "	2,020 "
Average gain for feeding period	304.1 "	336.6 "
Gain per day	2.02 "	2.24 "
Feed cost, 5,334 pounds meal at $2.30 per cwt.	$122.68	$122.68
Feed costs 31,560 pounds ensilage at $5 per ton	78.90	.....
Feed costs 18,121 pounds ensilage at $5 per ton	.....	45.30
Feed costs 8,454 pounds hay at $12 per ton	50.72	.....
Feed costs 13,008 pounds hay at $12 per ton	.....	78.04
Total cost of feed	252.30	246.02
Value at start of test, 5,305 pounds at 5 cents	265.25	.....
Value at start of test, 5,100 pounds at 5 cents	.....	255.00
Selling value, 7,130 pounds at 6¾ cents.	481.27	.....
Selling value, 7,120 pounds at 6¾ cents.	.....	480.60
Increase in value	216.02	225.60
Loss on pen	36.28	20.42
Loss per steer	6.04	3.40

SWINE

The swine carried at this Station are of the Yorkshire breed and consist of one boar, one three-year-old sow and four young sows. The sow Ottawa Lass was bred twice and had thirteen pigs. One young sow farrowed twelve pigs, one five and the other was not bred. The boar "Sheldrake" obtained in the spring, is of a September, 1920, litter, and a good bacon type Yorkshire. The feed consumption and cost of the sows and boar for one year are given in the table below. The meal averaged $2.68 per hundred pounds and the roots and ensilage were charged at $5 per ton. There was no skim-milk available during this period.

COST OF FOUR SOWS FOR ONE YEAR

	Meal		Roots and ensilage		Total cost
	Pounds	Cost	Pounds	Cost	
		$ cts.		$ cts.	$ cts.
Ottawa Lass	1,785	47·83	1,420	3 55	51 38
Kentville Lass 33	1,444	38 69	1,588	3 97	42 66
" 34	1,257	33 68	1,448	3 82	37 50
" 35	1,133	30 56	1,401	3 50	33 86
Average	1,405	37 64	1,464	3 71	41 46

COST OF BOAR FOR ONE YEAR

	Meal		Roots and ensilage		Total cost
	Pounds	Cost	Pounds	Cost	
		$ cts.		$ cts.	$ cts.
Sheldrake	1,113	29 82	1,107	2 76	32 58

FEEDING FOR PORK

Project 191.—The feed consumed by five pigs from weaning at five weeks old, June 11, 1921, to November 30, 1921, was as follows,—

2,932 pounds of meal at $2.71 per cwt.		$79 45
1,490 " skim-milk at 20 cents per cwt.		2 98
625 " mangels at 25 cents per cwt.		1 56
Total cost.		$83 99

These when slaughtered averaged 163 pounds each and were sold at 11 cents per pound, returning $89.65, or $5.66 above cost of feed.

THE FINANCIAL STATEMENT

The financial standing of this stock for the year was as follows:—

DEBIT

Feed cost of one boar	$ 32 58	
" " four sows	165 85	
" " five porkers	83 99	
" " one sow	16 78	
" " other pigs	27 10	
Boar service	8 00	
		$334 30

CREDIT

Increase in value of sows	$ 60 00	
" " boar	40 00	
Four young breeders at $15	60 00	
Two young porkers at $10	20 00	
Boar service	12 00	
Sale of finished porkers	89 65	
" young pigs	27 00	
" four young boars	40 00	
" one breeding sow	20 00	
" one boar	25 00	
		$393 65
Credit Balance		$ 59 35

HORSES

DRAUGHT HORSES

The four pairs of heavy horses were fed at the rate of 18 pounds of oats, 18 pounds of hay and 3 pounds of bran to each horse per day during heavy work. This was decreased to 12 pounds of oats, 15 pounds of hay and 3 pounds of bran on light work. Two pounds of carrots were fed each day during the winter.

The feeds consumed for the year per draught horse was as follows,—

5,800 pounds	hay at $12 per ton	$ 34 80
162 bushels	oats at 76 cents per bushel	123 12
1,100 pounds	bran at $35 per ton	19 75
400 "	carrots at $6 per ton	1 20
	Total	$178 87

Cost of feed per day, 49 cents.

DRIVING HORSES

The two driving horses were fed at the rate of 10 pounds of oats, 12 pounds of hay and 2 pounds of bran when given fairly steady driving and the oats were decreased to 8 pounds per day when not very busy. Carrots at the rate of 2 pounds per day were fed during the winter. The feed consumed by each of the light horses during the year was as follows:—

4,400 pounds	hay at $12 per ton	$ 52 80
98 bushels	oats at 76 cents per bushel	74 48
750 pounds	bran at $35 per ton	13 12
400 "	carrots at $6 per ton	1 20
		$141 60

Cost of feed per day, 39 cents.

FIELD HUSBANDRY

HAY

The hay crop on the whole was fair considering the unfavourable season. The total crop harvested was 139 tons 668 pounds. A good yield was from an area of 3½ acres in clover and timothy, which produced 10 tons, 1,448 pounds or 3 tons, 128 pounds per acre. Six acres adjoining produced 20 tons, 350 pounds of clover hay, a yield of 3 tons, 725 pounds per acre. Eight acres of diked land produced 1 ton, 1,308 pounds per acre and eleven acres produced 1 ton, 1,164 pounds per acre. Eight acres on the Western Farm which was in oats in 1920 yielded 2 tons, 973 pounds clover hay per acre.

COST PER ACRE

Rental of land	$3 00	
Share of manure	5 00	
Seed	6 50	
		$14 50
Use of machinery	$ 60	
Cutting, 1½ hours at 34 cents per hour	51	
Raking and tedding, 3 hours at 34 cents per hour	1 02	
Coiling and shaking out, 4¼ hours at 17 cents per hour	72	
Loading and unloading, 5¼ hours at 85 cents per hour	4 46	
		7 31
Total cost		$21 81

Yield per acre, 3 tons, 128 pounds.
Average cost, $7.12 per ton.

Summer Seeding for Hay and Pasture

An area of six acres of land which was cleared and ploughed during June and July of last season was prepared by applying 8 tons of stable manure, 300 pounds of acid phosphate and 2 tons of limestone per acre which was well disced into the

soil. The land was then seeded with 10 pounds timothy, 10 pounds of red clover, 4 pounds of alsike and 1 pound of white Dutch clover per acre. After seeding the ground was smoothed with the smoothing harrow. The seeding was done August 7. The catch was good and the soil well covered by fall by the plants which were well established. The yield this season from this area averaged 1 ton, 1,340 pounds of good quality of hay per acre which was exceptionally good considering the dry summer.

An adjoining area seeded at the same time but not fertilized, although limed, produced an average of 1,978 pounds per acre. Another similar area seeded August 17, winter killed in places and was worked up the following year. Seeding done on August 24 was also unsatisfactory. One year's results would indicate that land in a fair state of fertility may up to the first of August be seeded to timothy and clover with prospects of the stand carrying through the winter. It should be kept in mind that seasonable showers after seeding is a big factor in securing a well developed stand and dry weather following seeding may prevent the plants from making sufficient growth to carry over the winter. This area was intended for pasture and is in excellent condition for this purpose.

Oats and Other Grains

The area in oats was very limited and was confined principally to the cereal and different fertilizer plots. One acre in Victory oats yielded 62 bushels per acre and cost as follows:—

Rental of land	$3 00	
Share of manure	5 00	
Fertilizer, 100 pounds nitrate of soda	3 50	
		$11 50
Use of machinery	$ 60	
Ploughing in fall, 3½ hours at 34 cents	1 19	
Seed, 3 bushels at $1.25	3 75	
Twine, 3 pounds at 18 cents	54	
Discing and cultivating, 3¼ hours at 34 cents	1 10	
Seeding and smoothing, 2½ hours at 34 cents	85	
Cutting, 1½ hours at 34 cents	51	
Stooking, 2 hours at 17 cents	34	
Loading and unloading, 3 hours at 34 cents	1 02	
Threshing, 7½ hours (manual) at 17 cents	1 27	
		$11 17
		$22 67

Yield, 62 bushels per acre.
Cost per bushel, 36.5 cents.

Corn for Silage

The corn because of the dry weather was a light crop ranging from eight to twelve tons per acre. On very dry areas the lower leaves dried out completely before cutting. The variety Longfellow was grown. The total silage amounted to 152 tons 1,528 pounds.

COST OF GROWING ONE ACRE OF CORN

Project 192.—

Rental of land	$ 3 00	
Share of manure, 15 tons per acre	10 00	
Fertilizer, 100 pounds nitrate of soda $3.50, acid phosphate 300 pounds $4.80	8 30	
		$21 30
Use of machinery	$ 60	
Seed, 30 pounds	1 50	
Hauling manure and spreading, 10 hours at 85 cents	8 50	
Ploughing, 8 hours at 34 cents	2 72	
Discing and cultivating, 3½ hours at 34 cents	1 19	
Cultivating, 16 hours at 34 cents	5 44	
Hoeing, 21 hours at 17 cents	3 57	
Cutting, 6 hours at 34 cents	2 04	
Loading, 3 hours at 85 cents	2 55	
Putting in silo, 3 hours at 85 cents	2 55	
		$30 66
		$51 96

Yield per acre, 11 tons, 400 pounds.
Cost per ton, $4.64.

Sunflowers for Silage

The sunflower silage amounted to 25 tons 1,555 pounds. This also suffered from the dry weather and the lower leaves, for the most part, were entirely dried out when harvested. The yield ranged from ten to thirteen tons per acre. The Giant Russian variety was the most productive.

Spring and Fall Manured Corn Land

The practice followed in corn growing is to manure the sod land in the fall, winter and spring, and plough just before seeding. In order to gain some information as to the best practice a uniform area was manured at the rate of 20 tons per acre applied direct to the soil in the fall and on an adjoining plot at the same time the same amount per acre was put into a pile for spring application and was spread just before ploughing in the spring. The manure was uniform in each case. Both plots were ploughed at the same time and the same amount of cultivation was given to each. No other fertilizer was used. The yield was as follows:—

	Yield per acre, tons
Longfellow, spring manured	11.72
" fall manured	10.76

Turnips

The three acres of turnips grown were on land that had been in clover the previous season. This was ploughed in the fall and manured in the spring with 10 tons of stable manure per acre which was disced in and in addition 150 pounds nitrate of soda, 150 pounds of sulphate of ammonia, 100 pounds of muriate of potash and 800 pounds of slag per acre were worked into the soil and the land drilled for seeding. The stand was good but club-root developed and this together with the dry season very materially reduced the yield. The three acres produced 1,530 bushels.

Mangels

The land on which the mangels were grown was a spring ploughed sod area. Manure at the rate of 15 tons per acre was applied in the spring and the ground ploughed and worked. Fertilizer was scattered broadcast at the rate of 200 pounds of nitrate of soda and 300 pounds of acid phosphate per acre and harrowed in before seeding. The ground was well worked and the seed planted on the level with the hand seed drill in rows 2½ feet apart using eight pounds of seed per acre. The variety Danish Sludstrup was used. The yield was at the rate of 554 bushels per acre. The total mangel crop harvested amounted to 1,409 bushels. This crop suffered from the dry season as did all other root crops and the yield was consequently very light.

COST OF ONE ACRE OF MANGELS

Project 193.

Rental of land	$ 3 00	
Share of manure, 15 tons per acre	10 00	
Fertilizer, 200 pounds nitrate of soda $7, 300 pounds acid phosphate $4.80	11 80	
		$24 80
Use of machinery	$ 60	
Seed, 8 pounds at 30 cents	2 40	
Hauling manure and spreading, 9 hours at 85 cents	7 65	
Ploughing, 7½ hours at 34 cents	2 55	
Discing and cultivating, 6½ hours at 34 cents	2 21	
Seeding, 4 hours at 17 cents	68	
Cultivating, 18 hours at 27 cents	4 86	
Hoeing and thinning, 82 hours at 17 cents	13 94	
Pulling and topping, 23 hours at 17 cents	3 91	
Loading and hauling, 8 hours at 34 cents	2 72	
		41 52
		$66 32

Yield per acre, 554 bushels.
Cost per bushel, 11.9 cents.
Cost to produce 1 ton, $4.78.

Crop Yields from Fields No. 1 and No. 2

A three-year rotation, hoed crop, oats and hay is followed as far as possible in all field work, and the two fields designated below as fields 1 and 2 are simply fields so rotated. The limited land so far available renders rotation experimental work impossible on large areas. These fields have been managed in a uniform manner as far as has been possible and a record has been kept of the production from these areas, hence they may be considered as field crop rather than rotation areas. No. 1 field was cleared in 1914 and No. 2 in 1915. The object in giving the production from these areas is to indicate the possibilities of newly broken land for crop production. These areas having been brought into a fairly uniform condition will in the future be devoted to other experimental work. The production has been as follows:—

FIELD No. 1

Year	Crop	How fertilized per acre	Yield per acre
1916	Corn	15 tons manure 1,000 lbs. slag	11·59 tons
	Turnips	2,000 lbs. limestone	838·0 bushels
1917	Oats		42·0 "
1918	Clover and timothy		2·18 tons
1919	Corn	20 tons manure 450 lbs. acid phosphate 150 " nitrate of soda	18·8 tons
1920	Oats	300 lbs. acid phosphate 100 " nitrate of soda 2,000 " limestone	74·0 bushels
1921	Hay		3·2 tons

FIELD No. 2

1916	Oats	300 lbs. 4-8	30·0 bushels
1917	Turnips	15 tons manure 300 lbs. acid phosphate 100 " nitrate of soda	357·7 bushels
1918	Oats	500 lbs. 4-8 2,000 " limestone	82·0 bushels
1919	Hay		3·0 tons
1920	Corn	15 tons manure 450 lbs. acid phosphate 100 " nitrate of soda	15·0 tons
1921	Potatoes	200 lbs. nitrate of soda 500 " acid phosphate 200 " muriate of potash	190 bushels

HORTICULTURE

SEASON

The winter of 1920-21 was mild and all fruit trees came through the winter without injury. The weather during the blossoming period was favourable for the set of all kinds of fruit. The last spring frost was on May 11, there being 5 degrees of frost registered. The temperature fell to 31 degrees on the 24th when the apple trees were in full bloom. There was no damage to the blossoms, however, except in one section of the Valley where it was reported the temperature fell to 28 degrees. The season was earlier than usual the apple blossoms being ten days ahead of normal. The May temperature averaged 2.20 degrees higher than the average for the corresponding period during the past seven years. This favoured the set of fruit which was good in all varieties. The unusually bright and dry weather was unfavourable for the development of apple spot which was much less prevalent than usual. The summer on the whole was dry, particularly June and August. Fruit trees suffered very much during the latter period particularly on sandy or gravelly areas and the fruit not only matured prematurely but was much undersize. The fall weather was more favourable and rains during the latter part of September and October materially increased the size of the apple crop. October weather was such that fruit gathering could be carried on nearly every day without interruption. The first fall frost was September 21 of 3 degrees. On October 10 one degree of frost was registered, on the 18th 4 degrees, on the 26th 2 degrees and on the 27th 12 degrees, which was the first severe frost, but at this latter period the bulk of the fruit had been gathered. The crop in the three Valley Counties amounted approximately to two million barrels. The temperature, rainfall and sunshine for the six months ending September 30 was as given below and a comparison is also made of this season with the average of the same seven years previous:—

—	Mean Temperature		Rainfall		Sunshine	
	1921	Seven years 1914–20 inclusive	1921	Seven years 1914–20 inclusive	1921	Seven years 1914–20 inclusive
April	43·6	39·42	3·91	3·17	133·60	133·48
May	51·12	48·92	1·91	1·99	238·90	187·40
June	58·84	58·12	1·93	2·96	214·20	173·54
July	69·43	65·05	2·04	2·80	207·70	219·04
August	62·20	64·62	0·93	2·79	255·40	204·71
September	59·06	57·61	1·82	3·27	206·05	178·63
Total	.....	.....	12·54	17·00	1,255·85	1,096·80

PRUNING OF APPLE TREES

Project 102.—The mature apple orchard on the recently purchased Station property was pruned during the early spring commencing March 28. These trees are about twenty-five years old planted 30 by 30 feet apart and the pruning done was that necessary to remove surplus and dead branches, and open up the tree so that a good development of fruit would be possible. A record was kept of the cost of pruning one acre and the removal of the branches and was as follows:—

Labour, pruning, 14 hours at 30 cents	$4 20
" removing branches, 5 hours at 30 cents	1 50
Team, 2 hours at 50 cents	1 00
Total	$6 70

This cost was approximately 15 cents per tree. This work was completed about the middle of April and the pruning of the young orchard commenced. These trees are from seven to nine years of age and have been pruned with the idea of directing growth without the removal of very much growth. The practice so very often followed of excessive pruning on young trees has not been followed and judging by fruit yields on these young trees it would appear that moderate rather than severe pruning is advisable. It should be kept in mind, however, that the gradual removal of surplus branches, or the direction of growth so that surplus branches are not developed is necessary, and that trees cannot be left to develop without moderate annual pruning.

Crop of Fruit on Apple Trees Planted in 1912

Project 105.—Trees of Wagener planted in 1912 produced this year 2·1 bushels per tree; Ben Davis, 4·4 bushels; Blenheim, ·3 bushel; Stark, 1·9 bushel; Ribston, ·8 bushel; Rome Beauty, 1·3 bushel; Wealthy, 1·4 bushel; Cox Orange, ·9 bushel; Duchess, 1·3 bushel; Gravenstein, 1·4 bushel; Baldwin, 1·2 bushel; King, ·5 bushel and McIntosh Red, 1·4 bushel per tree. The average yields from these trees during the past three years and the average in barrels per year is given in the following table:—

Variety Planted 1912	Number of Trees Fruiting			Average Yield per Tree Barrels			Average barrels per tree
	1919	1920	1921	1919	1920	1921	
Ben Davis	18	17	18	0·916	0·121	1·47	0·836
Gano	18	14	17	0·900	0·143	1·43	0·824
Blenheim	39	30	29	0·026	0·256	0·196	0·159
Ribston	18	31	32	0·433	0·106	0·226	0·255
Stark	18	18	18	0·393	0·43	0·66	0·494
Wagener	108	104	104	0·523	0·174	0·829	0·509
Wealthy	73	64	71	0·553	0·253	0·517	0·441
Hubbardston	19	17	17	0·416	0·313	0·370	0·366
Rome Beauty	17	17	18	0·233	0·200	0·470	0·301
Cox Orange	10	11	13	0·333	0·213	0·360	0·302
Duchess	17	17	17	0·373	0·353	0·470	0·399
Nompareil	17	16	17	0·200	0·108	0·206	0·171
Golden Russet	16	15	18	0·063	0·150	0·250	0·155
Milwaukee	21	19	19	1·160	0·390	1·27	0·940
Fameuse	18	15	20	0·836	0·177	0·623	0·545
McIntosh Red	18	18	21	0·093	0·139	0·483	0·238
Baldwin	36	38	38	0·056	0·296	0·261	0·204
Crimson Beauty	17	20	18	0·176	0·162	0·333	0·226

General Treatment of Young Orchard, Crop Rotation and Fertilizers

Project 152.—The space between the young trees has been given up to general crop rotation being manured for a hoed crop every three years. The hoed crop was followed by grain and seeded to clover. Other than fertilizing at the rate of 15 tons per acre with stable manure and using 150 pounds nitrate of soda and 400 pounds of acid phosphate which was spread as close to the trees as the spreader and fertilizer distributor would work no additional fertilizers have been given, until 1921 when one pound of nitrate of soda was applied to each tree being scattered around the tree on a space to correspond with the spread of the tree.

ORCHARD ROTATION

The practice has been to use the land between the trees for field crops, leaving a strip of from five to six feet on each side of the trees for cultivation. The main orchard is spaced in rows 40 feet apart, and 20 feet apart in the rows. The yields in 1921 were greatly reduced because of the dry weather which affected this naturally dry area. A record has been kept of the production from part of the cropped areas, and is given below:—

YIELDS OF ORCHARD INTER-CROPS

Year	Crop	How Fertilized per Acre	Yield of Crop per Acre
1913	Potatoes	400 lb. 4–8–10	117·3 bushels
1914	Corn	15 tons manure 300 lb. 4–8–5 1,500 " limestone	12·0 tons
1915	Oats	400 lb. acid phosphate 100 " nitrate of soda 2,000 " limestone	57·7 bushels
1916	Clover and timothy		2·4 tons
1917	Corn	15 tons manure 500 lb. 4–10	15·8 tons
1918	Mangels	10 tons manure 800 lb. 4–10	983·0 bushels
1919	Oats	2,000 lb. limestone	62·7 bushels
1920	Clover and timothy		2·06 tons
1921	Mangels Potatoes	15 tons manure 200 lb. nitrate of soda 300 " acid phosphate	554·0 bushels 506 " 160 "

SPRAYING

Projects 121-150.—Bordeaux arsenate and lime-sulphur arsenate sprays, sulphur arsenic and copper arsenic dust have been used for spraying and dusting during 1921. The spray generally used has been lime-sulphur 1 to 40 and dry arsenate of lead, 2½ pounds to 100 gallons of liquid. The trees were sprayed May 6, May 17 and June 6. No injury from this spray or loss of fruit has been noticed. An area was sprayed with 4-8-40 Bordeaux, (4 pounds copper sulphate and 8 pounds hydrated lime to 40 gallons water), for the first two sprays before bloom and with lime-sulphur 1 to 50 for the spray right after bloom; arsenate of lime, 2½ pounds to 100 gallons was used as a poison. These trees were free from foliage injury and the fruit was of good quality. The percentage of clean fruit on McIntosh Red and Gravenstein, which varieties are very susceptible to scab was as follows,—

	Per cent Free from Scab	
	McIntosh Red	Gravenstein
Lime-sulphur	88	96.5
Bordeaux and lime-sulphur	91	93.6
Check	66	78.5

Two rows of Wagener trees considered fairly uniform were sprayed, one with lime-sulphur 1 to 40 and the other with Bordeaux 4-8-40. Arsenate of lime was used as a poison. Two sprays were given before bloom and one after. The Bordeaux

row yielded 88 bushels and the lime-sulphur row 81.25 bushels. There were 38 trees to each row. So far as could be determined there was no lessening of fruit or injury from either of these sprays. It was noticeable, however, that the lime-sulphur sprayed fruit had a much better finish and was more attractive than that from trees sprayed with Bordeaux.

DUSTING

The older trees were dusted with 90-10 sulphur arsenic dust (90 parts sulphur and 10 parts of dry arsenate of lead) and copper arsenic dust, which is made up of 10 parts dehydrated copper sulphate, 5 parts calcium arsenate and 85 parts of hydrated lime giving a dust of practically four per cent of metallic copper and 1¼ per cent of metallic arsenic.

Records were taken as to scab control on Gravensteins in this orchard from trees dusted twice before bloom and once after. On another plot five applications of copper arsenic dust, three before and two after bloom were given. The results were as follows:—

Gravenstein	Per cent Clean Fruit
Copper arsenic dust, five times	92
" " " three times	76
Sulphur arsenic dust, three times	81
Check, trees not dusted	63

It is necessary to dust during the early morning when the leaves are damp with dew and the air calm. The aim was to dust thoroughly and to do this the team was driven slowly thus giving an opportunity to place a protective covering of dust over the fruit and leaves. Thoroughness is very important in the application of dust, as it is in spraying, and it is doubtful if the desired protection can be given unless more time is given to dusting than is often practised.

The material used and the time required to do the work in an orchard of apple trees twenty-five years old is given below for both dusting and spraying. The copper arsenic dust spreads better than the sulphur dust and averaged 72 pounds per acre for one application, whereas 82 pounds was the average of sulphur arsenic dust used.

	Copper Arsenic Dust Pounds	Spray Gallons
Amount used per tree, 1 application	1.8	6.5
" " " 3 "	5.4	19.5
" " " 5 "	9.0	32.5
" " per acre, 40 trees, 3 applications	216.0	780.0
" " " 40 " 4 "	288.0	1,040.0
" " " 40 " 5 "	360.0	1,300.0
	Minutes	Hours
Time required per acre of 40 trees, 1 application	15	1.75
" " " 40 " 3 "	45	5.25
" " " 40 " 5 "	75	8.75

Cost of material per acre of forty trees, one application:—

Copper Arsenic	Sulphur Arsenic Dust	Bordeaux Arsenate 4-8-40	Lime-sulphur Arsenate 1 to 40
$4 32	$5 74	$4 09	$2 69

The copper arsenic dust cost 6 cents per pound and the sulphur arsenic dust cost 7 cents per pound. The copper sulphate 8¼ cents per pound; hydrated lime was $25 per ton; concentrated lime-sulphur, $8.50 a cask of 40 gallons; arsenate of lead, 17 cents per pound; arsenate of lime 20 cents per pound. The team and two men and machine were charged at the rate of 80 cents per hour.

The cost per acre in 1921 of forty trees, twenty-five years old, given three applications, two before bloom and one after was as follows:—

—	Copper arsenic dust	Sulphur arsenic dust	4-8-40 bordeaux arsenate	Lime-sulphur arsenate 1 to 40
Materials used	216 lbs.	246 lbs.	780 gals.	780 gals.
Time to apply	45 min.	45 min.	5¼ hrs.	5¼ hrs.
Cost of material	$12.96	$17.22	$12.28	$8.09
Cost of application	0.60	0.60	4.20	4.20
Total cost	$13.56	$17.82	$16.48	$12.29

PLUMS

Project 118.—Considerable loss has resulted from black knot which has been bad on our plum trees since this orchard was established. Every precaution has been taken in keeping this disease in check by cutting out the diseased places twice each year and not allowing any of the knots to ripen spores. The trees have been sprayed with Bordeaux mixture as well. Knots have appeared in places which made it necessary to cut out much growth and consequently the trees are not as uniform as one would like, nor have they the development necessary for a large fruit crop.

Fifty-eight varieties fruited during the past year. The variety Earliest of All, Burbank, Shiro and October Purple were the four best of the Japanese sorts and the Shipper Pride, Gucii, Monarch, Green Gage, Grand Duke, Bradshaw and Lombard are the leading European kinds.

The date of full bloom of the different varieties of plums during the past season was as given below. It is desirable when planting that varieties in full bloom at the same time be planted together to aid in pollination. The period of full bloom was short during the past season and records show the range in period of bloom was not as great as is usual.

May 14

Earliest of All

May 15

Red June
Hale
Willard

May 16

Abundance
Climax
Freeman
Duane Purple
Lombard
Tennant Prune
Empire
Monroe
Reine Claude

May 17

Burbank
October Purple
Gueii
Georgeson

May 18

Green Gage
Tatge

May 19

Spaulding
Hudson River Purple
Quackenboss
Frost Gage
Jefferson
Peters Yellow Gage
Paul Early
Cling Stem
Monarch
Sheldrake
Hector
Imperial Gage
Coe Golden Drop
Guthrie Late
Arch Duke
Moore Arctic
Yellow Egg
Washington
Belgian Purple

May 20

Frost
Transparent
Miller Superb
Newark
Shipper Pride
Damson Freestone
Shiro
America
Pearl
Belle de Louvain
Curlew

May 21

Chabot
Imperial Epineuse
Drap d'Or
Agen
Italian Prune
California
Shropsire Damson
Yellow Japan

FRUIT HARVESTED

The dates the fruit was harvested during the past season were as follows:—

August 4
Earliest of All

August 10
Red June
Willard

August 13
Shiro

August 16
Abundance

August 17
Paul Early

August 18
Climax

August 28
Gueii

August 29
Hale

August 30
Moore Arctic
Belle de Louvain

September 2
Freeman
Shipper Pride
Sheldrake
Voronesh
Curlew
Burbank

September 5
Spaulding
Frost
Imperial Epineuse
Hudson River Purple
Quackenboss
Transparent
Frost Gage
Jefferson
Miller Superb
Peters Yellow Gage
Duane Purple
Imperial Gage
Guthrie Late
Shropsire Damson
Arch Duke
Washington
Pearl
Belgian Purple

September 8
Yellow Japan

September 9
Chabot
Lombard
Cling Stem
Hector
California
Empire
Monroe
America
Yellow Egg
Tatge
Green Gage
Monarch

September 11
Georgeson

September 12
October Purple
Drap d'Or
Damson Freestone
Coe Golden Drop
Reine Claude

September 13
Agen

PEACHES

Project 115.—A number of the different sorts of peaches grown at this Station ripened during the past year. The trees are in the majority of cases not thrifty looking and because of the dry weather the fruit was small. The Arp Beauty and Greenboro are the two outstanding varieties of those tested. The former is a yellow fleshed and the latter a white fleshed variety. Both are partial cling, but when fully ripe are quite freestone. The Mayflower is a good very early white fleshed peach but small in size.

The date of full bloom and of harvest is given in the table below:—

May 14
Early Barnard

May 15
Alexander

May 17
Triumph

May 18
Greensboro

May 19
Engle Mammoth

May 20
Crawford Early
Early Beatrice
Early York
Duchess of Cornwall

May 20
Early Canada
Bokhara

May 21
Alton
Eureka
Arp Beauty

May 21
Iron Mountain
Captain Ede
Early Rivers
Mountain Rose
Smock
Foster
Mayflower
Duke of York

May 22
Yellow Rareripe
Hill Chili
Admiral Dewey
Brigdon

DATE OF HARVEST

Mayflower	August	2	Early York	September	10
Early Canada	"	10	Yellow Rareripe	"	11
Duchess of Cornwall	"	15	Alton	"	13
Arp Beauty	"	15	Early Beatrice	"	17
Hill Chili	"	20	Mamie Ross	"	20
Early Barnard	"	20	Champion	"	20
Triumph	"	20	Alexander	"	20
Admiral Dewey	"	20	Eureka	"	23
Greensboro	"	20	Mountain Rose	"	23
Duke of York	"	22	Kalamazoo	"	25
Bokhara	"	30	Brigdon	"	30
Abundance	September	4	Captain Ede	October	5
Early Rivers	"	4	Smock	"	6
Engle Mammoth	"	6	Foster	"	6
Crawford Early	"	9			

CHERRIES

Project 111.—Below is given a list of the cherries fruited during the year and the date of harvest. The blossoming period is also given. Birds render the profitable growing of sweet cherries about impossible, and it is difficult to get well ripened fruit of this class. The Governor Wood is one of the best of the early sweet yellow varieties. The Black Tartarian is a later excellent red sweet cherry and Yellow Spanish a fine yellow. Empress Eugenie and May Duke are two of the best Duke cherries. The Windsor is the best of the red Bigarreau cherries tested and Napoleon or Royal Ann is the finest of the yellow varieties of this class. Of the sour varieties the Montmorency is the best. The Ostheim and English Morello are later desirable sour varieties with wine-coloured juice. Belle Magnifique and Late Duke are two good very late Duke sorts:—

BLOSSOMING PERIOD

May 13
Early Purple Guigne

May 14
Schmidt

May 15
Royal Ann
Downer Late Red

May 16
Terry
Dikeman
Napoleon
Black Tartarian
Waterloo
Yellow Spanish
Coe Transparent
Bing
Bear River

May 17
Montmorency Sweet
Rockport
Empress Eugenie
Kirtland

May 18
Montmorency
Paul
Mercer
Louis Philippe
Royal Duke

May 19
May Duke
Dyehouse
Nouvelle Royale

May 20
Montmorency Large
Timme

May 20
Marguerite
Elton

May 21
Governor Wood
Montmorency King
Montmorency Monarch
Wragg
Vladimir
Early Richmond
Elkhorn
English Morello
Baldwin
Windsor
Suda Hardy
Arch Duke

May 22
Ostheim
Belle Magnifique
Late Duke

DATE OF HARVEST

June 30
Early Purple Guigne

July 3
Rockport
Ida
May Duke

July 4
Dikeman
Governor Wood
Kirtland
Black Eagle

July 5
Elton
Empress Eugenie

July 6
Terry
Coe Transparent
Florence

July 11
Baldwin

July 11
Bear River
Black Tartarian

July 12
Early Richmond
Vladimir

August 4
Belle Magnifique
Marguerite

DATE OF HARVEST—*Concluded*

August 12
Late Duke
Obesse d'Origines

July 13
Dyehouse
Elkhorn
Louis Philippe
Arch Duke
Schmidt
Waterloo
Yellow Spanish
Terry

July 18
Downers Late Red
Nouvelle Royale
Timme
Royal Duke
White Caroon
Olivet

July 19
Montmorency Monarch
" King
" Large
" Stark
Paul

July 23
Mercer
Windsor
Royal Anne
Napoleon

July 26
Ostheim
Wragg
English Morello
Suda Hardy

ORCHARD FERTILIZER EXPERIMENT

Project 194.—The object of the series of tests with fertilizers on orchard trees is to ascertain which of the three elements nitrogen, phosphoric acid and potash are of the greatest value and which combination of these are likely to give best results in orchard fertilization. In addition to commercial fertilizers manures have been added to some plots and to others ground limestone.

One series of experiments was started when the trees were planted in 1913 and this has been extended to a more complete series starting in 1916 on trees planted in 1913, making a total of 51 trial plots. There are two trees of Gravenstein on plots 1 to 34 inclusive, and on plots 35 to 51 two trees of McIntosh Red. The trees are 20 by 40 feet apart, the Wagener being used as fillers.

The fertilizer has been applied to a space 100 feet long and 36 feet wide with the trees in the centre. The space along the row in which the tree is growing is kept cultivated in width to correspond to the spread of the tree and is widened from year to year as the trees develop. Cultivation of this strip along the row is discontinued after July 1 each year. The fertilizer is applied in the spring and harrowed into the soil. The fertilizer has been applied with the potato crop and when seeding to grain.

The areas not required by the trees have been cropped under a three-year rotation with potatoes, grain and clover. At maturity areas of one-twentieth-acre have been harvested separately at each side of the trees, the product from these areas weighed, thus securing data as to the crop yields in the orchard on the land not required by the tree for its development. As time goes on this area will be given over to the tree entirely. The results from these are given in the table below, the total product per acre as calculated from the yields of these plots being given.

As these experiments were designed to gain information relative to the growth of the apple trees a record has been made of the growth for the years 1919, 1920 and 1921 by calipering the trees ten inches from the ground. The growth in 1919 is given as well as the average increase in diameter over this for the two years 1920 and 1921. These trees are just coming into fruiting and should give some data of value with respect to fruit yield within the next few years.

In the first stated series it will be seen that plots 7, 8 and 12 are the same mixture applied at the rate of 400, 600 and 800 pounds per acre respectively. Plots 3, 5, 9 and 13 have each received the same amount of nitrogen and phosphoric acid but 150, 100, 60 and 30 pounds of muriate of potash respectively. It will be noticed that plots 1 and 16 are fertilized alike and that the only difference between these and plot 4 is that this plot had its nitrogen applied in the form of sulphate of ammonia. Plot 17 has received acid phosphate only and may be compared with plot 21 receiving basic slag only. Plot 22 received nitrate of soda and basic slag and may be compared with plot 24 receiving the same nitrate of soda and acid phosphate.

In the second series it will be noted that plot 25 has been manured the same as plot 32; the latter, however, has had four tons limestone, half in 1916 and the other half in 1919; the results in favour of liming are very striking. It will be noticed that

plot 42 has been limed and given nitrate of soda, whereas plot 48 has been limed only. Plots 47 and 50 have had no lime and were fertilized alike except that 47 had acid phosphate and 50 basic slag. Plot 39 had limestone, otherwise was treated as plot 50 which had no lime.

On looking over the growth made by the trees it will be seen that there is little difference in the annual average growth of the trees and that the differences in yield of the crops grown between the trees does not in any way show a corresponding difference in the growth of the trees growing on these plots.

It should be pointed out that there is a factor in tree development the effect of which is difficult to measure and that is the variation in root development largely due to variation in seedling stock on which the trees were grafted. This possible variation can be overcome only by having nursery stock grafted on stock propagated vegetatively thus securing uniformity in the root development.

POUNDS PER ACRE OF FERTILIZER APPLIED IN 1913, 1914, 1916, 1917, 1919 AND 1920.

Plot	Nitrate of Soda 15% N.	Acid Phosphate 16% P_2O_5	Basic Slag 11·2% P_2O_5	Muriate of Potash 50% K_2O.	Sulphate of Ammonia 20% N.	Bone Meal 2½% N.	Manure 15 tons per acre 1916–19	Limestone 2 tons per acre 1916–19
1	150	350	.....	150	.....	.....	.....	
2	150	.....	500	150	.....	.....	.....	
3	150	.....	.....	150	.....	500	.....	
4	.....	350	.....	150	150	.....	.....	
5	150	350	.....	100	.....	.....	.....	
6	Check	.....	.....	.....	.....	.....	.....	
7	92·3	215·4	.....	92·3	.....	.....	.....	
8	138·5	323	.....	138·5	.....	.....	.....	
9	150	350	.....	60	.....	.....	.....	
10	150	.....	.....	.....	.....	.....	.....	
11	Check	.....	.....	.....	.....	.....	.....	
12	184·6	430·8	.....	184·6	.....	.....	.....	
13	150	350	.....	30	.....	.....	.....	
14	Check	.....	.....	.....	.....	.....	.....	
15	.....	.....	.....	150	.....	.....	.....	
16	150	350	.....	150	.....	.....	.....	
17	.....	350	.....	.....	.....	.....	.....	
18	.....	.....	.....	.....	.....	500	.....	
19	Check	.....	.....	.....	.....	.....	.....	
20	.....	350	.....	150	.....	.....	.....	
21	.....	.....	500	.....	.....	.....	.....	
22	150	.....	500	.....	.....	.....	.....	
23	150	.....	.....	150	.....	.....	.....	
24	150	350	.....	.....	.....	.....	.....	
25	.....	.....	.....	.....	.....	.....	15	.....
26	Check	.....	.....	.....	.....	.....	.....	
27	.....	250	250	.....	.....	.....	15	
28	.....	.....	500	.....	.....	.....	15	4,000
29	.....	250	250	.....	.....	.....	15	4,000
30	.....	.....	500	.....	.....	.....	15	
31	.....	500	.....	.....	.....	.....	15	
32	.....	.....	.....	.....	.....	.....	15	4,000
33	.....	500	.....	.....	.....	.....	15	4,000
34	Check	.....	.....	.....	.....	.....	.....	
35	.....	.....	500	.....	.....	.....	15	
36	150	.....	500	.....	.....	.....	.....	4,000
37	150	250	250	.....	.....	.....	.....	4,000
38	.....	.....	500	.....	.....	.....	.....	4,000
39	150	.....	500	150	.....	.....	.....	4,000
40	Check	.....	.....	.....	.....	.....	.....	
41	150	500	.....	.....	.....	.....	.....	4,000
42	150	.....	.....	.....	.....	.....	.....	4,000
43	.....	500	.....	.....	.....	.....	.....	4,000
44	Check	.....	.....	.....	.....	.....	.....	
45	150	.....	500	.....	.....	.....	.....	
46	Check	.....	.....	.....	.....	.....	.....	
47	150	500	.....	150	.....	.....	.....	
48	.....	.....	.....	.....	.....	.....	.....	4,000
49	150	500	.....	.....	.....	.....	.....	
50	150	.....	500	150	.....	.....	.....	.....
51	.....	500	.....	.....	.....	.....	.....	

YIELD OF TOTAL PRODUCT PER ACRE—TREE GROWTH

Plot	Oats 1914	Hay 1915 1918 1921	Potatoes 1913 1916 1919	Wheat 1917 1920	Straw	Diameter, 1919		Increased Tree diameter 1920–21	
						Gr.	Wag.	Gr.	Wag.
	Bush.	Lb.	Bush.	Bush.	Lb.	Lbs.	Inches	Inches	Inches
1	54·8	5,215	575·5	36·5	3,920	2·5	2·4	0·6	0·5
2	48·2	7,410	580·5	40·6	3,700	2·8	2·8	·6	·5
3	58·8	6,810	670·7	46·8	3,840	3·2	2·8	·7	·6
4	62	4,715	700·7	31	3,100	2·9	3·06	·7	·5
5	53·5	5,515	643·0	34	4,170	3·25	3·25	·65	·45
6	30	3,100	435·7	15·6	1,920	3·4	2·7	·6	·7
7	48·2	5,680	660·7	30·8	3,120	2·8	3·3	·6	·6
8	61·5	7,055	724·5	38·3	3,180	3·8	2·9	·1	·8
9	54·1	6,035	705·7	34	3,860	3·4	3·3	·7	·4
10	38·6	4,885	557·7	21·8	1,940	3·3	2·5	1·2	·4
11	32·2	3,095	435·5	16·5	1,320	3·3	2·8	·7	·7
12	61·7	8,360	790·0	48·6	3,920	3·5	2·9	·6	·3
13	55·2	6,385	602·2	38·8	4,000	3·5	2·7	·9	·2
14	25·2	3,960	429·7	18	2,000	2·7	2·8	·3	·1
15	27·6	6,700	473·7	18·3	1,300	3·4	2·9	·5	·4
16	68·8	8,935	768·5	40·8	3,560	3·7	2·9	·9	·6
17	30·6	6,330	487·2	27	2,580	3·5	2·2	·4	·2
18	37	7,190	620	35·1	3,220	3·4	3·07	·1	·5
19	30	5,010	484·2	23·1	1,620	3·6	3·08	1·0	·7
20	45·2	6,560	539·7	23·8	1,780	3·02	3·2	·7	·7
21	33·5	12,137	531·5	36·6	3,410	3·8	3·3	·5	·3
22	54·1	16,041	627·5	49·1	4,980	3·7	2·9	·8	·4
23	54·6	7,575	651·5	33·5	2,860	3·3	3·4	·8	·5
24	58·8	8,205	594·2	35·6	3,160	3·3	2·8	·7	·4
25	.....	2,935	529·5	31·5	2,200	3·1	2·8	·7	·7
26	.....	1,110	322·7	18·1	1,260	3·1	2·5	·6	·4
27	.....	5,740	576·7	42·3	3,240	3·3	2·9	·2	·6
28	.....	9,065	667	54·5	5,960	3·4	2·5	·8	·6
29	.....	9,725	651	60·5	6,320	4·2	2·6	·5	·5
30	.....	4,645	502·2	40·1	3,080	2·7	2·5	·7	·5
31	.....	3,815	490·5	34·6	2,300	2·9	2·2	·9	·6
32	.....	7,335	575·7	50	4,580	3·2	3·1	·6	·7
33	.....	8,985	611·7	48·8	5,240	3·2	2·5	1·0	·7
34	.....	2,315	323·5	21·7	1,800	2·9 McIntosh	2·7	·1	·6
35	.....	4,750	473·5	44·5	3,160	2·6	2·3	·2	·6
36	.....	4,175	324·5	50	3,720	2·3	2·4	·6	·6
37	.....	7,065	401·7	48·6	4,960	2·5	2·3	·4	·7
38	.....	6,015	332·5	39·3	3,460	3·4	2·7	·7	·7
39	.....	6,435	548·2	49·8	6,060	2·8	2·5	·7	·9
40	.....	1,255	282·7	22·5	1,540	2·5	2·3	·6	·4
41	.....	4,545	352·7	47·3	3,740	2·9	2·2	·6	·6
42	.....	5,155	422·7	39	3,600	3·4	2·7	·3	1·0
43	.....	5,495	377·5	33	2,920	2·7	2·7	·8	·6
44	.....	1,470	222·5	23·3	1,820	2·6	1·9	·7	·5
45	.....	3,275	328·5	46·3	3,480	2·6	2·3	·5	·5
46	.....	2,745	303·5	25	1,580	2·9	2·3	·5	·6
47	.....	4,650	451	41·8	3,600	2·6	2·4	·6	·6
48	.....	4,865	271	33·1	2,880	3·02	2·6	·58	·7
49	.....	3,980	364	52·2	3,920	2·6	2·2	·1	·6
50	.....	6,055	440	46·1	4,700	2·4	2·7	·6	·6
51	.....	6,670	334	28·1	2,660	2·6	2·6	·3	·6

NOTE.—Gr. = Gravenstein. Wag. = Wagener.

ORCHARD FERTILIZER EXPERIMENT—II

This experiment was carried out on a block of Golden Russet trees at Berwick, N.S., which had borne very little fruit up to 1913. The trees were at that time about eighteen years of age and fairly uniform. Four trees were used to each plot. The soil is light gravelly loam of poor quality. Fertilizers were applied in the spring of 1913 and each year up to and including 1917. The orchard was ploughed each spring and cultivated with the spring tooth harrow about once every week to the middle of June. Buckwheat and vetch were sown for cover crop. It will be seen that a fair crop of fruit has been produced on these trees each year with the exception of 1918.

It would seem that a fertilizer containing 150 pounds of nitrate of soda, 15 per cent nitrogen, 250 pounds of acid phosphate, 16 per cent phosphorus and 100 pounds of muriate of potash, 50 per cent potash, which combined would make 500 pounds of approximately 4-8-10 fertilizer is a satisfactory application per acre. There does not appear to be any economical gain from using a larger amount per acre. The check trees were surrounded by fertilized areas and evidently secured some nourishment from the fertilizers applied to the adjoining fertilizer plots. The results were as given below:—

ORCHARD FERTILIZER EXPERIMENT—GOLDEN RUSSET—1913 TO 1919

Plot	How Fertilized	Average Yield per Tree, pounds							Average yearly gain per tree over 1913	Average per cent No. 1 & 2
		1913	1914	1915	1916	1917	1918	1919		
1	4-8-10; 600 lb. per acre	86·5	198·5	219·7	267·5	295·2	39·7	482·5	144·0	91·4
2	4-8-5; 600 lb. per acre	72·0	179·0	218·0	132·7	270·0	25·7	195·0	98·0	91·5
3	4-4-5; 600 lb. per acre	49·5	140·0	163·0	158·0	213·0	31·5	342·0	108·4	97·3
4	2-8-10; 600 lb. per acre	45·0	130·5	138·0	254·5	150·5	47·0	250·5	117·0	93·3
5	4-8-10; 900 lb. per acre	15·5	94·5	146·2	242·2	195·5	44·0	389·5	169·8	95·1
6	4-8-5; 900 lb. per acre	46·5	196·5	189·5	170·2	170·2	34·0	432·0	152·2	94·8
7	4-4-5; 900 lb. per acre	26·5	194·5	242·5	171·5	198·5	46·5	305·5	166·5	94·4
8	2-8-10; 900 lb. per acre	53·0	193·0	134·3	262·6	199·0	33·0	380·3	147·3	92·6
9	Manure, 15 tons per acre	34·0	177·5	146·7	242·5	170·7	35·5	415·0	163·9	92·2
10	Fish, 500 pounds per acre	32·0	153·0	238·0	290·0	141·0	27·0	407·0	177·3	94·0
11	No fertilizer	42·6	158·6	219·0	215·0	194·3	29·3	467·6	171·3	88·8

SMALL FRUITS

STRAWBERRIES

Project 120.—Of the twenty-six varieties of strawberries tested the varieties given below have been the best yielders during the past year. The plots are two rows 16½ feet long, each planted four feet apart and the plants fifteen inches apart in the row. The matted row system is adopted. The plants were set May 6, 1920. The ground had been manured at the rate of 15 tons stable manure per acre and 150 pounds of nitrate of soda and 450 pounds of acid phosphate was applied per acre broadcast when planted. The Senator Dunlap has been our best variety for several years and seems well adapted to Valley conditions. It is a perfect flowering variety, makes a good stand on light soils and the fruit stands shipment well. Because of dry weather the crop was light throughout.

	When Ripe	Yield per Plot Quarts
Senator Dunlap	June 23	74.0
Corsican	" 22	74.0
Arnout	" 25	70.0
Cordelia	" 22	64.0
Premier	" 21	62.5
Glen Mary	" 23	61.2
President	" 25	61.0

To gain information as to whether there is any advantage in selecting well developed plants for planting rather than using the smaller ones which may be dug from the side of the rows a test was made with the results as given below. It would appear that there is an advantage in favour of the better developed plants. A test was made also of the early as compared with the late planting. The plants used in this planting were of medium size, no small ones being used, they on the whole were not as large as those used on the selected large plant plots. There is a gain from early planting as indicated by the results:—

	Planted, 1920	Yield per Plot Quarts
Selected large plants	May 6	97.0
" small plants	May 6	76.7
" ordinary plants	June 11	75.0

One plot of Senator Dunlap was planted as the other plots and all runners were kept cut off leaving only the planted plants to develop. This plot was adjoining the above three plots. It will be seen that the yield is not as good as where grown under the matted row system. However, more plants could have been grown on this area, by placing the rows two feet apart.

	Yield per Plot Quarts
Hill System—Set May 6	44.2

A series of plots were planted through the field commencing on a rather light soil area rather higher than the rest of the field and falling to more of a loam soil of better natural fertility. The planting was all done at the same time. The dry weather was very trying on the elevated area and the effect of the dry weather was very noticeable both in the appearance of the plants and in the crop produced. Had the weather not been so dry the results would not have been so striking, but in a season of short rainfall the depth of surface soil and capacity of the subsoil to hold moisture is a factor of great importance as indicated by these results. All this land was treated alike.

Senator Dunlap	Planted, 1920 May 6	Yield per Plot Quarts
Sandy loam knoll		32.5
" " " on decline		46.5
" " flat		70.2
" " " deeper surface soil		74.0

RASPBERRIES

Project 110.—The yield of raspberries was extremely light because of the unusually dry weather during fruiting period. The Newman Seedlings Nos. 1 and 20 were the best yielders and are the best for market purposes. The yields per acre as calculated from the crop on the plots were as follows:—

	First Ripe	Yield per Acre Quarts
Newman Seedling No. 1	July 16	3,193
" No. 20	" 16	2,768
" No. 24	" 16	2,646
" No. 1	" 16	2,283
" No. 23	" 18	1,800
" No. 21	" 18	1,485
Cuthbert	" 14	1,476
Eaton	" 16	873

BUSH FRUITS

Because of having to move the old plantation a new plantation of bush fruits was set this year. The plants were secured in 1920 and set in nursery rows from which they were planted permanently four by four feet apart on April 16, 1921. These have made a promising start.

ANNUAL FLOWERING PLANTS

Project 93.—The annual flowering plants in the borders were not as attractive as usual, owing to the excessively dry season. Their period of bloom was short and their growth inferior. Because of water shortage generally it was not possible to irrigate these plants.

Flower Garden Test Plots, Experimental Station, Kentville, N.S.

The plants were started from seed sown in flats in the greenhouse and these were later transplanted to other flats spacing the plants two inches apart. This

method makes possible planting without much check and consequenly better and earlier bloom results. Some pansies started early in February were set out May 16. They were in bloom when set and continued to make a good show until the dry weather in August. Marguerite carnations were started March 26 and were in bloom by the middle of August. The other varieties were set out after danger from frost during the first week in June.

The date of seeding as given is found to be early enough for the development of good plants by bedding out time if soil conditions are good:—

—	Date Seed Started	Date of First Bloom
Carnation, Marguerite	Mar. 26	Aug. 15
Pansy	" 26	June 10
Lobelia	" 26	Ju.y 15
Dianthus Heddewegii	" 26	June 20
Verbena	" 26	July 2
Antirrhinum	April 4	" 3
Phlox Drummondii	" 4	" 5
Alonsoa	" 9	" 21
Alyssum	" 9	June 15
Browallia elata	" 9	July 1
Celosia	" 9	June 20
Datura Wrightii	" 9	July 23
Jacobea	" 9	Sept. 15
Coreopsis	" 13	July 10
Hibiscus Africanus Major	" 13	" 17
Linum grandiflorum	" 13	" 12
Larkspur	" 13	" 15
Nicotiana affinis	" 13	" 9
Nemesia	" 13	" 26
Portulaca	" 13	" 16
Rodanthe	" 13	" 21
Sweet Sultan	" 13	" 6
Schizanthus	" 13	June 27
Stocks	" 13	July 11
Balsam	" 16	" 15
Chrysanthemum	" 16	" 15
Calendula	" 16	" 4
Dimorphotheca	" 16	June 28
Helichrysum	" 16	July 4
Marigold	" 16	June 29
Scabious	" 16	" 29
Tagetes	" 16	" 29
Virginian Stock	" 16	July 1
Zinnia	" 16	" 28

GREENHOUSE WORK

During the spring months the greenhouse is devoted entirely to the growing of annuals for bedding purposes and vegetables that are required for transplanting. Through the summer and early fall months ferns and chrysanthemums occupy the benches and a few pot plants are also grown. During the winter the geraniums for spring planting are grown from cuttings taken in the fall before frost. A small area is given up to carnations. Any additional space is given over to tests of various kinds and among the crops grown are tomatoes.

GREENHOUSE TOMATOES

Project 195.—Four varieties of tomatoes were grown during the winter of 1920-21. These were from seed started July 7. They were transplanted to three inch pots July 26 and to the bench August 26, 12 by 18 inches apart. They were

trained to a single stem and all the lateral growths kept removed. Below is given the yield per square foot of bench space.

	First Fruit Ripe	Yield per Square Foot
Bonny Best	December 6	3.3
Carter Sunrise	" 6	2.7
Livingston Globe	" 22	2.4
Lister Prolific Improved	" 6	2.3

Bonny Best was the most satisfactory, being of excellent colour and shape and considerably larger than Sunrise or Prolific, both of which ran too small for general market. In order to carry tomatoes satisfactorily a night temperature of 58 to 60 degrees is necessary, and on dull days 60 degrees. Under bright sun a temperature of 65 to 70 degrees is not objectionable.

RHUBARB FORCING

Project 196.—Clumps of rhubarb which had been two years planted from seedlings were forced under a bench in the greenhouse. These clumps were dug in the fall and allowed to thoroughly freeze before forcing. They were brought inside on January 16 and placed under the bench January 18. Some sand was scattered around the roots to hold moisture. Canvas was placed around the bench to exclude light. The first rhubarb was ready February 3 and it was finished March 30. The area occupied was 22 square feet. The yield was 89.75 pounds. The yield per square foot was 4.07 pounds.

GERANIUMS

Project 197.—There is no bedding plant that gives a more satisfactory summer bloom than the geranium. It will continue to flower from planting after danger of frost in June to autumn frosts. These are propagated by taking cuttings before frost about the last week in September. If more plants are desired lift the plants from which cuttings have been taken, shaking off the earth, and place three plants together in a seven-inch pot, using good garden soil and packing the soil around the roots. These will later break into good strong growth to furnish additional cuttings.

The cuttings are made from the latest green growth, the base of the cutting being at a joint. The leaves and bracts at the base of the leaves are removed leaving only one or two leaves at the top of the cutting. These are placed in good clean sand about 1½ inches deep and the sand well firmed about the plant. In five or six weeks roots will have formed when the rooted cuttings are potted into good soil in three-inch pots, and about the end of February they should be repotted to four-inch pots where they remain until used for bedding out. Four varieties which have given good satisfaction are: S. A. Nutt, crimson; Alphonse Ricard, orange scarlet; Beaute Poitevine, salmon; La Favourite, white. Madame Salleroi is a very effective variegated foliage geranium useful for edging. The plants are lifted in the fall and put in pots and cuttings are taken from these in January and later during the winter.

CHRYSANTHEMUMS

Project 198.—After the bloom is past a number of the best of the chrysanthemum roots are removed to a cool side bench for the purpose of propagation. This is done by means of shoots which start up from the base of the plant. About the latter part of February cuttings are taken from the thriftiest shoots avoiding long weak growths and also growths that have developed much woody tissue. These are placed in sand to root. When roots are formed the plants are set in three-inch pots and later they may be shifted to four-inch pots, from which they are set to the bench in the greenhouse about the first of the second week in June. In making the cuttings aim to have them about three inches long, making a square cut across the stem at the joint as from this point roots will strike most readily. The side leaves are all stripped

off and the top leaves are partly cut back to overcome too great transpiration. Clean, sharp sand well pounded to make it firm should be used in the propagation bench, and it should be perfectly level to permit of uniform watering. After the cutting is placed the sand should be well packed around it. The cutting is set about one and one-quarter inches deep, and when roots have developed about one-half inch they should be potted into good soil. The plant should not be allowed to wilt in the propagation bench and shading may be necessary to prevent this, particularly on bright days.

The soil in which the chrysanthemum is to be grown should be a rich garden loam with a good supply of available plant food and sufficient humus to make it readily friable. Feeding with liquid manure, or using a manure dressing may be practised to advantage after the buds have been selected. Care is necessary not to overforce the plant for to do so will result in disappointment because of soft, poorly developed flower stalks and flowers.

When plants are growing they may be developed into one, two or three stems and a bloom to each stem by the removal of lateral growths and buds. Those with a few branches require less space than when allowed to branch and grow naturally. Under such conditions they are spaced 12 to 15 inches apart and tied to supports. In following this development having in view large bloom it is necessary to give particular attention to the training of the plant, and the removal of buds to direct desired growth. The first bud to appear is called a crown bud; this bud is surrounded by lateral growth which growth later will produce either another crown bud, or terminal buds which are in clusters. The practice usually followed is to remove the crown bud and leave one, two or three of the lateral growths which produce the terminal buds, and of these terminal buds which are in clusters the strongest is left to develop the flower. The second crown bud is sometimes left, as determined by the judgment of the operator. The development of the plant and the season are factors determining this, but as a rule the terminal buds will give the most satisfactory bloom, and if the second crown bud appears it is done away with and the best and usually the top lateral growth left to later develop a suitable terminal bud, which is left after the removal of the weaker buds in the cluster as indicated above.

All side lateral growth along the plant is kept pinched out and all suckers removed. In growing the single and pompon varieties no or little removal of buds is practised and they are allowed to grow spreading which of course means that they must be given more space. Such plants may be carried in pots, and, in fact, the single or double stemmed plants may also be grown in this way satisfactorily. In order to get low branched bushy plants it is necessary to have the plants start laterals early, and to bring this about, pinching off the top may be desirable.

Varieties which have been grown are old standard sorts and many of the later introductions are doubtless better. Those grown are: yellow, Yellow Eaton, Major Bonnaffon and Chelton; white, Early Snow, Alice Byron and Timothy Eaton; cream, Jones; pink, Pennsylvania, Dr. Enguehard; single, Mrs. Ames Holden, Mary Anderson, and Dorothy Duggan.

VEGETABLE EXPERIMENTS

LETTUCE

Project 161.—The Grand Rapids, an open-head variety, and All Heart, a head variety, have proven as good as any of the fifteen sorts tested this season. Iceberg and Improved Hanson are also two good sorts. Seed started under glass the latter part of March and the seedlings planted into flats two inches apart and set to the field May 3 were fit for market June 15. Duplicate plots from seed started in the field May 6 were fit for use July 15. Because of the dry season the later sowings were not satisfactory.

CARROTS

Project 157.—These were grown in rows 18 inches apart and thinned to three inches apart in the rows. The carrot rust fly maggot has caused much damage and there does not appear to be an effective practical method of control except to seed after June 1. It has been found that plants from the later seeded plots ranging from early in June until the last of June are generally free from this pest, and with favourable soil conditions the product of really desirable cooking carrots is as

Vegetable and Strawberry Test Plots, Experimental Station, Kentville, N.S.

great as from the earlier seeded plots. The later the planting the smaller the yield but early seeded plots usually have many overgrown unmarketable roots which are not the best for home cooking. The Scarlet Horn is useful as a very early sort but is otherwise not of any value. The seed was sown May 6 and the product from the three best yielding sorts from rows 16½ feet long was as follows:—

—	Ready to use	Yield per plot
Intermediate	Sept. 10	7·0 lb.
Improved Danvers	Aug. 30	6·5 "
Chantenay	" 30	5·7 "

BEETS

Project 154.—The test with garden beets would indicate that the standard of quality is not as good in many sorts as formerly. Probably now with more attention being given to selection we can hope for improvement. The tests were con-

ducted in rows 18 inches apart and they were thinned to three and four inches apart in the row. For quality, Detroit Dark Red, Crosby, Egyptian, Early Wonder and Crimson Globe were the best. Detroit Dark Red thinned to two inches yielded 35 pounds, three inches apart 35½ pounds, and four inches 27 pounds from the same length of plot. Three to four inches apart gives the earliest marketable beets but may not give greatest total yield.

The yields from rows 16½ feet long were as follows in the four best plots:—

Variety	Yield per Plot
Early Model	43 pounds
Black Red Ball	41 "
Detroit Dark Red	40 "
Crimson Globe	40 "

CABBAGE

Project 155.—Three varieties of early cabbage from seed started on March 22 under glass were compared with similar sorts from seed sown in the field May 6. The plants were protected when set out, with tar paper discs to prevent loss from root maggot. The Copenhagen Market is one of the earliest round head sorts and is of a very desirable shape. The Jersey Wakefield will give a larger number of early heads but the pointed shape sorts are not generally so desirable for market.

—	Seeded	Planted	Ready for use	Weight of six heads
				Pounds
Copenhagen Market	Mar. 22	May 3	July 12	10·8
" "	May 6	June 17	Aug. 23	14·4
Jersey Wakefield	Mar. 22	May 3	July 7	10·2
" "	May 6	June 17	Aug. 27	7·4
Enkhuizen Glory	Mar. 22	May 3	July 27	20·0
" "	May 6	June 17	Sept. 3	18·12

The following sorts of cabbage were grown from seed started in the field May 6 and transplanted June 17. The date of marketing and weight of six average heads is given below:—

—	When ready	Weight six heads
		Pounds
Copenhagen Market	Sept. 1	16·5
Enkhuizen Glory	" 3	18·7
Danish Drumhead	" 10	16·5
Early Summer	" 25	14·2
Early Winningstadt	" 26	13·1
Flat Swedish	Oct. 14	21·0
Succession	" 14	22·2
Kildonan	" 14	16·8
Marblehead Mammoth	" 14	16·5
Danish Ballhead	" 25	16·8
Red Drumhead	Nov. 1	31·5
Red Delicatesse	" 1	24·0
Red Danish Stonehead	" 1	10·8

CAULIFLOWERS

Project 156.—Cauliflowers were grown from seed sown under glass March 20 and set to the field May 3 and from seed sown in the field May 6 and transplanted June 17. These were protected from root maggot at time of planting by using the tar

felt discs. The season was very dry and the soil being a light, sandy one, the heads matured small and were not of marketable size. The date heads formed was as follows:—

	Ready for use	
Seeded March 20—		
Early Snowball	June	28
Extra Early Dwarf Erfurt	July	1
Extra Selected Erfurt	June	28
Dryweather	July	4
Seeded May 6—		
Early Snowball	August	30
Extra Selected Erfurt	September	3
Dryweather	"	3
Walcheren	October	14

GARDEN PEAS

Project 163.—Tests have been made with twenty varieties of peas for shelling. These were grown in rows 33 feet long and 2 feet, 9 inches between the rows. The plants were thinned to three inches apart to be sure of uniformity. None of these peas were staked. The most promising of these are given below together with the yield. Three varieties tested for the first time this year and which are promising are also given:—

——	Height	Date fit to use	Weight per plot
	Feet		Pounds
First Early—			
Gregory Surprise	2·5	July 8	13·2
Early Morn	2·5	" 9	15·2
Blue Bantam	1·5	" 10	17·5
Pioneer	1·5	" 10	18·7
Second Early—			
Thomas Laxton	3·0	" 12	15·5
Gradus	3·5	" 12	11·7
Advancer	2·7	" 14	11·2
Late—			
Stratagem	4·0	" 22	10·0
Radiance	2·5	" 18	8·0
Promising Sorts—			
Homesteader	3·0	" 16	17·0
Western Beauty	1·5	" 11	14·0
Admiral Beatty	4·0	" 11	13·0

CELERY

Project 158.—Ten sorts of celery were grown on the test plots and of these White Plume, Golden Self Blanching and Evans Triumph have been the most satisfactory. Various methods of blanching have been tried and boards twelve inches wide placed against the plants have been most satisfactory. For very early use 4- to 6-inch drain tiles have been very satisfactory particularly with the White Plume variety. A well prepared trench two feet wide with two rows of plants set nine inches apart is very satisfactory, and the most economical for small areas. It is found that with a good supply of well decayed manure dug into the soil and moisture supplied during very dry periods a fine quality of celery can be grown on naturally poor sandy areas. The plants were started March 24, and the seedlings transplanted to flats 2 inches apart and set to the open ground May 21. Frequent applications of 4-4-40 Bordeaux mixture every two or three weeks starting when the plants are first set is necessary to keep the celery rust in check particularly on the Golden Self-blanching.

ONIONS

Project 162.—Tests have been made with onions started under glass as compared with those started in the open ground. Plants from seeds started at different dates were set to the open on May 4 in rows one foot apart and three inches apart in the rows. The yield per plot as given is the product from one row 16½ feet long.

—	Yield per plot	Yield per acre
	Lb.	Tons
Seed started February 15—		
Prizetaker	22·5	29·7
Ailsa Craig	22·5	28·4
Denia	20·2	26·7
Cranstons Excelsior	20·0	26·2
Seed started March 7—		
Denia	24·0	31·6
Ailsa Craig	23·0	30·3
Seed started March 22—		
Denia	21·0	27·7
Prizetaker	16·0	21·1
Ailsa Craig	16·0	21·1
Southport Red Globe	15·0	19·8
Onions from seed sown in field May 6 and thinned to three inches apart. Yield from one row 66 feet long—		
Denia	33·0	11·0
Ailsa Craig	32·5	10·7
Yellow Globe Danvers	31·0	10·2
Cranstons Excelsior	28·0	9·3
Large Red Wetherfield	26·0	8·6
Prizetaker	23·0	7·6

SPINACH

Project 174.—Seed of this was seeded early in May and the varieties which did the best are Bloomdale, Monstrous, Viroflay and Thick-leaved. They were ready for use June 15. Because of the dry season later seedlings were unsatisfactory. This plant likes a rich, moist soil otherwise the plants are very small and go to seed quickly.

TURNIPS

Project 177.—Of the early garden turnips tested the Purple Milan is one of the best. The yield from a row 16½ feet long was as follows:—

	Pounds
Extra Early Purple Top Milan	13
" " Strap-leaf	11
" " Snowball	8
Golden Ball	7

PARSLEY

Project 199.—Parsley seeded March 27, and the seedlings transplanted into flats and the plants set to the open ground early in May, were compared with seedlings made in the open. The advantage of the early seeding is early crop for market. The Triple Curled and Exquisite were two of the best sorts.

BEANS

Project 158.—The leading varieties of snap and pole beans have been tested. The Early Red Valentine and Round Pod Kidney Wax have been two of the leading sorts and are of fine quality. Refugee or 1000 to 1, is the best late variety. Kentucky Wonder Wax is one of the best pole sorts. Successional seedings of Round Pod Kidney every two weeks for three seedings lengthens the season materially, and a still longer season is possible by using the Refugee or 1000 to 1. Plantings are made in rows 2½ feet apart and the plants are thinned to 4 inches apart. The records are from rows 16½ feet long and the varieties named below were the best yielders:—

Variety	Yield per Plot Pounds
Hodson Long Pod	13.3
Stringless Green Pod	13.6
Refugee or 1000 to 1	12.7
Plentiful French	11.2

The earliest green pod varieties were Plentiful French, Masterpiece and Bountiful and of golden pod, Davis and Wardwell Kidney Wax.

TABLE CORN

Project 159.—Tests were made of all the leading varieties of sweet corn seeded May 30 in rows three feet apart and later thinned to nine inches apart in the rows. The earliest varieties to mature were those originated at Ottawa, Pickaninny August 14, Sweet Kloochman August 16 and Sweet Squaw August 20. The ears of the first two are small but the quality is very fine. The latter is a promising very early variety. Early Malcolm and Early Mayflower were ready August 30 these being the earliest commercial sorts. Golden Bantam has been one of the best mid-season sorts but it is being superseded by the Golden Giant a very similar variety of high quality with larger ears. Howling Mob, Country Gentleman and Stowell Evergreen are all good late sorts. The Early White Cory, Early Malcolm, Early Fordhook and Early Mayflower ranged 73, 74, 74 and 75 per cent respectively of marketable cobs of those harvested.

CUCUMBERS

Project 160.—These were grown in duplicate hills six feet apart and five plants left to a hill. The seed was sown May 30. The yield from two hills as gathered during the season was as given below:—

Variety	Fit to use	Yield from ten plants
Improved Long Green	August 3	45·0 pounds
" White Spine	" 9	42·0 "
Danish Pickling	" 3	37·0 "
Prolific	" 3	36·5 "
Davis Perfect	" 6	34·7 "
Giant Pera	" 9	32·8 "
White Spine	" 3	31·2 "
Early Russian	July 30	29·6 "

PEPPERS

Seed of peppers were sown under glass on March 16 and later transplanted to flats from which they were planted to the field June 2. The first of these were ready for market the last of August. Harris' Earliest, 0·878, was one of the best varieties.

PUMPKINS

Project 173.—Seed was sown of several varieties on the 30th May in hills 12 feet apart and five plants to a hill. The Small Sugar was ready for use September 10 and Connecticut Field on September 20. These were two of the best sorts grown.

SQUASH

Project 175.—Seven varieties were grown from seed sown May 30 in hills 12 feet apart and five plants to a hill. The Golden Hubbard and Green Hubbard, two of the best, were ready for market early in September. The English Vegetable Marrow was fit for use during the latter part of August and should be included in the varieties for home use.

EGG PLANTS

Project 200.—Two varieties of egg plants were grown from seed started March 16, these seedlings were transplanted to flats four inches apart and these were planted in the open on June 2. The New White Round was the earliest and fit for use September 17. The New York Purple set only a few fruits.

TOMATOES

Project 176.—Tests were conducted with twenty-three varieties of tomatoes and the best of these are those given below. The seed was sown in flats on March 28, later transplanted into flats six inches apart and set to the open ground June 12, four by four feet apart. Two crosses from the Experimental Farm, Ottawa, were amongst the best ten varieties tested this season. The fruit was harvested from six plants three times a week and records obtained.

The summer being so dry nearly all the fruit ripened. Black rot was present on the fruit of the John Baer and Chalk's Early Jewel and Bonny Best, the total amount being 8·4, 8·7 and 2·8 pounds per plot respectively. The other varieties were practically free.

TOMATOES—TEST OF VARIETIES

—	Ready to use	Ripe fruit	Green fruit
		Lbs.	Lbs.
Alacrity K. 1914	Aug. 12...	81·0	6·2
Alacrity x Earlibell	" 16...	80·0	4·4
Alacrity 0·704	" 12...	79·4	9·0
Earliana Sunnybrook K. 1914	" 14...	77·0	3·5
" Adirondack K. 1914	" 14...	72·2	7·2
Earlibell	" 20...	72·5	7·5
Burbank Early	" 9...	70·0	3·0
Alacrity x Hipper	" 9...	64·2	2·5
Danish Export	" 9...	63·0	7·0
John Baer	" 16	59·4	8·5
Chalk's Early Jewel	" 14...	48·0	9·6
Bonny Best	" 16...	45·0	2·7

TOMATOES—TRAINING METHODS

Project 176a.—Several methods of training tomatoes have been practised and it is found that while earlier and smoother fruit may be obtained from plants tied either to stakes or to wires, yet the work involved in training is so great that it would not prove economical commercially. It is a practice quite suitable for gardeners, however.

The results as given below show the yields from a similar area of ground 96 square feet, six plants in bush form to a plot or four by four feet apart and the yields from twelve plants two by four feet apart each trained to two stems and tied to stakes. Two varieties were used.

TOMATOES—TRAINING METHODS

—	Ready to use	Yield of Fruit		
		Ripe	Green	Decayed
Bonny Best		Lbs.	Lbs.	Lbs.
Double stem trained	August 12..	65	3·5	3·5
Bush, not trained	" 16..	45	2·7	2·8
Alacrity				
Double stem trained	August 8..	64	3·5	0
Bush, not trained	" 12..	79	9·0	0

HERBS

Project 201.—Thyme, sage, sweet marjoram and summer savory seeded May 6th all made a good stand. Cress, both the Extra Curled and Upland, did well.

VEGETABLE INSECTS

SQUASH BUG

Project 202.—The squash bug makes its appearance soon after the first week in June and continues more or less abundant to toward the middle of July. The method of control which has been effective is to keep the foliage of the plants covered with a poisoned spray made up of four pounds of paste arsenate of lead and two pounds of hydrated lime to forty gallons of water.

CABBAGE WORM

The green cabbage worm developed from eggs laid on the plants by the cabbage white butterfly, so much in evidence in cabbage fields soon after the middle of May, causes much damage to the crop if not killed either by using a poison or contact spray. The poison dust applied early in the morning when the dew is on the plants was the most effective. One pound of dry arsenate of lime or arsenate of lead to ten pounds of hydrated lime thoroughly mixed makes a good dust. The dust was applied by using a hand dusting machine blowing the dust into the plant. After the heads are half formed it is usually found unnecessary to dust. Two and sometimes three applications are necessary. As the heads develop from the inside and the outer leaves are removed before using there does not appear to be any danger from the use of this poison. There may be some danger from feeding to stock the leaves left in the field after the head is cut if large amounts of dust have been used and little rain has fallen to carrry away the poison. Dusting was done on early and late plants on June 6 and 13 and on July 4 and 19. No worms were seen when harvesting the crop.

CABBAGE ROOT MAGGOT

This is always a troublesome pest at this Station and of the various materials tried the tar felt discs have on the whole been the most economical. These are put on at planting time. It is necessary that they be placed carefully to prevent openings around the plant in which the fly may deposit eggs. Corrosive sublimate one ounce to eight gallons of water sprayed around the plants using one-half pint to each plant is also effective. It is wise to move some soil away from the stem of the plant to hold the liquid and give it a chance to work in well around the area in which eggs or maggots are located. This was done on May 27, June 4 and 11 and the maggots were controlled.

CARROT RUST FLY

Soaking sawdust in kerosene oil and scattering it along the rows was tried as a repellant to the fly which deposits its eggs from which the carrot maggot develops. This was of no use. Rows sprayed with corrosive sublimate using one ounce to eight gallons of water show this also was not of any value under conditions which existed this season. It may be that the ground which was very dry was not sufficiently soaked with the material to be effective.

CUTWORM

Cutworms appeared on June 4 and poison bran made of two pounds Paris green to 100 pounds of wheat bran was effectively used. This was made up by mixing thoroughly the bran with Paris green, sprinkling with water, and working it over to thoroughly cover all particles of the bran with poison. The mass is not made too wet. This is placed on the soil, one handful making five small heaps. It is applied as late in the afternoon as possible. The cutworms feed upon this damp bran at night and are killed. We do not use sweetening in the bran bait and it seems to be quite effective.

POTATOES

Projects 165-72.—The area on which the potatoes were grown was in clover the previous season. It was fertilized with 200 pounds of nitrate of soda, 200 pounds of sulphate of ammonia, 800 pounds of acid phosphate and 100 pounds of muriate of potash per acre. No stable manure was used. The land was thoroughly disced and the fertilizer applied broadcast and harrowed into the soil. The potatoes were planted with the potato planter in rows 33 inches apart and each plot was one row 132 feet long. The plants were well cultivated, and four sprays of Bordeaux were applied. There was no evidence of blight. The season was abnormally dry and the crop suffered greatly with the result that the yields were light.

The yield from seed of potatoes previously grown at this Station was as follows:—

POTATOES—TEST OF VARIETIES

Name	Yield per Acre Marketable	Yield per Acre Unmarketable	Total Yield per Acre
	Bush.	Bush.	Bush.
Todd Wonder	211·2	17·6	228·8
Pioneer	211·2	17·6	228·8
Manistee	202·4	13·2	215·6
Comet, G	193·6	17·6	211·2
Morgan Seedling	198·0	4·4	202·4
Early Rose	187·0	15·4	202·4
Ensign	193·6	8·8	202·4
Acquisition	176·0	22·0	198·0
White Albino	184·8	13·2	198·0
Black Cape Breton	158·4	30·8	189·2
Delaware, C.R.B	180·4	8·8	189·2
Farmer, R	176·0	13·2	189·2
Pan American	167·2	17·6	184·8
New Queen	171·6	13·2	184·8
Empire State	162·8	22·0	184·8
Davies Warrior	154·0	26·4	180·4
Rawling	162·8	13·2	176·0
Factor	167·2	8·8	176·0
Prince Albert	158·4	11·0	169·4
Clyde	145·2	22·0	167·2
Vermont Gold Coin, O	158·4	17·6	167·2
McIntyre	140·8	22·0	162·8
Green Mountain	136·4	13·2	149·6
New Scotch Rose	140·8	8·8	149·6
Sir Walter Raleigh	132·0	13·2	145·4
Hustler, G	127·6	13·2	140·8
Gold Coin, C.P.B	127·6	13·2	140·8
Early Buckeye	127·6	8·8	136·4
Early Six Weeks	118·8	17·6	136·4
Dakota Red	118·8	13·2	132·0
Cobbler, G	123·2	8·8	132·0
Bliss Triumph	112·2	17·6	129·8
Early Ohio, Ont	118·8	8·8	127·6
Mills Pride	114·4	13·2	127·6
Scottish Triumph	107·8	17·6	125·4
Cobbler, F	114·4	8·8	123·2
Cobbler, A	105·6	13·2	118·8
Green Mountain, J.H.J	105·6	8·8	114·4
Green Mountain, E.McF	88·0	22·0	110·0
Speedwell	92·4	13·2	105·6
White Rose	94·6	8·8	103·4
Bovee	92·4	8·8	101·2
Scott	79·2	17·6	96·8
Early Hebron	70·4	17·6	88·0
McCulloch	74·8	8·8	83·6

POTATOES—TEST OF VARIETIES—*Concluded*

The yield from seed of varieties obtained from the Experimental Station, Fredericton, New Brunswick, in the spring of 1921 was as follows:—

Name	Yield per Acre Marketable	Yield per Acre Unmarketable	Total Yield per Acre
	Bush.	Bush.	Bush.
American Wonder	266·7	13·2	279·9
Maggie Murphy	233·2	8·8	242·0
New Chieftain	220·0	13·2	233·2
Money Maker	224·4	8 8	233·2
Rural New Yorker	180·4	39·6	220·0
Wee McGregor	202·4	8·8	211·2
Reeves Rose	193·6	13·2	206·8
Carman No. 1	171·6	17·6	189·2
Longworth	149·6	35·2	184·8
Eureka, Extra Early	167·2	8·8	176·0
Early Nebraska	167·2	4·4	171·6
Sir Walter Raleigh	151·8	17·6	169·4
Dreer Standard	136·4	26·4	162·8
Delaware	105·6	52·8	158·4
Table Talk	136·4	22·0	158·4
Vermont Gold Coin	140·8	13·2	154·0
Seedling 5727	127·6	17·6	145·2
Whitney No. 1	127·6	17·6	145·2
Carman No. 3	127·6	13·2	140·8
Piermont Seedling	118·8	13·2	132·0
Bliss Triumph	105·6	26·4	132·0
Early May	110·0	13·2	123·2
Seedling 13660	101·2	8·8	110·0

The yield from three varieties sent to us for trial was as stated below:—

Long Mountain, white	237·6	26·4	264·0
Seedling, F. Hayward	171·6	13·2	184·8
King Edward VII	171·6	13·2	184·8

The English six varieties supplied by the Central Experimental Farm, Ottawa, were also tested for the first time. The yields were as follows:—

Kerr Pink 916-17	220·0	30·8	250·8
King George 923	149·6	30·8	180·4
Edzell Blue 19	110·0	22·0	132·0
Great Scott 918	118·8	13·2	132·0
Majestic 915	105·6	8·8	114·4
Barnhouse Beauty 922	44·0	52·8	96·8

The average yield per acre of fifteen of the highest yielding sorts of potatoes tested for a number of years at this Station are:—

Selina Burbank	251·5	37·2	288·7
Davies Warrior	248·1	35·8	283·9
Green Mountain	238·8	32·2	271·0
Beauty of Hebron	235·3	25·1	260·4
Irish Cobbler	227·0	31·3	258·3
Early Rose	235·5	20·2	255·7
Manistee	231·2	16·7	247·9
Comet	229·0	17·5	246·5
Farmer	227·1	17·6	244·7
Empire State	218·1	20·5	238·6
Todd Wonder	219·6	14·7	234·3
Acquisition	198·3	32·0	230·3
Sir Walter Raleigh	206·7	19·8	226·5
Morgan Seedling	212·0	13·7	225·7
Gold Coin	202·4	16·7	219·1

POTATOES CUT IN DIFFERENT WAYS

Tests have been conducted with potato sets cut in different ways and a record has been kept of the seed required per acre when cut in a particular way. The planting was done in rows 33 inches apart and 12 inches apart in the rows. The average yield per acre of three varieties, Empire State, Garnet Chili and Delaware, is given for six years, 1915 to 1920, and also the average seed used per acre. The yield in 1921 from Vicks and Davies Warrior is also given as well as the seed used per acre:—

POTATOES CUT IN DIFFERENT WAYS

—	Seed used per acre Bushels	Vicks Bushels Yield	Davies Warrior Bushels Yield	Average Yield	Average of Six Years	
					Seed used per acre Bushels	Yield per acre Bushels
1 eye, small	6·6	143·0	176·0	159·5	12·2	295·3
1 eye, large	17·4	242·0	246·4	244·2	16·7	277·3
2 eyes, small	7·5	239·8	316·8	278·3	13·8	309·7
2 eyes, large	20·39	281·6	329·0	305·3	20·8	289·4
3 eyes	21·05	303·6	325·0	314·3	23·8	271·9
Stem end	21·5	198·0	220·0	209·0	23·6	299·6
Seed end	18·5	193·6	193·6	193·6	20·3	264·8
Cut lengthwise	25·1	237·6	281·6	259·6	24·6	247·1
Ordinary	19·7	224·4	171·6	198·0	17·76	254·5
Whole	44·9	253·0	291·0	272·0	38·0	278·5

POTATOES AT DIFFERENT DISTANCES

Experiments conducted this season with three varieties of potatoes planted in rows of different widths and spaced in the rows different distances apart show a gain in favour of the 36-inch row and favour 12 inches apart for the sets on the 26- and 30-inch row, and 10 inches apart in the 36-inch row. The yield from these plots was as given below:—

POTATOES PLANTED AT DIFFERENT DISTANCES

Distance apart	Yield per Acre.			
	Irish Cobbler	Vicks	Davies Warrior	Average of Three Varieties
Inches	Bush.	Bush.	Bush.	Bush.
26 x 10	182·6	208·0	223·3	204·6
26 x 12	182·7	213·1	223·3	206·3
26 x 14	177·6	147·1	219·3	181·0
26 x 16	263·8	154·8	180·0	199·5
30 x 10	202·4	149·6	140·8	164·2
30 x 12	211·2	193·6	211·2	205·3
30 x 14	184·8	132·0	140·8	152·5
30 x 16	193·6	145·2	176·0	171·6
36 x 10	154·0	205·3	256·6	205·3
36 x 12	190·6	183·3	227·2	200·3
36 x 14	196·1	200·1	217·6	204·6
36 x 16	153·9	161·0	105·6	140·1

POTATOES PLANTED AT DIFFERENT DISTANCES APART (AVERAGE OF SEVEN YEARS)

Tests covering a period of seven years have been conducted with three varieties of potatoes to gain information as to the best distance for planting. It will be noticed that the rows 26 inches apart have given the largest yield per acre, the rows

36 inches apart the next highest, and the rows 30 inches apart gave the smallest yield. It will be seen that in the rows 30 inches apart those spaced 12 inches gave the highest yield and the same held true in the plantings in rows 26 inches apart. In the rows 36 inches apart those spaced 10 inches apart gave the highest yield. The practice that seems to work best as to seed requirements per acre and ease of cultivation and digging with the digger is rows 33 inches apart and 12 inches apart in the row. Much more hard work is necessary in the close planted rows as soil for hilling and covering weed growth is not available without disturbing the root development of the plant. In the 33- to 36-inch rows an opportunity is given for doing away with nearly all hand hoeing.

The yield per acre as calculated from these plots was as follows:—

AVERAGE YIELD PER ACRE—SEVEN YEARS

How Planted	Marketable	Unmarketable	Total
	Bush.	Bush.	Bush.
26 x 10	242·7	25·5	268·2
26 x 12	260·7	28·6	289·3
26 x 14	212·4	22·3	234·7
30 x 12	195·3	25·9	221·2
30 x 14	182·3	22·9	205·2
30 x 16	181·4	25·3	206·7
36 x 10	235·0	19·0	254·0
36 x 12	210·3	25·05	235·3
36 x 14	212·0	17·3	229·3

CERTIFIED GREEN MOUNTAIN POTATOES

An area of land previously in a fertilizer experiment was planted to certified Green Mountain seed stock. The ground was a clover sod which had been fall ploughed. The area was four acres and the fertilizer applied broadcast per acre and harrowed in before planting was 150 pounds of nitrate of soda, 150 pounds of sulphate of ammonia, 800 pounds of acid phosphate and 170 pounds of muriate of potash. The planting was done with the planter in rows 33 inches apart and the seed was spaced 12 inches apart in the row. The area was sprayed June 21, July 2 and July 18 with 4-4-40 Bordeaux and to this was added 1½ pounds of dry arsenate of lead to 40 gallons. The area was dusted with copper arsenic dust July 26 and again sprayed with the regular Bordeaux mixture August 1. There was no blight noticed. The area was not in proximity to other potatoes so that no infection could result from potatoes having Mosaic or leaf roll. This seed stock is for supplying growers with disease-free Green Mountain stock.

The summer being very dry the area suffered as a result and the yields were not large. The whole area produced 528 bushels marketable and 142·8 bushels of unmarketable potatoes, an average yield per acre of 132 bushels marketable and 35·7 bushels unmarketable, a total of 167·7 bushels per acre.

DUSTING AND SPRAYING POTATOES

In order to gain information with regard to the cost of dusting as compared with the spraying of potatoes an area was dusted and a similar area sprayed. The orchard power dusting machine was used for applying the dust and the four-row traction sprayer with eight nozzles was used for spraying. In comparing these as to time required to do the work it was found that there was little difference as the work could be done only as fast as the team would work. It seemed impossible to guide the dusting outlet to do more than four rows thoroughly, and if more was

attempted the foliage was not so well covered as it should be. There does not appear to be any saving in time. The orchard dusting outfit requires the help of one man more than the spraying as the operator of the dusting outlet cannot attend to this and drive the team as well.

The dust used was the regular orchard copper arsenic dust made up of 10 parts dehydrated copper, 5 parts of calcium arsenate and 85 parts of hydrated lime. This cost six cents per pound. It was found that 60 pounds was required to do an acre. The spray used was the regular 4-4-40 Bordeaux arsenate made up of 4 pounds of copper sulphate and 4 pounds of lime to 40 gallons of water. The poison used was calcium arsenate 1½ pounds, to 40 gallons of water. It was found that 80 gallons of this spray was required for an acre. The men were charged at the rate of 25 cents per hour and the team and outfit at the rate of 30 cents per hour.

The foliage did not look as good on the dusted plots as on the sprayed areas. There was no blight on either plot.

The cost per acre for one application was as given below:—

DUSTING

Sixty pounds copper arsenic dust at 6 cents	$3 60
Two men, team and outfit, one hour	80
	$4 40

SPRAYING

Eighty gallons Bordeaux arsenate at 1¾ cents	$1 40
One man, team and outfit, one hour	55
	$1 95

INFLUENCE OF LIME ON POTATO SCAB

An area of the land where experiments with lime for the control of club-root have been conducted was planted to potatoes, the object being to determine the influence of lime in the development of the potato scab organism. One part of this land had been limed once only in 1916, and another in 1916 and 1918, using the amounts applied in 1916 at the same rate per acre. One area was limed once only in 1918 with quicklime and an area had not been limed at all. It will be noticed that the area not limed produced 16 per cent of scabby potatoes as against 19 per cent where 1½ tons of ground limestone was applied in 1916, five years previous, and 27 per cent where 3 tons was applied in 1916. It will be seen also that the 27 per cent of scab on the 1916 plot of 3 tons per acre of ground limestone was a very light infection there being no tubers with bad or medium bad scab development. It will be seen also that the 65 per cent of the scab on the plot where 1½ tons were applied in 1916 and 1918 was in the slight column and that the bad and medium scab development was not great. Scab apparently has been greatly developed because of the use of limestone and the degree of scab development is much greater on the quicklime than on the ground limestone plots. Unfortunately through an error records of the degree of scab development were not taken of all the plots.

It is quite evident from this test that it is not wise to use quicklime, and that ground limestone applied at a rate greater than two tons per acre once in five years is likely to give trouble from increased scab development on the tubers. The intention is to use gypsum or land plaster on these areas another year to determine whether the germs of this disease may be destroyed or rendered inactive by such treatment. The per cent of scab is given in the table below, and also a table is presented showing the bad, medium bad and slight scab on plots from which records were secured:—

GROUND LIMESTONE

When Limed	Quantity	Per cent Scab	Per cent free from Scab
	per acre lb.		
1916	3,000	19	81
1916	6,000	27	73
1916	9,000	66	34
1916	12,000	86	14
1916 and 1918	3,000	80	20
1916 and 1918	6,000	88	12
1916 and 1918	9,000	94	6
1916 and 1918	12,000	98	2

QUICKLIME

When Limed	Quantity per acre	Per cent Scab	Per cent free from Scab
	lb.		
1916	1,500	44	56
1916	3,000	67	33
1916	4,500	72	28
1916	6,000	77	23
1916 and 1918	1,500	87	13
1916 and 1918	3,000	94	6
1916 and 1918	4,500	97	3
1916 and 1918	6,000	99	1
1918	6,000	76	24
Not limed		16	84

DEGREE OF SCAB DEVELOPMENT

GROUND LIMESTONE

When Applied	Quantity per acre	Bad	Per cent Scab		Total
			Medium	Slight	
	lb.				
1916 and 1918	3,000	4	11	65	80
1916 and 1918	6,000	8	33	47	88
1916	6,000	0	0	27	27

QUICKLIME

1916 and 1918	1,500	22	35	30	87
1916 and 1918	3,000	30	23	41	94
1916 and 1918	4,500	24	39	34	97
1916 and 1918	6,000	46	39	14	99
1918	6,000	5	17	54	76

CEREAL HUSBANDRY

The work with cereal crops includes tests with three varieties of oats, three of wheat and two of barley. The areas in these tests were one-half acre of each variety. The land on which they were grown was in mangels in 1920. The ground was fall ploughed. Limestone at the rate of 2 tons per acre was applied in the early spring, and the land worked with the disc-harrow. Nitrate of soda at the rate of 100 pounds per acre was scattered broadcast and harrowed in before seeding. The seeding was done with the disc-drill on May 14, and the land seeded to clover and timothy at the same time. Because of the very dry summer, crops ripened early and all about at the same time. The yield of both grain and straw was light. The yields per acre were as follows:—

CEREALS—TEST OF VARIETIES

Variety	Date of Ripening	No. of days Maturing	Yield per acre
			lbs.
Oats—			
Victory	August 13	91	2,096
Banner, Ottawa 49	" 13	91	1,776
Hulless oats—			
Liberty, Ottawa 480	" 10	88	1,928
Barley—			
Charlottetown, No. 80	" 10	88	1,912
Duckbill, Ottawa 57	" 10	88	1,180
Wheat—			
Huron, Ottawa 3	" 17	95	1,432
Red Fife, Ottawa 17	" 20	98	1,362
Marquis, Ottawa 15	" 17	95	1,294

AVERAGE YIELD OF CEREAL CROPS

The table below gives the average yield per acre of the above varieties grown here, including 1921:—

Variety	Average No. of days maturing	No. of Tests	Yield per acre
			lbs.
Oats—			
Victory	99	7	2,163
Banner, Ottawa 49	99	6	2,115
Hulless oats—			
Liberty, Ottawa 480	90	4	1,548
Barley—			
Charlottetown, No. 80	93	6	1,612
Duckbill, Ottawa 57	94	3	1,396
Wheat—			
Huron, Ottawa 3	100	4	1,442
Red Fife, Ottawa 17	105	8	1,112
Marquis, Ottawa 15	100	8	1,285

FIELD PEAS

Project 203.—Two varieties of field peas have been under test for six years. They have yielded as given below:—

Variety	Average Number of days maturing	Number of Tests	Yield per acre
			lbs.
Arthur, Ottawa 18	108	6	1,703
Golden Vine	108	6	1,478

SPRING RYE

Project 204.—One variety of spring rye has been under test for three years. The average yield for the three years was as follows:—

Variety	Number of days Maturing	Number of Tests	Yield per acre
			lbs.
O. A. C. No. 61	99	3	1,733

THE TREATMENT OF GRAIN WITH COPPER DUST FOR THE CONTROL OF BUNT SMUT

Project 205.—Tests were made of various copper sulphate dusts to determine whether the "stinking" or "bunt" smut of grain could be controlled by means of a dry dust applied to the seed at seeding time. The variety Huron wheat and Victory oats used were quite free from infection, as is indicated by the No. 2 plot. The variety Liberty, which is a hulless oat, is very susceptible to this disease, the untreated plot running 61·3 per cent of smut. We have experienced considerable difficulty in the treatment of this variety with formalin because of injury to germination. The results would seem to show that the treatment as given in plot 3 is quite effective. Two and one-half ounces of dust was used to 10 pounds of dry grain but this amount was not required to coat the seed thoroughly and it would seem that one-half to one ounce to 10 pounds would thoroughly cover the surface of the seed. In plot 7 the seed was moistened before the dust was applied.

The following combinations were used:—

Plot 1.—The grain was soaked in water for ten minutes and partly dried, after which it was soaked in formalin solution one pint to forty gallons, for three minutes. The seed was sown immediately.

Plot 2.—The grain seeded in this plot had no treatment.

Plot 3.—The seed grain was mixed with dust composed of the following materials: 28·5 parts of dehydrated copper sulphate mixed with 71·5 parts of infusorial earth, used purely as an inert filler, leaving the copper sulphate entirely water soluble. Many other materials such as gypsum, talc, chalk, etc., could have been used in place of infusorial earth. The dust was applied at the rate of two and a half ounces per ten pounds of grain.

Plot 4.—The seed grain was mixed with the following dust: 28·5 parts of dehydrated copper sulphate mixed with 71·5 parts of hydrated lime, giving a dust of ten per cent metallic copper. This dust on contact with water gives a blue Bordeaux mixture in which the copper is insoluble in water. The copper in this form is, however, very readily acted upon by acid and organic solvents and also by fungus secretions. The dust was applied at the same rate as the above.

Plot 5.—The seed grain was mixed with the following dust: 53 parts of stone lime were slaked with a small amount of water and while slaking 40 parts of crystal copper sulphate were added, the whole being then thoroughly mixed and ground. This mixture gives a dust of ten per cent metallic copper. The copper in this mixture is in the form of the hydrate, totally insoluble in water, and not as readily reacted upon as the blue compound. The dust was applied at the same rate as the previous two.

Plot 6.—The seed grain was mixed with the dust that is regularly used on apple as a combined fungicide and insecticide, which is composed of ten parts dehydrated copper sulphate, 5 parts calcium arsenate and 85 parts of hydrated lime, giving a dust of approximately four per cent metallic copper and one and one-quarter per cent metallic arsenic. The copper in this form is in a similar condition to that of plot 4, only there is less of it and there is a greater excess of hydrated lime. The excess of hydrated lime makes the copper more inert as far as certain solvents are concerned. The dust was applied at the same rate as the others.

Plot 7.—In this case the grain was moistened with water and then treated with the same dust as used for plot 4, the dust being used at the same rate.

SEED GRAIN TREATMENT

Plot	Treatment	Grain	Number of Heads Counted	Number Heads Smut	Per Cent Smut
1	Formalin	Hulless oats	744	388	52·1
		Victory oats	564	0	....
		Huron wheat	538	34	6·3
2	No treatment	Hulless oats	530	325	61·3
		Victory oats	382	2	0·5
		Huron wheat	383	7	1·8
3	Water Soluble	Hulless oats	438	11	2·5
	Copper Sulphate	Victory oats	395	3	·7
	Dust	Huron wheat	553	11	1·9
4	Bordeaux Dust	Hulless oats	543	88	16·2
		Victory oats	533	2	·3
		Huron wheat	498	7	1·4
5	Hydrated Copper	Hulless oats	824	374	45·3
	Sulphate and Lime	Victory oats	472	12	2·5
	Dust	Huron wheat	523	13	2·5
6	Orchard Copper	Hulless oats	425	310	72·9
	Sulphate Dust	Victory oats	480	0	0
		Huron wheat	423	12	2·8
7	Bordeaux Dust on moistened grain.	Hulless oats	378	36	9·6
		Victory oats	364	2	·5
		Huron wheat	321	9	2·8

FORAGE PLANTS

SEASON

The summer of 1921 was unusually dry, the precipitation from April 1 to September 30 being 12·54 inches, while 17 inches was the average for the same period during the previous seven years. The greatest shortage was in June and August, the lack of rain in June very materially reducing hay yields, and the August shortage influenced the forage crops adversely. On certain areas the corn crop dried out to the extent of appearing as if frosted when cut on September 15. The stand of clover and grasses on all newly seeded areas was poor.

INDIAN CORN FOR ENSILAGE

Project 53.—Ten varieties were sent to this Station from Ottawa, three were obtained from the Halifax Seed Company, and one from the Experimental Station, Fredericton, N.B. These were grown in one-twentieth-acre plots. Twelve varieties were also furnished by the Division of Forage Plants, Ottawa, in larger amounts, sufficient to seed one-eighth-acre plots. One plot was also seeded with stock seed secured from the United Fruit Company, Kentville. The land on which these were grown was a clover sod which was manured in the spring at the rate of 15 tons of stable manure per acre and ploughed. The usual preparation was given. The corn was seeded in rows 3½ feet apart. The smaller plots were seeded on May 20 and the larger areas on June 1. The plots seeded early were on a lighter and more open soil which dried out badly and the crop had the appearance of being frosted the foliage was so dried out before harvest. Few ears developed and little information of value as to maturity of the different sorts at time of harvest was obtainable. The yields from these plots were as given in the following table:—

INDIAN CORN FOR ENSILAGE—TEST OF VARIETIES

	Yield Per Acre				
	Seeded May 20		Seeded June 1		
	Tons	Lb.	Height Feet	Tons	Lb.
Golden Glow	..	....	7½	11	400
Comptons Early	11	740	6½	10	1,280
Wisconsin No. 7	9	1,500	6½	10	1,040
Bailey	11	240	6½	9	1,280
Early Leaming	8	....	6½	9	720
White Cap Dent	8	1,240	7	9	720
North Dakota	11	1,600	6½	8	1,840
Improved White Cap, Duke	..	....	6½	8	1,680
North Dakota, Campbell	..	....	6½	8	560
Comptons Early, Apcott	..	....	6	7	1,280
Improved Longfellow, Duke	..	....	6	7	1,040
Longfellow, U.F.C.	..	....	6	9	1,280
Longfellow	13	500	..		
Longfellow, H.S.C.	11	....	..		
Comptons Early, H.S.C.	10	1,500	..		
Leaming, H.S.C.	9	1,240	..		
Twitchells Pride	8	....	..		
Twitchells Pride, F	7	1,500	..		
Quebec, No. 28	6	1,000	..		
Canada Yellow	6	500	..		
Average	9	1,111	.....	9	593

SUNFLOWERS FOR ENSILAGE

Project 54.—Two lots of sunflowers were grown on land similar to that on which the corn was grown. The seeding was done May 18 and the crop was harvested September 12. The yields were light. The plants suffered from the dry weather and all the lower leaves were dried up before harvest time. The variety Saunders Early came into flowering earlier than the Giant Russian, but was not so heavy in growth.

Variety	Stage of maturity	Yield per acre	
		Tons	Lbs.
Giant Russian	Late milk	13	
Saunders Early	Dough	10	1,000
Average		11	1,500

FIELD ROOTS

TURNIPS

Project 69.—The land on which the turnips were grown was in clover the previous year. It was manured in the spring at the rate of 15 tons of stable manure per acre, after which it was ploughed and worked. Commercial fertilizer at the rate of 200 pounds of nitrate of soda and 300 pounds of acid phosphate per acre was scattered broadcast and worked into the soil with the wheel cultivator. The ground was then ridged into rows 2½ feet apart, rolled and seeded. The hand seeder was used for seeding. The seeding was done May 20. The crop was harvested October 28. Club-root very materially lessened the yield on these plots, all of which were more or less diseased, except the Bangholm variety from Denmark, which appeared to be resistant, at least no very decided evidence of this disease could be seen. The dry August and September also reduced the yields very much. The yields as given below were calculated from the production of plots of one-fortieth-acre each:—

TURNIPS—TEST OF VARIETIES

Variety	Source of Seed	Yield per acre	
		Tons	Lbs.
Bangholm	Denmark	18	1,260
Ditmars	Kentville	17	1,900
Shepherds Swede	Denmark	17	20
Hazards Imperial	Halifax Seed Co.	16	940
Kangaroo	Lamont & Steadman	16	940
Ditmars	Kentville	16	400
Good Luck	Lamont & Steadman	14	1,940
Suttons Champion		14	1,160
Kangaroo	Halifax Seed Co.	14	1,160
Bangholm	" "	13	1,540
Monarch	Nappan	13	1,540
Imperial Hardy	United Fruit Co.	13	180
Corning	Kentville	12	1,100
Yellow Aberdeen	United Fruit Co.	11	400
Bangholm	" "	11	140
Hardy Green	" "	9	1,440

MANGELS

Project 58.—The land on which the mangels were grown was in clover the previous season. It was manured in the spring at the rate of 15 tons of stable manure per acre, after which it was ploughed and disced. Commercial fertilizer at the rate of 200 pounds of nitrate of soda and 300 pounds of acid phosphate was scattered broadcast and worked into the soil with the wheel cultivator. The ground was levelled and the mangels seeded in rows 2½ feet apart. The mangels were thinned to 10 inches apart. Because of the dry weather the crop was light. Seeding was done May 5, a hand seeder being used. The crop was harvested October 15. The yields were calculated from the product obtained from duplicate plots of one-fortieth acre each. The yields were as follows:—

MANGELS—TEST OF VARIETIES

Variety	Yield per acre	
	Tons	Lbs.
Danish Sludstrup	14	160
Giant Yellow Globe	13	1,720
Yellow Leviathan	12	1,300
Echendorffer	12	860
Mammoth Long Red	12	440
Gate Post	12	300
Half Sugar White	11	1,980
Eckendorffer Red	10	1,120
Sugar Rose	10	240
Yellow Intermediate	9	1,360
Yellow Intermediate	8	600
Yellow Intermediate	7	1,180
Eckendorffer ' ed	6	1,640
Golden Tankard	6	1,200
Red Globe	5	1,320

SUGAR BEETS

Project 59.—Three varieties of sugar beets were received and planted on May 5 on land similar to that on which the mangels were grown. They were seeded in rows 2½ feet apart and the plants were thinned to 8 inches apart. The variety Klein Wanzleben was received later and planted, but because of the late planting made a very uneven stand. The crop was harvested October 15 and the following yields obtained:—

SUGAR BEETS—TEST OF VARIETIES

Variety	Source	Yield per acre	
		Tons	Lbs.
Chatham	Dominion Sugar Co.	15	1,500
British Columbia	" "	11	500
Waterloo	" "	9	500
Klein Wanzleben	Germany	4	360

CARROTS

Project 55.—Tests with this crop were made on land similar to that on which the mangels were grown. Manure was applied at the rate of 15 tons per acre and fertilizer at the rate of 200 pounds of nitrate of soda and 300 pounds of acid phosphate.

The land was levelled with the smoothing harrow after being well worked, and the seed was sown with a hand seeder in rows 2½ feet apart. The plants were thinned to 4 inches apart. Seeding was done May 5 and the crop was harvested October 29. The plots were one-fortieth acre each. The following yields were secured:—

CARROTS—TEST OF VARIETIES

Variety	Source	Yield per acre	
		Tons	Lbs.
White Belgian	Halifax Seed Co	13	920
White Intermediate	United Fruit Co	12	1,600
White Vosges		9	740
Danish Champion	Ottawa	6	140
Mammoth Yellow Intermediate	"	5	1,880
Ox Heart	Halifax Seed Co	5	820

ALFALFA

Project 77.—The Grimm alfalfa seeded in 1920 came through the winter in excellent condition. The growth in the early spring was strong and even and a large crop was anticipated. Half of the area had been seeded broadcast at the rate of twenty pounds per acre and the other half in rows 12 inches apart at the rate of six pounds per acre. Half of each had been seeded with a nurse crop in 1920 and the other half had not.

The soil on which this alfalfa was seeded was a sandy loam of low natural fertility. The crop on this land in 1919 was mangels, having been manured at the rate of 15 tons per acre, together with 720 pounds of acid phosphate and 270 pounds of nitrate of soda per acre. This was limed in the spring of 1920 using 4 tons limestone per acre. One hundred and fifty pounds of nitrate of soda and 500 pounds of acid phosphate was also applied and well worked in before seeding.

The alfalfa leaf spot made its appearance on the alfalfa area early in June and because of this disease at harvest time a heavy defoliation had taken place. This trouble together with the very dry weather resulted in a very poor growth after the first cutting and the total growth made was not sufficient during the balance of the season to make a second cutting worth while. The plants seemed to be vigorous in the fall when winter set in, and doubtless will carry through in good condition. The dry weather evidently favoured the alfalfa leaf spot disease as it was much worse than ever before.

The yield of oats from the area on which a nurse crop was grown in 1920 was 65 bushels per acre. The yield from the broadcast and row seeding, cut August 7, 1920, and the yield from the respective plots cut June 20, 1921, is given in the table below:—

Grimm alfalfa	1920 Yield per acre Hay	1921 Yield per acre Hay
	Lbs.	Lbs.
Broadcast, nurse crop	.....	3,130
" no nurse crop	1,340	3,170
Rows, 12 inches, nurse crop	.....	3,330
" 12 inches, no nurse crop	1,420	3,580

SWEET CLOVER

Project 88.—Duplicate plots of sweet clover were seeded in the spring of 1920 broadcast at the rate of 15 pounds per acre. These were seeded with an oat nurse crop which yielded 65 bushels of oats per acre. The plants during this period made weak growth, the oat crop having checked the development very much. After the nurse crop was removed a strong growth started up and the stand was even throughout. The growth during 1921 was cut for hay June 25. The quality of the hay was very coarse in the white variety and much finer in quality in the yellow. There was very little second growth, although it was cut eight inches high in order to permit of a second crop development. Plants of the white variety left for seed were ripe August 8 and of the yellow July 25. The yield of hay per acre as calculated from the yield of these plots was as follows:—

Variety	Height	Yield per acre
	Feet	Tons Lbs.
White Blossom Sweet Clover	4	2 1,000
Yellow " "	3½	2 200

RED CLOVER SEED GROWING

Project 83.—Red clover was seeded in 1920 without a nurse crop in rows one and two feet apart and this test was again duplicated using a nurse crop. One plot was seeded broadcast with a nurse crop. The nurse crop was oats which yielded 65 bushels of oats per acre in 1920. The object of the test was to determine what method of seeding would give the best yield of seed. Because of not having facilities for threshing these plots the crop was cut and weighed for hay. The plots were one-twentieth acre each. The yield of clover on the plots without a nurse crop, which was cut during the fall of 1920, was heavy, but this growth evidently was to the detriment of the crop on these plots during the present year as many of the plants killed out during the winter while the smaller plants on the nurse crop plots did not, and the increased yield on these is due to the better and more vigorous 1921 stand of plants on these plots.

—	Space between rows	Yield Hay per Acre, 1921	
		No nurse crop in 1920	With nurse crop in 1920
	Feet	Lbs.	Lbs.
Common red clover	1	990	3,300
" "	2	943	1,320
" "	Broadcast	.....	2,400

COMMON RED CLOVER CUT AT DIFFERENT DATES FOR SEED PURPOSES

Project 83a.—In order to gain information relative to the seed production and hay yields of areas from which the first clover growth was made into hay, cuttings were made at different dates and the yields were as stated in the table below. An examination of the heads of the second growth in the fall indicated that the best seed was on the areas cut June 23 and the next on that cut July 4. Cuttings made after these dates were thin and the growth too late to reach maturity. Not having facilities for threshing the seed was not obtained. It will be seen that the greatest

yield of hay was from the area cut July 4 and that the loss from cutting one week earlier was 1,460 pounds. It seems necessary to sacrifice some of the possible crop if a good second stand is desired for seed purpoes. This area was seeded in 1920 with common red clover at the rate of eight pounds per acre using wheat as a nurse crop:—

When cut	Yield of hay per acre	
	Tons	Lbs.
June 23	1	800
July 4	2	260
" 12	1	1,740
" 25	1	1,400
Aug. 4	1	800

SEEDING WITH COMMON RED CLOVER AND TIMOTHY FOR SEED PURPOSES

Project 85.—The object of this test was to determine whether clover seed could be had the second year and timothy the third year after seeding. The seeding was at the rate of 10 pounds of timothy and 8 pounds of clover. The crop was cut June 23 and July 25. It will be seen that there was little difference in the yield of hay due largely to the extra growth of timothy. There was a good stand of second growth clover on the early cut plot, but practically none on the late cut area. The heads from the early cut area were well filled with clover seed. This area will be held for timothy seed in 1922:—

—	When Cut	Yield per acre	
		Tons	lbs.
Red clover and timothy	June 23	1	1,620
Red clover and timothy	July 25	1	1,700

ALSIKE CLOVER SEED GROWING

Project 82.—Duplicate plots were seeded in rows one and two feet apart, one of these having a nurse crop and the other without. One plot was seeded broadcast with a nurse crop. The object was to determine the method of seeding best suited for seed production. As there were no facilities for threshing the crop was cut for hay. The yield was obtained from the product of one-twentieth-acre plots:—

—	Space between Rows	Yield of Hay per acre,	
		No Nurse Crop 1920	Nurse Crop 1920
	feet	lbs.	lbs.
Alsike clover	1	970	1,267
"	2	471	660
"	Broadcast	.....	1,800

ALSIKE CLOVER CUT AT DIFFERENT DATES FOR SEED PURPOSES

An alsike clover area was seeded broadcast at the rate of 5 pounds per acre in 1920 using wheat as a nurse crop. The object was to determine the seed production from this area. Facilities for threshing not being available the crop was cut at

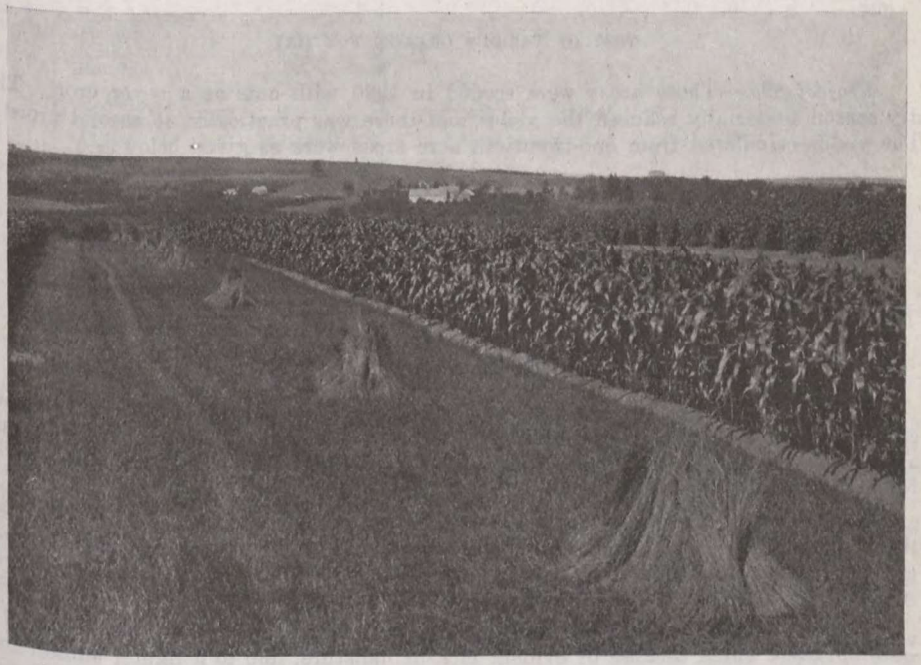
different dates for hay and an examination made of the heads for seed. It was found that the August 4 cutting was fully ripe and the seed well matured. It was found also that the second growth on the early cut plots was poor and had in the fall few heads with any seed matured.

OTTAWA PERENNIAL CLOVER

Project 86.—A one-twentieth acre of this strain from seed supplied by the Division of Forage Plants was seeded in 1920 with a nurse crop of oats. The yield of hay secured was 2,200 pounds per acre. Whether this strain will prove to be perennial under our conditions will be determined by allowing it to remain as a permanent plot.

TIMOTHY SEED GROWING

Project 74.—Duplicate plots of timothy were seeded on one-twentieth acre plots in rows one and two feet apart. A nurse crop of oats was seeded on one and the other was left without a nurse crop when seeded in 1920. The yield of hay from



Timothy Seed Plot, second year from Seeding, Experimental Station, Kentville, N.S.

these two plots was as given in the table below. It will be seen that the area in a nurse crop in 1920 was much lighter than that where no nurse crop was grown. The seed was sown at the rate of 10 pounds per acre. The yield of seed was not obtained from these plots:—

	Space between rows	Yield of Hay per acre, 1921	
		No Nurse Crop in 1920	Nurse Crop in 1920
	Feet		
Timothy	1	2,750	942
Timothy	2	1,886	800

TIMOTHY CUT AT DIFFERENT DATES FOR SEED

Project 76.—An area was seeded to timothy in 1920 with wheat as a nurse crop. Cuttings were made at different dates to determine the hay yields. The cuttings before August 4 were not ripe for seed. The August 4 cutting, however, was ripe and yielded 280 pounds of seed per acre. The plots were one-twentieth acre each:—

—	When Cut	Yield of Hay per acre	Yield of Seed per acre
		Tons lbs.	lbs.
Timothy	June 23	1 700	
"	July 25	1 220	
"	Aug. 4	1 500	280

TEST OF VARIOUS GRASSES FOR HAY

Project 89a.—These areas were seeded in 1920 with oats as a cover crop. The dry season materially reduced the yields and there was practically no second growth. The yields calculated from one-twentieth acre areas were as given below:—

	Yield of hay per acre Pounds
Red top	2,530
Western rye	1,900
Meadow fescue	1,700
Kentucky Blue	1,500
Orchard	1,100

TEST OF GRASS MIXTURES FOR HAY

Project 89.—Seven plots of one-half acre each were seeded May 17, 1920, with clover and grass mixtures in different proportions using red clover, timothy and alsike in each mixture and replacing some of the timothy with red top and meadow fescue on some of the plots.

Because of the difficulty in seeding red top and meadow fescue evenly through the regular seeder attachment these were seeded by hand before the oats and other grasses were sown. After the grain was seeded a light plank smoothing harrow was run over the field.

Because of the dry year the test was not entirely satisfactory as plots 1, 2 and 7 were on areas which because of evident lack of moisture, due to a lighter subsoil formation, developed the crop prematurely with a consequent lessened yield. This condition was not so evident on the other apparently more favourably situated areas. This land had been selected as being entirely uniform, the surface being of the same soil formation, and had a reasonable moisture supply been available the difference shown would probably not have appeared.

The stand of clover and grasses was uniform. The land had previously been treated alike. This area will be left in grass for another year to gain information relative to the development of the grasses on the fourth year of the rotation. The bulk of the crop harvested this season was clover. The fertilizer applied in 1920 was 500 pounds of acid phosphate, 150 pounds of nitrate of soda and 2 tons of ground limestone per acre. The yield of oats in 1920 averaged 74 bushels per acre with little variation on any of the plots. The yield per acre of hay given below from the respective plots was harvested July 6:—

Plot	How Seeded per acre	Yield of Hay per acre, 1921	
	lbs.	Tons	lbs.
1	Red clover....10 Timothy.... 8	2	1,102
2	Red clover.... 8 Timothy.... 8 Alsike.... 2	2	1,382
3	Red clover.... 5 Timothy.... 8 Alsike.... 5	3	1,384
4	Red clover.... 8 Timothy.... 6 Alsike.... 2 Red top.... 2	3	912
5	Red clover.... 8 Timothy.... 4 Alsike.... 2 Red top.... 4	3	260
6	Red clover.... 8 Timothy.... 6 Alsike.... 2 Red top.... 2 Meadow fescue.... 6	3	818
7	Red clover.... 8 Timothy.... 4 Alsike.... 2 Red top.... 4 Meadow fescue.... 6	2	1,038

YIELD OF HAY FROM DIFFERENT CLOVER AND GRASS SEED MIXTURES

A summary of tests conducted at this Station with many grass mixtures indicate that the best mixture for seeding is one made up of 8 pounds timothy, 2 pounds of alsike clover and 8 pounds of red clover per acre. In the test given below red clover when used alone was seeded at the rate of 10 pounds per acre and alsike at the rate of 4 pounds per acre. Where used with other grasses 8 pounds of red clover and 2 pounds of alsike were used:—

Mixture used	Average yield of cured hay per acre
	lbs.
Red clover and different grasses	3,650
Alsike clover and different grasses	2,966
Gain in favour of red clover	684
Red and alsike and different grasses	4,185
Red clover and different grasses	3,650
Gain in favour of red and alsike mixed	535
Red and alsike and different grasses	4,185
Alsike and different grasses	2,966
Gain in favour of red and alsike mixed	1,219

The yield for the second year 1918 was as follows:—

Mixture used	Average yield of hay per acre
	lbs.
Red clover and different grasses	3,537
Alsike clover and different grasses	2,633
Gain in favour of red clover	904
Red and alsike clover and different grasses	4,083
Red clover and different grasses	3,537
Gain in favour of red and alsike mixed	546
Red and alsike clover and different grasses	4,083
Alsike and different grasses	2,633
Gain in favour of red and alsike mixed	1,450

MANGEL SEED PRODUCTION

Project 62.—In the spring of 1921 selected Danish Sludstrup stecklings raised from our selection of this mangel were planted. The roots made a strong growth but failed to produce other than a few pounds of seed and these were confined to a few branches on several plants. This condition evidently was due to the extremely dry weather and soil conditions at the time of blossoming resulting in no seed forming.

TURNIP SEED PRODUCTION

Project 64.—Because of club-root no stecklings free from disease were obtainable in 1920 for carrying through the winter and no turnip seed was produced.

CLUB-ROOT RESISTANT STRAIN OF TURNIPS

Project 70.—A small sample of Bangholm turnip seed from Denmark said to be club-root resistant was furnished for trial in 1921. This was seeded alongside a regular trade variety. The difference in these two turnips was very marked throughout the season and at harvest time the Bangholm seed could be pronounced practically free from this disease.

The soil on which the roots were grown was infected with the disease, and when records were taken anything indicating a possibility of disease was counted. The results would indicate the possibility of securing a variety resistant to this troublesome disease.

Variety	Per Cent Free from disease	Per cent Diseased
Bangholm	93·05	6·9
Trade Variety	38·4	61·6

Some seed has been raised from this stock and additional seed will be secured to continue this work further.

CHEMISTRY

GROUND LIMESTONE APPLIED AT DIFFERENT RATES PER ACRE

Project 47.—The practice advised in the use of limestone is to apply two tons per acre when seeding down to clover and timothy. In order to determine whether larger amounts are advisable a test was started in 1917 using one, two, three and four tons per acre on one-half acre plots of each. The land was all treated alike, except in the quantity of lime applied. There were three hoed crops in succession on this land: corn in 1917, turnips in 1918, and mangels in 1919. The land was manured in 1917 and 1919 with 15 tons stable manure per acre, and in 1916 with 12 tons per acre. A 4-10-0 fertilizer, *i.e.*, one containing 4 per cent nitrogen and 10 per cent of phosphoric acid, was used for the above crops in addition to the manure; at the rates of 500 pounds in 1917, 600 in 1918, and 550 in 1919. In 1920 the land was seeded to oats with 8 pounds red clover, 2 pounds alsike and 8 pounds timothy per acre. An area of one-half acre was not limed but treated similarly in every other respect.

The results, as tabulated below, show an appreciable gain from the use of lime, particularly is this noticeable in the clover yields of the past year. These results confirm our past experience, which is that the greatest gain from the use of limestone may be expected in the clover crop, and that other crops, while showing some gain from its use, do not respond to it in any marked or striking degree. It will be seen that the gain in clover yield over the unlimed area has been 1,302 pounds where 1 ton of lime was used, a further gain of 324 pounds for the second ton, of 222 pounds for the third ton, and of 240 pounds for the fourth ton. It is evident that, based on the results from the clover crop, the most economical use of limestone in this experiment has been where the material was applied at the rate of one ton per acre. It would seem, however, that the rate advised of two tons per acre is the most practicable for application, a less amount being difficult to apply evenly.

CROP YIELDS PER ACRE FROM LAND LIMED AT DIFFERENT RATES

	Corn 1917	Turnips 1918	Mangels 1919	Oats 1920	Hay 1921
	Tons	Bush.	Bush.	Bush.	Lbs.
Limed, 1 ton	15·2	924	831	79·2	4,356
" 2 ton	14·1	1,090	900	74·3	4,680
" 3 ton	17·0	1,033	918	84·2	4,902
" 4 ton	15·3	1,048	1,110	79·8	5,142
Not limed	13·2	1,118	862	76·6	3,054

From the above it will be seen that the gain in clover hay per acre in favour of liming at different rates per acre over the unlimed area was:—

1 ton, increase over area not limed	1,302	pounds
2 tons " " " " "	1,626	"
3 " " " " " "	1,848	"
4 " " " " " "	2,088	"

FERTILIZER AND LIME EXPERIMENT

Project 44.—The object of this experiment is to ascertain the relative values of various sources of nitrogen, and phosphoric acid in a "complete fertilizer" with and without lime. The soil on which these tests are being conducted was at the commencement of the test in 1914 of low fertility. The rotation has been potatoes, grain and hay. The fertilizer used was applied the years potatoes were planted, viz, in 1914, 1917 and 1920. The fertilizer was applied just before the potatoes were

planted, and the lime was applied before the land was worked for planting. Because of the soil being practically devoid of humus it was decided to apply 15 tons of manure per acre evenly over the whole area, which was done in the spring of 1917. The plots are one-twentieth acre each. Each fertilizer trial consists of four plots, two of which have been limed at the rate of 2 tons per acre at the commencement of each rotation. The fertilizers used on the different plots were as follows:—

FERTILIZERS APPLIED

Plot	Nitrate of Soda (15% N.)	Sulphate of Ammonia (20% N.)	Acid Phosphate (15% P_2O_5)	Basic Slag (16% P_2O_5)	Bone Meal (22% N. 22% P_2O_5)	Muriate of Potash (50% K_2O)
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
1	140	.....	150	150	.....	101·2
2	.....	105	150	150	.....	101·2
3	70	52½	300	.....	.....	101·2
4	70	52½	.....	300	.....	101·2
5	50	52½	.....	.....	240	101·2
6	.....	No Fertilizer				

FERTILIZER AND LIME EXPERIMENT

	Potatoes 1914–17–20 Total Yield	Hay 1916–19 Total Yield	Wheat 1918–21 Total Yield		Oats 1915 Total Yield	
			Grain	Straw	Grain	Straw
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
1. Limed	607·3	6,690	44·4	4,920	37·9	2,200
Not limed	581·3	3,760	34·5	3,430	32·6	1,970
Gain	26·0	2,930	9·9	1,490	5·3	230
2. Limed	588·4	6,100	44·3	4,700	38·5	2,250
Not limed	568·9	3,750	31·5	2,810	29·1	1,590
Gain	19·5	2,350	12·8	1,890	9·4	660
3. Limed	618·9	6,100	45·2	4,640	36·9	2,115
Not limed	583·8	3,540	31·6	3,110	31·8	1,785
Gain	35·1	2,560	13·6	1,530	5·1	330
4. Limed	638·2	6,850	48·5	4,520	40·4	2,405
Not limed	585·6	4,130	34·4	3,530	31·1	1,900
Gain	52·6	2,720	14·1	990	9·3	505
5. Limed	614·2	6,360	45·2	4,910	38·2	2,020
Not limed	536·9	3,780	35·3	3,750	33·6	1,845
Gain	77·3	2,580	9·9	1,160	4·6	175
6. Limed	530·9	5,200	41·9	3,950	32·7	1,575
Not limed	461·7	3,360	28·3	3,270	30·4	1,615
Gain	69·2	1,840	13·6	680	2·3	40

NITRAPO, 1921

Project 206.—The soil on which these experiments were conducted is a sandy loam of fair fertility. The previous crop was clover hay, the sod having been fall ploughed and worked in the spring.

Nitrapo is a by-product of the nitrate of soda industry in Chile and contains 15 per cent nitrogen and 15 per cent potash. The plots were one-twentieth acre each and the results as given are the average of the yields from duplicate plots. No fertilizers in addition to these specified were applied to this land and as the quantity per acre was very light a very large crop was not anticipated.

The dry season very greatly reduced the yield and the proportion of small tubers was quite large. It will be noticed that plots 5 and 7 were given the same amount of nitrogen, potash and phosphoric acid. The 200 pounds of nitrapo contained the same amount of nitrogen and potash as 200 pounds of nitrate of soda and 60 pounds of muriate of potash.

It would appear that nitrapo has no superiority as a fertilizer over a combination of nitrate of soda and muriate of potash, though, applied alone (plot 1) nitrapo gave the highest yield recorded in the test. The Davies Warrior potato was used. They were planted May 12 and dug September 27. The results were as follows:—

EXPERIMENT WITH NITRAPO

Plot	How Fertilized	Quantity Per Acre	Yield Per Acre		
			Marketable Bushels	Unmarketable Bushels	Total Bushels
1	Nitrapo	200	142·0	39·0	181·0
2	Nitrate of soda	200	129·1	22·3	151·4
3	Sulphate of ammonia	150	119·0	36·8	155·8
4	Not fertilized		113·3	30·3	143·6
5	Nitrapo	200			
	Superphosphate	300	108·3	32·6	140·9
6	Nitrate of soda	200			
	Superphosphate	300	107·8	33·5	141·3
7	Nitrate of soda	200			
	Superphosphate	300			
	Muriate of potash	60	111·3	31·1	142·4
8	Sulphate of ammonia	150			
	Superphosphate	300	130·6	32·1	162·7
9	Sulphate of ammonia	150			
	Superphosphate	300			
	Muriate of potash	60	138·0	32·8	170·8

NOTE:—The soil of plots 1 and 9 was somewhat more fertile than that of the other plots in this experiment.

BASIC SLAG EXPERIMENTS

Project 207.—A series of tests with different kinds of basic slag was undertaken in the spring of 1921 in duplicate plots of one-twentieth acre each. The ground was uniform and had as a previous crop, potatoes, the whole area being alike for that crop. The south range was termed "A" plot and the north range "B" plot. The yields given are the average of the two plots. Victory oats were seeded at the rate of 2½ bushels per acre. The slag was applied by hand. Nitrate of soda at the rate of 150 pounds per acre was used over the whole area. The ground was seeded with clover and timothy at the rate of 8 pounds timothy, 8 pounds common red clover and 2 pounds alsike clover per acre. The seeding was done May 13 uniformly over the whole area.

The guaranteed analysis of the two Sydney slags used were: "Victory" 8 per cent and "B" 11·2 per cent available phosphoric acid. The Belgian slag has been considered as containing 16 per cent of available phosphoric acid, the analysis indicating 18 per cent. An acid phosphate containing 16 per cent phosphoric acid was used on plot 10. Plots 7, 8, 10 and 11 were therefore all furnished with an equal amount of available phosphoric acid. The season being very dry the growth of

clover and timothy was not very strong and there was no noticeable difference in the clover growth on the various plots in the fall. The hay crop of 1922 will be expected to manifest the relative value of the different brands of basic slag employed in the experiment.

The yields per acre were as follows:—

BASIC SLAG EXPERIMENT

Plots	Quantities of Different Brands Used Per Acre	"Victory"		"B"		"Belgian"	
		Grain	Straw	Grain	Straw	Grain	Straw
	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
1, 2, 3	500	52·6	2,060	52·3	2,160	51·7	2,500
4, 5, 6	1,000	46·9	2,090	53·1	2,370	62·3	3,220
7	750	55·2	2,470	.....	.....	.....	
8	536	.....	.....	45·2	2,110	.....	
11	375	.....	.....	.....	.....	50·5	2,780
9	470	.....	.....	.....	.....	59·3	2,890

		Limestone		Limestone 2 tons and Acid Phosphate		Check	
		Grain	Straw	Grain	Straw	Grain	Straw
		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
10	375 pounds	.....	.....	54·1	2,900		
12	2 tons	47·3	2,000	.....	.....	.....	
13	1 ton	50·7	2,320	.....	.....	.....	
15, 16, 17	Nitrate only		.....	.....	.....	51·5	2,560

MALAGASH SALT

Project 208.—In order to test out the value of Malagash salt in root growing a test was made on an area of Danish Sludstrup mangels, the salt being applied at the rate of 300 pounds per acre scattered broadcast and well harrowed in before seeding. A similar area was treated with common salt, and an equal area was left without salt. It is likely had the weather not been so dry there would have been a gain from the use of salt. The whole area was treated alike. The results did not favour the use of salt. The Malagash salt, however, gave better results than did the common salt. The yields per acre were as follows:—

Plot	How Treated	Yield Per Acre
		Bushels
1	Common salt, 300 lbs. per acre	480·3
2	Malagash salt, 300 lbs. per acre	573·5
3	No salt	609·1

POULTRY

EQUIPMENT

The poultry buildings at this Station consist of one breeding house 12 by 72 feet divided into twelve pens, two permanent houses 16 by 32 feet, each to carry 100 hens, four brooder houses 10 by 12 feet fitted with brooder stoves, and six colony houses. In addition there is the service building where records are kept, incubators operated and feed stored.

From the buildings constructed we feel safe in advising the 16 by 32 foot house as a desirable one. This depth with roosts at the rear places the hens at a good distance from the front and no trouble is experienced from disagreeable drafts which are difficult to overcome in the houses 10 or 12 feet deep. The concrete floor we find is satisfactory. In the construction a concrete foundation around the edge of the house 8 inches wide and 12 inches deep is put in with good drainage away from the building the grade line being 2 inches below the top of this foundation. The floor proper is concrete 2 inches thick placed on soil. This has been satisfactory and if good drainage has been provided there seems to be no good reason why the floor should not always be perfectly dry. The advantage of a concrete floor is that mice and rats are not the troublesome pest they often become when wooden floors are used. In a house 16 feet wide the roof space is a little wide for the one-pitch roof and it is better to put up the roof pitching both ways; if the one-slope roof is constructed supports are necessary through the centre otherwise the roof will sag. These supports are not always desirable and are not required where the pointed roof is constructed. The cost for building material is a little greater as boards are necessary for a ceiling on a level with the bottom of the purlin. These boards are placed one inch apart and above these straw is packed to prevent air currents, keep the house warmer in the winter and cooler in summer and take up excess moisture. The breeding house built on this plan is a very satisfactory poultry building. The ceiling should be 6 feet 4 inches from the floor to give ample height.

POULTRY KEPT

The White Wyandottes and Barred Plymouth Rock breeds are kept. The object in view is to encourage the development of breeds suitable for meat and egg production. The range available for economical management does not permit of more than two breeds, in fact one breed is better and it may be that the number of breeds here will be reduced. The stock on hand at the commencement of the breeding season consisted of the following:—

Breed	Males	Hens	Pullets	Total
White Wyandottes	7	23	41	71
Barred Plymouth Rocks	12	47	95	154

TRAPNESTING

Project 184.—Trapnesting has been followed for the purpose of breeding only from the productive hens. The records show the best production in White Wyandottes. The highest record was 293 eggs in twelve months; ten others gave over 200 eggs in this period. The best producing Barred Plymouth Rock laid 287 eggs in twelve months and thirty birds went above 200 eggs each. There is a wide variation in production and the progeny from the above show much variation, however, it is

hoped by consistent breeding and selection to arrive at fairly uniform production and establish a strain with production quality in cockerels that will aid materially in building up the production of flocks where they are used. Chicks from the best hens are carried as pedigree birds and systematic breeding is followed. The introduction of bred-to-lay strains of Barred Rocks has helped to bring up the production, and White Wyandotte males from other Experimental Farm flocks is giving satisfactory results in this breed.

The seventy breeding hens in the mated pens this year produced an average of 205 eggs in their pullet year. The records for two years of the highest Barred Rocks are given as follows:—

	1st year	2nd year
No. 53	248	189
" 63	246	179
" 47	249	123
" 64	231	164
" 41	211	90
" 43	205	112
" 48	219	....

No. 63 hen was the pullet that laid 104 eggs in 104 consecutive days.

In White Wyandottes the following records were made:—

	1st year	2nd year
No. 119	293	182
" 126	241	105
" 102	219	130
" 120	212	147
" 122	205	....
" 124	205	....

EGG PRODUCTION

A record was kept of the food consumed and the eggs laid which was as follows:—

Total egg yield for the year	17,398
Average egg yield per month	1,449
Value at 50 cents per dozen	$724 91
Total cost of feed	547 37

CHICKS ON ORCHARD RANGE

The difficulty in allowing chicks on orchard range is that poisoning from the arsenic used for spraying may result. The spray or dust settling on the grass, clover or weeds renders orchard ranges unsuitable for this purpose. After the middle of the summer, however, when this danger is past an orchard run is a very suitable place for the maturing chicken. Another disadvantage of the orchard range for young chicks is that clean cultivation is given to the first of July and much better results will be had by giving a clover or grass run to the chicks during this period. It does not seem desirable that the spraying or cultivation of the orchard should be neglected to furnish a place for rearing the chicks early. The results on such ranges with the more mature chicks have been satisfactory and the use of orchard areas for this purpose is advised.

FEEDING

The winter ration has been oats, wheat and cracked corn used in the proportion of 100 pounds oats, 150 pounds wheat and 150 pounds cracked corn. The dry mash has been crushed oats and bran equal proportions, and the wet mash, bran, middlings and crushed oats equal parts. In addition beef scrap, grit and oyster shell have been fed separately in hoppers and green feed consisting mainly of mangels was fed each day. The whole grain is generally fed separately, giving whole oats in the morning and cracked corn or wheat in the afternoon. The hopper is kept filled with dry mash so that the hens can eat it as they wish. Mangels in quantities that are eaten up nicely in two hours are supplied daily.

With oats at 2¼ cents per pound, wheat 3½ cents, and cracked corn at 2½ cents, the cost of scratch grain is approximately 2¾ cents per pound. The feed consumption and cost for 100 hens during the winter of 1921-22 has been per day as follows:—

				Cents
Scratch grain	16	pounds at 2¾	cents	44
Dry and wet mash	6	" " 2½	"	15
Meat scrap	1	" " 5	"	05
Green feed	8	" " ¼	"	03
Green feed	8	" " ¼	"	02
Oyster shell and grit	1	" " 3	"	03
Total				69

For one month of thirty days the cost was $20.70 for 100 hens, or 20·7 cents per hen for the month. This makes a cost per month of 13·2 cents for whole grain, 4·5 cents for mash, and 3 cents for green feed, meat scrap, shell, grit and charcoal.

BEES

During the winter 1920-21 thirty-six colonies of bees were wintered in eight quadruple, one double and two single cases. Twenty colonies were placed in house 9 by 12 feet, packed in shavings, with a bottom packing of 6 inches, sides 5 inches and top 12 inches. On April 15 bees were removed from winter cases and house. A great deal of drifting took place of bees that were in the house, weakening the colonies considerably which later on had to be united to stronger colonies, reducing the number of colonies to forty-three spring count. On May 12 a thorough examination was given the colonies, and the average number of combs covered by bees per colony was 5·5. Weather conditions during the height of the fruit bloom were quite favourable for the gathering of nectar. During seven days 649 pounds of surplus honey was gathered.

The value of bees for orchard pollenation was again studied and orchard experiments covering this work and results are tabulated in this report. Owing to the exceptionally dry season this year alsike and Dutch clover only secreted nectar from June 21 until July 9. The quality of the honey was only fair owing to an admixture of nectar from other sources. The total production from this source was 1,032½ pounds.

Weather conditions during the fall flow were quite favourable for the gathering of honey. In this section, however, there is very little golden rod, which in other sections of the province where bees are kept can be fairly well relied upon as a good honey plant. Bees brought in some nectar from wild aster and other fall flowers, but were unable to obtain any surplus, the bees storing the honey in the brood chambers.

The number of colonies was increased during the season to sixty. Two of these are being wintered on natural stores, namely clover honey and honey gathered in the fall. The remainder are being wintered on natural stores plus a given amount of sugar syrup. Sugar syrup consisting of two parts of sugar and one of water was fed to the bees from October 9 to 19. Seven hundred pounds of sugar was used, approximately 20 pounds per colony. Ten-pound honey tins with tops perforated with thirty or forty holes were used as feeders; a few "Miller" feeders were also used. The former method was found the quicker and better of the two.

QUEEN REARING

Project 209.—Queen rearing was started this season at this Station. In the past the only method of requeening was the supersedure method; this meant that most of

the colonies were headed by unprolific queens of poor stock or old and failing queens; occasionally two or three queens of selected stock were procured from Ottawa.

Method of Procedure.—Wooden cell cups were secured, but these not proving entirely satisfactory wax cell cups were made conforming to the size of a natural queen cell. These cups were then fastened to special carriers by means of melted wax, about fifteen cells on each carrier. A swarm box was then made by cutting down an eight-frame hive making it large enough to hold four frames, two of honey and two carriers. The bottom of the box was covered with wire screen cloth to allow a circulation of air, the top having a hinged cover with a hole in it large enough to insert a three-inch funnel. Two strong colonies were prepared for finishing colonies two days before grafting cells, this was done as follows: One colony was first made queenless and all the combs containing young larvæ or eggs in them were removed. These were replaced with frames of sealed or emerging brood, six or seven frames of sealed brood and two full combs of honey were also placed in a super immediately above the regular brood chamber leaving space for one or two carriers of cells. The second colony was prepared by raising all the sealed brood to the top chamber leaving space for one carrier of cells. A queen excluder was placed between the two chambers and the queen and unsealed brood left in the lower chamber, which was then filled up with drawn combs. Two days after preparing the finishing colonies two full combs of honey were put in the swarm box, one on either side. A funnel was then placed in the opening of the box and about three or four pounds of bees from a strong colony were shaken through the funnel in the swarm box making certain that the queen of the colony from which these bees were taken was not transferred to the box. The funnel is then taken out and the hole is closed with a sliding cover. This swarm box containing the bees is then put in a dark, cool cellar. Four hours later the cells are grafted with larvæ from the breeding colony and immediately placed in the swarm box. Larvæ about twenty-four hours old make the best queens. The larvæ are lifted from the cells with a grafting needle and placed in cell cups which are first supplied with royal jelly. This royal jelly is obtained from queen cells that are taken out of colonies that are building queen cells. The grafted cells are left in the swarm box for twenty-four hours where they are fed by the queenless bees. At the end of the twenty-four hours these bars of accepted cells are given to the colonies that were prepared two or three days before to finish them. On the tenth day from date of grafting these ripe cells are given to colonies that have been de-queened twenty-four hours previous or to nuclei that have been made up the previous day. The bees that are in the swarm box are returned to the hive from which they were taken the day previously. When bees are not bringing in nectar it is advisable to feed the colony prepared to accept the cells two quarts of sugar syrup, equal parts sugar and water, three days previous to giving them the cells. Fifty-seven colonies were requeened with young queens replacing the old Hybrid and Black queens. Seventy per cent of the queens raised were purely mated producing three banded Italian workers. The remainder produced Hybrid workers this being due to the number of black and hybrid drones in the apiary at that time.

SWARM CONTROL

Project 30.—The method of swarm control that has been adopted at this Station is as follows: At the beginning of the swarming season about July 1st queens in the colonies that have the swarming impulse are placed on empty drawn combs over which are placed the original brood chambers and supers. When seven combs were filled with brood three of these were placed above queen excluders, at first making sure that queen was not on frames to be raised. Empty drawn combs were substituted for those taken out of brood chambers. Providing the bees are given ample room it is hardly ever necessary to adopt any method of swarm control.

METHOD OF INCREASE

On July 2 fifteen nuclei were made from six colonies. These were made by taking two full combs of emerging brood with adhering bees from a strong colony and placing them in an empty hive on a new stand. A division board was put in close to the combs conserving the heat. Entrances were reduced to two inches with blocks, also, this opening was closed by placing a handful of grass over it, this being left a day. The second day after this operation each nuclei was given a ripe queen cell. By the latter part of September these colonies were in good condition to be packed in their winter cases. This brings the number of colonies up to sixty.

WINTER CARE

Projects 56-8.—On October 25 and 26 the colonies were packed in cases using planer shavings. Thirty-two colonies were packed in cases having a permanent bottom board made of matched lumber with three inches of shavings for packing. Four hives were placed on each bottom board, two facing east and two west. Sides were then placed on bottom boards and fastened together with hooks. Cases were made large enough to allow four inches of shavings between the hives and four sides of the cases. Also the cases are deep enough to allow a super to be placed on each colony in the spring. Entrances, eight inches long, half an inch high, were made in the packing cases opposite each hive entrance. These entrances were reduced in the fall to two and a half inches long by half an inch high.

Twenty-eight colonies were packed in the old quadruple cases. These cases have not a bottom board or floor, so about six inches of shavings are first put in the cases and the hives are placed on the shavings and six inches of packing put around the four sides of the case between the hives and the case. About six inches of packing is placed over each colony in four separate bags. Three half-inch holes were made directly opposite the hive entrances. An abridgement is made between the hive entrances and the beeways in the case. This keeps the entrance of the hive from being clogged with shavings and at the same time allows packing down as far as the entrances.

EXHIBITIONS

During the active season of beekeeping a large number of beekeepers were visited and practical assistance given. Late in the fall a honey exhibit was put up at Windsor, also the exhibition at Amherst was attended and the honey judged.

ORCHARD POLLENATION

Project 29.—The object of this experiment was to ascertain to what extent the honey bee aids in pollenating the apple blossoms and in their consequent influence on fruit yields. To carry on this work sufficient cheese cloth was used to cover a limb on each of seven different trees. On May 19 when the apple buds were showing a little colour the number of apple clusters were counted on two limbs of each tree, one limb was then covered with cheesecloth and the other limb left uncovered. The apples that set on both the covered and uncovered limbs were counted. It is evident, however, that many wild bees and other insects bring about the distribution of pollen from one tree to another as the number of bees are not sufficient to account for the good set of fruit in sections where few colonies of honey bees are kept. The following table gives the results obtained:—

ORCHARD POLLENATION

Variety	Covered		Not Covered	
	Number of Clusters	Number of Apples Set	Number of Clusters	Number of Apples Set
Nonpareil	228	.....	205	.....
Nonpareil	152	.....	210	30
Duchess	51	.....	66	93
Crimson Beauty	110	6	83	83
Banks Gravenstein	287	.....	268	52
Banks Gravenstein	360	13	250	132
Tolman	129	6	97	143

PRODUCTION

Project 25.—The production of honey during the year has been far below the average compared with other years due to the dry season. Alsike and white clover only secreted nectar from June 21 to July 9. This was clearly indicated by records taken of the hive on scales which only showed a gain during this period while the clover was in bloom.

Year	Number of Colonies	Number of Colonies in fall	Pounds of Honey Produced	Average per Colony Spring count
1919	21	36	2,577½	122·7
1920	32	56	1,168	36·5
1921	43	60	1,681½	39·1

FRUIT BLOOM HONEY PRODUCTION

Project 28.—Records have been kept of honey gathered during the apple blossom period in 1919, 1920 and 1921. In 1919 there were seven days favourable for bees to work and three of these was during the height of bloom. In 1920 there were nine days favourable but during the height of bloom there were three days unfavourable because of dark, damp weather and no honey was gathered. In 1921 there were seven days favourable for the gathering of nectar. On two days we had rain.

FRUIT BLOOM—HONEY PRODUCTION

Year	Number of Colonies	Honey Produced Pounds	Average per Colony	Period of Bloom
1919	21	701	33·4	May 25 to June 11
1920	32	184	5·8	May 28 to June 15
1921	43	649	15·0	May 20 to June 1

PRODUCTION FROM COLONIES ALLOWED TO SWARM AS COMPARED WITH THOSE WHERE SWARMING WAS CONTROLLED

The following experiment was carried on during the season to determine the average profit where colonies were increased, that is, being divided into more than one colony, versus, those that were not divided or did not swarm. This experiment would indicate that during a dry season such as we have just experienced a greater profit is obtained by increasing the colonies rather than depending on the honey gathered:—

Number of Colonies	Number Increase from six colonies	Amount of Honey gathered Pounds	Total value of honey at 20 cents per pound plus value of increase at $9 per colony, not including hive.
6.....	15	87	Total profit, $152.40 Average profit, $25.40
6.....	.....	536	Total profit, $107.20 Average profit, $17.87

GENERAL NOTES

EXHIBITIONS AND EXCURSIONS

An exhibit of farm produce was made at the Three Counties Exhibition at Windsor, N.S., on October 4, 5 and 6.

Several farmers' picnics were held at the Station during the summer. The King's County Farmers' picnic on August 24 was very largely attended. Agricultural meetings have been attended and addresses given during the year.

BUILDINGS CONSTRUCTED

The three old buildings on the farm purchased two years ago were moved together and a lean-to part erected to accommodate forty steers. The buildings are used for the storage of hay and straw. This makes a satisfactory steer shed entirely away from the other stock carried at this Station. A silo was also erected 12 by 28 feet for corn or other silage.