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Canada

DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

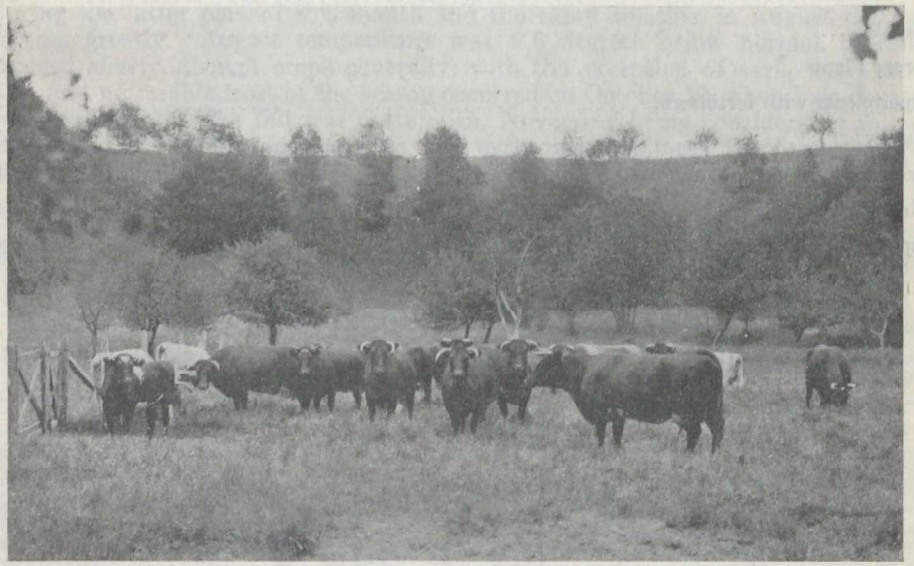
EXPERIMENTAL STATION

KENTVILLE, N.S.

REPORT OF THE SUPERINTENDENT

W. SAXBY BLAIR

FOR THE YEAR 1923



Shorthorn cows, Kentville.

Printed by authority of the Hon. W. R. Motherwell, Minister of Agriculture, Ottawa, 1925.

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EXPERIMENTAL STATION, KENTVILLE, N.S.

REPORT OF THE SUPERINTENDENT, W. S. BLAIR

THE SEASON

The winter of 1922-23 will be remembered for the great fall of snow, accompanied by unusually steady and severe cold weather. Throughout most of the winter there was from one to two feet of snow on the ground at all times, with drifts in some places to the depth of ten or twelve feet. The sunshine was above the average during the winter months. The snow started to disappear during the first week of April, but owing to the cold weather was not completely gone even at the last of the month. The spring was from one to two weeks later than usual. No work could be done on the land during April, and very little was possible until the middle of May, because of the wet condition of most land. May temperature was normal, with somewhat over the normal precipitation and sunshine. Favourable June weather with seasonable showers resulted in the vigorous growth of all crops, counterbalancing the late planting to a considerable extent. July temperature was 2·6 degrees below normal. The cool dark weather during the latter part of this month and the rainy weather in August delayed haying greatly. August temperature was 4·5 degrees below normal. Grains ripened slowly, though crops generally, with the exception of corn, were good. The first noticeable frost of the season occurred on October 10, when four degrees were registered. The fall was quite open, November being considerably milder than usual. Ploughing was possible until early in December. The first measureable snowfall, occurring on December 11, was slightly over three inches.

METEOROLOGICAL RECORDS AT KENTVILLE, N.S., 1923

1923 Month	Temperature, Fahrenheit			Precipitation					Sunshine	
	Highest	Lowest	Mean	Rainfall		Snowfall		Total Inches	Number of days	Total Hours
				Days	Inches	Days	Inches			
	°F	°F	°F							
January	51	−18	16·70	4	1·42	13	44·50	5·87	20	93·05
February	39	− 9	10·87	.....	.....	8	21·25	2·12	26	131·20
March	47	− 6	20·70	5	1·57	9	30·25	4·59	26	139·50
April	61	5	36·60	14	2·97	3	2·75	3·24	22	183·55
May	76	30	49·35	13	2·34	.....	.....	2·34	27	218·05
June	86	35	57·63	11	3·54	.....	.....	3·54	25	201·15
July	85	40	63·10	13	2·32	.....	.....	2·32	26	207·65
August	80	38	60·65	13	4·03	.....	.....	4·03	31	243·95
September	78	31	56·56	11	3·93	.....	.....	3·93	26	167·10
October	73	23	48·35	10	3·05	.....	.....	3·05	23	151·40
November	62	18	40·20	13	5·60	.....	.....	5·60	19	93·70
December	57	− 2	31·18	5	1·96	10	27·87	4·74	17	46·60
Totals for year	.....	.....	.....	112	32·73	43	126·62	45·37	288	1,876·90

90508—1½

ANIMAL HUSBANDRY

SHORTHORN HERD

The herd bull, Brandon Conjuror, was exchanged for Major Maud from the Experimental Station, Fredericton, N.B., in October. This bull is seven years old, was bred at the Ontario Agricultural College, Guelph, and has good milk production in his ancestors, the yearly milk production of his four nearest dams averaging 9,176 pounds. The herd at the end of the year consisted of one herd bull, twenty-four cows, six two-year-old heifers, seven yearling heifers, twelve heifer calves, and five bull calves, a total of 55 head. Of the eighteen cows and heifers finishing their lactation periods during the year, eleven qualified in the Record Performance. The herd is accredited.

General Care of Herd.—Regularity in feeding and care is strictly observed. The work in the barn begins at six in the morning, with milking. A milking machine is used and gives satisfaction. Each cow is milked in her turn, stripped, and the milk weighed. The skim-milk is fed warm from the separator. After milking, the cattle are fed roots and ensilage with the meal ration; while this is being eaten, the manure is cleaned out and the stock bedded. Hay is then fed, the barn swept and the animals brushed. They are then left unmolested until about three o'clock, when the stable is again cleaned of manure, the bedding shaken up, mangers cleaned, and another sweeping done. Ensilage and meal is then fed and the cows cleaned up for milking, which is done after the feed is consumed. After milking, hay is fed, the barn tidied up, calves given their milk, and the work completed at six o'clock. The stable is always visited by the herdsman during the evening and all departments given any attention required.

Feed Ration.—The regular meal mixture for the first part of the year was made up of 300 pounds of bran, 200 pounds of ground oats, 200 pounds of cottonseed meal, and 100 pounds of linseed oil meal. On account of the high cost, the cottonseed meal was not used during the latter half of the year, when the meal mixture was 300 pounds of wheat bran, 200 pounds of ground oats, and 200 pounds of linseed oil meal. The average price of the meal mixtures during the year was $2.25 per cwt. The average prices charged for other feeds were $10 per ton for hay, $3.40 for roots and ensilage, and $4 for green feeds. Skim-milk was valued at 20 cents per cwt. The price of butter was the wholesale price allowed at a local creamery.

The practice followed is to feed each cow one pound of meal mixture to every 3 pounds of milk produced, and during the dry period to feed 3 pounds of meal mixture per day. The heifers with first calf and also four of the cows were fed an additional ration of 1½ pounds of meal per day during their lactation periods, thereby increasing the meal ration for these above the standard ration given above. It will be noticed that the cows were on pasture for only a short period, having been fed practically all the year except some nights when they were turned into a small pasture.

The tabulated data below show the feed consumed by and the production of the eighteen Shorthorn cows which completed their lactation periods during the year ending December 31, 1923. This herd is made up of seven mature cows, with an average production of milk of 5,907·5 pounds; six three-year-old cows, with an average of 4,462·1 pounds, and five two-year-old cows with an average of 4,163·8 pounds.

AMOUNT AND VALUE OF MILK PRODUCED BY SHORTHORN COWS WHICH COMPLETED LACTATION PERIODS DURING THE YEAR ENDING DECEMBER 31, 1923

Name of Cow	Age in years	Date of dropping calf	Number of days dry	Number of days milking	Total milk	Daily average yield of milk	Average per cent of fat	Butter produced	Value of butter	Value of skim-milk	Toyal value of product
					lb.	lb.	%	lbs.	$ cts.	$ cts.	$ cts.
Kentville Jessamine	9	Nov. 17, 1922	109	348	8404·9	24·15	3·53	349·82	144 97	16 21	161 18
" Victoria	8	April 3, 1923	184	238	5148·4	21·63	3·99	241·79	92 18	9 88	102 06
" Fairy	5	" 29, 1922	89	304	5024·9	16·52	4·27	252·49	93 65	9 62	103 27
" Mayflower	6	" 9, 1923	114	275	5585·1	20·30	4·01	263·56	99 18	10 72	109 90
" Fairy 2nd	5	Mar. 22, 1923	89	252	5334·1	21·16	4·18	262·37	100 15	10 22	110 37
" Primrose	5	" 20, 1923	92	283	5381·1	19·01	3·90	247·34	95 49	10 34	105 83
" Susan	4	May 20, 1922	109	313	6474·1	20·68	4·10	312·24	116 59	12 41	129 00
" Victoria 3rd	3	June 27, 1922	89	263	5478·1	20·82	4·11	264·93	101 39	10 51	111 90
" Susan 2nd	3	Dec. 3, 1922	76	196	3859·3	19·69	3·97	180·37	77 74	7 41	85 15
" Meadow Flower 2nd	3	" 4, 1922	77	317	5457·2	17·21	4·03	258·80	106 33	10 47	116 80
" Jessamine 4th	3	Mar. 26, 1923	99	205	3659·6	17·85	3·69	159·00	59 91	7 04	66 95
" Jessamine 5th	3	Dec. 29, 1922	121	226	3601·5	15·93	3·99	169·33	71 37	6 91	78 28
" May 2nd	3	Jan. 30, 1923	135	242	4717·3	19·49	3·70	205·69	85 47	9 08	94 55
" Primrose 2nd	2	Nov. 29, 1922	First calf	235	3947·5	16·79	4·09	190·16	79 94	7 57	87 51
" Lass	2	April 8, 1922	"	355	5356·0	15·08	4·19	264·43	106 00	10 26	116 26
" Jessamine 6th	2	Feb. 11, 1923	"	298	3656·0	12·26	3·88	167·20	67 12	7 02	74 14
" Susan 4th	2	Jan. 12, 1923	"	283	3313·9	11·70	4·04	157·62	64 28	6 35	70 63
" Victoria 4th	2	Nov. 20, 1922	"	303	4545·7	15·00	3·97	212·72	85 12	8 72	93 84
Average	4	.....	106	274	4941·3	18·07	3·98	231·10	91 49	9 48	100 97

FEED CONSUMPTION AND COST

Name of Cow	Age in 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 lbs. milk	Cost to produce one pound of butter	Profit on one pound of butter	Profit on cow
			lbs.	lbs.	lbs.	lbs.		$ cts.	$ cts.	cts.	cts.	$ cts.
Kentville Jessamine	9	Nov. 17, 1922	3,426	15,605	4,030	1,680	2·50	129 47	1 54	37·01	4·43	31 71
" Victoria	8	April 3, 1923	2,298	14,545	4,124	1,680	0·35	100 26	1 94	41 46	−3·34	1 80
" Fairy	5	" 29, 1922	1,896	11,910	3,625	1,100	4·25	79 18	1 57	31·35	5·73	24 09
" Mayflower	6	" 9, 1923	2,357	14,165	3,802	1,680	0·35	100 26	1 79	38·04	−0·41	9 64
" Fairy 2nd	5	Mar. 22, 1923	2,147	13,145	3,341	1,680	0·35	91 31	1 71	34·80	3·36	19 06
" Primrose	5	" 20, 1923	2,199	14,955	3,724	1,680	0·35	97 42	1 81	39·38	−0·78	8 41
" Susan	4	May 20, 1922	2,535	13,510	3,961	1,100	4·25	114 57	1 76	36·69	0·64	14 43
" Victoria 3rd	3	June 27, 1922	2,532	10,415	3,495	1,100	3·25	102 48	1 87	38·68	−0·41	9 42
" Susan 2nd	3	Dec. 3, 1922	1,689	10,960	3,018	.....	0·50	70 99	1 83	39·35	3·74	14 16
" Meadow Flower 2nd	3	" 4, 1922	2,180	12,945	3,806	1,680	0·75	93 75	1 71	36·22	4·86	23 05
" Jessamine 4th	3	Mar. 26, 1923	2,123	11,095	2,878	1,680	0·35	84 32	2 30	53·03	−15·35	−17 37
" Jessamine 5th	3	Dec. 29, 1922	1,694	12,095	3,368	420	.....	76 24	2 11	45·02	−2·87	2 04
" May 2nd	3	Jan. 30, 1923	2,418	11,635	3,576	1,680	0·35	94 81	2 01	46·09	−4·54	−0 26
" Primrose 2nd	2	Nov. 29, 1922	1,827	10,400	2,528	.....	.....	70 49	1 78	37·06	4·97	17 02
" Lass	2	April 8, 1922	2,112	8,725	2,941	1,100	4·25	85 54	1 59	32·34	7·73	30 72
" Jessamine 6th	2	Feb. 11, 1923	1,851	9,955	2,794	1,680	0·35	77 16	2 11	46·14	−6·00	−3 02
" Susan 4th	2	Jan. 12, 1923	1,825	8,725	2,472	1,680	0·35	72 06	2 17	45·71	−4·93	−1 43
" Victoria 4th	2	Nov. 20, 1922	2,079	10,445	2,924	1,130	0·35	82 45	1 81	38·76	1·25	11 39
Average	4	.....	2,177	11,957	3,356	1,264	1·27	90 15	1·85	39·84	−0·11	10 82

SWINE

The hogs kept are Yorkshires, the aim being to breed for the select bacon type. The young pigs are sold for the most part as breeders. Records of feed used to carry a breeding sow and a boar are given below. Thirty young pigs, some of them not receiving milk in any form, are being fed for bacon purposes. The meal ration of those receiving buttermilk is: crushed oats, 200 pounds; bran, 100 pounds; crushed barley, 100 pounds; middlings, 200 pounds; mineral mixture, 30 pounds. Those receiving no milk are fed: crushed oats, 200 pounds; crushed barley, 100 pounds; middlings, 200 pounds; bran, 100 pounds; linseed oil meal, 50 pounds; tankage, 50 pounds; mineral mixture, 35 pounds. The mineral mixture is made up of 100 pounds fine crushed limestone, 100 pounds steamed bone meal, 100 pounds fine charcoal, and 50 pounds salt. Roots are fed the different lots daily in equal amounts. The test is not yet completed.

FEED CONSUMED BY ONE BOAR AND ONE BREEDING SOW FOR ONE YEAR

—	Total fed	Average per day	Total cost	Cost per day
	lbs.	lbs.	$ cts.	cents
Sow—				
Meal	1,947	5·3	44 78	12·2
Roots and other green feed	3,040	8·3	4 56	1·2
Total cost			49 34	13·4
Boar—				
Meal	1,450	3·9	33 35	9·1
Roots and other green feed	2,900	7·9	4 35	1·2
Total cost			37 70	10·3

FIELD HUSBANDRY

FODDER CROPS

The amount of corn ensiled was 189·2 tons; sunflowers, 21·4 tons; second growth clover, 29.8 tons; and sweet clover, 0.97 tons, a total of 241.37 tons. The root crops harvested were 2,054 bushels of turnips, 666·7 bushels of mangels, and 123·5 bushels of carrots, a total of 2,844·2 bushels.

HAY

Eight acres seeded to clover and timothy in 1922 yielded 24 tons of excellent clover hay. The clover hay on Experiment E plots amounted to 23 tons, 1,180 pounds, a yield per acre of 2 tons, 1,898 pounds. Ten acres of dyked land produced 15 tons, 280 pounds, and 11 other acres, 22 tons. Other farm areas produced 59 tons, 1,350 pounds, making a total hay crop harvested of 144 tons, 810 pounds. Alfalfa hay harvested amounted to 6·91 tons.

GRAIN CROPS

One field of ten acres in oats averaged 52·5 bushels per acre. A two-acre area yielded 56.7 bushels per acre. The total oat crop harvested was 1,060 bushels; wheat, 47 bushels; barley, 34 bushels; peas, 4 bushels and mixed grain, 60 bushels, making a total grain yield of 1,205 bushels.

A COMPARISON OF DIFFERENT FODDER CROPS

This experiment included the growing of corn, sunflowers, turnips, mangels, and an oats, peas, vetches mixture on equal areas of land treated alike in every particular as to manuring, ploughing and preparation of the soil. The

object of the experiment was to determine the total fodder available from each crop grown under similar conditions, and their relative costs.

The land on which this test was conducted was in hay in 1922. The crop was light, because of the clover having been largely winter-killed. The ground was ploughed in the early fall and was disced soon after ploughing. Manure was applied in the spring at the rate of 20 tons per acre, and no additional fertilizer was given. The land was disced when dry enough and the manure spread broadcast and ploughed under. The ground was again disced, and then levelled. Seeding was done June 2. The corn and sunflowers were seeded in rows 3½ feet apart, the corn at the rate of 30 pounds and the sunflowers at 12 pounds per acre. The sunflowers were thinned to seven inches apart where plants were closer than this distance. For roots rows were made 2½ feet apart with the horse hoe; these were rolled down and the turnips and mangels seeded with the hand seeder at the rate of two and twelve pounds per acre respectively. The turnips and mangels were thinned to 10 inches apart. In order to avoid possible error in distances and to be sure of a uniform stand the thinning was done by hand, which added somewhat to the cost. For the O.P.V. area 2½ bushels of oats, ½ bushel of peas and ⅓ bushel of vetches were mixed together and seeded per acre with the grain drill. The plots in this test were each of one-half acre. The oats, peas and vetches were harvested August 20; the sunflowers September 24, when the heads were nicely in bloom; the corn October 5 and the mangels and turnips October 24.

In the following tables manure is charged at the rate of $1 per ton, and 50 per cent of its value is charged up to the crop grown on the year it is applied. The rental charge is on a valuation of $50 per acre at 6 per cent interest. The table below gives a summary of the cost of production, and is followed by tables giving detailed costs.

SUMMARY—COST OF PRODUCTION OF DIFFERENT FORAGE CROPS, KENTVILLE, N.S., 1923

Charges in Producing One Acre	Corn	Sunflower	Turnips	Mangels	Oats, Peas, Vetches
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Rental of land, preparation, and fertilizer	18 88	18 88	19 37	19 37	18 39
Seed	1 07	1 80	1 20	2 80	5 35
Seeding operations	0 74	0 74	0 75	0 75	0 49
Cultural operations	12 12	18 99	21 80	22 55	.....
Harvesting and storing	9 51	10 50	12 13	12 13	5 61
Use of machinery	3 00	3 00	3 00	3 00	0 60
Total cost per acre	45 32	53 91	58 25	60 60	30 44
Yield per acre, tons	14·9	19·8	19·14	16·47	8·26
Cost per ton	3 04	2 72	3 04	3 67	3 68

COST OF GROWING ONE ACRE OF CORN, KENTVILLE, N.S., 1923

Rental of land	$ 3 00
Share of manure, 20 tons per acre at $1	10 00
Use of machinery	3 00
Seed, 30 pounds at $2 per bushel	1 07
Ploughing, 8 hours at 49 cents	3 92
Discing and cultivating, 4 hours at 49 cents	1 96
Seeding, 1½ hours at 49 cents	0 74
Cultivating, 10 hours at 49 cents; 6 hours at 37 cents	7 12
Hoeing, 20 hours at 25 cents	5 00
Cutting, 1½ hours at 49 cents	0 74
Twine, 3 pounds at 15 cents	0 45
Loading and hauling to silo, 3 hours at 99 cents	2 97
Cutting and storing in silo, 3 hours at $1.50	4 50
Kerosene and oil	0 85
	45 32

Yield per acre, 14·9 tons
Cost per ton $3.04

COST OF GROWING ONE ACRE OF SUNFLOWERS, KENTVILLE, N.S., 1923

	$
Rental of land	3 00
Share of manure, 20 tons per acre at $1	10 00
Use of machinery	3 00
Seed, 12 pounds at 15 cents	1 80
Ploughing, 8 hours at 49 cents per hour	3 92
Discing and cultivating, 4 hours at 49 cents	1 96
Seeding, 1½ hours at 49 cents	0 74
Cultivating, 10 hours at 49 cts.; 6 hours at 37 cts	7 12
Hoeing and thinning, 47½ hours at 25 cents	11 87
Cutting, 1½ hours at 49 cents	0 74
Twine, 3 pounds at 15 cents	0 45
Loading and hauling to silo, 4 hours at 99 cents	3 96
Cutting and storing in silo, 3 hours at $1.50	4 50
Kerosene and oil	0 85
	53 91

Yield per acre 19·8 tons
Cost per ton $2.72

COST OF GROWING ONE ACRE OF TURNIPS, KENTVILLE, N.S., 1923

	$
Rental of land	3 00
Share of manure, 20 tons per acre at $1 per ton	10 00
Use of machinery	3 00
Seed, 2 pounds at 60 cents	1 20
Ploughing, 8 hours at 49 cents	3 92
Discing and cultivating, 5 hours at 49 cents	2 45
Seeding with garden drill, 3 hours at 25 cents	0 75
Cultivating, 15 hours at 37 cents	5 55
Hoeing and thinning, 65 hours at 25 cents	16 25
Pulling and topping, 25 hours at 25 cents	6 25
Loading and hauling to storage cellar, 12 hours at 49 cents	5 88
	58 25

Yield per acre, 765·6 bushels, or 19·14 tons
Cost per bushel 7·6 cents
Cost per ton, $3.04

COST OF GROWING ONE ACRE OF MANGELS, KENTVILLE, N.S., 1923

	$ cts.
Rental of land	3 00
Share of manure, 20 tons per acre at $1 per ton	10 00
Use of machinery	3 00
Seed, 8 pounds at 35 cents	2 80
Ploughing, 8 hours at 49 cents	3 92
Discing and cultivating, 5 hours at 49 cents	2 45
Seeding, 3 hours at 25 cents	0 75
Cultivating, 15 hours at 37 cents	5 55
Hoeing and thinning, 68 hours at 25 cents	17 00
Pulling and topping, 25 hours at 25 cents	6 25
Loading and hauling to storage cellar, 12 hours at 49c	5 88
	69 60

Yield per acre, 658·8 bushels, or 16·47 tons
Cost per bushel 9·2 cents
Cost per ton, $3.67

COST OF GROWING ONE ACRE OF OATS, PEAS AND VETCHES, KENTVILLE, N.S., 1923

	$ cts.
Rental of land	3 00
Share of manure, 20 tons per acre at $1	10 00
Use of machinery	0 60
Seed, 2½ bus. oats at $1; ½ bush. peas at $3; ¼ bus. vetches at $4.05	5 35
Discing and cultivating, 3 hours at 49 cents	1 47
Ploughing, 8 hours at 49 cents	3 92
Seeding, 1 hour at 49 cents	0 49
Cutting, 1½ hours at 49 cents	0 74
Loading, hauling and unloading, 5 hours at 49 cents	2 45
Cutting and storing in silo, 2 hours at $1	2 00
Kerosene and oil	0 42
	30 44

Yield per acre, 8·26 tons
Cost per ton, $3.68

YIELD OF OATS FOLLOWING DIFFERENT FODDER CROPS

Victory oats was seeded May 26 on the land on which different fodder crops had been grown in 1922. The land had been fall ploughed after the crop was harvested and was worked up in the spring of 1923 by discing and harrowing, after which the grain was seeded. Eight pounds of red clover, 2 pounds of alsike clover and 8 pounds of timothy were seeded per acre. These areas were prepared in the same way and were fertilized alike in 1922 and no additional fertilizer was applied in 1923. The crop was harvested September 19 with results as given in the following table.

OATS FOLLOWING DIFFERENT FODDER CROPS

Crop in 1922	Yield per acre 1922	Yield of oats per acre, 1923	
		Straw	Grain
	tons	tons	bushels
Corn	19·92	1·14	56·6
Oats, peas, vetches	5·05	1·23	52·1
Turnips	21·28	1·12	51·6
Sunflowers	20·8	1·00	49·6
Mangels	17·59	0·93	48·1

COST OF GROWING ONE ACRE OF OATS

The table below gives the cost of growing one acre of oats in 1923. This crop was grown in a three-year rotation and is charged with 30 per cent of the manure used on this field in 1922:—

COST OF GROWING ONE ACRE OF OATS, 1923

	$ cts.	$ cts.
Rental of land	3 00	
Share of manure, 30% of 15 tons at $1	4 50	
Seed, 3 bushels at $1	3 00	
		10 50
Use of machinery	1 00	
Ploughing in fall, 8 hours at 49 cents	3 92	
Discing with tractor, 1 hour at $1	1 00	
Cultivating, 1½ hours at 49 cents	0 74	
Seeding and smoothing, 3 hours at 49 cents	1 47	
Cutting, 1½ hours at 49 cents	0 74	
Twine, 3 pounds at 16 cents	0 48	
Stooking, 1½ hours at 25 cents	0 38	
Loading and unloading, 2 hours at 74 cents	1 48	
Threshing, 7 hours at 25 cents	1 75	
Kerosene and oil	0 52	
		13 48
Total cost per acre		23 98

Yield per acre, oats, 51·6 bushels
Yield per acre, straw, 1·08 tons

Cost of oats per bushel (deducting value of straw at $6 per ton), 33·9 cents.

COST OF CLOVER HAY

The data below indicate the cost of clover hay per acre on a three-year rotation area. This field was in oats in 1922, and was seeded with 8 pounds of timothy, 8 pounds of red clover and 2 pounds of alsike clover per acre. The first cutting produced 2·4 tons, and the second cutting ·65 tons, a total of 3·05 tons per acre. The cost of harvesting the second cutting, it will be noticed, is nearly double that of the first cutting.

COST OF ONE ACRE OF CLOVER HAY, 1923

	$ cts.	$ cts.
Rental of land per acre	3 00	
Share of manure, 20% of 20 tons at $1	4 00	
Ground limestone, half cost of 1922 application	2 15	
Seed, clover and timothy	3 94	
		13 09
Use of machinery	1 00	
Cutting, 1½ hours at 49 cents	0 74	
Tedding, ¾ hour at 49 cents	0 37	
Raking, ¾ hour at 37 cents	0 28	
Coiling, 2¼ hour at 25 cents	0 56	
Shaking out and recoiling, 4½ hours at 25 cents	1 13	
Loading, hauling and unloading, 5 hours at $1	5 00	
		8 08
Cost per acre		22 17

Yield per acre 2·4 tons
Cost of harvesting per ton $3.78
Cost per ton, $9.23

(*Second Crop*)

	$ cts.	$ cts.
Use of machinery	1 00	
Cutting, 1½ hours at 49 cents	0 74	
Raking, ¾ hour at 37 cents	0 28	
Coiling, 1½ hours at 25 cents	0 38	
Shaking, out, loading and storing, 2 hours at 75 cents	1 50	
		3 90

Yield per acre 0·65 tons
Cost of harvesting per ton, $6.00
Cost, per ton, (1st and 2nd cuttings) $8.54

HAY FROM NEWLY-BROKEN LAND SEEDED IN THE SUMMER OF 1922

A newly-broken area of three acres which had not previously been in crop was prepared and seeded July 15, 1922. This area was limed at the rate of 2 tons of ground limestone per acre, and a light coating of manure at the rate of 10 tons per acre was applied and disced in before seeding. The seed, made up of 10 pounds of timothy and 5 pounds each of red and alsike clovers, was put in with the grain seeder and levelled with a light levelling harrow. The yield from this area was 3.3 tons per acre of a fine quality of clover hay.

An adjoining area of 3 acres of similar land was prepared later and seeded with the same grass mixture on August 12 and 14. This land was limed at the rate of 2 tons per acre, and 100 pounds per acre of nitrate of soda was applied. No manure was used. The season was favourable and a good stand was secured. The yield of hay was 2.58 tons per acre. The stand of clover was much thinner than that of the area first seeded. If the summer is not very favourable as to moisture, seeding after the first of August is likely to kill out during the winter unless well protected with snow until late in the spring. The snow protection prevents much alternate freezing and thawing in the early spring when the land is charged with an excess of water.

NEWLY-BROKEN AREAS SUMMER SEEDED IN 1920 FOR HAY

This area of six acres was cleared and broken in the spring of 1920, and seeded on August 7. It was seeded with the object of developing pasture, but because of a scarcity of hay, a hay crop was harvested the following three years, and it will be turned to pasture in 1924. In the table following, the cost of preparation after breaking, and the method and cost of fertilization are given. On such new land the application of even a light coating of manure is advisable, and the benefit from lime is very marked in the hay yields. The seeding on August 7 was later than is advised, as from a seeding at this date many of the clover plants do not become sufficiently established to withstand the winter, particularly if the soil is wet. The seeding was made with 10 pounds of timothy, 10 pounds of red clover, 4 pounds of alsike and 1 pound of white dutch clover per acre.

The value of the hay produced is given at the replacement cost, as without it a similar amount would have had to be purchased, at possibly a higher price than that stated. It will be seen that the production of hay over the three years has a value of $21.60 more than the cost incidental to preparation, seeding and harvesting. This area has an excellent sward in which is a good sprinkling of white clover, and should make a very good pasture. The cost of preparation, and the crop produced were as follows:—

NEWLY-BROKEN AREAS SUMMER SEEDED IN 1920 FOR HAY

(Cost per Acre)

	$ cts.	$ cts.
Discing, 3½ hours at 60 cents per hour		2 10
Manure, 8 tons at $1 per ton	8 00	
Ground limestone, 2 tons at $4 per ton	8 00	
Acid phosphate, 300 lbs. at $1.60 per cwt	4 80	
Distribution of lime and fertilizer, 1 hour	0 60	
		21 40
Discing in manure and fertilizer, 3½ hours at 60 cents		2 10
Seed, timothy and clover	11 75	
Seeding and smoothing, 2½ hours at 60 cents	1 50	
		13 25
Preparation cost per acre		46 85
Use of machinery, 3 years at $1 per year	3 00	
Rental of land, 3 years at $3 per year	9 00	
Harvesting and storing, 3 years at $8.08 per year	24 24	
		36 24
Cost of crop for three years		75 09

(Value of Hay Crop)

Yield 1921	3,340 lbs. at replacement value of $18 per ton	30 06	
Yield 1922	4,630 lbs. at replacement value of $18 per ton	41 67	
Yield 1923	4,160 lbs. at replacement value of $12 per ton	24 96	
			96 69

Total yield, 12,130 lbs.

Value above cost of crop $21.60

Cost of hay per ton, $12.38

CLEARING LAND

The roots of the spruce and fir trees are confined mostly to the surface soil, where after a few years they readily decay and can be removed without great difficulty or expense. The pine tree grows deeper, and because of this and the resinous nature of the wood, decays slowly, making it necessary to use dynamite to remove the stumps. The deciduous trees, unlike the evergreens, are likely to develop a sprout growth from the stumps, and unless this sprout growth is removed the stump will not rot, but will continue to grow, rendering the clearing very difficult and expensive. The soft maple and the birch are the two worst in this respect, and it is because of these that clearing work has been difficult at this Station.

The cost of explosives and the time employed in their use on field A of 5½ acres was $17.91 per acre, while on field B of 5¾ acres the cost was $6.08 per acre, the difference in cost being due to the character of the growth. It is more difficult to plough land from which stumps of sprout growth have been removed, because of the fibrous roots still left in the surrounding undisturbed area.

The filling-in of the holes made by the dynamite also causes considerable expense. It is found that it is more economical to use small amounts of dynamite, just enough to split the stump and loosen it, so that it may be pulled out in sections. The smaller stumps that cannot be lifted with the plough are pulled out separately, either with oxen or by a stump puller.

Because of the unevenness of the surface it has been found very difficult to work horses for breaking up land. The fields before breaking are a succession of hillocks and hollows, which it seems impossible for horses to work over quietly. Oxen, on the other hand, will work along steadily without undue strain and excitement, and consequently a much better job can be done. The Manitoba brush-breaker plough is used with two yoke of oxen. Approximately one-half acre can be broken in a day. It requires six men to drive and handle the plough, to keep it going steadily. This represents a cost of $30 per acre for man labour and $8 for oxen, a total of $38 per acre. The advantage of using one man to keep the plough clear and two men to follow is that all roots and stones likely to give future trouble are placed on the surface so that they may be easily removed later. Of course, if there is no thick growth of birch or maple, as was the case in field B, this number of men is not required, and if the land is fairly level the difficulty of getting the furrow well turned is not so great, and the extra help is unnecessary.

The practice followed is to seed down with clover and timothy on the newly-broken area, allowing two years before a second ploughing. This gives time for the remaining roots to decay and also, because of the clover growth, fits the ground better for future crops. After the first ploughing the ground is disced with a heavily-weighted double disc harrow to prepare the seedbed.

The practice of using limestone on all newly-broken land has been followed, and it is because of this that a strong clover growth has been possible. It has been found advisable to use stable manure on the newly-broken fields, even if only in limited amounts. Through its application certain beneficial bacteria are evidently introduced. If manure is not available, acid phosphate or slag at the rate of 500 pounds per acre is applied, and nitrate of soda at the rate of 150 pounds per acre. This, of course, may not be necessary on some soils, but on areas where a growth of birch has predominated there is apparently little available plant food for crops, making it necessary to fertilize in order to get the first crop established.

Field A was broken in time to be seeded with oats and barley on June 19, and in addition 8 pounds of timothy, 8 pounds of red clover, and 2 pounds of alsike clover were seeded per acre. The oats was covered with a disc harrow. The grass seed was put in separately with a grain seed drill running light. It was necessary because of the uneven land to put a brush harrow over the ground to cover the grass seed properly. The growth of grain although uneven was fairly good, and it ripened before any killing fall frost, being harvested October 12. The stand of clover was good, but not nearly so vigorous as that on field B, seeded a month later with no nurse crop.

Field B was ploughed later than field A and was not ready for seeding until July 17 and July 18. This field was given the same quantity of manure as field A, 10 tons per acre. In addition, slag at the rate of 500 pounds per acre was applied to one section, and acid phosphate at the rate of 500 pounds per acre to another. Nitrate of soda at the rate of 150 pounds per acre was also applied over the whole field. The reason for this fertilization was to gain some information as to the possibility of quickly developing pasture areas on such newly-broken lands, naturally low in fertility. Eight pounds of timothy, 8 pounds of red clover and 4 pounds of alsike clover were seeded per acre with the seeder after the ground had been disced. The seed was further covered with a brush harrow, which is excellent for covering small seed on rough areas. The season was very favourable and a vigorous stand of clover was obtained. The following table gives the cost of breaking and seeding the respective areas:—

Cost of Breaking Land

(Field A, 5½ acres)

	$ cts.	$ cts.
Dynamiting (material and labour)	98 50	
Stumping, 810 hours at 25 cents per hour	202 50	
Piling and burning brush and roots, 450 hours at 25 cents	112 50	
Hauling stone, 52 hours at $1 per hour	52 00	
Ploughing, labour of men, 670 hours at 25 cents	167 50	
Ploughing, oxen, 120 hours at 40 cents	48 00	
		681 00
Cost per acre		$ 123 81

(Field B, 5¾ acres)

	$ cts.	$ cts.
Dynamiting, material and labour	35 00	
Stumping, 410 hours at 25 cents	102 50	
Piling and burning brush and roots, 320 hours at 25 cents	80 00	
Hauling stone, 50 hours at $1 per hour	50 00	
Ploughing, labour of men, 540 hours at 25 cents	135 00	
Ploughing, oxen, 150 hours at 40 cents	60 00	
		462 50
Cost per acre		80 43

Cost of Preparation and Seeding of Newly-Broken Land

(Field A.—5½ acres)

	$ cts.	$ cts.
Discing, (horses) 70 hours at 50 cents per hour		35 00
Hauling and spreading manure, 60 hours at 50 cents	30 00	
Hauling and spreading limestone, 10 hours at 75 cents	7 50	
		37 50
Manure, 55 tons at $1 per ton	55 00	
Limestone, 6 tons at $4.50 per ton	27 00	
		82 00
Seed, 15 bushels oats at 75 cents	11 25	
Seed, 4 bushels barley at $1	4 00	
Seeding by hand, 10 hours at 25 cents	2 50	
Discing with tractor, 8 hours at $1	8 00	
		25 75
Clover and grass seed, 18 pounds per acre	21 67	
Seeding clover and grass seed with seeder, 5 hours at 50 cents	2 50	
Covering clover and grass seed with brush harrow, 5 hours at 50 cents	2 50	
		26 67
Total cost		206 92
Cost per acre		37 62

Credit

180 bushels oats and barley at 80 cents	144 00	
7 tons straw at $7	49 00	
		193 00
Credit per acre		35 09

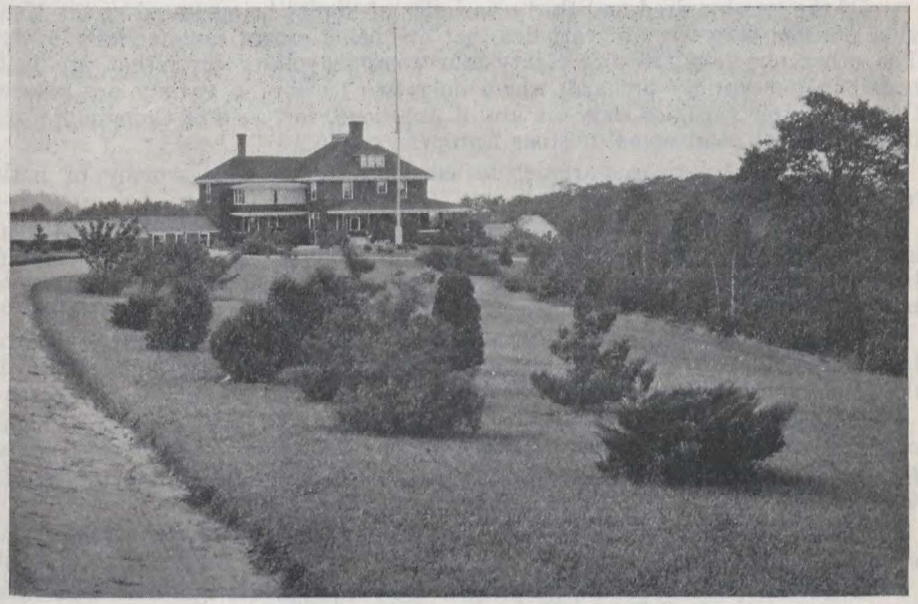
Field B—5¾ acres)

	$ cts.	$ cts.
Discing, (tractor) 18½ hours at $1	18 50	
Discing (horses) 25 hours at 50 cents	12 50	
		31 00
Hauling and spreading manure, 80 hours at 50 cents	40 00	
Manure, 57½ tons at $1 per ton	57 50	
		97 50
Slag, 1,500 pounds at $24 per ton	18 00	
Acid phosphate, 1,000 pounds at $20 per ton	10 00	
Nitrate of soda, 860 pounds at $60 per ton	25 80	
Hauling and spreading fertilizer, 8 hours at 75 cents	6 00	
		59 80
Harrowing with tractor, 10 hours at $1		10 00
Clover and grass seed, 20 pounds per acre	25 07	
Sowing clover seed and grass seed, 5 hours at 50 cents	2 50	
Covering clover seed and grass seed, with brush harrow, 5 hours at 50c	2 50	
		30 07
Total cost		228 37
Cost per acre		39 71

HORTICULTURE

THE SEASON

The winter's heavy snowfall, 140¼ inches, did much damage to trees, and young orchards in many cases were so completely covered that when the snow settled the trees were almost ruined by the splitting of branches. The trees were in many cases repeatedly dug out, but this was of little avail as a later storm would drift still more snow over the tree.



A group of Juniperus Sabina, Arbor-Vitae, and Retinospora on the Station grounds.

Cultural operations were not possible in the orchard until May 10, fully three weeks later than in 1922. All fruit trees excepting peaches came through the winter without injury from frost.

Three light frosts of one and two degrees were recorded during the month of May, but, owing to the retarded growth of the trees because of the backward weather, did no injury.

Leaf buds were open sufficiently for the first spray on May 22. Foliage and blossom buds opened rapidly. Crimson Beauty was in bloom on May 31 while Spy and Rome Beauty commenced to bloom June 4. The fruit bloom, all varieties considered, was at its best June 8.

The weather during early June was bright with a high temperature. The best condition for distribution of pollen was on June 7 and June 8, and a high temperature following June 9 favoured fertilization, resulting in a good set of fruit in all varieties that bloomed.

The mean average daily temperature during June, July, August, and September was somewhat lower than for the same periods during the previous nine years, while the total rainfall and hours of sunshine were somewhat higher. Whether this temperature was too low for the proper development of certain varieties is not evident, but it was noticeable that some varieties were undersized and lacked the maturity they usually have.

Conditions were favourable for the development of scab, particularly during the latter part of July, when a fifth dust or spray could have been applied to

advantage. A bad outbreak of green aphids occurred during the month of July. The autumn season was characterized by two gales, occurring on August 22 and October 1 respectively. The former caused considerable loss of early fruit, while the latter not only blew off in many cases from 25 to 50 per cent of the crop, but completely destroyed many trees.

APPLES

VARIETIES UNDER TEST

Of the two hundred and thirty varieties of apples being tested at the Kentville Station, forty-six are varieties that are being grown commercially to-day. The other one hundred and eighty-four comprise newer sorts that are being tested in our variety orchard, where only two trees of a variety are planted. Of these latter varieties sixty-six are of American, forty-six of Canadian, sixty-five of English, and seven of other European origin.

From the American varieties tested those which seem worthy of notice are as follows:—

Stayman Winesap.—Origin, Kansas. This variety has fruited three years at Kentville, the 1923 crop being the best in quality. It is hardy, an annual bearer, with fruit of fair colour and quality, and a good keeper. It is a late-maturing variety and for that reason may not be suitable for general planting.

Delicious.—Origin, Iowa. Productive, hardy, of good quality. Season, late winter. The fruit of this variety is very irregular in size and colour, and does not mature well under certain soil conditions.

Ohio Bright Red Rome Beauty.—Origin, Ohio. A very attractive, highly coloured apple of fair quality, handles well, is a late winter variety and a heavy producer. If Rome Beauty is to be planted this is the best of the several strains tested. The Illinois Dark Red Rome Beauty is also good.

Black Ben Davis.—Owing to its very brilliant colour and attractive appearance, and being equal in other respects to Ben Davis, it is desirable for planting.

Arkansas (Mammoth Black Twig).—Like many other late maturing varieties it is apparently too late for many locations, and is not advised for general planting.

Arkansas Black.—Somewhat similar to Arkansas; is not desirable for planting.

Winter Banana.—This variety does well, but is difficult to handle in barrels and is more suitable for boxes. We would not advise planting it.

Opalescent.—This variety has fine colour but lacks in quality. It is an early winter variety.

Newtown Pippin.—This we do not recommend, the season not favouring proper maturity.

VARIETIES OF APPLES UNDER TEST

Variety	Origin	Season	Quality	Total production 1918–23	Remarks
				pecks	
Adams Pearmain	Eng.	Dec.-Feb.	Good	12	Probably useful.
Akin	Am.	Jan.-Feb.	"	3½	No commercial value.
Alfriston	Eng.	Jan.-April	Poor	7	Of no special value.
Allington Pippin	"	Dec.-Mar.	Good	30½	No commercial value.
Allens Everlasting	"	Feb.-April	"	1¼	Of no value.
Ambo	C.E.F.	Sept.-Oct.	Fair	27	Swayzie seedling.
Annie Elizabeth	Eng.	Dec.-Feb.	"	3	Of no value.
Arkansas	Am.	Mar.-April	Good	20	Of commercial value.
Barnack Beauty	Eng.	Jan.-Mar.	Fair	6	A promising variety.
Bailey Sweet	Am.	Oct.-Jan.	Good	14	Of no commercial importance.
Beauty of Bath	Eng.	Sept.	"	9	Of value for early market.

VARIETIES OF APPLES UNDER TEST—*Continued*

Variety	Origin	Season	Quality	Total production 1918-23	Remarks
				pecks	
Bens Red	Eng.	Sept.-Oct.	Good	12	Of no value commercially.
Belle de Pontoise	"	Jan.-April	Poor	8	" "
Boskoop	Eur.	Nov.-Dec.	Fair	23	" "
Bismarck	N.Z.	Dec.-Feb.	"	5	" "
Black Ben Davis	Am.	Feb.-May	"	39	Equal in value to Ben Davis.
Boiken	Eur.	Mar.	Poor	57	Of no commercial value.
Bramley Seedling	Eng.	Jan.-Feb.	"	10¼	Promising.
Calville Blanc	Eur.	Dec.-April	Fair	2	Of no commercial value.
Canada Red	Am.	Jan.-Feb.	"	2½	Of no special value.
Chenango	"	Sept.	Good	52	Of local value only.
Charles Ross	Eng.	Oct.-Nov.	Fair	17	Of value commercially.
Chelmsford Wonder	"	Jan.-Mar.	Poor	22¾	Of no commercial value.
Cox Pomona	"	Nov.-Dec.	Fair	36	" "
Crimson Bramley	"	Dec.-Jan.	Poor	22	Promising.
Danville	C.E.F.	Nov.-Dec.	"	41	Lawver seedling.
Deacon Jones	Am.	Feb.-Mar.	Fair	42½	No commercial value.
Devonshire Quarrenden	Eng.	Sept.-Oct.	Good	22½	Only of local value.
Delicious	Am.	Jan.-Mar.	"	23	Possible commercial value.
Diana	C.E.F.	Oct.-Nov.	"	23	Langford Beauty seedling.
Early Victoria	Eng.	Sept.-Nov.	Fair	29	Of no commercial value.
Early Julian	"	Sept.-Dec.	"	18	" "
Early Harvest	Am.	Aug.-Sept.	"	17¾	Useful early variety.
Early Rivers	Eng.	Sept.	Poor	39	Of no commercial value.
Ecklinville	"	Sept.-Nov.	"	47	" "
Emilia	C.E.F.	Jan.-Feb.	Good	2¾	Spy seedling.
Encore	Eng.	Mar.-April	Poor	9½	Of no commercial value.
English Russet	Am.	Feb.-Mar.	Good	34	Not equal to Golden Russet.
Ewalt	"	Jan.-Feb.	Poor	46	Of no commercial value.
Estelline	"	Oct.-Dec.	"	21	" "
Fall Pippin	"	Dec.-Feb.	Fair	22½	" "
Forerunner	C.E.F.	Sept.	"	8	McIntosh seedling.
Fall Jennetting	Am.	Sept.-Oct.	Poor	19	Of no commercial value.
Galetta	C.E.F.	Dec.-Jan.	Fair	14½	Wealthy seedling.
Gascoyne Scarlet	Eng.	Nov.-Dec.	Poor	21	Of doubtful value.
Gilliflower	Am.	Oct.-Feb.	Good	19½	Of no value.
Gold Medal	Eng.	Oct.-Nov.	Poor	41½	Of no commercial value.
Golden Sweet	Am.	Sept.-Oct.	Fair	19½	" "
Grimes	"	Nov.-Jan.	Good	43	Of little value in Nova Scotia.
Grenadier	Eng.	Oct.-Nov.	Poor	29¾	Of no commercial value.
Hambling Seedling	"	Dec.-Feb.	"	13	" "
Hector McDonald	"	Nov.-Jan.	Fair	31½	" "
Hendricks Sweet	Am.	Nov.-Feb.	Good	4	" "
Houblon	Eng.	Nov.-Dec.	"	4½	Cox Orange seedling.
Hounslow Wonder	"	Feb.-Mar.	Fair	8½	A promising variety.
James Grieve	"	Oct.-Nov.	"	57	Of no commercial value.
Jonathan	Am.	Nov.-Feb.	Good	40	Of doubtful value in Nova Scotia.
Joyce	C.E.F.	Oct.-Nov.	"	8	McIntosh seedling.
Kim	"	Nov.-Jan.	Fair	25½	Langford Beauty seedling.
King Edward VII	Eng.	Jan.-April	"	15½	Promising.
King of Pippins	Eur.	Dec.-Jan.	"	21½	Of no commercial value.
Lady Sudeley	Eng.	Aug.-Sept.	Good	14	" "
Langley Pippin	"	"	"	15½	" "
Lady Sweet	Am.	Nov.-Mar.	"	5½	" "
Lawver	"	Jan.-Mar.	Fair	26	Very late, of doubtful value.
Lane Prince Albert	Eng.	Oct.-Jan.	"	32½	Not advised.
Langford Beauty	Am.	Oct.-Nov.	Good	24¼	Of no commercial value.
Lobo	C.E.F.	"	"	19¾	McIntosh seedling.
Lord Stradbrooke	Eng.	Mar.-April	Fair	1¾	Of no commercial value.
Lord Derby	"	Nov.-Jan.	Poor	32	" "
Lord Grosvenor	"	Oct.-Jan.	Fair	26¼	" "
Lord Suffield	"	Oct.-Dec.	Poor	8¾	" "
Lord Hindlip	"	Jan.-May	Good	10¾	" "
Lowland Raspberry	Eur.	Aug.-Sept.	"	11¾	Very early.
Magog	Am.	Dec.-Jan.	Fair	19½	Of no commercial value.
Maiden Blush	"	Nov.-Dec.	"	10¾	" "
Mann	"	Feb.-April	"	17½	Of no special value.
Mavis	C.E.F.	Dec.	Poor	9¼	McIntosh x Lawver.
Melba	"	Sept.-Oct.	Good	43¾	McIntosh seedling.
Mere de Menage	Eng.	Dec.-Jan.	Poor	10¾	Of doubtful value.
Milding	Am.	Nov.-Feb.	Fair	30	" "
Mother	"	Oct.-Jan.	Good	5½	Not as good as Spitzenburg.
Mr. Gladstone	Eng.	Sept.-Oct.	Poor	6¼	Of no commercial value.
McLellan	Am.	Dec.-Jan.	Good	6¾	" "
Newton Wonder	Eng.	Dec.-May	Fair	16¾	Of doubtful value.

VARIETIES OF APPLES UNDER TEST—*Concluded*

Variety	Origin	Season	Quality	Total production 1918-23	Remarks
Nepean	C.E.F.	Jan.-Feb.	Good	42	Salome seedling.
Newtown Pippin	Am.	Feb.-Mar.	"	17½	Of doubtful commercial value.
New Hawthornden	Eng.	Dec.-Jan.	Poor	11¾	Of no commercial value.
Niobe	C.E.F.	Dec.-Mar.	Good	26	Spy seedling.
Norfolk Beauty	Eng.	Oct.-Dec.	Fair	17¼	Of no commercial value.
Northwestern Greening	Am.	Nov.-Jan.	Poor	62½	" "
Ohio Bright Red Rome	"	Nov.-April.	Fair	9	Worthy of more general planting.
Ohio Dark Red Rome	"	"	"	18¾	" " "
Olympia	"	Jan.-Mar.	"	7½	Closely resembles Baldwin.
Opalescent	"	Nov.-Mar.	"	37	Not equal to our standard varieties of same season.
Ostego	"	Jan.-Mar.	"	10½	Of no commercial value.
Ortley	"	Oct.-Feb.	"	1¼	" "
Pinto	C.E.F.	Nov.-Dec.	Poor	27½	Wealthy seedling.
Pensaukee Russet	"	Dec.-Jan.	Fair	4½	Of doubtful value.
Porter	Am.	Nov.-Dec.	Fair	6	Of no commercial value.
Peasgood Nonsuch	Eng.	Oct.-Dec.	"	29	" "
Pecks Pleasant	Am.	Oct.-Feb.	"	25½	Not advised for general planting.
Pewaukee	"	Nov.-Jan.	"	31½	Of no commercial value.
Pedro	C.E.F.	Oct.-Nov.	Good	13	Of value; McIntosh seedling.
Rosalie	"	Jan.-Feb.	"	45	" Spy "
Roger	"	"	Fair	63¼	" Gano "
Rocket	"	Dec.-Jan.	"	67	" Spy "
Rev. W. Wilks	Eng.	Nov.-Jan.	Poor	21	Of no commercial value.
Red Winter Reinette	"	Jan.-Mar.	Fair	13½	Attractive; some value.
Red June	Am.	Sept.	Good	19	Of no commercial value.
Red Victoria	Eng.	Sept.-Oct.	Fair	36	" "
Red Bietigheimer	Eur.	Oct.-Nov.	"	16½	" "
Ramona	C.E.F.	Sept.-Oct.	Good	6½	Shiawassee seedling.
Rockland	Am.	Dec.-Jan.	Poor	18	Of no commercial value.
Rome Beauty	"	Jan.-April.	Fair	18	Not as good as strains of higher colour.
Rustler	C.E.F.	Jan.-Feb.	"	15½	Of value; McIntosh x Lawver.
Rolfe	Am.	Oct.-Jan.	"	15½	Of no commercial value.
Rambo Winter	"	Dec.-Feb.	Good	21	" "
Rupert	C.E.F.	Sept.	Fair	4	Of some value; early.
Sutton	Am.	Nov.-Feb.	Good	9	Of no commercial value.
Stirling Castle	Eng.	Nov.-Dec.	Poor	9¼	" "
Smokehouse	Am.	Nov.-Feb.	Fair	50¾	" "
Stayman Winesap	"	Jan.-Mar.	Good	18¾	Of some commercial value.
Schoharie	"	Feb.-Mar.	Fair	12	Of no commercial value.
Summer Golden	Eng.	Oct.-Dec.	"	16	" "
Saratoga	Am.	Feb.-Mar.	"	13	" "
St. Lawrence	Can.	Oct.-Nov.	Good	9½	No value for general planting.
Stump	Am.	Feb.-Mar.	Poor	7¼	Of no commercial value.
Salome	"	Mar.-May.	Good	11	Not advised for general planting.
Smith Cider	"	Jan.-Mar.	Poor	31¾	Of no value.
Stearns	"	Dec.-Jan.	Fair	3½	Of no commercial value.
Scarlet Beauty	"	Jan.-Feb.	Poor	43½	" "
Scarlet Pippin	Can.	Oct.-Nov.	Fair	22½	Promising.
Sop of Wine	Eng.	Aug.-Sept.	Poor	28¼	Of no value.
Summer Champion	Am.	"	Fair	36¾	"
Star of Devon	Eng.	Nov.-Dec.	"	21	Of no commercial value.
Striped Beaufin	"	Jan.-Mar.	"	1½	" "
Sturmer Pippin	"	Dec.-Mar.	Good	14	A valuable English apple.
Tower of Glamis	"	Nov.-Dec.	Poor	25½	Of no commercial value.
Tom Putt	"	Jan.-Feb.	"	14½	" "
Thurso	C.E.F.	Oct.-Nov.	Good	9	A Spy seedling resembling parent, but earlier.
Twenty Ounce	Am.	Oct.-Dec.	Fair	13½	Not as good as King.
Victoria Sweet	"	Oct.-Nov.	"	45½	Of no commercial value.
Warner King	Eng.	Nov.-Jan.	Poor	14½	Very large bright yellow.
Wm. Crump	"	Dec.-Jan.	Fair	10	Of no commercial value.
Westfield	Am.	Jan.-Mar.	Good	21	" "
Williams	"	Sept.-Oct.	"	36½	Old variety of good quality.
Walter Pease	Eng.	Dec.-Jan.	Poor	15	Of doubtful commercial value.
Wellington	"	Dec.-Feb.	Fair	30½	Useful cooking apple.
Walker Beauty	Am.	Nov.-April.	Poor	11¾	Of no value.
Winter Banana	"	Jan.-Feb.	Good	40	Of little commercial value.
Worcester Pearmain	Eng.	Sept.-Oct.	"	32	Of no commercial value.
Wismer	Can.	Dec.-Jan.	Fair	10½	Resembles Spitzenburg.
Winterstein		Dec.-Jan.	"	2¾	Of no commercial value.
Winter Pearmain	Eng.	Dec.-Mar.	"	21¼	" "
Winter Ribston	"	Jan.-Mar.	Good	4½	Worthy of trial.
Winton	C.E.F.	Dec.	Fair	3½	McIntosh seedling.
York Imperial	Am.	Jan.-Feb.	"	15½	Of doubtful value.

COMPARATIVE YIELDS OF STANDARD COMMERCIAL VARIETIES OF APPLES PLANTED 1912

The majority of commercial varieties under test at this Station fruited well in 1923. The fruit picked was generally below the average in size and colour but was of good quality. The date of harvesting was about two weeks later than the average date for this operation during the previous five years. The yield of fruit from the apple orchards was approximately 2,400 barrels. The table below gives the average yield per tree from planting in 1912 up to and including the crop for 1923, of all commercial varieties tested. It also shows the range of productiveness of the trees of the different varieties.

COMPARATIVE YIELDS TO DATE OF STANDARD COMMERCIAL VARIETIES OF APPLES PLANTED 1912

Varieties planted 1912	Number of trees fruiting	Lowest yield per tree	Highest yield per tree	Total yield including 1923 crop	Total yield per tree since planted	
		pecks	pecks	pecks	pecks	barrels
Baldwin (American)	40	4·50	53·0	767·50	19·19	1·599
Baxter	11	7·50	37·0	239·75	21·79	1·816
Ben Davis	18	26·75	69·5	908·75	50·48	4·206
Bishop Pippin (Yellow Bellflower)	19	3·75	33·5	333·33	17·54	1·461
Blenheim	38	0·0	36·0	361·25	9·50	0·792
Cox Orange	10	7·0	40·5	263·75	26·38	2·198
Crimson Beauty	17	11·75	50·5	438·60	25·80	2·150
Duchess	16	25·0	49·25	551·50	34·47	2·872
Dudley	6	22·25	60·0	226·25	37·71	3·142
Fallawater	20	2·5	34·5	357·50	17·87	1·489
Fameuse	19	24·0	80·0	1,147·0	60·37	5·031
Gano	18	22·5	87·0	953·60	52·98	4·415
Golden Russet	16	7·25	27·0	311·0	19·44	1·620
Gravenstein	40	0·25	82·0	1,429·33	35·73	2·977
Greening, Rhode Island	39	6·50	53·5	1,065·25	27·31	2·276
Hubbardston	14	23·50	74·0	476·33	34·02	2·835
King of Tompkins	29	0·50	33·5	450·33	15·53	1·294
McIntosh	19	9·5	45·5	580·50	30·55	2·546
McMahan	6	27·5	66·5	289·0	48·16	4·013
Milwaukee	19	52·5	108·5	1,414·0	74·42	6·203
Nonpareil (Roxbury Russet)	17	3·5	25·5	197·25	11·60	0·975
Northern Spy	39	0·0	17·75	149·25	3·83	0·319
Ontario	18	9·5	62·5	568·0	31·55	2·629
Red Astrachan	13	3·75	28·50	278·75	21·44	1·786
Ribston	34	3·50	47·50	965·50	28·39	2·366
Rome Beauty	17	15·0	67·5	659·50	38·80	3·233
Stark	18	12·0	82·0	769·0	42·72	3·560
Tolman	20	10·0	44·5	515·0	25·75	2·146
Wagener	74	10·0	65·5	2,693·2	36·39	3·032
Wealthy	48	15·25	70·5	2,279·0	47·48	3·956
Wellington	19	15·0	82·25	675·25	35·54	2·961
Wolf River	9	0·75	55·50	264·50	29·39	2·449
Yellow Transparent	18	16·5	44·50	577·0	32·06	2·671

SPRAYING

The 4-8-40 Bordeaux mixture, made up of 4 pounds copper sulphate, 8 pounds hydrated lime, and water to make 40 gallons, to which was added 1 pound of arsenate of lime for every 40 gallons, was compared with lime sulphur, 1 gallon of the concentrate in water to make 40 gallons, to which was added 1 pound of arsenate of lime and 2 pounds of hydrated lime for every 40 gallons. When the hydrated lime used is equal to twice the amount of copper sulphate there is less liability of yellowing and dropping of foliage, so that the 4-8-40 Bordeaux is now used in place of the old standard 4-4-40 Bordeaux.

The Bordeaux was made up by first dissolving the bluestone and adding the required amount to the nearly full tank. The engine is started and the solution kept agitated, and into this the hydrated lime, mixed with water into

a thin paste, is added, followed by the arsenate of lime, also previously made into a thin paste. This gives a thorough agitation when the materials are being mixed, and forms a mixture which does not settle rapidly because the precipitation is finer and remains in suspension better.

The required amount of lime sulphur concentrate is mixed with the water in a nearly filled tank and the whole kept thoroughly agitated. To this the hydrated lime is added after having been made into a thin paste with water, followed by the arsenate of lime required, also made into a thin paste.

A spray gun was used to apply these mixtures and the pump kept at 200 to 225 pounds pressure. The nozzle discs should be of the proper size and opening to give a fog-like spray. Discs that are worn and with a large opening should be discarded. The operator of the spray gun should not stand too close to the foliage. Care in mixing is very important, and the sprays should be applied as soon as mixed.

The dates of spraying apple trees were May 22, June 2, June 18, and July 4. The records as tabulated below were secured from Gravenstein trees, eleven years old.

SPRAYING RESULTS, 1923

How sprayed	Number of apples counted	Per cent clean	Per cent scab	Per cent insect injury	Per cent culls	Per cent No. 1's and 2's
Lime sulphur	1,685	99·89	0·11	0·35	1·00	98·51
Bordeaux	1,313	99·62	0·38	0·38	1·45	92·92
No spray	1,163	70·00	30·00	5·76	5·76	51·08

SPRAYING COSTS

The cost of materials used in spraying was, for lime-sulphur-arsenate, 1.14 cents per gallon, and for Bordeaux arsenate, 1.26 cents per gallon. The price of materials used was: concentrated lime sulphur, 28¾ cents per gallon; hydrated lime, $19 per ton; copper sulphate (bluestone) 7 cents per pound; arsenate of lime, 15 cents per pound. The labour charges were $1 per hour, the same as for dusting. The trees used were Gravensteins eleven years old.

SPRAYING COSTS, 1923

——	Lime-sulphur-arsenate	Bordeaux-arsenate
Number of trees used	150	150
Spray used, 4 applications	642 gals.	642 gals.
Spray used per tree, 4 applications	4·28 gals.	4·28 gals.
Spray used per acre 40 trees, 4 applications	171·2 gals.	171·2 gals.
Cost of spray material, 4 applications	$7·32	$8·09
Cost of spray material per tree, 4 applications	4·88 cts.	5·39 cts.
Cost of spray material per acre 40 trees, 4 applications	$1·95	$2·15
Time taken to spray 4 times	495 min.	495 min.
Time taken to spray one tree 4 times	3·3 min.	3·3 min.
Time taken to spray per acre, 40 trees, 4 times	132 min.	132 min.
Cost of time applying 4 sprays	$8·25	$8·25
Cost of time applying per tree, 4 sprays	5·5 cts.	5·5 cts.
Cost of time applying per acre, 40 trees, 4 times	$2·20	$2·20

DUSTING

The results obtained by orchardists who use dust for the control of fungous diseases and insects would indicate that thoroughness in all operations is of great importance. The leaf surface should be well covered, and this is not possible unless the tree is enveloped in a cloud of dust. The exercise of good judgment is necessary in regulating the machine so that the proper amount of dust may be secured, and no loss result from using more than is necessary. The team should be driven at a slow walk to enable a better regulation of the dust supply to be made, and to give an even dust blast. To do a thorough job the tree should be dusted from both sides. The weather conditions which permit of dusting are usually found in the very early morning before wind currents start up. The foliage at this time, being covered with dew, is also in a satisfactory condition for the dissolving and holding of the dust. Dusting on dry leaves, with wind or rain following, may result in much loss of material and consequently lessened protection.

Sulphur and Bordeaux dusts were used at Kentville on both young and mature orchards. The first dust was applied on May 22 and May 23, the second on June 5. (This dust was applied just as the blossom buds were opening, and in order to prevent poisoning of the honey bees no insecticide was included in the dust.) The third dust was applied on June 18, and the fourth on July 4. Records were taken from the Gravenstein variety only and are given below. The mature orchard was dusted from both sides, and the young trees from one side only.

DUSTING RESULTS, 1923

Mature Orchard

How dusted	Number apples counted	Per cent clean	Per cent scab	Per cent insect injury	Per cent culls	Per cent No. 1's and 2's
Bordeaux	1,943	97·33	2·67	3·05	3·04	71·90
Sulphur	1,197	95·74	4·26	2·09	6·77	70·17
No dust	1,188	76·69	23·31	5·22	7·83	57·74

Eleven-Year-Old Trees

Bordeaux	1,933	91·62	8·38	2·84	2·43	79·66
Sulphur	2,013	91·05	8·95	3·18	2·23	78 87
No dust	1,163	70·0	30·0	5·76	6·96	51·08

COST OF DUSTING

The 90-10 sulphur dust (90 pounds sulphur, 10 pounds arsenate of lime) cost 5½ cents per pound. No poison was used in the third dust application, the sulphur alone costing 4 cents per pound. The 12-8-80 Bordeaux dust (12 pounds dehydrated copper sulphate, 8 pounds arsenate of lime, and 80 pounds of hydrated lime) cost 4¼ cents per pound. The 12-88 Bordeaux dust (12 pounds dehydrated copper sulphate, 88 pounds hydrated lime), used in the third application, cost 3¾ cents per pound. The labour charges per hour were two men at 25 cents each; two horses, 25 cents; dusting machine, 20 cents; and gasoline, 5 cents, making a total of $1 per hour. The results were as follows:—

COST OF DUSTING

—	Sulphur Dust	Bordeaux Dust
Trees Eleven Years Old		
Number of trees used	299	264
Dust used, 4 applications	882 lbs.	709 lbs.
Dust used per tree, 4 applications	2·94 lbs.	2·69 lbs.
Dust used per acre, 40 trees, 4 applications	117·6 lbs.	107·6 lbs.
Cost of dust	$44·76	$29·14
Cost of dust per tree, 4 applications	14·96 cts.	11·04 cts.
Cost of dust per acre, 40 trees, 4 applications	$5·98	$4·41
Time taken to dust 4 times	275 min.	223 min.
Time taken to dust 1 tree 4 times	0·92 min.	0·85 min.
Time taken to dust 1 acre, 40 trees, 4 times	36·8 min.	34·0 min.
Cost of time applying 4 dusts	$4·58	$3·72
Cost of time per tree, 4 dusts	1·53 cts.	1·41 cts.
Cost of time per acre, 40 trees, 4 dusts	61·2 cts.	56·4 cts.
Mature Orchard		
Number of trees used	225	180
Dust used 4 applications	1,400 lbs.	915 lbs.
Dust used per tree, 4 applications	6·22 lbs.	5·08 lbs.
Dust used per acre, 40 trees, 4 applications	248·8 lbs.	203·2 lbs.
Cost of dust	$71·00	$37·72
Cost of dust per tree, 4 applications	31·55 cts.	20·96 cts.
Cost of dust per acre, 40 trees, 4 applications	$12·62	$8·38
Time taken to dust 4 times	435 min.	306 min.
Time taken to dust 1 tree, 4 times	1·93 min.	1·7 min.
Time taken to dust 1 acre, 40 trees, 4 times	77·3 min.	68 min.
Cost of time applying 4 applications	$7·25	$5·10
Cost of time applying per tree, 4 applications	3·22 cts.	2·83 cts.
Cost of time applying per acre, 40 trees, 4 applications	$1·28	$1·13

CHERRIES

All cherries tested at this Station fall within the three groups of Sour cherries *(Prunus cerasus)*, Sweet cherries *(Prunus avium)*, and hybrids of these species, commonly called Duke cherries. The sour cherries constitute two distinct classes having easily distinguished constant character, the colour of the juice. In the Morellos the juice is red, and in the Amarelles it is colourless. The sweet cherries with soft, tender flesh form a class known as the Hearts, while those with firm, breaking flesh are called Bigarreaus. In each of these classes are found some varieties with coloured, and some with colourless juice. The Duke cherries constitute a group from among which some of our finest dessert and canning cherries are found. The Dukes cherries have two fatal faults from a commercial standpoint; their long period of ripening, making several pickings necessary, and the trees are not productive.

The following table lists the cherries that have fruited since their planting at this Station in 1913, giving their total production together with the quality and colour of the fruit. The class to which each variety belongs is indicated by the first letter of the word; as, A, Amarelle; B, Bigarreau, etc.

Montmorency is pre-eminently the most satisfactory and productive Amarelle cherry under test at this Station. It holds first place by reason of several characters. The tree is hardy, healthy, vigorous, productive and suited to a wide range of soils; the fruit is of good quality, firm-fleshed and with a thick skin that makes it less subject to brown rot than are other varieties and more valuable for shipping. Early Richmond ripens one week earlier than Montmorency, but is otherwise not so valuable.

Of the Morellos, Suda Hardy is the most productive, and with so little difference in quality between it and English Morello, is probably the best late

sour cherry of this group. The fruits of this group with their rich, dark, wine-coloured juice and sprightly, aromatic flavour rank among the best sour cherries for culinary purposes, and a tree or two should be found in every garden.

Of the Bigarreau group Napoleon, a large, handsome cherry (varying shades of bright red over a yellow background), of high dessert and culinary qualities, combined with great productiveness, is the best, and ranks ahead of all the other sweet cherries tested here. Mercer, a dark, reddish-black cherry of high quality and productiveness, ranks second in this group.

The Heart cherries are not entirely satisfactory for commercial planting except for local markets because of the soft juicy character of the fruit. The Ida, Elton, and Coe Transparent are among the best of this group.

The Duke cherries are also satisfactory for local markets but are not so suitable for distant markets. They should be included in the home garden. The finest of those tested are: early varieties—May Duke and Empress Eugenie; mid-season—Arch Duke; medium late—Nouvelle Royale and Royal Duke; late—Magnifique and Late Duke.

VARIETIES OF CHERRIES UNDER TEST

Variety and class		Season	Colour	Quality	Total yield
					quarts
Montmorency Large	A	M	Dark red	F	305·0
Suda Hardy	M	L	Purplish red	F	219·0
Montmorency (Stark)	A	M	Dark red	F	216·0
Montmorency (Monarch)	A	M	Dark red	F	200·5
Montmorency	A	M	Dark red	F	191·0
Napoleon	B	M	Bright red over yellow	G	189·0
Timme	A	M	Light to dark red	F	162·5
Florence	B	E	Orange over yellow	G	153·0
Early Richmond	A	E	Light to dark red	F	141·0
Mercer	B	M	Dark reddish-black	G	138·0
Montmorency King	A	M	Dark red	F	125·5
Vladimir	M	M	Dark red to black	P	120·0
Downers Late Red	H	M	Light to dark red	G	116·0
English Morello	M	L	Dark red to black	F	103·0
Ida	H	VE	Light red over amber	G	100·0
Black Tartarian	B	M	Deep reddish black	G	92·0
Terry	A	M	Deep red	P	89·0
Nouvelle Royale	D	M	Dark red	G	86·0
Dyehouse	A	E	Light opaque red	G	85·0
Montmorency Sweet	A	M	Dark red	F	83·0
Governor Wood	H	E	Yellowish crimson	G	82·0
Ostheim	M	L	Very dark red	P	79·0
Baldwin	M	M	Very deep red	F	78·0
Rockport	B	VE	Bright red over amber	G	76·0
Coe Transparent	H	E	Pale amber mottled red	G	76·0
White Caroon	B	L	Yellowish white	G	72·0
Elton	H	E	Dark red over amber	G	70·5
Elkhorn	B	M	Purplish black	G	65·0
Bing	B	M	Very dark red	G	63·5
May Duke	D	VE	Light to dark red	G	63·5
Belle Magnifique	D	L	Very light red	F	62·0
Arch Duke	D	M	Light to dark red	G	60·0
Louis Philippe	D	M	Very dark red	G	55·0
Windsor	B	L	Dark red to black	G	54·5
Dikeman	B	M	Deep reddish black	G	50·5
Wragg	M	L	Dark red to black	P	50·0
Yellow Spanish	B	M	Amber yellow, red cheek	G	50·0
Paul	B	M	Black mottled with red	G	49·0
Empress Eugenie	D	E	Dark red	G	47·5
Waterloo	B	M	Dark purplish red	P	45·0
Marguerite	A	L	Light red	P	42·0
Late Duke	D	VL	Dark red	G	41·0
Olivet	D	L	Very deep red	F	26·5
Royal Duke	D	M	Dark red	G	25·5
Kirtland	B	M	Red over yellow	G	25·0
Early Purple Guigne	H	VE	Dark purplish black	P	12·0
Black Eagle	B	M	Dark red to black	G	6·5
Lyons	B	E	Very dark red	G	4·0

PLUMS

The crop of plums in 1923 was below the average. Below is given the yield per tree since planting in 1913, of many of the varieties under test. The Burbank has been the most productive and is the most profitable of the Japanese varieties tested. Of the Domesticas or European group the following are likely to prove the most desirable for general market: Quackenboss, Gueii, Bradshaw, Grand Duke and Monarch of the purple varieties, and Green Gage, Reine Claude and Washington of the green or yellow plums. The Freestone Damson is one of the best of the Damson group.

Burbank plum tree in full bloom, nine years from planting. Result of fruit set, 135 quarts.

The following table gives the species from which the variety has originated. The European group *(Prunus domestica)*, is indicated by D; the Japanese *(Prunus triflora)*, by T; the Damson *(Prunus institia)*, by I; the American *(Prunus americana)*, by Am; and a hybrid of some of these species by an asterisk (*). The season, as very early (VE), early (E), medium (M), and late (L), is also given. The quality is similarly indicated, as good (G), fair (F), and poor (P).

VARIETIES OF PLUMS UNDER TEST

Variety and species		Season	Colour	Quality	Total yield
					quarts
Burbank	T	E	Dark red over yellow	F	329·0
Sheldrake	D	E	Purplish black	P	256·0
Quackenboss	D	M	Dark purple	F	221·0
Hudson	D	M	Reddish purple	F	210·0
Moore Arctic	D	E	Bluish black	F	208·0
Freeman	D	M	Golden yellow	G	164·5
Newark	D	VE	Dull reddish yellow	F	157·0

VARIETIES OF PLUMS UNDER TEST—*Concluded*

Variety and species		Season	Colour	Quality	Total yield
					quarts
Gueii	D	M	Dark purple	F	136·0
Earliest of All	T	VE	Pinkish red	P	122·0
Shiro	*	VE	Clear light yellow	F	122·0
Miller Superb	D	M	Golden yellow	G	117·0
Tennant Prune	D	M	Dark reddish purple	F	113·0
America	*	M	Yellowish red	F	113·0
Hale	T	E	Yellow tinged with red	P	111·0
Damson Freestone	I	L	Dark blue	F	109·5
Paul Early	D	VE	Purple	F	109·0
Voronesh	D	M	Dark amber	P	108·5
Chabot	T	M	Dull red on green	G	92·0
Climax	*	VE	Deep dark red	G	91·0
Agen	D	L	Reddish purple	F	90·0
October	T	M	Purplish black	F	88·0
Reine Claude	D	L	Greenish yellow	G	82·0
Yellow Japan	T	M	Red	F	82·0
Lombard	D	M to L	Purplish red	P	81·0
Middleburg	D	L	Greenish yellow	F	80·0
Yellow Egg	D	M to L	Golden yellow	F	77·0
Willard	T	M	Dark red	P	76·0
Cling Stem	D	M	Reddish yellow	F	75·0
Belgian Purple	D	E	Purple	P	72·0
Abundance	T	VE	Reddish yellow	F	70·0
Red June	T	VE	Garnet red	F	70·0
Hector	D	M to L	Reddish purple	G	66·0
Duane Purple	D	M	Purple	P	61·5
Shipper Pride	D	M	Purplish black	F	60·0
California	Am	L	Bright red	F	57·0
Frost Gage	D	M	Dark purple	G	53·0
Green Gage	D	L	Dull greenish yellow	G	50·0
Peters Yellow Gage	D	M	Dull yellow green	G	49·0
Empire	D	M to L	Dark reddish purple	G	48·0
Drap d'Or	I	M to L	Golden yellow	F	46·0
Tatge	D	L	(Very similar to Lombard)	.....	46·0
Early Rivers	D	VE	(Very similar to Paul Early)	.....	46·0
Spaulding	D	M	Greenish yellow	G	44·0
Oullins Golden Gage	D	E	Greenish yellow	P	44·0
Belle de Louvain	D	M	Purplish red	F	44·0
Tragedy	D	M	Dark purple	G	42·5
Monarch	D	L	Dark purplish	G	41·5
Imperial Gage	D	M	Greenish yellow	G	40·0
Diamond	D	M to L	Purplish black	P	38·0
Wyant	Am	L	Dark carmine	P	38·0
Imperial Epineuse	D	L	Reddish purple	G	35·0
Grand Duke	D	L	Purple	F	35·0
Transparent	D	M	Reddish amber	G	34·0
Georgeson	T	M	Yellow	P	33·0
Bradshaw	D	M	Reddish purple	G	32·0
Jefferson	D	M	Yellow	G	32·0
York State Prune	D	L	Purple	F	30·0
Coe Golden Drop	D	L	Golden Yellow	G	28·0
Curlew	D	E	Purple	F	27·0
Monroe	D	L	Golden yellow	G	25·0
Palatine	D	L	Green to yellow	G	24·0
Furst	D	L	Purplish black	G	22·0
Czar	D	E	Purplish black	P	19·0
Washington	D	L	Greenish yellow	G	17·5
Arch Duke	D	M	Dark purple	G	14·0
Shropshire Damson	I	L	Dark blue	F	14·0
Pond Seedling	D	L	Reddish purple	G	13·5
Giant Prune	D	L	Reddish purple	P	13·5
St. Catherine	D	L	Golden yellow	F	8·0
Guthrie Late	D	L	Greenish yellow	G	7·5
Pearl	D	M to L	Reddish orange	F	7·5
French Damson	I	L	Dull black	F	6·0
Stella	Am	M	Purplish red	F	4·0
Gold	*	M	Golden yellow	F	3·0

STRAWBERRIES, TEST OF VARIETIES

The soil upon which this test was conducted is an open, sandy loam. After a garden crop was harvested, stable manure, 20 tons per acre, was applied and ploughed down during the autumn of 1921. An application of 200 pounds of

nitrate of soda and 300 pounds of acid phosphate per acre was applied and incorporated with the soil in the spring of 1922 just previous to planting. The plants were set out on May 9. Each plot consisted of two rows 16½ feet long and 4 feet apart. The plants were set 15 inches apart, twenty-six plants being used to a plot.

Senator Dunlap, the variety that is almost exclusively grown for commercial purposes in the Annapolis Valley, has outyielded all other varieties. Its consistent productiveness is due largely to its habit of developing runners abundantly and its adaptability to a variety of soil conditions. It is an early variety of good dessert and shipping qualities. Desdemona, a comparatively new variety originated at the Central Experimental Farm, Ottawa, although outyielded by Senator Dunlap is superior to it in dessert quality and is recommended in preference to it for domestic use. Corsican, President, Sample and Parson Beauty are all productive but fall below Senator Dunlap in both shipping and dessert qualities. The yields were as follows:—

STRAWBERRIES, TEST OF VARIETIES

Variety	Size	Quality	Season (First and last picking of fruit)	Yield per acre
				quarts
Senator Dunlap	Large	Good	July 3–Aug. 1	14,400
Kellogg Premier	"	"	" 3 " 1	14,340
Chesapeake	Medium	"	" 7 " 1	14,040
Corsican	Small	Fair	" 3 " 1	13,800
Desdemona	Large	Excellent	" 3 " 1	12,540
Ford	"	Fair	" 5 " 1	12,540
Cordelia	Medium	"	" 5 " 1	12,420
Early Jersey Giant	Large	Good	" 3 " 1	12,300
Buster	"	Poor	" 5 " 1	12,240
Mariana	"	Very good	" 5 " 1	12,240
New Globe	Very large	Fair	" 9 " 1	12,120
Gold Mine	Large	Good	" 3 " 1	11,760
Pocomoke	Med. to large	"	" 5 " 1	11,520
Greenville	Very large	Poor	" 3 " 1	11,400
Portia	Med. to large	Good	" 5 " 1	11,160
Cassandra	Large	"	" 5 " 1	11,100
McAlpine	"	"	" 5 " 1	11,100
President	Very large	Fair	" 9 " 1	10,680
Parson Beauty	Medium	"	" 5 " 1	10,620
Maggie	Small to med.	"	" 3–July27	10,560
Wm. Belt	Large	Good	" 7–Aug. 1	10,440
Arnout	"	"	" 5 " 1	9,960
Orem	Med. to small	Poor	" 5 " 1	9,840
Rewastico	Large	Fair	" 5 " 1	9,720
Prize	"	Good	" 7 " 1	9,600
Bisel	Med. to large	Fair	" 7 " 1	9,120
Stevens Late	Large	Poor	" 11 " 1	8,940
Warfield	Small to med.	Good	" 3 " 1	8,880
Grand Prize	Large	Fair	" 9 " 1	8,760
Lavinia	"	Very good	" 7 " 1	8,760
Williams	Med. to large	Good	" 5 " 1	8,760
Glen Mary	Medium	"	" 11 " 1	8,580
Dornan	Large	Very good	" 7 " 1	8,460
Magic Gem	Small to med.	Fair	" 5 " 1	8,460
Paul Jones	Medium	"	" 5 " 1	8,220
Three W's	Large	Poor	" 7 " 1	8,040
Charles I	Small to med.	"	" 3–July27	7,980
Dr. Burrill	Med. to large	Good	" 5–Aug. 1	7,920
Sample	"	Fair	" 7 " 1	7,800
Kellogg Prize	Small	Good	" 5 " 1	7,680
Armanda	Large	"	" 7 " 1	7,500
Brandywine	"	"	" 7 " 1	7,040
Ophelia	"	"	" 7 " 1	6,480
Pearl	Large to very large.	"	" 17 " 1	3,720
$100	Large	"	" 9–July27	3,480
Beder Wood	Medium	Fair	" 11–Aug. 1	3,360
Jessie	Large	Fair to good	" 9–July27	3,180
Premier	Med. to large	Very poor	" 5 " 27	1,920
Early Giant	"	Good	" 1 " 14	1,860

STRAWBERRIES, AVERAGE YIELD OVER A PERIOD OF EIGHT YEARS

Variety	Quality	Yield per acre
		quarts
Senator Dunlap	Good	9,028
Corsican	Fair	8,725
Desdemona	Good	7,955
President	Fair	7,953
Pocomoke	Good	7,675
Sample	Fair	7,582
Parson Beauty	"	6,949
Portia	Good	6,518
Stevens Late	Poor	4,985

VEGETABLES

BEANS

TEST OF VARIETIES.—The table below gives the date of first harvest and yield of green beans from plots of one row 33 feet long, and 2½ feet wide, seeded on May 28. A record was obtained of the per cent of anthracnose, or bean rust, by taking enough plants to give 100 pods, free and diseased, from duplicate adjoining areas, on August 26. The per cent of diseased pods and the severity of the infection are indicated. It will be noticed that this disease very materially reduces the amount of marketable pods after the first one or two pickings. The late varieties, Refugee, green-podded, and Hodson Long Pod, wax-podded, were practically free from disease, as was also Masterpiece, a green-podded early variety.

BEANS—TEST OF VARIETIES

Source	Variety	First fit to use	Yield	Per cent Anthracnose Aug. 16	Per cent Anthracnose, on 100 pods, Aug. 26			
					Slight	Medium	Bad	Free
			lbs. oz.					
O. 2826	Challenge Wax	July 31	10 14	90	30	32	38	
O. 2772	Davis Wax	Aug. 1	16 2	5	24	26	40	10
Graham	Wardwell Kidney Wax	" 2	15 7	10	22	13	50	15
O. 2823	" "	" 2	14 8	10	23	17	60	
Graham	Masterpiece	" 3	24 2	0	0	0	0	100
O. 2824	Plentiful French	" 3	23 ..	0	27	27	36	10
O. 2825	Bountiful	" 3	18 8	5	44	30	26	
Carter	"	" 3	14 4	5	16	32	52	
Graham	Round Pod Kidney Wax	" 3	18 4	5	34	16	45	5
O. 2597	" "	" 3	11 12	15	28	30	42	
O. 2747	Stringless Green Pod	" 3	13 ..	5	16	30	54	
Burpee	" "	" 3	12 12	5	6	14	80	
O. 2822	Yellow Eye	" 3	13 6	0	12	2	6	80
Carter	Dwarf French	" 4	13 10	0	24	40	36	
O. 2821	Yellow Eye Yellow Pod	" 5	17 14	0	30	8	12	50
Burpee	Fordhook Favourite	" 6	10 4	0	20	19	46	15
Kentville	Yellow Eye	" 6	11 10	25	35	47	18	
O. 2543	Early Red Valentine	" 10	7 2	25	11	24	65	
Kentville	Improved Yellow Eye	" 14	13 12	0	40	24	21	15
Burpee	Refugee or 1000 to 1	" 16	19 4	0	5	0	0	95
Carter	" "	" 18	22 6	0	5	0	0	95
O. 1681	" "	" 18	22 6	0	5	0	0	95
O. 2748	Hodson Long Pod	" 18	19 4	0	10	0	0	90
Rennie	" "	" 18	17 14	0	10	0	0	90

N.B.—The letter "O", and number, under "Source" designate strains produced at the Central Experimental Farm, Ottawa.

PLANTING AT DIFFERENT DISTANCES. A test was conducted with two varieties of beans planted in rows 2 feet apart and the plants spaced 1, 2, 4, and 6 inches apart in the rows. The yields given are the product of green beans picked from rows 30 feet long.

BEANS PLANTED AT DIFFERENT DISTANCES

——	Inches apart	Yield of first three pickings		Total yield	
		lbs.	oz.	lbs.	oz.
Hodson Long Pod	1	11	2	19	10
" "	2	13	6	21	14
" "	4	13	4	23	2
" "	6	10	2	20	2
Stringless Green Pod	1	3	6	8	14
" "	2	5	8	13	4
" "	4	4	14	12	3
" "	6	5	2	15	..

POLE BEANS—TEST OF VARIETIES.—Three varieties of pole beans were planted May 28, each in a row 12 feet long, 2½ feet wide, and the plants 4 inches apart in the row, with results as follows:—

POLE BEANS—TEST OF VARIETIES

Source	Variety	First fit to use	Yield from three pickings		Remarks
			lbs.	oz.	
O. 3209	Pole bean No. 1	Aug. 8	16	8	Heavy cropper.
Kentville	Scarlet Runner	" 12	27	8	Very heavy cropper.
"	Kentucky Wonder	" 20	9	..	Large pods.

CABBAGE

Twelve varieties were sown May 12 in the open field, and transplanted June 25, twenty-five plants of each variety to a plot. Tar paper discs were used satisfactorily for the control of root maggot. The cabbage worm (the caterpillar of the common cabbage butterfly) is controlled by dusting the plants at intervals as required with a mixture of one pound of arsenate of lime or lead to ten pounds of hydrated lime. Copenhagen Market has been the best early variety over a number of years. Early Jersey Wakefield is also good, and for second-early sorts, Enkhuizen Glory and Succession. Danish Ballhead is one of the best winter varieties. The table below gives certain data obtained in the test.

CABBAGE—TEST OF VARIETIES

Variety	First ready for use	Marketable heads October 8	Marketable heads November 1	Weight of 6 average heads	
				lbs.	oz.
Copenhagen Market	Aug. 24	24	24	37	8
Early Jersey Wakefield	" 28	23	23	24	8
Enkhuizen Glory	Sept. 10	21	23	34	..
Succession	" 15	15	25	42	..
Danish Summer Ballhead	" 15	19	24	42	8
Winnigstadt	Oct. 8	16	23	28	..
Danish Ballhead	" 8	13	22	38	..
Summer Ballhead	" 8	19	24	29	8
Extra Amager Ballhead, O. 2013	" 8	4	20	36	..
Red Stonehead	" 8	9	.....	31	..
Danish Delicatesse	" 8	3	.....	30	..
Drumhead Savoy	Nov. 1	0	4	28	..

CABBAGE, SUCCESSIONAL SOWING.—Two varieties were sown at intervals from March 22 to April 16 under glass, and from May 12 to June 15 in the open field. It is found that plants started the latter part of March and well-hardened off before being set out will give the earlist crop, and that sowings later than the first week in June do not allow the plants to mature sufficiently. The following data were obtained:—

CABBAGE, SUCCESSIONAL SOWING

Variety	Date sown	Date transplanted to field	First ready for use	Weight of six average heads
				lbs. oz.
Copenhagen Market	Mar. 22	May 12	July 10	28 ..
" "	April 6	" 12	" 12	27 ..
" "	" 16	" 12	" 14	26 ..
" "	May 12	June 25	Aug. 24	37 8
" "	" 25	" 25	Sept. 12	30 ..
" "	June 5	July 7	" 15	26 ..
" "	" 15	" 7	" 25	26 ..
Danish Ballhead	April 6	May 12	" 10	47 ..
" "	" 16	" 12	" 12	50 ..
" "	May 12	June 25	Oct. 8	38 ..
" "	" 25	" 25	" 8	32 ..
" "	June 5	July 7	Nov. 1	19 ..
" "	" 15	" 7	" 1	18 ..

CELERY

Thirteen lots of celery were grown from seed sown April 6 in the greenhouse, and the plants set to the open ground June 8. The plants were set in single rows 6 inches apart, and were blanched with earth. The Golden Self-blanching is one of the best sorts, some strains of which appear to be superior to others. The Rose-ribbed Paris is an excellent variety. The French Success is one of the best of the green varieties for winter. The following records were taken on October 29:—

CELERY, TEST OF VARIETIES

Variety	Weight of three average heads	Season	Quality	Blanching
	lbs. oz.			
Solid Ivory	7 8	Late	Fair	Poor
White Plume	7 ..	Early	Good	Good
Sutton Red (1921 seed)	7 ..	Late	Fair	Poor
Special Golden Self-blanching (D. & F., 1922 seed)	6 ..	Early	Good	Good
Fordhook	6 8	Medium	Good	Fair
Evans Triumph	5 8	Late	Fair	Poor
Rose-ribbed Paris	5 8	Early	Good	Good
French Success	4 12	Medium	Good	Fair
Rose-ribbed Golden Self-blanching	4 8	Early	Good	Good
Winter Queen	4 ..	Late	Fair	Poor
Winter King	4 ..	Late	Fair	Poor
Golden Self-blanching (McD.)	4 ..	Early	Good	Good
New Emperor	3 8	Late	Good	Poor

CELERY BLANCHING.—Plants of the Golden Self-blanching variety were set June 8 on the level ground in rows 4 feet apart and 6 inches apart in the rows. The results were as given below:—

Method of blanching	Weight of three average heads	Condition of plants
	lbs.	
With boards	5·0	Best
With earth	6·5	Good
With roofing	3·6	Good

METHODS OF PLANTING.—One lot of celery was planted in a trench, another on the level, and a third in a six-foot square bed, all plants being set six inches apart. The plants grown in the bed were pithy with little substance.

How planted	Weight of three average heads	Condition of plants
	lbs.	
In trench 6 inches deep	5·5	Good
On the level	6·5	Best
On the level in square bed	2·5	Poor

CORN

The season was very unsuitable for corn because of the cool summer. The corn did not ear well and many varieties tested did not mature for use. The records secured as given below were from rows 66 feet long. The seed was sown in rows 3 feet apart May 29.

CORN, TEST OF VARIETIES

Variety	First ready for use	Height	Size of ears	Marketable ears to Oct. 13	Total ears
		feet			
Pickaninny, O	Sept. 1	2	Small	41	73
Otta, O. 846	" 22	4½	Medium	27	45
Buttercup (Harris)	" 29	4½	"	7	10
Mayflower (McDonald)	" 29	4	"	44	76
Early Squaw, O	" 29	4½	"	50	77
Extra Early Cory (McDonald)	" 29	4½	Large	10	21
Early Malcolm, O	" 29	4	"	47	102
Golden Bantam (McDonald)	Oct. 6	4½	Medium	6	18
Golden Giant (Rennie)	" 13	4½	Large	13	28
Seymour Sweet Orange (Burpee)	" 13	4	Medium	16	33
Earliest Catawba (Burpee)	" 13	4	Small	7	11

REMOVING SUCKERS FROM CORN.—In order to test the value of taking the sucker growth from the base of the corn plant as soon as the suckers started, an equal number of hills so treated were compared with those from which the sucker growth was not removed. The results this season would indicate more early ears where the suckers were removed. The plots were 20 hills three feet apart, with three plants to a hill.

Variety, and treatment given	Marketable ears October 6	Total ears
Golden Bantam, suckers removed	52	69
Golden Bantam, suckers not removed	37	76
Early Malcolm, suckers removed	49	62
Early Malcolm, suckers not removed	37	54

LETTUCE

Several varieties of lettuce were seeded on April 6 and 16 and set to the field on May 12. Seed was also sown in the open ground May 11, and some plants from this seeding transplanted June 17. Danvers Market and Tom Thumb do not appear to be of much value. Crisp as Ice is a fine head sort and was one of the best this year. The Grand Rapids is the best open-headed variety.

LETTUCE, TEST OF VARIETIES

Variety	Date seeded	Trans-planted to field	Ready for use	Weight of six average heads
				lbs. oz.
Grand Rapids, O. 1943	April 6	May 12	June 16	6 4
" O. 1943	May 11	June 17	July 20	5 ..
" O. 1943	" 11		" 14	2 8
All Heart	April 6	May 12	June 22	3 12
"	May 11	June 17	July 26	4 ..
"	" 11		" 18	4 6
Black-seeded Simpson	April 6	May 12	June 22	4 7
" "	May 11	June 17	July 26	4 14
" "	" 11		" 21	5 12
Crisp as Ice	April 6	May 12	June 28	3 4
" "	May 11	June 17	July 29	5 ..
" "	" 11		" 21	4 2
Salamander	April 6	May 12	June 22	3 12
"	May 11	June 17	July 26	4 8
"	" 11		" 18	3 12
Iceberg	April 6	May 12	June 28	3 10
"	May 11	June 17	July 31	7 4
"	" 11		" 19	5 12
All Seasons	April 16	May 12	" 18	4 2
"	May 11	June 17	" 31	6 ..
"	" 11		" 22	6 8
New York, or Wonderful	April 16	May 12	" 6	4 2
" "	May 11	June 17	Aug. 1	8 6
" "	" 11		July 19	6 7
Tom Thumb	April 16	May 12	" 4	1 12
"	May 11	June 17	" 21	2 6
"	" 11		" 16	2 12
Danvers Market	April 16	May 12	Seeded	
" "	May 11	June 17	"	
" "	" 11		July 19	4 4
White Cos	April 6	May 12	" 2	7 14

DATES OF STARTING UNDER GLASS.—Below is given the date of harvest for lettuce started under glass at different dates.

Variety	Seeded	Ready for use	Weight of six average heads
			lbs. oz.
Grand Rapids	Mar. 22	June 12	2 1
"	April 6	" 16	2 3
"	" 16	July 3	3 4
Black seeded Simpson	" 6	June 22	4 7
" "	" 16	July 6	4 2

SUCCESSIONAL SOWING.—In order to test the possibility of making seedings at different dates to obtain lettuce throughout the season seed was sown at intervals from May 11 to July 23. There was not sufficient seed of one variety to follow the seeding throughout, but seed of a similar variety was used for a later seeding. July 3 seeding will give good heads to end of season.

LETTUCE, SUCCESSIONAL SOWING

Variety	Seeded	Fit to use	Weight of six average heads
			lbs. oz.
Grand Rapids	May 11	July 14	2 8
All Heart	" 11	" 18	4 6
Grand Rapids	June 5	Aug. 6	2 8
All Heart	" 5	" 6	3 4
Grand Rapids	" 22	" 24	.. ..
All Heart	" 22	Sept. 1	.. ..
Grand Rapids	July 3	" 20	.. ..
Salamander	" 3	" 30	.. ..
Crisp as Ice	" 23	Oct. 4	.. ..

ONIONS

The onions listed below were sown in flats on February 22, transplanted to one inch apart March 27, and planted to the field May 13. They were set in rows 1 foot apart, one lot being planted 15 inches apart in the rows, and others 9 inches apart. The table below gives the yield from a row 16½ feet long.

——	Number of bulbs	Yield from 16½ feet
		lbs. oz.
Plants set 15 inches apart in the row—		
Denia	13	18 ..
Cranston Excelsior	13	16 ..
Prizetaker	13	13 ..
Plants set 9 inches apart in the row—		
Denia	22	22 ..
Cranston Excelsior	22	20 8
Prizetaker	22	18 ..
Plants set 3 inches apart in the row—		
Cranston Excelsior	50	37 ..

ONIONS STARTED IN GREENHOUSE.—The following varieties of onions were started in flats in the greenhouse on the dates given, and the plants transplanted from these boxes to the field on May 16. The plants were set in rows one foot apart and 3 inches apart in the row. All of the varieties were well matured when harvested. The yield from rows of 16½ feet, harvested September 10, is given below:—

Variety	Date sown in flats	Marketable bulbs from 16½-ft. row
		lbs. oz.
Denia, D. & F.	Mar. 16	22 4
Denia, D. & F.	April 6	25 ..
Prizetaker, D. & F.	Mar. 16	24 ..
Excelsior, D. & F.	Feb. 22	23 ..
Excelsior, D. & F.	Mar. 16	17 8
Ailsa Craig, G.	April 6	21 ..
Selected Red Wethersfield, McD.	" 6	17 8
Large Red Wethersfield, O. 1930	" 6	17 ..
Giant Prizetaker, G.	" 6	17 8
Red Globe, G	" 6	16 8
Southport Red Globe, St. B.	" 6	14 8
Yellow Globe Danvers, G.	" 6	15 ..
Yellow Globe, Leth	" 6	14 ..
Yellow Globe Danvers, O. 2003	" 6	12 8

ONIONS SEEDED IN THE OPEN.—The onions seeded to the open field were planted May 13. The growth was good but because of the cool damp weather in July and August the plants continued to make strong vegetative growth and did not mature their bulbs, so that no ripened stock was harvested.

RIPENING ONION BULBS.—After the fall weather sets in much difficulty is experienced in getting onions properly matured. The advantage of very early seeding, or of starting the plants early and transplanting, is that with early development the bulbs can be cured early in September. The table below gives the yield from rows 16½ feet long, pulled August 24 and September 10, and shows that considerable gain in size is taking place at just this time. The results would indicate that between the first and second week in September is the best time for harvesting. The seed was started March 16 and the plants set to the field May 13.

Variety	Pulled August 24		Pulled September 10	
	lbs.	oz.	lbs.	ox.
Prizetaker	17	8	24	..
Denia	16	..	22	4
Cranston Excelsior, D. & F.	14	..	17	8
Cranston Excelsior, W.	15	8	23	..

MULTIPLIER.—The multiplier or potato onion is a compound bulb when harvested, and may be divided into its component parts for planting. These parts vary in size, and the following figures would indicate that the larger sections will give the best returns. There is apparently no reason why this onion should not be grown in every garden as it is the easiest of all onions to handle, matures without difficulty, and keeps during the whole year without any loss. The onion bulbs were separated, graded into large, medium and small sizes, and planted May 13. The number of bulbs harvested was as follows:—

Size of bulbs planted	Number of bulbs harvested from 16½-ft. row				
	Large	Medium	Small	Seeded	Total
Large	198	93	36	12	339
Medium	95	57	23	7	182
Small	96	26	24	0	146

PEAS

TEST OF VARIETIES.—The test of varieties of garden peas was made in rows 30 inches apart. The plots harvested for green peas were each one row 33 feet long. The seed was sown May 11, except Market Garden which was seeded May 28. The following table gives the date of first harvest, the total yield of green pods, and the percentage of pea moth injury in the seeds.

PEAS—TEST OF VARIETIES

Variety	Ready for use	Yield of green peas		Pea moth injury in dry seed
		lbs.	oz.	per cent
Gregory Surprise, Gr.	July 14	15	3	25
Thomas Laxton, McD.	" 14	14	9	22
English Wonder X Gradus, O-2338	" 17	12	10	38
Laxtonian, Gr.	" 18	18	11	32
Pioneer, Gr.	" 18	18	8	31
Gradus, O-2398	" 18	17	8	30
English Wonder X Gregory Surprise, O—2343	" 18	12	2	44
McLean Advancer X Gregory Surprise, O-2336	" 18	11	4	40
Lincoln, E. S., K.	" 18	10	6	19
English Wonder, O-2347	" 20	19	2	19
English Wonder, O-20-1931	" 20	18	..	
Quite Content, McD.	" 20	12	4	47
American Wonder, O-2332	" 21	22	13	23
Blue Bantam, Gr.	" 21	12	4	25
Lincoln, E. S., I.	" 26	21	2	20
Stratagem, Gr.	" 31	20	11	
Harrison Glory, E. S., K.	Aug. 6	17	12	
Stratagem, R.	" 14	10	..	
Market Gardener, C.	" 4	12	10	8

SUCCESSIONAL SOWINGS.—The variety Thomas Laxton was seeded on the dates given below, and a record obtained of the harvesting dates to determine the possibility of extending the season by planting a single variety at successive intervals. The yields given are from rows 33 feet long.

——	Sown	Date ready for use	First picking Yield	Total yield
			lbs. oz.	lbs. oz.
Thomas Laxton	May 11	July 14	3 4	14 9
"	" 17	" 16	3 2	12 8
"	" 21	" 21	2 2	12 2
"	June 19	Aug. 10	3 1	11 4
"	" 26	" 17	3 12	10 14
"	July 3	" 28	2 10	10 6

PEAS PLANTED AT DIFFERENT DISTANCES.—Three varieties were planted in rows 30 inches apart and at a distance of one, two and three inches apart in the row. Seeding was done May 11, somewhat more thickly than required, and the plants thinned on June 2 to the distances stated. The yields are given below:—

Variety	How seeded	Yield
		lbs. oz.
Thomas Laxton	1 inch	14 9
"	2 inches	12 8
"	3 "	11 6
English Wonder	1 inch	18 ..
"	2 inches	15 14
"	3 "	17 8
Stratagem	1 inch	21 2
"	2 inches	20 11
"	3 "	24 8

SQUASH, PUMPKINS, CITRON

These were planted in the open ground on May 29. The method of preparation was to plough out two furrows each way, and into the trench so formed to place three forkfuls of manure at intervals of eight feet. The trench was filled in by ploughing the two furrows at each side back over the manure. The land was levelled and the seed sown directly over the manured areas. The plants were later thinned to three plants to a hill. Although the season was not particularly favourable because of low temperature, good growth was made and a fair crop was harvested. The striped cucumber beetle was first noticed on June 26. This was controlled by frequent applications of poison dust made up of one part of arsenate of lime to ten parts of hydrated lime, sifted over the plants. The yields were as given below:—

SQUASH

——	Number of hills	Number of fruits per hill	Weight of 3 average fruits Sept. 27
			pounds
Golden Hubbard, MacD	3	6·5	28
" O. 2910	2	6·5	26
" E.S., K	3	4·6	32
Green Hubbard, G	3	4·3	38
Kitchenette, V	2	6·0	23
Vegetable Marrow, E	2	10·5	27
" St.-B	2	10·0	24
Italian Vegetable Marrow, H	2	7·0	15
White Bush Scallop, G	2	7·5	14

PUMPKINS—TEST OF VARIETIES

Connecticut Field, McD	4	5	83
Small Sugar, G	4	12	23

CITRON—TEST OF VARIETIES

Colorado, O. 2982	2	3·5	19
Red Seeded, R	2	3·5	16
Colorado, R	2	4·5	10

TOMATOES

TEST OF VARIETIES.—Seed of the different varieties was sown April 2 in flats, the seedlings pricked out into other flats April 25, and the plants set to the open ground June 5. Six plants of a variety were planted four feet apart in each plot. Because of the cool season, the fruit ripened about two weeks later than usual, and much of it was still green on September 27, when one degree of frost was registered. The yield of both ripe and green fruit is given below, and also the amount of fruit ripe by September 12, which gives an indication of the earliness of the variety.

TOMATOES—TEST OF VARIETIES

Variety	Yield of ripe fruit to Sept. 12		Yield of marketable ripe fruit		Yield of marketable green fruit		Total yield of marketable fruit	
	lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.
Sparks Earliana	20	..	123	8	50	..	173	8
Alacrity No. 1, O. 3031	12	..	82	8	41	..	123	8
Fifty Day	10	8	84	8	90	..	174	8
Earliana (Langdons 2)	9	..	72	8	58	8	131	..
Danish Export	8	8	45	8	61	..	106	8
Burbank Early	8	6	86	..	60	..	146	..
Bonny Best (Stokes)	6	..	68	..	59	..	127	..
Alacrity, O. 3033	6	..	90	..	61	..	151	..
Select Earliana	5	14	72	..	81	8	153	8
Earliana (Ferry)	5	12	73	8	79	..	152	8
Bonny Best (Keith)	4	..	49	..	98	..	147	..
Early Mascot	3	8	78	..	80	..	158	..
Avon Early	3	8	55	..	106	..	161	..
First of All	2	..	37	..	77	..	114	..
Pink, O. 3039	1	12	43	8	49	..	92	8
John Baer	1	..	34	..	69	..	103	..
Earliest of All	1	..	45	..	90	..	135	..
Chalks Early Jewel	1	..	28	8	58	..	86	8
Red Canner	..	..	49	..	92	..	141	..
Albino	..	..	11	8	139	..	150	8
Matchless	..	..	..	..	50	..	50	..

TRAINING TO A SINGLE STEM.—Two varieties were used, 100 plants of each, all trained to a single stem. Each 100 plants was divided into four lots of 25 each, which were treated as follows: (1) allowed to grow (not headed back), (2) stopped at the third truss of fruit, (3) stopped at the second truss of fruit, (4) stopped at the first truss of fruit. The object of the test was primarily to find out which method is of most value in inducing early ripening of fruit. It will be noticed that the data obtained do not give a conclusive result.

90508—5½

Variety	How trained	Yield of ripe fruit to Sept. 12		Total yield of ripe fruit		Total yield of green fruit		Total yield of fruit	
		lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz
Alacrity....	1 truss to a plant	9	8	45	4	10	..	55	4
Alacrity....	2 trusses to a plant	24	..	93	6	10	..	103	6
Alacrity....	3 trusses to a plant	18	8	74	..	22	..	96	..
Alacrity....	Full grown	21	8	85	6	26	..	111	6
Bonny Best.	1 truss to a plant	12	6	36	6	5	8	41	14
Bonny Best.	2 trusses to a plant	6	8	82	8	11	8	94	..
Bonny Best.	3 trusses to a plant	7	..	97	6	16	..	113	6
Bonny Best.	Full grown	7	6	93	8	38	..	131	8

POTATOES

TEST OF VARIETIES AND STRAINS.—Two strains of Irish Cobbler, two of Green Mountain, and one of Bliss Triumph were grown this year on land which had been in hay in 1921 and 1922. The land was ploughed in the early fall of 1922 and disced with a heavy tractor disc, again ploughed in the spring of 1923, well cultivated and disced, a good seed-bed being secured.

No manure was use but a mixture of 300 pounds of nitrate of soda, 400 pounds of acid phosphate and 100 pounds of muriate of potash (containing 5.6 per cent nitrogen, 8 per cent phosphoric acid and 6.2 per cent potash) was applied at the rate of 700 pounds per acre and worked in with the smoothing harrow. The potatoes were planted May 25 in rows 33 inches apart, and the seed 12 inches apart in the row. The plants were sprayed four times with Bordeaux, to which a poison was added when required. The crop was harvested October 15 to 18, with yields per acre as given in the table below.

Variety and strain		Yield per acre		
		Marketable	Unmarketable	Total
		bush.	bush.	bush.
Irish Cobbler	McG....	303·05	13·2	316·25
Irish Cobbler	B.....	221·7	13·4	235·1
Green Mountain	P.E.I...	259·8	8·8	268·6
Green Mountain Triumph	K.....	184·8	23·1	207·9
Bliss Triumph	N.B....	229·5	49·8	279·3

POTATOES PLANTED AT DIFFERENT DISTANCES.—The results given below, covering a period of eight years of planting potatoes at different distances apart, would show that the greatest yield was secured where rows were 26 inches apart, and the seed spaced 12 inches apart in the rows. There is no reasonable explanation why the rows spaced 30 inches apart should give lower yields than those spaced 36 inches apart. In the management of potatoes it is not possible to do the cultivating, hilling, and handling of the crop without hand-hoeing if the rows are closer than 33 inches apart, and this distance has been adopted as the most practical and economical for general field work. The spacing of the seed 12 inches apart in the rows has been adopted as likely under varying soil conditions to give the best yield.

How planted	Yield per acre		
	Marketable	Unmarketable	Total
inches	bush.	bush.	bush.
26 x 10	239·4	32·7	272·1
26 x 12	256·8	31·2	288·0
26 x 14	217·1	26·2	243·3
30 x 12	201·7	28·4	230·1
30 x 14	204·8	25·4	230·2
30 x 16	206·2	27·9	234·1
36 x 10	230·0	23·5	253·5
36 x 12	221·4	26·14	247·54
36 x 14	220·2	17·5	237·7

PLANTING POTATOES, 1923.—In this test the variety Green Mountain was used. There has been a decided variation in the yield of the different plots from year to year, and the results do not show a consistently better yield from plots with rows spaced a certain distance apart. It has been impossible to explain certain differences in yield from rows adjoining each other, with all conditions equal except as to distance planted apart in the row. It would seem that the spacing between the rows which facilitates cultivation and harvesting, and that will do away with hand labour, is of prime importance. When rows are too close together there is not the opportunity to do the cultivating and get enough soil for hilling that is possible with wider rows, and much hand work is necessary to keep the crop free from weeds. The crop was planted June 3 and harvested November 1.

POTATOES PLANTED AT DIFFERENT DISTANCES, 1923

Distance apart	Yield per acre		
	Marketable	Unmarketable	Total
Inches	bush.	bush.	bush.
26 x 10	216·6	83·3	299·9
26 x 12	230·0	50·0	280·0
26 x 14	250·0	54·0	304·0
26 x 16	380·0	40·0	420·0
30 x 10	240·7	69·6	310·3
30 x 12	246·5	46·4	292·9
30 x 14	362·5	43·5	406·0
30 x 16	379·9	46·4	426·3
36 x 10	195·7	55·5	251·2
36 x 12	299·6	33·8	333·4
36 x 14	277·9	19·3	297·2
36 x 16	389·08	26·5	415·58

CUTTING POTATOES FOR PLANTING, 1923.—Tests were made with sets cut to one, two, and three eyes, with potatoes cut in two crosswise (the seed ends and stem ends being planted separately), cut in two lengthwise, and using whole potato for planting. The size of the potato is a factor as to quantity required to plant an acre. The seed this year that was cut into two parts was smaller than that used for planting whole, and smaller than the potatoes from which the one, two, and three-eye sets were taken. The variety Green Mountain was used. The results were as follows:—

How cut	Seed used per acre	Yield per acre		
		Marketable	Unmarketable	Total
		bush.	bush.	bush.
Whole	48·6	316·1	78·3	394·4
Lengthwise	27·3	356·7	52·2	408·9
Stem end	19·1	345·1	46·4	391·5
Seed end	20·2	273·8	78·3	352·1
One eye	24·3	139·2	87·0	226·2
Two eyes	27·3	266·8	58·0	324·8
Three eyes	29·4	324·8	63·8	388·6

CUTTING POTATOES AVERAGE OF EIGHT YEARS' RESULTS.—The table below gives the average results of this test over a period of eight years, and would indicate that potatoes cut to two and three eyes have given the best results. The planting was done in rows 33 inches apart, and the sets placed 12 inches apart in the rows.

How cut	Seed required per acre	Yield per acre		
		Marketable	Unmarketable	Total
	bush.	bush.	bush.	bush.
One eye	18·56	262·6	34·8	297·4
Two eyes	22·21	285·2	30·3	315·5
Three eyes	22·51	280·2	28·2	308·4
Stem end	23·03	278·1	29·8	307·9
Seed end	20·98	249·9	35·9	285·8
Lengthwise	25·04	259·6	30·3	289·9
Whole	40·02	285·2	39·6	324·8

POTATO SCAB ON LIMED SOIL.—Limestone was applied at the rate of 1, 2, 3, and 4 tons per acre in 1917 to different areas, and a section left without lime, to determine the value of this material in crop production. This land was all treated alike otherwise, and was in hoed crops of roots and corn in 1917, 1918 and 1919, to which crops manure had been applied. These crops were followed by grain and two crops of hay, and in 1923 a section of each area was in potatoes, for the purpose of determining the influence of the lime on the development of potato scab. The variety Irish Cobbler, free from scab, was used. Planting was done May 30. The records secured at the time of digging would indicate little difference in the various plots, the crops from which were practically free from scab. Where 4 tons was applied the records show 2.2 per cent of the tubers with indications of scab, but the infection was light and in no case was there sufficient disease present to make any commercial difference in the product.

It is well to point out, however, that on land where frequent applications of lime are made, and manure used, and on which potatoes are grown every three years or so, the scab organism develops very rapidly and much loss is likely to result because of diseased, unsaleable tubers. In the long rotations, with the potato crop planted less frequently, and only an occasional application of lime, trouble from this disease may not occur.

POTATO SCAB ON LIMED SOIL

—	Yield per acre			Per cent of Scab
	Marketable	Unmarketable	Total	
	bush.	bush.	bush.	
No lime	89·9	66·7	156·6	0·9
1 ton per acre	118·9	48·3	167·2	0·0
2 tons per acre	123·7	52·2	175·9	0·18
3 tons per acre	117·9	34·8	152·7	0·71
4 tons per acre	114·0	35·7	149·7	2·2

FLOWERS

ANNUAL FLOWERING PLANTS IN THE GREENHOUSE

Several annual flowering plants were started from seed August 28 in the greenhouse for winter bloom. The Calendulas Orange King and Lemon Queen were grown in the benches and gave effective bloom from November until spring. The central leader should be cut off about two or three inches from the top after the plant is well established in order to force strong laterals to develop good bloom. The Schizanthus, if grown in the bench, should be pinched back and six laterals allowed to develop, thus furnishing desirable branches for cutting. When developing a pot plant pinching back is not desirable, as a

better-formed plant is obtained without pinching. The Schizanthus were in bloom February 9, and continued in bloom well into the spring. Clarkia Salmon Scarlet makes a fairly effective pot plant. To secure a well-formed plant it is necessary to pinch back the growth when three inches high, again when six inches high, and again when nine inches. When well-grown the plant is very attractive. They were in bloom January 28, and continued to April. Antirrhinum Katherine Morse was late coming into bloom, the first flowers appearing the latter part of February. They are very desirable bench plants for winter flowering, but the seed should be started a month earlier to have the plants far enough advanced for winter bloom.

FLOWERING BULBS IN THE HOUSE

For winter bloom nothing is more satisfactory than the narcissus, hyacinth and tulip. Of these the narcissus is the best. The principal consideration in the kind of soil to use is to select one that is open, a sandy loam being preferable. This permits of good drainage, and makes for a good root development, which is important if good bloom is to be secured. The larger the bulb the better the bloom, other conditions being equal, but even large bulbs will not give satisfactory bloom if a good root system has not been developed. The growth is supported largely from the nourishment stored up in the bulb, and usually the bulbs are of little value after the first year. They may be gradually dried off and planted again, but are usually not satisfactory.

To get a good root system before the top starts to grow is of first importance. To do this the pots in which the bulbs are planted should be placed outside in a frame and covered with sand and straw to keep the tops dormant until the roots have nicely started. Or they may be set in a cool outhouse or cellar. The roots will grow at a lower temperature than the top, but if the temperature is high the top may develop before the roots, resulting in a weak unsatisfactory growth. It requires from six to eight weeks to develop a good root system before the plant can be successfully forced into bloom. Excessive watering should be avoided at this period. When the bulbs are once thoroughly watered after being planted in pots or boxes they will usually not require additional watering for some time if kept in a cool place. If placed outside for root development they should be brought in before hard freezing weather sets in, usually in December. They can then be placed in a cool cellar, from where they can be taken as desired for forcing in a sunny window. There is little danger of over-watering after the plant starts into growth, but reasonable drainage should, of course, be provided to allow any excess of water to escape, and on the other hand the soil should not be allowed to dry out.

The following will be found to be satisfactory for house bloom:—

Narcissi.—Von Sion, Sir Watkin, Emperor, Empress, Golden Spur, Victoria, Barrii conspicuus, Barrii Firebrand, Princeps Poeticus (Pheasant's Eye), Poeticus Horace, Paper White Ornatus grandiflora.

Hyacinths.—White varieties—British Queen, L'Innocence, White Lady and Arentine Arendsen; pink varieties—Gigantea, Moreno, Queen of the Pinks; red varieties—Garibaldi, Roi de Belges; blue varieties—Grand Maitre, Dr. Lieber, King of the Blues; yellow varieties—City of Haarlem, Yellow Hammer.

Tulips.—La Reine, Pottebakker White, Artus, Duchess de Parma, Keizerskroon, Vermilion Brilliant, Cottage Maid, Chrysolora and Proserpine.

NARCISSI

The narcissus is one of the most satisfactory spring-flowering bulbs. It is easy of culture and will continue to give satisfactory bloom for several years. The ground is prepared by digging in some well-rotted manure and thoroughly mixing it with the soil to a depth of ten inches. Any good garden soil will be

suitable. Additional fertilizer may be necessary after the first year, and probably nothing is more suitable than to work into the soil a liberal dressing of bone meal early in the spring.

The bulbs are planted in the fall as early as possible. They are usually available early in October. The top of the bulb should be set four inches below the surface of the soil. It is advisable to place a light covering of strawy manure over the soil the first year, thus giving the bulbs an opportunity to become well rooted before the soil becomes too cold. It is best to plant the bulbs in groups, and six to eight inches apart in the group. As the clumps thicken up, which happens after four or five years because of the development of new bulbs, the bloom will become smaller and less satisfactory. New bulbs may be set or the old lot dug up and the best of the bulbs replanted, giving them more space. This replanting should be done early in September.

Annual flowering plants may be set in between the bulbs early in June to give a bloom later after the tops of the narcissi have died down. Very many places could be made attractive at a small expense in the early spring by the use of this desirably early-blooming bulb. The list given below indicates the period of bloom of a number of good varieties. Golden Spur is a fine early variety, and Emperor a good medium-season variety.

NARCISSI

Variety	Period of bloom		
	Start	Finish	Days
Golden Spur	May 9	May 17	8
Sir Watkin	" 11	" 25	14
Princeps	" 12	" 23	11
Victoria	" 14	" 24	10
Emperor	" 14	" 25	11
Empress	" 14	" 25	11
Madame de Graaff	" 16	" 25	9
Flora Wilson	" 21	" 30	9
Poeticus (Pheasants' Eye)	" 21	" 30	9
Poeticus odoratus	" 23	" 31	8
White Lady	" 25	June 1	7

TULIPS

For wealth of early spring bloom in many colours nothing surpasses the tulip. Its culture is little different from that of the narcissus. Any well-drained garden soil of good fertility is suitable. The soil should be prepared thoroughly and worked deeply, so that the bulbs may be set with the tops four inches below the surface. They are set about six inches apart. If arranged in fairly large groups the effect is much better than if scattered to make a thin planting. The bulbs should be set in September or early October to give them time to become well rooted before the weather becomes cold. They are covered with light strawy manure as a winter protection. Tulips, unlike narcissi, do not give very satisfactory bloom after the second year. Many small inferior bulbs develop and a replacement of well-developed bulbs is necessary.

Considerable disappointment has resulted from tulip bulbs not developing proper blooms, due evidently to a disease which prevents the development of a satisfactory root system, without which no bulbs can bloom well. Tests made at this Station indicate that the bulbs from British Columbia supplied by the Sidney Experimental Station are much better than the Holland bulbs, and show no trouble in this respect. It would seem desirable that the growing of bulbs to supply our own requirements should be encouraged.

The following varieties from British Columbia were tested. These were planted in the fall of 1922, and were very much superior to the imported bulbs.

TULIPS FROM EXPERIMENTAL STATION, SIDNEY, B.C.

Variety	Period of Bloom		
	Start	Finish	Days
Duchesse de Parma	May 18	May 31	13
Madame Krelage	" 28	June 12	15
Isabella	" 28	" 13	16
La Merveille	" 29	" 13	15
Sunset	" 29	" 12	14
Inglescombe Yellow	" 31	" 14	14
Clara Butt	" 31	" 14	14
Caledonia	" 31	" 14	14

GLADIOLI

Twenty varieties of gladioli were planted in the spring of 1922 and a record kept of the bulbs to determine the increase or loss. The start was made with 10 bulbs each. It will be noticed that the four Primulinus varieties, given first on the list, have made the most rapid increase, there being 91 bulbs of Orange Brilliant for planting next spring. The spikes of this Primulinus are very suitable for cutting, as they are more graceful than some of those with heavier spikes and larger flowers. The bulbs are planted 4 inches deep and 6 to 8 inches apart, in soil well manured the previous fall and thoroughly prepared in the spring before planting. In the table the first sized bulbs are given; the difference between these and the total gives the second size bulbs, which, while not so large as the first size, will produce good blooms.

GLADIOLI—INCREASE OF BULBS

Variety	Colour	Number of bulbs 1923		Number of bulbs 1924		Gain of 1st size bulbs since 1922
		1st size	Total	1st size	Total	
Pink Perfection, P	Bright pink	11	15	32	40	22
Orange Brilliant, P	Glowing orange	32	35	57	91	47
Mrs. Grullemans, P	Golden yellow	18	24	37	39	27
Maidens Blush, P	Blush pink	25	27	33	66	23
Muriel	Violet	7	7	1	8	−9
Liebiesfeuer	Scarlet	6	10	1	3	−9
Glory of Holland	White	12	22	10	24	..
War	Bright red	6	6	3	5	−7
Myrtle	Blush pink	4	6	1	4	−9
Loveliness	Cream overlaid with pink	11	16	10	18	..
Mrs. Francis King	Bright pink	16	24	27	39	17
Niagara	Creamy white, striped purplish red	11	12	6	10	−4
Mrs. Frank Pendleton	Pink, scarlet throat	5	7	2	6	−8
Wilbrink	Light pink	10	14	11	14	1
Foch	Rose	4	7	2	2	−8
Fire Queen	Blush pink	10	10	10	17	..
Schwaben	Cream, crimson throat	8	10	7	16	−3
Peace	White	11	15	12	17	2
White Giant	Pure white	9	18	13	21	3
Prince of Wales	Bright pink	8	11	7	9	−3

CEREAL HUSBANDRY

The spring was fully ten days later than normal, and seeding of grain was not possible, except on very sandy areas, until the latter part of May. The mean temperature during May was normal, but the mean in April was over four degrees lower than normal, so that the usual warming up and drying out of the soil in April did not take place until May, thus delaying farming operations.

Unusual conditions obtained during the summer, the average day temperature for June, July and August being 2.13 degrees lower than the average day temperature of these months during the previous eight years. The night temperature was 3.51 degrees lower than the average for the previous eight years for the same months. The rainfall for these months was 0.46 inches more than the average for the same months for the eight years previous. The sunshine was 11.39 hours greater than the average for the previous eight years of the same period. The period from seeding to maturity was about fifteen days more than the average for the previous eight years. This delay evidently was due to the low temperature, as moisture and sunshine were both as favourable as during the previous years mentioned. The delayed maturity resulted in late harvest, so that grain usually harvested in August was not harvested until September. The quality of the oats harvested was fairly good and the yields were fair. The barley and wheat on the other hand were poor, and the yields considerably below the average.

The table below gives the average day and night temperatures for the growing season, 1923.

SOME METEOROLOGICAL RECORDS, 1923

Month	Day Temperature		Night Temperature	
	1923	Average of 8 years, 1915 to 1922	1923	Average of 8 years, 1915 to 1922
April	44·0	47·76	29·2	31·56
May	59·3	59·58	39·4	38·86
June	69·2	69·86	46·06	48·46
July	73·5	75·78	52·7	55·95
August	71·6	74·96	49·7	54·56
September	66·1	67·71	47·03	47·4

VARIETY TESTS

The plots of wheat, barley and oats were seeded May 19. The land had been in potatoes in 1922 and was in a fair state of fertility. The oats were seeded at the rate of 2½ bushels per acre; wheat, 2 bushels, and barley, 2 bushels. The plots were each one-sixth of an acre. The results were as stated in the following table:—

CEREALS, TEST OF VARIETIES, 1923.

Variety	When sown	When ripe	Number of days to mature	Height	Yield per acre	Yield per acre	Straw per acre
Oats				inches	lbs.	bush.	tons
Victory	May 19	Sept. 8	112	44	2,205	64·8	1·95
Banner, Ottawa 49	" 19	" 8	112	42	1,788	52·6	1·28
Hulless Oats							
Liberty, Ottawa 480	" 19	" 4	108	35	1,182	34·7	1·16
Barley							
Chinese, Ottawa 60	" 19	" 4	108	38	978	20·3	0·83
Duckbill, Ottawa 57	" 19	" 4	108	40	705	14·7	1·35
Charlottetown No. 80	" 19	" 8	112	39	1,122	23·3	1·07
Wheat							
Marquis, Ottawa 15	" 19	" 13	117	40	606	10·1	0·67
Huron, Ottawa 3	" 19	" 17	121	41	576	9·6	0·604
Red Fife, Ottawa 17	" 19	" 17	121	42	498	8·3	0·51
Peas							
Arthur, Ottawa 18	" 30	" 17	110	.....	660	11·0	2·5
McKay	" 30	" 17	110	.....	730	12·1	2·9

AVERAGE YIELDS OVER A NUMBER OF YEARS

The following table gives the average yield of the cereal crops grown at this Station. The low yields of wheat and barley this season have materially reduced the average of these crops.

AVERAGE YIELD OF CEREAL CROPS

Variety	Number of years tested	Yield per acre	
		Pounds	Bushel
Oats			
Banner, Ottawa 49	8	2,046	60·1
Victory	9	2,193	64·5
Hulless Oats			
Liberty, Ottawa 480	6	1,458	42·9
Barley			
Charlottetown No. 80	8	1,794	37·3
Duckbill, Ottawa 57	5	1,292	26·9
Chinese, Ottawa 60	2	1,244	25·9
Wheat			
Huron, Ottawa 3	6	1,088	18·1
Red Fife, Ottawa 17	10	909	15·1
Marquis, Ottawa 15	10	1,065	17·7
Peas			
Arthur, Ottawa 18	8	649	10·8
McKay	2	729	12·1
Rye			
O.A.C. No. 61	4	1,143	20·4

CONTROL OF LOOSE SMUT OF OATS [*Ustilago Avenæ* (Pers.) Jens.]

This experiment was conducted in co-operation with the Dominion Entomological Laboratory at Annapolis Royal, which treated the seed for plots 2 to 24. Two varieties of oats were used, Liberty, a hulless variety, and Irish King. The latter was from stock known to have been badly smutted the previous season. The plots were one-eighthieth acre each. Seeding was done June 6, by hand. The stand was good on all plots. There was sufficient soil moisture, and so far as could be determined all plots germinated equally well.

The different methods of treatment were as follows:—

Formalin sprinkle.—One pint of formalin diluted with 40 gallons of water was sprinkled on the grain as it was being shovelled over until it was evenly dampened, when it was piled, covered with bags for two hours, and then spread out to dry. Forty gallons of solution is sufficient for 40 to 50 bushels of seed.

Formalin spray (Dry formalin method).—Equal parts of formalin and water were sprayed on the grain as it was turned over, the pile covered for five hours, and the grain sown without drying. One quart of solution is used to 50 bushels of grain.

Formalin sprinkle, lime dip.—After the formalin sprinkle treatment as outlined above, the grain was immersed for ten minutes in a solution of one pound of quicklime in 10 gallons of water.

Formalin spray; lime dip.—The seed, after the formalin spray treatment, was dipped in the lime bath mentioned above.

Copper sulphate; lime dip.—The grain was soaked for 10 minutes in a solution of one pound of copper sulphate crystals and one pound of salt in 5 gallons of water, after which it was immersed in the lime bath.

In the copper carbonate, copper sulphide, dehydrated copper sulphate, Paris green, sulphur dust, inoculated sulphur, semesan, and dusting sulphur treatments, the amount of the fungicide stated for each plot was mixed with the grain for that plot so that the grain was thoroughly coated with the material. With dust treatments the grain need not be sown at once, as with wet treatments, but

can be kept for some days. This is sometimes an advantage where a large quantity of seed has to be treated.

Samples were taken from the centre of each plot, and the diseased and healthy heads counted. The results are given below:—

CONTROL OF SMUT OF OATS, 1923

Plot	Treatment per bushel of grain	Variety of oats	Number of heads counted	Number of heads of smut	Per cent of smut
1	Formalin sprinkle	Liberty	1,050	14	1·33
		Irish King	1,080	38	3·52
2	Copper carbonate, 2 ounces	Liberty	1,066	9	0·84
		Irish King	1,082	34	3·14
3	Copper carbonate, 4 ounces	Liberty	1,107	9	0·81
		Irish King	1,065	38	3·57
4	Copper carbonate, 8 ounces	Liberty	1,198	5	0·42
		Irish King	866	6	0·69
5	Copper sulphide, 2 ounces	Liberty	1,133	67	5·91
		Irish King	1,167	57	4·88
6	Copper sulphide, 4 ounces	Liberty	1,168	40	3·42
		Irish King	979	61	6·23
7	Copper sulphide, 8 ounces	Liberty	1,170	16	1·36
		Irish King	906	57	6·29
8	Dehydrated copper sulphate, 2 ounces	Liberty	1,243	6	0·48
		Irish King	1,045	15	1·44
9	Dehydrated copper sulphate, 4 ounces	Liberty	1,150	5	0·43
		Irish King	936	16	1·71
10	Dehydrated copper sulphate, 8 ounces	Liberty	848	3	0·35
		Irish King	1,158	10	0·86
11	Check (untreated)	Liberty	1,379	329	23·86
		Irish King	1,292	70	5·42
12	Paris green, 2 ounces	Liberty	920	25	2·72
		Irish King	1,366	40	2·93
13	Paris green, 4 ounces	Liberty	1,105	10	0·90
		Irish King	1,056	10	0·95
14	Paris green, 8 ounces	Liberty	964	3	0·31
		Irish King	1,074	12	1·12
15	Sulphur dust, 2 ounces	Liberty	1,142	13	1·14
		Irish King	1,164	14	1·20
16	Sulphur dust, 4 ounces	Liberty	1,153	7	0·60
		Irish King	831	9	1·08
17	Sulphur dust, 8 ounces	Liberty	1,199	3	0·25
		Irish King	942	30	3·18
18	Sulphur dust, 16 ounces	Liberty	900	5	0·55
		Irish King	948	26	2·74
19	Inoculated sulphur, 2 ounces	Liberty	1,071	11	1·03
		Irish King	1,504	59	3·92
20	Inoculated sulphur, 4 ounces	Liberty	1,275	7	0·55
		Irish King	874	54	6·18
21	Inoculated sulphur, 8 ounces	Liberty	1,206	6	0·49
		Irish King	1,452	58	3·99
22	Inoculated sulphur, 16 ounces	Liberty	1,026	4	0·39
		Irish King	1,252	38	3·03
23	Check (untreated)	Liberty	1,206	182	15·09
		Irish King	905	72	7·95
24	Semesan, 2 ounces	Liberty	814	58	7·12
		Irish King	1,082	38	3·51
A	Formalin spray; lime dip	Liberty	.....	.....	Trace
		Irish King	1,116	6	0·54
B	Copper sulphate; lime dip	Liberty	.....	.....	Trace
		Irish King	735	22	2·99
C	Check (untreated)	Liberty	1,133	146	12·88
		Irish King	767	49	6·39
D	Formalin spray	Liberty	.....	.....	Trace
		Irish King	1,042	2	0·19
E	Check (untreated)	Liberty	1,203	203	16·87
		Irish King	1,373	73	5·32
F	Formalin sprinkle; lime dip	Liberty	1,080	5	0·46
		Irish King	1,808	81	4·48
G	Dusting sulphur	Liberty	.....	.....	Trace
O	Check (untreated)	Liberty	1,313	205	15·61

NOTE.—In the Liberty plots, A, B, D and G, there were only 2, 2, 5 and 4 heads of smut, respectively, in the whole plot.

It will be noticed that all the treatments were, in general, more successful with the Liberty oats, which is hulless, and it would seem that the treatment of hulless varieties with dust is entirely satisfactory. The dust treatments, however, are apparently not so effective for the varieties with hulls, the formalin treatments having given better results with these.

FORAGE PLANTS

CORN FOR ENSILAGE—TEST OF VARIETIES

Eighteen varieties and strains of corn were grown on land which had produced hay in 1921 and 1922. The land was ploughed soon after the hay crop was removed and was then disced. In the spring, manure was applied at the rate of 20 tons per acre and ploughed under. The land was well worked, and the corn was seeded June 8. The stand was uniform on all plots. The crop was cut for ensilage October 5. The ten highest-yielding varieties are given below.

CORN FOR ENSILAGE—TEST OF VARIETIES

Variety	Average height	Stage of maturity	Average yield per acre	
	feet		tons	lbs.
Longfellow	6	Early milk	14	1,260
Longfellow 1099	6½	"	14	820
Quebec No. 28	5½	Late milk	13	1,353
Wisconsin No. 7	6	Silk to early milk	12	1,887
Bailey	6½	Silk	12	1,887
Ninety Day White Dent 1318	6½	"	12	1,813
Leaming	6	Silk to early milk	12	1,593
Golden Glow	6½	Silk	12	1,227
Comptons Early	6	Early milk	12	347
Northwestern Red Dent, A.B	6	Late milk	11	1,980

SUNFLOWERS FOR ENSILAGE—TEST OF VARIETIES

Nine varieties of sunflowers were tested this year. These were seeded on land which had grown hay in 1921 and 1922. The land was ploughed after the hay crop was removed, and was then disced. Twenty tons of manure per acre were applied in the spring, and the ground well worked. Seeding was done June 2, and all varieties were harvested September 18. The stand was uniform on all plots. The table shows the percentage of each variety in full bloom at the time of cutting, and the yield per acre of the different varieties.

SUNFLOWERS FOR ENSILAGE—TEST OF VARIETIES

Variety	Average height	Per cent in bloom at harvest	Average yield per acre	
	feet		tons	lbs.
Russian Giant	7	9	18	1,070
Giant Russian	7	9	18	447
Mammoth Russian, U.F.	7	10	17	1,163
Mammoth Russian	7	10	17	320
Black	5½	55	16	1,513
Manchurian 87-352	5¼	50	16	1,440
Mixed	5¼	60	16	450
Mancheco	5½	50	15	1,790
Ottawa No. 76	5¼	19	14	1,810
Mennonite Mixed	5	80	14	1,810

SOY BEANS—TEST OF VARIETIES

Six varities of soy beans were seeded May 21, using a hand seeder, in plots of one-twentieth-acre each. Manure at the rate of 15 tons per acre was applied in the fall and ploughed under. In the spring the land was well worked with a disc harrow and cutivator. All of the varieties were showing above ground June 4. The season throughout was cool, the temperature being about three degrees below normal. None of the varieties made what would be considered a heavy growth. Early Black gave the highest yield and was as far advanced in maturity as any of the others, with the possible exception of Ito San. The yield of the latter was one half ton less per acre than that of Early Black. The weight of green fodder only was obtained. The crop was put into the silo and a good quality of ensilage secured. The results were as follows:—

SOY BEANS—TEST OF VARIETIES

Variety	Yield per acre, green fodder	Stage of maturity
	tons	
Early Black, 1063	3·35	Seeds formed
Manchu, 1367	3·3	Some pods
Ito San, 1342	2·85	Seeds formed
Early Brown, 1047	2·8	Seeds formed
Hollybrook, 1368	2·75	No pods
Summerland	2·7	Some pods

SUGAR BEETS—TEST OF VARIETIES

These were grown on land which was in hay in 1921 and 1922. The land was ploughed early in the fall of 1922 and disced. In the spring of 1923 it was disced, manured at the rate of 15 tons per acre, ploughed, cultivated and smoothed. Planting was done May 21, in rows 2½ feet apart. The drills were opened with a hand marker, and the seed dropped by hand. The stand was good. The plants were thinned July 7 to ten inches apart in the row, and the crop was harvested October 20. The yields per acre are given in tabular form.

SUGAR BEETS—TEST OF VARIETIES

Variety	Average yield per acre		Per cent sugar in juice
	tons lbs.	bush. lbs.	
Chatham	13 460	529 10	19·59
Henning & Harving	12 1,440	508 40	21·13
Vilmorin's Improved Selection B	12 240	484 40	21·00
Kitchener	10 1,720	434 20	20·04
Sluice Bros	10 1,360	427 10	20·40

CARROTS—TEST OF VARIETIES

Fourteen lots of carrots were seeded May 22 on level ground with the hand seeder. The land had grown hay in 1921 and 1922. It was ploughed in the early fall and disced, and in the spring manure at the rate of 15 tons per acre was applied. No chemical fertilizers were used. Most of the plants were showing above ground June 4. They were thinned to four inches apart in the row July 9, and a good stand of plants was secured. The crop was harvested October 24. The ten highest yielding varieties are given below.

CARROTS—TEST OF VARIETIES

Variety	Average yield per acre			
	tons	lbs.	bush.	lbs
Mammoth Short White	16	1,120	662	20
White Belgian	15	840	616	40
Improved White Vosges	15	840	616	40
Mammoth White Intermediate	15	730	614	30
Orange Giant	14	1,940	598	40
Danish Champion	14	800	576	..
Long Orange	13	1,660	553	10
James	13	640	532	40
Champion 7031	12	420	488	20
Large White Belgian	12	240	484	40

MANGELS—TEST OF VARIETIES

These were grown on land which was in hay in 1921 and 1922. The land was ploughed early in the fall of 1922, and disced. In the spring of 1923 it was disced, manured at the rate of 15 tons per acre, ploughed, cultivated and smooth-harrowed.

Some difficulty has been experienced here in securing a good stand of plants from mangel seed when sown with a hand drill. To overcome this, planting this year was done by hand, and an average stand of 93.4 per cent was secured. The seed was sown May 21, after a drill had been made with a marker, and was covered by hand. The plants were showing above ground June 5. They were thinned to ten inches apart July 6, and sufficient cultivation was given to keep down weeds and retain moisture. The roots made fair growth and were harvested October 20. The ten highest-yielding varieties are given in tabular form.

MANGELS—TEST OF VARIETIES

Variety	Average yield per acre			
	tons	lbs.	bush.	lbs.
Barres Stryno B.O., 748	23	1,580	951	30
Barres Stryno V., 7034	23	440	928	40
Champion or Gate Post	20	1,460	829	10
Giant Yellow Globe	19	700	774	..
Danish Sludstrup	18	1,620	752	20
Barres Sludstrup B.O., 752	18	1,440	748	40
Giant Yellow Globe, R	18	1,320	746	20
Best of All	18	300	726	..
Barres Stryno V., 3084	17	1,940	718	40
Devon Yellow Globe	17	1,940	718	40

TURNIPS—TEST OF VARIETIES

Thirty-one lots of turnips were grown on land which had produced hay in 1921 and 1922. The land was ploughed very early in the fall and disced, to assist in the decay of the sod. Manure was applied in the spring at the rate of 15 tons per acre. No chemical fertilizers were used. The land was again ploughed, cultivated and disced, hoed up into rows with the horse hoe and rolled. The seed was sown with the hand seeder May 22. Plants of most varieties were emerging June 1. The plants were thinned July 7 to ten inches apart in the row. Cultivation was continued until the plants were too large to permit of a horse passing between the rows without damage to the crop. The roots were harvested October 30. The ten highest yielding varieties are listed in tabular form.

TURNIPS—TEST OF VARIETIES

Variety	Average yield per acre			
	tons	lbs.	bush.	lbs.
Yellow Tankard	24	1,380	987	30
Best of All	23	1,700	954	..
Derby	23	980	939	30
Halls Westbury	23	980	939	30
Kangaroo	22	1,420	908	20
Famous Kangaroo, S. 993-23	22	460	889	10
Bangholm, 33-209	22	340	886	40
Bangholm, 7021	22	280	885	30
Ditmars	22	160	883	10
Best of All	22	40	880	40

TURNIP SEED GROWING

The results from the area devoted to the production of the club-root-resistant strain of Bangholm swede were not as satisfactory as had been anticipated. The roots were harvested carefully but evidently suffered from lack of ventilation in storage, owing to there being no satisfactory storage cellar. The roots were planted May 3 and had the appearance of being in excellent condition, although some growth had started. In many cases they failed to send out feeding rootlets, and the growth dried up or did not start. There was nothing to indicate the cause directly, as the roots were stored in crates. Some rows showed a good stand, evidently where the contents of certain crates had been planted; other rows, doubtless from other crates, had a great number of misses.

From the trial plots of this strain grown from seed obtained from Charlottetown, Denmark and Kentville, roots were saved and planted in order to follow up the resistance to club-root in further trials. The product of seed from 25 plants of each harvested August 29, was as follows:—

Kentville	5.7	pounds, or	3.6	ounces per plant.
Charlottetown	5.3	"	3.4	"
Denmark	5.2	"	3.3	"

Roots set in rows 4 feet apart and 2 feet apart in the rows would total 5,445 plants per acre, which at 3.4 ounces per plant would be 1,157 pounds of seed per acre. There are bound to be misses because of certain roots not starting, but a yield per acre ranging from 700 to 1,000 pounds should be possible. For a farmer's seed supply, 25 roots carefully set aside in the fall, handled carefully without bruising, the leaves removed without injury to the top of the root, the roots left intact as far as possible, and stored in a cool place, should meet average requirements satisfactorily. The roots are set as early as the ground can be prepared. They are set into the ground with the crown nicely exposed. Any good soil is suitable.

SWEDE STRAINS RESISTANT TO CLUB ROOT

It was found at this Station and at the Charlottetown Station that strains of Bangholm swede turnips are resistant to the organism causing club-root in turnips. That the Bangholm swede offered by the seed trade is not resistant is evident from the results given in the table below. The seed grown at Kentville and Charlottetown from Danish seed obtained in the spring of 1921 was compared with that obtained from the seed trade and also with that offered by a Danish seed firm. It will be seen that one strain of the imported seed was practically destroyed by this disease, yielding only 28 bushels per acre, and that others were only partially resistant. The Wilhelmsburger, a green-top

turnip, is apparently very resistant. The Danish 1922 strain is evidently similar to the 1921 strain. The propagation of seed at Kentville will be continued with this highly-resistant strain. Seed of this is also being raised at Nappan and at Charlottetown, so that a good supply should be available in a few years, in case the seed trade is unable to furnish it. Farmers should endeavour to get enough seed to grow at least a few roots for their own seed supply, and thus escape the loss that too often results because of this disease.

The seed was sown on June 2 and the harvesting done on November 5. The preparation of the soil and its management was the same in all plots. The ground was alike in respect to the presence of the disease, and the fact that 96.3 per cent of the crop was destroyed in one case indicates the severity of the soil infection.

The first column of the table gives the per cent apparently free from disease; the second, the per cent of diseased roots fit for storage; and the third, those killed outright or unfit for storage because of the disease.

RESISTANCE TO CLUB-ROOT OF SWEDE STRAINS

Strain	How affected by Club Root			Yield per acre fit for feed
	Free	Diseased	Lost by disease	
	Per cent	Per cent	Per cent	bush
Kentville, E.F.	97·7	1·2	1·1	779·4
Charlottetown, E.F.	97·5	2·5	0	821·1
Denmark, 1922	98·6	1·4	0	623·7
Wilhelmsburger, 770 Denmark	98·2	1·8	0	810·5
Studsgaard, 768, Denmark	88·3	1·9	9·8	683·7
Bangholm, 7021, Denmark	73·1	2·7	24·2	574·5
Lyngby, 318, Denmark	63·3	6·1	30·6	526·05
Pajbjerg, 7022, Denmark	0	3·7	96·3	28·04
Rennie	48·5	2·1	49·4	383·5
Halifax Seed Company	39·8	1·4	58·8	312·2
McKenzie, 33–209	48·6	1·4	50·0	379·0

CLUB-ROOT CONTROL

Additional data were secured this season from the plots which had been treated with lime for the control of the club-root organism. This land was manured in 1916 with manure from stock which had been fed turnips affected with club-root. Since that time no manure has been used on this soil, and all fertilizers have been in the form of nitrate of soda, acid phosphate and muriate of potash. Turnips were seeded in 1916 and again in 1917 and the lime had no appreciable effect in suppressing the disease, as all plots were apparently affected similarly to the check plots not limed. The land was in oats in 1918, and clover in 1919. Turnips were again seeded in 1920, and received very little apparent benefit from the application of lime. In 1922 and 1923 turnips were again seeded. There was an apparent benefit in 1922 from lime, and in 1923 the benefit was quite noticeable, particularly where heavy applications had been made.

It will be noticed from the table below that certain areas were again limed in 1918, and that on some plots lime was again applied in 1921. It will be seen that where a total of 9 tons of quicklime was applied in three applications, 1916, 1918, and 1921, the crop was 89.5 per cent free from disease this year, and that where 18 tons of ground limestone were applied in these same years, the crop this year was quite free from disease.

It should be pointed out that this has been a severe test, for it is not considered to be good practice to continue growing turnips on the same land from

year to year, and had this not been done, the benefit from the lighter applications of lime no doubt would have been more apparent. The same trade variety has been grown from year to year as far as was possible. In addition to this trade variety, the Bangholm club-root-resistant strain has been grown on these plots, and has remained free from disease on all plots. The results of this test for 1923 are as given in the following table:—

CLUB-ROOT CONTROL WITH LIME, 1923

How Treated Per acre	Commercial Swede								
	Limed 1916			Limed 1916 and 1918			Limed 1916, 1918 and 1921		
	Free per cent	Diseased per cent	Lost per cent	Free per cent	Diseased per cent	Lost per cent	Free per cent	Diseased per cent	Lost per cent
Quicklime, pounds—									
1,500	2·7	0	97·2	31·2	12·5	56·2	64·5	12·5	22·9
3,000	3·4	4·1	92·4	77·1	10·3	12·5	87·5	12·5	0
4,500	8·3	0	91·7	93·7	2·1	4·1	93·8	0	6·2
6,000	19·4	1·4	79·2	78·1	9·3	12·5	89·5	2·0	8·4
Limestone, pounds—									
3,000	0	1·4	98·6	59·3	9·3	31·4	39·5	6·2	54·3
6,000	4·1	3·8	92·1	60·3	9·8	29·9	79·1	6·2	14·7
9,000	24·3	6·2	69·5	87·4	2·1	10·4	95·5	4·5	0
12,000	26·1	9·0	64·9	89·5	3·1	7·4	100·0	0	0
	Limed 1918 only			Limed 1918 and 1921			Check, not limed		
Quicklime, pounds—									
6,000	45·8	8·3	45·9	.....	.....	.....	.....	.....	.....
6,000	.....	.....	.....	54·1	8·3	37·6	.....	.....	.....
Check, not limed	.....	.....	.....	.....	.....	.....	0	0	100

GRIMM ALFALFA

In the tables following the yields are given of alfalfa hay from fields seeded to Grimm alfalfa in 1920, 1921, and 1922. Areas were seeded broadcast, and duplicate areas were seeded with the hand seeder in rows 12 inches apart. On other areas, duplicating each method of seeding, a nurse crop of oats was seeded, and the effect of this is indicated in the yield. The plants on all the areas suffered considerably during the winter of 1922-23, and the stand was greatly reduced because of plants having winterkilled. There was an unusual fall of snow during the winter and it was thought that this would give good protection. The injury, however, evidently resulted during the early spring soon after the snow melted from the fields. It is probable that three cuttings should not have been made in 1922 and that if the last cutting had not been made, better maturity of the plants would have resulted, so that they could better have resisted the unfavourable spring conditions.

Alfalfa leaf spot, which was so prevalent in 1921 on the 1920-seeded field, did not develop to any great extent in 1922 and 1923. It was because of defoliation resulting from this disease that no second crop was harvested in 1921 from the 1920-seeded area.

The results would show that a nurse crop during a dry season may materially check the development of the alfalfa plants. The 1920-seeded, it will be seen, did not suffer materially. The 1921-seeded, however, because of the dry summer, was thin and weak, and many of the plants killed out the following winter. Of particular interest are the yields from the second cutting on the 1921-seeded areas. Many plants were thrown up in the soil by alternate freezing and thawing, and it will be noticed that the nurse crop area had a very

poor first cut. This was due to many of the plants having been lifted out of the soil by frost during the early spring. Many of these plants, however, developed new roots, and at the time of the second cutting had so recovered that the crop was as good as that on the area where no nurse crop had been grown. It will be seen that the broadcast area seeded in 1922 was much better in 1923 where no nurse crop had been grown, and also that the first cuttng in rows was better where a nurse crop was grown in 1922.

The 1920-seeded area produced 1,340 pounds of alfalfa hay on the broadcast-seeded, and 1,420 pounds on the row-seeded area, these crops being harvested August 7 of the year of seeding. This indicates an unusual growth due directly to favourable weather and soil conditions, the land having been in roots the previous year. The yield of oats grown as a nurse crop was 65 bushels per acre.

At a valuation of $16 a ton for alfalfa hay and 60 cents per bushel for oats, the hay produced was worth $11.04 per acre and the oats $39. The future gain on the plot not seeded to a nurse crop was not sufficient to offset this extra gain in the value of the grain crop over the alfalfa produced. The point of particular interest is that if a nurse crop is grown with the alfalfa the first year the ground should be well enriched and moisture conditions be favourable, otherwise the alfalfa will not make a sufficiently strong stand to carry through the winter in a satisfactory way. This was the case in the 1921-seeded area, where a soil with much less fertility was used, and with the season not at all favourable as to moisture.

When seeding broadcast 20 pounds of seed per acre is used, and when seeding in rows 10 pounds is sufficient. It would appear that there is little difference whether seeding is done broadcast or in rows. The stand, however, was not as good where row seeding was followed in 1921 as was that of the broadcast areas. This can be explained in part by the fact that where the row happened to fall close to, or in, a row of oats, the plants made much less growth than if the row of alfalfa fell between two drills of grain. With a fertile soll and plenty of moisture this condition might not occur. It is evident that a good supply of plant food and a continuous moisture supply is important during the year of seeding to get a strong well-rooted stand, without which the chances of success with this crop are far from good.

GRIMM ALFALFA, SEEDED 1920

Year and date of cutting	Seeded broadcast		Seeded in rows 12 inches apart	
	Seeded with a nurse crop in 1920	Seeded without a nurse crop in 1920	Seeded with a nurse crop in 1920	Seeded without a nurse crop in 1920
1921. Cut June 20	3,130 lbs.	3,170 lbs.	3,330 lbs.	3,580 lbs.
Total, tons	1·56	1·58	1·66	1·79
1922. 1st cut, June 13	3,230 lbs.	3,230 lbs.	3,420 lbs.	3,350 lbs.
2nd cut, August 4	2,340 lbs.	3,200 lbs.	2,870 lbs.	2,080 lbs.
3rd cut, September 13	1,940 lbs.	2,600 lbs.	1,940 lbs.	1,400 lbs.
Total, tons	3·75	4·52	4·11	3·41
1923. 1st cut, July 10	2,750 lbs.	3,910 lbs.	3,360 lbs.	3,360 lbs.
2nd cut, August 24	870 lbs.	1,010 lbs.	890 lbs.	990 lbs.
Total, tons	1·81	2·46	2·12	2·17
Total for 3 years, tons	7·12	8·56	7·89	7·37

GRIMM ALFALFA, SEEDED 1921

Year and date of cutting	Seeded broadcast		Seeded in rows 12 inches apart	
	Seeded with a nurse crop in 1921	Seeded without a nurse crop in 1921	Seeded with a nurse crop in 1921	Seeded without a nurse crop in 1921
1922. 1st cut, June 13	860 lbs.	2,680 lbs.	460 lbs.	2,700 lbs.
2nd cut, August 4	1,340 lbs.	1,170 lbs.	1,980 lbs.	2,500 lbs.
3rd cut, September 13	1,140 lbs.	1,240 lbs.	1,420 lbs.	1,520 lbs.
Total, tons	1·67	2·54	1·93	3·36
1923. 1st cut, July 10	2,140 lbs.	3,310 lbs.	2,140 lbs.	2,120 lbs.
2nd cut, August 24	430 lbs.	1,360 lbs.	460 lbs.	660 lbs.
Total, tons	1·28	2·33	1·3	1·39
Total for 2 years, tons	2·95	4·87	3·23	4·75

GRIMM ALFALFA, SEEDED 1922

Year and date of cutting	Seeded broadcast		Seeded in rows 12 inches apart	
	Seeded with a nurse crop in 1922	Seeded without a nurse crop in 1922	Seeded with a nurse crop in 1922	Seeded without a nurse crop in 1922
1923. 1st cut, July 10	3,096 lbs.	3,280 lbs.	2,520 lbs.	2,900 lbs.
2nd cut, August 24	656 lbs.	340 lbs.	380 lbs.	540 lbs.
Total, tons	1·87	1·81	1·45	1·72

NITRO-CULTURE FOR ALFALFA

The value of artificial inoculation with bacterial cultures on alfalfa, although in some cases not very marked in the tests made on certain soils at this Station, is sufficiently pronounced in other cases to make this practice desirable. Cultures for this purpose may be obtained from the Division of Bacteriology Central Experimental Farm, Ottawa.

NITRO-CULTURE FOR ALFALFA

Year and date of cutting	Seed inoculated		Seed not inoculated	
	Broadcast	Rows, 12"	Broadcast	Rows 12"
No nurse crop				
1923. 1st cut, July 10	3,520 lbs.	2,820 lbs.	3,280 lbs.	2,900 lbs.
2nd cut, August 4	380 lbs.	620 lbs.	340 lbs.	540 lbs.
Total, tons	1·95	1·72	1·81	1·72
With nurse crop				
1923. 1st cut, July 10	.....	3,020 lbs.	.....	2,520 lbs.
2nd cut, August 4	.....	460 lbs.	.....	380 lbs.
Total, tons	.....	1·74	.....	1·45
No nurse crop				
1923. Seeded on May 19, cut Sept. 6	.....	0·62 tons	.....	0·47 tons

RED CLOVER. DIFFERENT STRAINS AND SOURCES OF PRODUCTION

In 1922 eighteen different lots of red clover were seeded in uniform plots. These made good growth and show considerable variation. This variation is particularly noticeable in the second growth, a number of the varieties not having made enough growth to harvest. The clovers having medium to large

leaves evidently develop a second crop, while those will small leaves do not. The table below gives the yield of cured hay per acre from the first and second cuttings.

RED CLOVER OF DIFFERENT STRAINS

Strain	Yield per acre					
	1st cutting		2nd cutting		Total yield	
	tons	lbs.	tons	lbs.	tons	lbs.
Medium Late Red, Sweden	1	1,768	..	1,725	2	1,493
Ottawa, 1916-20	2	275	1	475	3	750
France, 533	2	125	1	100	3	225
France, 535	2	1,137	1	1,825	4	962
United Fruit Co., 1922	1	1,731	..	1,050	2	781
Ottawa District	2	425	..	1,275	2	1,700
Ottawa, 1917-20	2	668	1	250	3	918
France, 500	2	200	..	1,875	3	75
St. Clet, Quebec	2	256	..	1,875	3	131
Mammoth Red, U.F. Co., 1922	2	237	..	1,125	2	1,362
St. Casimir, Quebec	2	331	..	1,725	3	56
Early Red, Sweden	2	893	..	.....	2	893
Altaswede	2	1,175	..	.....	2	1,175
Italy, 501	1	1,468	..	225	1	1,693
Ottawa, O.S., 21	1	1,862	..	1,350	2	1,212
Italy, 536	1	1,937	..	150	2	87
Kenora, Ont	2	950	..	.....	2	950
Late Red Swedish	2	1,850	..	.....	2	1,850

RED CLOVER SEED PRODUCTION

In order to determine the possibilities of red clover seed production, five duplicate areas were seeded in 1922 to clover at the rate of 10 pounds per acre. The plots were seeded with a nurse crop of wheat. Plot 1 was cut for hay in 1923, the yield of which is given. Plot 2 was cut for hay, and the second crop harvested for seed. Plot 3 was allowed to ripen and was cut for seed. Plot 4 was seeded in rows 12 inches apart, and plot 5 in rows 24 inches apart, and the seed gathered from these when matured. It will be seen that the yield of seed was very light in every case. There were many immature seeds which amounted in weight to much more than the good seed produced. The conditions do not seem to be favourable for a good yield of seed from clover allowed to ripen. The second growth clover seems to yield much more seed per acre, and it is from this that the clover seed grown in Nova Scotia is generally obtained. The season on the whole was unfavourable for seed production. The season was late and the first cutting was not made until July 14, when the clover had nicely started to bloom. To secure a good second growth for seed purposes the clover should be cut from June 20 to the last of June. The yield of seed as given in the table below is that of the good seed only.

RED CLOVER SEED PRODUCTION

Plot	How seeded	Hay per acre			Seed per acre
		1st cutting	2nd cutting	Total	
		tons	tons	tons	lbs.
1	Broadcast	1·9	1·04	2·94	.....
2	Broadcast	1·6	.....	.....	82·5
3	Broadcast	.....	.....	.....	47·5
4	Rows 12 inches apart	.....	.....	.....	27·0
5	Rows 24 inches apart	.....	.....	.....	28·8

ALSIKE CLOVER SEED PRODUCTION

One plot of alsike clover was seeded broadcast at the rate of 5 pounds per acre in 1922, with a nurse crop of wheat. This was allowed to mature for seed in 1923. The yield of seed was light, amounting to only 29·9 pounds per acre.

SWEET CLOVER

The White Blossom and Yellow Blossom sweet clovers were seeded in the spring of 1922. Duplicate plots of each variety were seeded with and without a nurse crop. The difficulty with this crop at this Station is that the plants, unless well developed the first year, are thrown out of the soil by alternate freezing and thawing in the early spring following the year of seeding. The season and the fertility of the soil have a great deal to do with the development the first year, and if no nurse crop of grain is grown the chances for success are greater than if it is used. It does not seem practical, however, to start a crop without using a nurse crop, as there are no returns of much consequence from the clover crop the year of seeding. It should be pointed out that the yield of the plots where no nurse crop was used was practically a full stand of sweet clover, while on the areas seeded with a nurse crop fully twenty-five per cent of the crop was red clover, which grew as a volunteer crop without having been seeded. Of the two clovers the Yellow Blossom makes the finer quality of hay. Its height was four feet while the White Blossom ranged from four and one-half to five feet. The Yellow Blossom was in full bloom July 10, and the White Blossom a week later. The crop is harvested just as the plants have nicely started to bloom. If the harvesting is delayed the product is much more woody, and less valuable for hay. The yields were as given below:—

SWEET CLOVER

How seeded	Yellow Blossom Yield per acre	White Blossom Yield per acre
	tons	tons
With a nurse crop	2·14	2·82
Without a nurse crop	2·76	3·56

HUBAM CLOVER

Hubam, an annual white blossom sweet clover, was seeded in the spring of 1923 on May 26. This was cut October 10. To compare it with the biennial white and yellow blossom sweet clovers, the product from adjacent plots was harvested at the same time. The results in cured hay were as follows:—

HUBAM—ANNUAL SWEET CLOVER

—	Yield per acre	Average height
	tons	inches
Hubam	3·91	38
White Blossom	1·73	18
Yellow Blossom	0·30	8

WHITE DUTCH CLOVER

Five lots of the white dutch clover were seeded in the spring of 1922. These were cut once and cured into hay. The Scottish and Kentish Wild White have a finer growth and slightly smaller leaf than the commercial, and spread more rapidly. The Danish Stryno is a more vigorous plant than the Danish Morso. The different lots were seeded in rows 12 inches apart, and in every case they spread to make a thick mat of closely-rooted plants between the rows by the

end of the first season after seeding. The ranging power of the Wild White Scottish and Kentish is evidently greater than that of the other varieties tested. The yields of cured hay were as follows:—

WHITE DUTCH CLOVER

Variety or strain	Yield per acre	
	tons	lbs
Danish Stryno	1	1,536
Commercial (H. S. Co.)	1	906
Danish Morso	1	1,000
Scottish Wild	1	1,243
Kentish Wild	1	700

TIMOTHY

Nine strains of timothy were seeded under similar conditions and in uniform areas in 1922. The cured timothy hay per acre was as follows in 1923:—

TIMOTHY, TEST OF STRAINS

——	Yield per acre	
	Tons	lbs.
Huron, Ohio, 3937	2	1,981
Commercial, Ohio	2	1,118
Ohio, 9352	3	.....
Ohio, 6779	2	1,006
Ohio, 9335	2	1,400
Quebec, Sample	2	1,418
Ottawa, Bulk, 1921	3	75
Commercial (L. & S.)	2	1,100
Commercial (U. F. Co.)	2	800

WESTERN RYE GRASS

Fifteen strains of Western Rye Grass were seeded on uniform areas in 1922. The product of cured hay in 1923 from these areas was as follows:—

WESTERN RYE GRASS, TEST OF STRAINS

——	Yield per acre	
	tons	lbs.
No. 78	2	950
No. 20	2	875
No. 16	2	875
No. 98	2	837
No. 15	2	800
No. 4	2	762
No. 10	2	668
No. 17	2	556
No. 81	2	537
No. 19	2	312
No. 18	2	275
No. 11	2	218
No. 5	1	1,975
No. 118	1	1,975
No. 6	1	1,937

TIMOTHY SEED PRODUCTION

Three duplicate plots were seeded in 1922 for timothy seed production with wheat as a nurse crop. One plot was seeded broadcast with clear timothy at the rate of 12 pounds per acre. One was seeded with timothy at the rate of

10 pounds per acre, and red clover, 8 pounds per acre. From this plot, clover hay was harvested in 1923, and in 1924 the area will be in timothy for seed. The other plot was seeded with timothy in rows 12 inches apart, and from this seed was harvested in 1923.

TIMOTHY SEED PRODUCTION

Plot	How seeded	Clover Hay yield per acre		Yield of seed per acre
		1st cutting	2nd cutting	
		tons	tons	pounds
1	Timothy seeded broadcast	.....	.....	220
2	" in rows 12 inches apart	.....	.....	189
3	" with clover	2·18	1·02	.....

NITROGENOUS FERTILIZERS FOR TIMOTHY SEED PRODUCTION

Three plots of timothy of one-quarter acre each were used in this test. One plot was fertilized with nitrate of soda at the rate of 150 pounds per acre, one with sulphate of ammonia at the rate of 112.5 pounds per acre, and the third left unfertilized as a check. The results would indicate a great gain from the use of either of these fertilizers in the production of timothy seed. The timothy was cut August 17 and was threshed August 27. The seed was of good quality, and the hay left after threshing was of fair quality for feeding.

NITROGENOUS FERTILIZERS FOR TIMOTHY SEED PRODUCTION

How fertilized per acre, 1923	Hay average yield per acre	Seed average yield per acre
	tons	pounds
No fertilizer	1·49	84
Nitrate of soda, 150 pounds	2·034	274
Sulphate of ammonia, 112·5 pounds	1·95	254

TIMOTHY AND CLOVER VS. MEADOW FESCUE AND CLOVER FOR HAY

Two plots were seeded in 1922 with early red clover at the rate of 10 pounds per acre. On one timothy was also seeded at the rate of 8 pounds per acre, and on the other meadow fescue at the rate of 15 pounds per acre. This same test was made with late red clover. An additional plot was seeded with mammoth red clover and timothy at the same respective rates per acre. The second growth on these plots was very light. The plots will be continued for another year to determine the yield of timothy and meadow fescue hay. The yields this year were as follows:—

TIMOTHY VS. MEADOW FESCUE, WITH CLOVER, FOR HAY

How seeded, per acre	Yield of clover hay per acre		
	1st cutting	2nd cutting	Total
	tons	tons	tons
Early red clover, 10 lbs.; timothy, 8 lbs	2·98	0·72	3·70
Early red clover, 10 lbs.; meadow fescue, 15 lbs	3·37	0·38	3·75
Late red clover, 10 lbs.; timothy, 8 lbs	3·27	0·24	3·51
Late red clover, 10 lbs.; meadow fescue, 15 lbs	3·03	0·60	3·63
Mammoth red clover, 10 lbs.; timothy, 8 lbs	3·13	0·26	3·39

EXPERIMENTS WITH FERTILIZERS

FERTILIZERS AND GROUND LIMESTONE EXPERIMENT

This test was started in 1914, and has as its object a determination of the most profitable sources of nitrogen and phosphorus, and the ascertaining of the value of ground limestone when used alone and in conjunction with chemical fertilizers.

The area was apparently uniform at the start of the experiment, but was in a low state of fertility, and as the small amount of fertilizer applied once in three years was inadequate to support a vigorous growth in the three successive crops, the whole area was manured at the rate of 15 tons per acre in the spring of 1917. The rotation has been potatoes, grain and clover, with the fertilizer applied to the potato crop. The limestone was applied in 1914, 1917 and 1920. Limestone applied directly to land prepared for potatoes materially increases the amount of scab. The practice of applying limestone to the ground when seeding to grain and clover is advisable.

Details of this experiment are given in the accompanying table, showing the yields from areas treated similarly except that one series of plots was limed and one series not limed.

FERTILIZERS AND GROUND LIMESTONE EXPERIMENT
Fertilizers Applied 1914, 1917, 1920, 1923

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 (2½% N, 22% P_2O_5)	Muriate of potash (50% K_2O)
	lb.	lb.	lb.	lb.	lb.	lb.
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	.....	.....	.....	.....

YIELDS FROM FERTILIZED PLOTS—FERTILIZERS AND GROUND LIMESTONE EXPERIMENT

Plot		Potatoes 1923	Potatoes 1914–17–20–23 Total yield	Hay 1916–19–22 Total yield	Wheat 1918–21 Total yield		Oats 1915 Total yield	
					Grain	Straw	Grain	Straw
		bush.	bush.	lbs.	bush.	lbs.	bush.	lbs.
1	Limed	183·9	791·2	9,640	44·4	4,920	37·9	2,200
	Not limed	144·5	725·8	4,630	34·5	3,430	32·6	1,970
	Gain	39·4	65·4	5,010	9·9	1,490	5·3	230
2	Limed	154·7	743·1	9,000	44·3	4,700	38·5	2,250
	Not limed	121·8	690·7	4,290	31·5	2,810	29·1	1,590
	Gain	32·9	52·4	4,710	12·8	1,890	9·4	660
3	Limed	169·6	788·5	9,270	45·2	4,640	36·9	2,115
	Not limed	150·2	734·0	4,520	31·6	3,110	31·8	1,785
	Gain	19·4	54·5	4,750	13·6	1,530	5·1	330
4	Limed	181·2	819·4	10,450	48·5	4,520	40·4	2,405
	Not limed	152·7	738·3	4,840	34·4	3,530	31·1	1,900
	Gain	28·5	81·1	5,610	14·1	990	9·3	505
5	Limed	177·9	792·1	9,360	45·2	4,910	38·2	2,020
	Not limed	165·2	702·1	4,590	35·3	3,750	33·6	1,845
	Gain	12·7	90·0	4,770	9·9	1,160	4·6	175
6	Limed	121·5	652·4	7,300	41·9	3,950	32·7	1,575
	Not limed	95·7	557·4	4,020	28·3	3,270	30·4	1,615
	Gain	25·8	95·0	3,280	13·6	680	2·3	−40

SUMMARY OF RESULTS, FERTILIZERS AND GROUND LIMESTONE EXPERIMENT, FOR THE NINE YEAR PERIOD, 1914 TO 1922, EMBRACING THREE THREE-YEAR ROTATIONS

Plot	How treated, per acre	Total value of crop, per acre	Total value of gain over untreated plot, per acre	Total cost of gain, per acre	Total profit, per acre
		$ cts.	$ cts.	$ cts.	$ cts.
6	No chemical fertilizer	364 78			
	No chemical fertilizer, ground limestone, 2 tons.	443 20	78 42	24 00	54 42
1	Nitrate of soda 140 lbs., acid phosphate 150 lbs Slag 150 lbs., muriate of potash 101·2 lbs	449 52	84 74	28 56	56 18
	Same as above and ground limestone, 2 tons...	514 28	149 50	52 56	96 94
2	Sulphate of ammonia 105 lbs., acid phosphate 150 lbs. Slag 150 lbs., muriate of potash 101·2 lbs	431 43	66 65	28 56	38 09
	Same as above and ground limestone, 2 tons...	498 76	133 98	52 56	81 42
3	Nitrate of soda 70 lbs., sulphate of ammonia 52½ lbs. Acid phosphate 300 lbs., muriate of potash 101·2 lbs	445 20	80 42	27 66	52 76
	Same as above and ground limestone 2 tons.	517 94	153 16	51 66	101 50
4	Nitrate of soda 70 lbs., sulphate of ammonia 52½ lbs. Slag 300 lbs., muriate of potash 101·2 lbs	452 46	87 68	29 46	58 22
	Same as above and ground limestone 2 tons...	542 60	177 82	53 46	124 36
5	Nitrate of soda 50 lbs., sulphate of ammonia 52½ lbs. Bone meal 240 lbs., muriate of potash 101·2 lbs.	424 73	59 95	34 14	25 81
	Same as above and ground limestone 2 tons...	517 05	152 27	58 14	94 13

ORCHARD FERTILIZER EXPERIMENT, INTERMEDIATE CROPS

This experiment was started to gain information as to the fertilizers likely to give the best results for apple production. The test was begun when the trees were planted, and the ground not occupied by the growing trees has been in rotation with potatoes, grain and hay. A record has been kept of the product from these crops, and is tabulated below. A record is kept of the fruit produced from each area, but as the trees are just commencing to bear, information on this point is not yet of value. The results, consequently, indicate only the profits that may be possible from the land not occupied by the trees during their early growth. The first twenty-four plots were started in 1913, and the others in 1916. The following table gives the total yield of potatoes, and their value over the plots not fertilized, and the succeeding table the yield and value of the grain and hay produced, with their gain over the check plots. The value of the crop is calculated on the basis of 60 cents per bushel for potatoes, $1 for wheat, 60 cents for oats, $7 per ton for straw, and $12 per ton for hay.

INTERMEDIATE CROPS SUMMARY, ORCHARD FERTILIZER EXPERIMENT
Eight Years, 1916-1923

Fertilizers applied 1916–17–19–20–22–23 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	Other fertilizers	Total potatoes 1916–19–22 per acre	Total value of potatoes 1916–19–22	Gain in value over check plot
	lbs.	lbs.	lbs.	lbs.	lbs.	bush.	$ cts.	$ cts.
6, 11, 14, 19 (Check plots)						439·7	263 82	
1, 16	150·0	350·0		150·0		761·0	456 60	192 78
2	150·0		500	150		675·5	405 30	141 48
3	150·0			150	500 (1)	768·75	461 25	197 43
4		350·0		150	150 (2)	729·25	437 55	173 73
5	150·0	350·0		100		785·5	471 30	207 48
7	92·3	215·4		92·3		667·25	400 35	136 53
8	138·5	323		138·5		784·0	470 40	206 58
9	150·0	350		60		782·75	469 65	205 83
10	150·0					555·75	333 45	69 63
12	184·6	430·8		184·6		872·5	523 50	259 68
13	150	350		30		774·25	464 55	200 73
15				150		444·75	266 85	3 03
17		350				479·75	287 85	24 03
18					500 (1)	602·5	361 50	97 68
20		350		150		542·25	325 35	61 53
21			500			556·5	333 90	70 08
22	150		500			612·0	367 20	103 38
23	150			150		707·5	424 50	160 68
24	150	350				621·25	372 75	108 93
Fertilizers applied 1916-17-19-20-22-23			Basic slag 16%	Manure 15 tons per acre 1916–19–22	Ground limestone 2 tons per acre 1916–19–23			
			lbs.	tons	lbs.			
26, 34, 40, 44, 46 (Check plots)						426·8	256 08	
25				15		858·0	514 80	258 72
27		250	250	15		979·75	587 85	331 77
28			500	15	4,000	1,104·0	662 40	406 32
29		250	250	15	4,000	1,100·0	660 00	403 92
30			500	15		885·75	531 45	275 37

INTERMEDIATE CROP SUMMARY, ORCHARD FERTILIZER EXPERIMENT—*Continued*

Fertilizers applied 1916-17-19-20-22-23 Plot	Nitrate of soda 15% N.	Acid phosphate 16%P_2O_5	Basic slag 16%P_2O_5	Manure 15 tons per acre 1916-19-22	Limestone 2 tons per acre 1916-19-23	Total potatoes 1916-19-22	Total value of potatoes 1916-19-22	Gain in value over check plot
	lbs.	lbs.	lbs.	tons	lbs.	bush.	$ cts.	$ cts.
31	.....	500	.....	15	.....	875·0	525 00	268 92
32	.....	.....	.....	15	4,000	987·75	592 65	336 57
33	.....	500	.....	15	4,000	1,056·25	633 75	377 67
35	.....	.....	500	15	.....	827·0	496 20	240 12
36	150	.....	500	.....	4,000	481·5	288 90	32 82
37	150	250	250	.....	4,000	583·75	350 25	94 17
38	.....	.....	500	.....	4,000	470·0	282 00	25 92
				Muriate of potash lbs.				
39	150	.....	500	150	4,000	870·75	522 45	266 37
41	150	500	.....	.....	4,000	553·25	331 95	75 87
42	150	.....	.....	.....	4,000	624·25	374 55	118 47
43	.....	500	.....	.....	4,000	577·5	346 50	90 42
45	150	.....	500	.....	.....	563·0	337 80	81 72
47	150	500	.....	150	.....	756·5	453 90	197 82
48	.....	.....	.....	.....	4,000	536·0	321 60	65 52
49	150	500	.....	.....	.....	631·5	378 90	122 82
50	150	.....	500	150	.....	786·5	471·90	215 82

NOTE: (1) Bone Meal, 2½% N. and 22% P_2O_5.
(2) Sulphate of ammonia, 20% N.

INTERMEDIATE CROP SUMMARY, ORCHARD FERTILIZER EXPERIMENT

Plot	Oats 1923 per acre	Total wheat 1917–20 per acre	Total straw 1917–20–23 per acre	Total hay 1918–21 per acre	Total value of crops	Gain in value overcheck plot
	bush.	bush.	tons	tons	$ cts.	$ cts.
6, 11, 14, 19 (Check plots)	30·9	18·3	1·36	0·84	56 44	.....
1, 16	65·78	38·6	1·93	1·5	109 57	53 13
2	65·0	40·6	4·02	1·38	124 30	67 86
3	57·2	46·8	3·77	1·12	120 95	64 51
4	65·2	31·0	3·03	0·63	98 89	42 45
5	56·42	34·0	3·71	1·48	111 58	55 14
7	50·4	30·8	2·52	0·88	89 24	32 80
8	61·1	38·3	3·21	1·07	110 27	53 83
9	58·76	34·0	3·8	1·47	113 49	57 05
10	54·6	21·8	1·99	0·92	79 53	23 09
12	70·7	48·6	4·52	1·38	139 22	82 78
13	60·58	38·8	3·63	1·77	121 79	65 35
15	23·4	18·3	1·03	0·7	47 95	−8.49
17	38·22	27·0	1·94	1·41	80 43	23 99
18	53·56	35·1	2 39	1 73	104 72	48 28
20	39·0	23·8	1·91	1·08	73 53	17 09
21	51·4	36·6	2·18	2·57	113 54	57 10
22	69·16	49·1	3·84	3·26	156 59	100 15
23	57·2	33·5	2·53	1·12	98 97	42 53
24	53·82	35·6	3·0	1·65	108 69	52 25
26, 34, 40, 44, 46 (Check plots)	29·85	22·12	1·02	0·885	57 79	.....
25	54·34	31·5	2·19	1·47	97 07	39 28
27	65·7	42·3	3·42	2·87	140 10	82 31
28	74·36	54·0	4·83	4·53	186 78	128 99
29	78·0	60·5	5·02	4·86	200 76	142 97
30	62·4	40·2	2·55	2·32	123 33	65 54
31	55·6	34·0	2·21	1·90	105 63	47 84
32	68·3	50·0	3·43	3·66	158 91	101 12
33	74·88	48·9	4·20	4·49	177 10	119 31
35	66·8	44·5	3·05	2·32	133 77	75 98
36	57·72	50·0	3·54	2·09	134 49	76 70
37	63·44	48·6	4·26	3·53	158 84	101 05
38	58·76	39·3	2·8	3·0	130 15	72 36
39	66·82	49·8	4·87	3·21	162 50	104 71
41	60·32	47·3	3·44	2·27	134 81	77 02
42	65·0	39·0	3·42	2·57	132 78	74 99
43	49·4	33·0	2·16	2·74	110 64	52 85
45	42·64	46·3	3·27	1·63	114 33	56 54
47	53·82	41·8	4·26	2·32	131 75	73 96
48	43·42	33·1	1·99	2·43	102 24	44 45
49	44·2	52·2	3·32	1·99	125 84	68 05
50	57·2	46·1	4·37	3·02	147 25	89 46

NITRATE OF SODA AS A TOP-DRESSING FOR OATS

An experiment was conducted in 1922 to determine the value of nitrate of soda as a top-dressing applied broadcast to the oats crop when the plants were three inches high. (See report of this Station for 1922). Further work was carried on this season. The land was in sod in 1922 and had previously been uniformly treated. It was ploughed in the fall and prepared and seeded May 19. The plots were in duplicate, and the results given in the following table are the average of the two plots. The average results of the two years are also given. The oats are valued at 60 cents per bushel and the straw at $6 per ton. The nitrate of soda is charged at $60 per ton, and 30 cents per acre is allowed for application. The average value of oats for the two years is figured at 64 cents per bushel.

NITRATE OF SODA AS A TOP-DRESSING FOR OATS, RESULTS FOR THE YEAR 1923

Nitrate of soda applied per acre	Yield per acre		Gain over plot not treated		Value of gain per acre	Cost of gain per acre	Profit per acre
	Grain	Straw	Grain	Straw			
	bush.	tons	bush.	tons	$ cts.	$ cts.	$ cts.
Not treated	54·2	1·3					
100 pounds	58·2	1·2	4·0	−0·10	1 80	3 30	−1 50
200 pounds	60·0	1·98	5·8	0·68	7 56	6 30	1 26
Average Results for the Two Years, 1922 and 1923 (on separate areas)							
Not treated	54·9	1·22					
100 pounds	62·9	1·327	8·0	0·107	5 76	3 30	2 46
200 pounds	64·5	1·76	9·6	0·54	9 38	6 30	3 08

LIMESTONE AND MANURE ON HAY LAND

No. 19—Limestone, 2 tons per acre. Hay, 0.58 tons per acre.
No. 25—Manure, 15 tons per acre. Hay, 0.86 tons per acre.
No. 26—Not manured, not limed. Hay, 0.25 tons per acre.
No. 32—Manure, 15 tons per acre; limestone, 2 tons per acre. Hay, 1.29 tons per acre.

THE EFFECT OF NITRATE OF SODA APPLIED TO OATS ON THE YIELD OF CLOVER HAY THE NEXT YEAR

In order to determine the effect, if any, of nitrate of soda applied the previous year to the oats crop, on the hay crop of the following year, records were obtained from the plots on which nitrate of soda was used in 1922. These plots were in triplicate, and the yield given is the average of the three plots. The hay was cut July 23. Because of the grain having lodged on the plots where

large amounts of nitrate were used in 1922, it was anticipated that the yield of hay would be lighter on these areas on account of the probable smothering out of some of the clover plants. The yield, however, was practically uniform over the whole area, the hay crop being slightly heavier where the grain lodged so badly in 1922, viz., on the plots that had received 250 and 300 pounds of nitrate of soda per acre. From the standpoint of profitable application for the two years it will be seen that 100 pounds of nitrate of soda per acre was the most satisfactory.

THE EFFECT OF NITRATE OF SODA APPLIED TO OATS ON THE YIELD OF CLOVER HAY THE NEXT YEAR

Amount applied per acre, 1922	Oats, 1922						Hay, 1923	
	Yield per acre		Gain over plot not treated		Value of gain per acre	Profit per acre	Yield per acre	Gain over plot not treated, per acre
	Grain	Straw	Grain	Straw				
	bush.	tons	bush.	tons	$ cts.	$ cts.	tons	tons
Not treated	55·6	1·14					2·4	
100 pounds	67·7	1·455	12·1	0·315	10 11	6 81	2·4	−0·02
150 "	65·75	1·33	10·15	0·19	8 04	3 24	2·3	−0·12
200 "	69·02	1·545	13·42	0·405	11 55	5 25	2·34	−0·08
250 "	67·8	1·543	12·2	0·403	10 70	2 90	2·47	0·05
300 "	63·6	1·598	8·0	0·458	8 18	−1 12	2·5	0·08

NITRATE OF SODA AS A TOP-DRESSING FOR GRASS LAND

An experiment was begun in 1922 to determine the value of nitrate of soda scattered broadcast on grass lands. (See report of this Station for 1922). Further work was carried on this year, and the results obtained are given in the table following. A summary is also given of the results covering the two years. It would appear from these tests that an application of 100 pounds per acre, applied from the middle to the latter part of May, is profitable. The condition of the stand will doubtless have much to do with the results, as old sods that need renewing by ploughing would not be benefited proportionately to areas having a good stand of suitable grasses. The hay is valued at $10 and the nitrate of soda at $60 per ton; the cost of application at 30 cents per acre. In the summary the hay is valued at $11 per ton, the average of the 1922 and 1923 prices.

NITRATE OF SODA AS A TOP-DRESSING FOR GRASS LAND, 1923

Nitrate of soda applied per acre	Average yield per acre	Gain over plot not fertilized	Value of gain per acre	Cost of gain per acre	Profit per acre
	tons	tons	$ cts.	$ cts.	$ cts.
Not treated	2·715				
100 pounds	3·715	1·0	10 00	3 30	6 70
200 pounds	3·39	0·675	6 75	6 30	0 45
Average of Results for the Two Years 1922 and 1923 (on separate areas)					
Not treated	2·541				
100 pounds	3·11	0·569	6 25	3 30	2 95
200 pounds	3·051	0·510	5 61	6 30	−0 69

NITRATE OF SODA AND SULPHATE OF AMMONIA FOR TIMOTHY SEED PRODUCTION

At the time of harvesting the hay in the preceding experiment, it was noticed that the heads on the nitrate of soda and sulphate of ammonia plots were considerably longer and larger than on the plots not fertilized. As the stand was

good for seed production and the original areas were one-half-acre each, it was decided to allow one-quarter-acre of each plot to ripen for seed. Of the three plots one was not fertilized, one received 150 pounds of nitrate of soda, and the other 112.5 pounds of sulphate of ammonia. The nitrate of soda is valued at $60, and the sulphate of ammonia at $80 per ton. As the hay left after threshing was of fair quality for feeding, it was valued at $6 per ton. The timothy seed, which was of good quality, was valued at 12 cents per pound. The results would indicate a great gain from the use of either nitrate of soda or sulphate of ammonia in timothy seed production. The timothy was cut August 17. The hay was threshed August 27, and the following yield obtained:—

NITRATE OF SODA AND SULPHATE OF AMMONIA FOR TIMOTHY SEED PRODUCTION

How fertilized, per acre, 1923	Hay, average yield per acre	Seed, average yield per acre	Value of hay	Value of seed	Total value of hay and seed	Gain in value over check plot	Cost of gain per acre	Profit
	tons	lbs.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
No fertilizer	1·49	84	8 94	10 08	19 02	.....	.....	.....
150 pounds Nitrate of soda	2·034	274	12 20	32 88	45 08	26 06	4 80	21 26
112·5 pounds Sulphate of ammonia	1·95	254	11 70	30 48	42 18	23 16	4 80	18 36

NITRATE OF SODA AS A SURFACE APPLICATION ON TURNIPS

In order to obtain information as to the value of surface applications of nitrate of soda to growing turnips, tests were made by applying this fertilizer to turnips, broadcast at different rates per acre. This was done on July 13, after the turnips had been thinned and were nicely established. The land was in timothy hay the previous year, the preceding crop having been clover. The sod was ploughed in the early fall. Manure was applied in the spring of 1923 at the rate of 15 tons per acre and the land ploughed, worked, and seeded. The area was apparently uniform. The Bangholm club-root-resistant strain of seed was used, and the stand was uniform. The plots were one-fifteenth acre each, and were in duplicate. The results given are the average of the duplicate plots.

The nitrate of soda cost $60 per ton, and 30 cents per acre is allowed for cost of application. The roots are valued at 10 cents per bushel, or $4 per ton. The records as given below indicate that nitrate of soda can be used to advantage under such conditions, and results in economical gain. The advantage, judged by the growth of the crop, is due to the vigorous start given to the young plants at a time when they are unable to forage at great range, and before the plant food in the manure has become available in quantities sufficient to supply their immediate requirements. The retardation of the early growth of the check plots persisted and was not made up later.

NITRATE OF SODA ON TURNIPS

—	Pounds applied per acre	Yield per acre	Increase per acre over area not treated	Cost of increase	Value of increase	Profit
		bush.	bush.	$ cts.	$ cts.	$ cts.
1	No nitrate	738·0	.....	.....	.....	.....
2	200	892·5	154·5	6 30	15 45	9 15
3	150	844·5	106·5	4 80	10 65	5 85
4	100	841·5	103·5	3 30	10 35	7 05

MIXING FERTILIZERS

It has been the practice at this Station to purchase nitrate of soda, acid phosphate and muriate of potash as fertilizer materials, and to mix them in the proportions that may be required. The table below serves as a handy reference table to determine the amount of each material required to give the equivalent of one ton of the mixture, containing the percentage of each material shown in the first column of the table. For example, if a 4-8-4 fertilizer is wanted, 533⅓ pounds of nitrate of soda, 1,000 pounds of acid phosphate and 160 pounds of muriate of potash, a total of 1,693⅓ pounds, would give the equivalent of one ton of 4-8-4 fertilizer. Or the same mixture may be obtained by using 400 pounds of sulphate of ammonia in place of 533⅓ pounds of nitrate of soda.

FERTILIZER TABLE—AMOUNT OF FERTILIZER MATERIALS REQUIRED TO MAKE UP A PARTICULAR FORMULA

	Per cent of plant food desired in fertilizer	Ammonia derived from		Phosphoric acid derived from acid phosphate (16% P_2O_5)	Potash derived from muriate of potash (50% K_2O)
		Nitrate of soda (15% N.)	Sulphate of ammonia (20% N.)		
		lbs.	lbs.	lbs.	lbs.
1		133⅓	100	125	40
2		266⅔	200	250	80
3		400	300	375	120
4		533⅓	400	500	160
5		666⅔	500	625	200
6		800	600	750	240
7		933⅓	700	875	280
8		1,066⅔	800	1,000	320
9		1,200	900	1,125	360
10		1,333⅓	1,000	1,250	400

It has been found that generally it is more economical to combine the fertilizers by mixing together on a floor than to apply each material separately in the field. If the nitrate of soda has not been reground it should be run through a screen of four meshes to the inch, all large particles being broken up, for which a block of hardwood eight inches in diameter and a foot high with a handle three and one-half feet long may be used. It is advisable to put the other materials to be mixed through the screen also, if they are lumpy. A sieve is made by using side pieces of five-inch wide boards nine feet long, the ends of the boards chamfered off so that they can be readily gripped by the hand. Cross pieces 1½ inches less in length than the width of the wire screening to be used, generally 2½ feet long, are nailed twenty inches in from the ends of the boards, making the four sides to which the wire is fastened. The usual galvanized screening, four meshes to the inch, is satisfactory. This makes a screen approximately 2½ feet wide by 5½ feet long, to be handled by two men.

The acid phosphate is usually spread on the floor first and then the other materials evenly spread over this. The whole mixture is shovelled over three times and is then passed through the screen for final mixing. It takes four men one hour to mix thoroughly, screen and bag a ton of the three materials given above. If the material is not to be used at once it is a good plan to leave it in a pile and screen again just before using, as otherwise it will after a few days become caked in the bag.

POULTRY

STOCK KEPT

Twenty-four of the best Barred Rock and White Wyandotte two-year-old hens and 52 Barred Rock yearling hens were carried over as breeders, and 162 Barred Rock, 25 White Wyandotte, and 173 White Leghorn pullets were put into winter quarters.

TRAPNESTING

The trapnest records show,—

1. That a dozen of the best Barred Rock pullets averaged for the first year's production 218.3 eggs, and for their second year 125.4 eggs.
2. In this flock 17 went over 200 eggs (average 224) 12 over 175 (average 189), 15 over 150 (average 167).
3. The 44 best Barred Rock pullets in 1922 laid an average of 175 eggs and the best 44 in 1923 averaged 195 eggs.
4. In White Leghorns 10 pullets laid over 200 eggs, (average 205) 10 over 175 (average 187) and ten over 150 (average 172). The average for the 30 pullets was 188.

ADVANTAGE OF PULLETS OVER HENS FOR EGG PRODUCTION

An examination of the data in the following table will show clearly that as many (or more) eggs are usually laid in the pullet year as in the second and third years together.

Number of hens	Breed	Average production		
		1st year	2nd year	3rd year
(1922)				
13	Barred Plymouth Rocks	222·4	125·3	84·9
5	White Wyandottes	234·0	128·4	74·0
8	Barred Plymouth Rocks	210·6	134·0	
(1923)				
1	Barred Plymouth Rocks	278·0	134·0	59·0
10	Barred Plymouth Rocks	218·3	125·4	

The reason for keeping birds more than one year is for breeding purposes. With the trapnest it is possible to tell what the pullet is and only those that lay well and are from good layers are kept to breed from.

FEEDING

The grain ration for the laying stock has been one pint of oats in the morning, and one quart of equal parts of wheat and corn in the afternoon, to every twelve birds. This is fed in the litter, and makes for activity during the day and a full crop at night. A wet mash composed of 200 pounds each of oats and cornmeal, 100 pounds each of bran and middlings, and 25 pounds each of oil meal and beef scrap was fed at noon at the rate of 6 pounds of dry mash per 100 hens. (No dry mash was fed this year, as the hens did not seem to like it. An increase over that of last year was made in the amount of wet mash fed.) Grit and charcoal were available at all times in hoppers. Green feed, consisting of either mangels, alfalfa, or clover hay was fed during the winter.

The feed for 100 hens per day has worked out as follows:—

19 pounds scratch grain at $2.52	$ 0.48
6 pounds mash at $2.35	0.14
1 pound beef scrap	0.05
8 pounds green feed at ½ cent	0.02
1 pound grit and shell	0.03
Total per day	72 cents

The cost of feed for 100 hens per month of thirty days was $21.60, and for one hen per month of thirty days, 21.6 cents.

FEEDING EXPERIMENTS

HOME-MIXED VS COMMERCIAL SCRATCH GRAINS

Experiments were again conducted this year to determine the relative value of commercial scratch grains for poultry in comparison with separate grains mixed at home. The home-mixed consisted of 75 pounds of wheat, 75 pounds of whole corn, and 50 pounds of oats, and cost $2.50 per cwt. The commercial grain "Purina" consisted chiefly of wheat, corn and oats, with small amounts of millet seed, buckwheat, kaffir corn and sunflowers. This mixture cost $3.10 per cwt. The grain mixture was fed in the litter in the morning and again in the afternoon. A moistened mash was fed at noon, made up of 200 pounds of corn meal, 200 pounds of crushed oats, 100 pounds of bran, 100 pounds of middlings, 25 pounds of oil cake, and 25 pounds of beef scrap, moistened with water. This cost $2.25 per cwt. Grit, charcoal, shell, beef scrap, mangels and water were accessible to the hens at all times. The two lots of hens were fed alike except for the scratch grain.

Barred Rock pullets were used in this experiment. They were of similar breeding and apparently were uniform, but for some unknown reason Pen 1 started laying much earlier than Pen 2. Each pen was started with 35 birds. The test extended from January 1 to June 1, 1922. The results are tabulated.

HOME-MIXED VS. COMMERCIAL SCRATCH GRAINS
Pen 1, Commercial—Pen 2, Home-mixed

		Total		Average per month	
		Commercial scratch	Home-mixed scratch	Commercial scratch	Home-mixed scratch
Number of birds				31·4	31·2
Scratch grain	lbs.	973	896	194·6	179·2
Mash	"	342	345	68·4	69·0
Beef scrap	"	31	30	6·2	6·0
Oyster shell	"	29	27	5·8	5·4
Fish meal	"	20	19	4·0	3·8
Eggs laid		2,518	2,193	503·6	438·6
Cost per day	cts.			28·9	24·1
Value of eggs	$	93 22	78 98	18 64	15 79
Cost of feed	$	43 71	36 27	8 74	7 25
Profit over feed	$	49 51	42 71	9 90	8 54
Profit, pen 1 over pen 2	$	8 94			
Profit, pen 2 over pen 1	$		2 14		
Gain, pen 1 over pen 2	$	6 80			

It will be noticed that production was greater on the commercial scratch grain, 325 more eggs being produced. The difference was, in January, 44; February, 194; March, 51; April, 27; and May, 9.

FISH MEAL VS BEEF SCRAP

The object of this test was to compare fish meal with beef scrap as a source of animal food. The analysis of the beef scrap shows the following content: protein, 60 per cent; fat, 6.3 per cent; fibre, 10 per cent. The analysis of the

fish scrap was not obtainable. It consisted of the larger particles of fish scrap screened out of fish meal produced for animal feeding, and averaged about 60 per cent protein, with most of the animal oils eliminated. Other than these all feeds were alike for each pen. Both scraps were fed dry. The test was started with 25 White Leghorn pullets to each pen. These pullets were uniform and were of similar breeding. The results were as follows:—

FISH MEAL VS. BEEF SCRAP

Pen 16—Fish meal
Pen 17—Beef scrap

		Total		Average per month	
		Fish meal	Beef scrap	Fish meal	Beef scrap
Number of birds				25	24·8
Scratch grain	lbs.	642	642	128·4	128·4
Mash	"	222	222	44·4	44·4
Beef scrap	"		36·5		7·3
Fish scrap	"	27		5·4	
Shell	"	33	28·5	6·6	5·7
Eggs laid		1816	1755	363·2	351·0
Cost per day	cents			16·3	16·4
Value of eggs	$	63·71	61·67	12·74	12·33
Cost of feed	$	24·02	24·72	4·80	4·94
Profit over feed	$	39·69	36·95	7·93	7·39
Profit pen 16 over pen 17		3·39			
Profit pen 17 over pen 16			0·65		
Gain pen 16 over 17		2·74			

It will be noticed that the fish scrap gave somewhat better results than the meat scrap, the total production being 61 eggs more from the hens fed fish meal, and the profits from the pen $2.74 more.

OYSTER SHELL VS CLAM SHELL

The object of this test was to compare oyster shell with clam shell as a source of shell for poultry. The pens were otherwise fed alike. The test was started with 25 White Leghorn pullets to each pen. These pullets were uniform and were of similar breeding. The results were as follows:—

OYSTER SHELL VS. CLAM SHELL

Pen 14—Oyster shell
Pen 15—Clam shell

		Total		Average per month	
		Oyster shell	Clam shell	Oyster shell	Clam shell
Number of birds				24·4	24·6
Scratch grain	lbs.	642	642	128·4	128·4
Mash	"	222	222	44·4	44·4
Beef scrap	"	23	24·5	4·6	4·9
Fish	"	10·5	11	2·1	2·2
Oyster shell	"	28·0		5·6	
Clam shell	"		29·0		5·8
Eggs laid		1720	1820	344	364
Cost per day	cents			16·2	16·3
Value of eggs	$	60·59	63·93	12·12	12·78
Cost of feed	$	24·39	24·56	4·87	4·91
Profit over feed	$	36·20	39·37	7·24	7·87

It will be noticed that pen 15, fed clam shell, produced 100 more eggs than pen 14, fed oyster shell. This would indicate that clam shell is at least as good a shell food as oyster shell. The cost of these shells was the same, and they seemed equal in quality.

MANGELS, CLOVER, AND SPROUTED OATS AS GREEN FEED

The object of this test was to find out the difference, if any, between these green feeds for poultry. Pen 11 was fed mangels at the rate of one pound per pen per day. These were split in two and hung on the wall so that the hens could peck at them as they wished. Pen 12 was fed second growth clover and alfalfa hay, well cured, with the leaves on. This was thrown in dry at the rate of one pound each day. The sprouted oats were started in shallow flats, 1½ inches of oats being spread on the bottom of the box after having been soaked in water. These boxes were placed in a warm place, where they were watered as needed to keep them moist. When the grain had sprouted to 3 inches high it was ready for use. This sprouted mass was fed to the hens in pen 13 at the rate of one pound per day. White Leghorns were used in this experiment. They were from a later hatching than the ones used in the other tests but were apparently uniform.

MANGELS, CLOVER, AND SPROUTED OATS AS GREEN FEED

Pen 11—Mangels
Pen 12—Clover
Pen 13—Sprouted oats

		Total			Average per month		
		Mangels	Clover	Sprouted Oats	Mangels	Clover	Sprouted oats
Number of birds		.....	.....	.....	24·6	23·6	23·2
Scratch grain	lbs.	552	552	527	110·4	110·4	105·4
Mash	"	190	200	178	38	40	35·6
Beef scrap	"	16·5	15·5	16	3·3	3·1	3·2
Fish scrap	"	8	8	8	1·6	1·6	1·6
Oyster shell	"	16	18	18	3·2	3·6	3·6
Mangels	"	150	.....	.....	30	.....	.....
Clover	"	.....	150	.....	.....	30	.....
Sprouted oats	"	.....	.....	150	.....	.....	30
Eggs laid	.....	1068	1146	886	213·6	229·2	177·2
Cost per day	cents	.....	.....	.....	13·3	13·8	13·3
Value of eggs	$	36·28	39·33	31·24	7·25	78·6	6·25
Cost of feed	$	20·14	20·76	20·02	4·03	4·15	4·00
Profit over feed	$	16·14	18·57	11·22	3·22	3·71	2·25

The pen given clover was the most productive, laying 78 eggs more than the pen given mangels, while the pen fed sprouted oats laid 182 eggs less than the pen fed mangels.

COST OF FEEDING CHICKS FOR THE FIRST TWO MONTHS

Records were obtained of the feed used by chicks from hatching to two months old. These chicks when 60 hours old were placed in a brooder at a temperature of 90 degrees. The floor was covered with clean, sharp sand, on which clean straw litter was scattered thinly. Only Purina Baby-Chick Scratch grain was fed for the first two days. This was given three times daily in the litter in quantity to keep the chicks active, using small amounts only. After two days, in addition to this scratch grain, Blatchford's Dry Milk Mash was placed in a hopper where the chicks could get it as required. Stale bread was soaked in milk, making a dry, crumbly mass which was fed at noon each day. A hopper with fine meat meal was placed so that the chicks could get at it. Alfalfa and clover leaves were scattered in the litter to furnish green feed until clover and grass were available outside. Fresh water was supplied each day.

After the first month two parts of Purina Scratch grain, one part of cracked corn, and one part of wheat were mixed together for the scratch feed. To the Blatchford's mash equal parts of cornmeal and bran were added to make it

approximately one-third of the meal mixture. The test was started with 140 chicks, but by the end of the first month 15 had died and by the end of the second month four more had died. The brooder house was gradually reduced in temperature to range between 75 and 80 degrees during the second month. The results from this test are given below:—

COST OF FEEDING CHICKS FOR THE FIRST TWO MONTHS

(First month, April 7 to May 7)

	$ cts.
51 pounds Blatchford's Milk Mash at 5 cents	2 55
50 pounds Purina Chick Scratch at 5 cents	2 50
20 pounds stale bread at 5 cents	1 00
2 pounds meat meal at 5 cents	0 10
Skimmed milk	0 10
Cost for 125 chicks	$ 6 25
Cost per chick, 5 cents each	

(Second month, May 7 to June 7)

72½ pounds Purina scratch grain at 5 cents	$ 3 62
36 pounds cracked corn at 2¼ cents	0 81
36 pounds wheat at 3 cents	1 08
82 pounds Blatchford's milk mash at 5 cents	4 10
30-pounds cornmeal and bran at 2 cents	0 60
20 pounds bread at 5 cents	1 00
4 pounds meat scrap at 5 cents	0 20
Skim-milk	0 10
Cost for 121 chicks	$ 11 51
Cost per chick 9·5 cents	
Cost per chick for first two months, 14·5 cents	

FEED FOR CHICKENS FOR THIRD AND FOURTH MONTHS

The scratch grain for these months was made up of equal parts of cracked corn and wheat. The dry mash was made up of 100 pounds each of cornmeal, middlings and crushed oats, 40 pounds of rolled oats, and 10 pounds of linseed oil meal mixed together. This was placed in a hopper so that the chickens could get it at any time. At noon each day a wet mash of the same meal mixture, dampened with skim-milk or water, was fed. Skim-milk was given as drink during this period. Beef-scrap was available in hoppers at all times.

It was impossible to keep records of the cost of feed for any individual lot, but below is given the fed consumed and the cost to raise 780 chickens from hatching to November 1 including also 100 Leghorn cockerels from hatching to September 1. The cost for feed to November 1, it will be seen, approximates 50 cents each.

TOTAL COST OF CHICKENS TO NOVEMBER 1

4,300 pounds corn at $2.50	$ 107 50
4,600 pounds wheat at $2.85	131 10
600 pounds oats at $2.10	12 60
400 pounds rolled oats at $4.50	18 00
350 pounds beef-scrap at $6	21 00
500 pounds chick-scratch at $5	25 00
400 pounds Blatchford's meal at $5	20 00
1,850 pounds corn-meal at $2.50	46 25
300 pounds oil-cake meal at $3.60	10 80
500 pounds shorts at $2	10 00
1,050 pounds bran at $1.85	19 42
200 pounds bread at 5 cents	10 00
14,469 pounds buttermilk at 15 cents per cwt	21 70
	$ 453 37

(780 chicks from hatching to November 1)
(100 chicks from hatching to September 1)

THE APIARY

During the winter of 1922-23 sixty-nine colonies of bees were wintered out-of-doors. Of these, thirty-two colonies were packed in cases which were large enough to allow four inches of packing around the sides and deep enough for a super to be placed on the colonies in the spring. The bottoms of these cases are double and were packed between with three inches of shavings. On top of the cases eight inches of shavings in bags were placed. The entrances, which are eight inches long by one-half inch deep, and are opposite those of the hives, were reduced for winter to two inches by one-half inch. Thirty-six colonies were packed in cases so constructed as to allow four inches of packing around the sides of the colonies and deep enough for a super to be placed on each colony when required. The bottoms of these cases are made of matched lumber on which are nailed inside four pieces of two by four on edge. This allows four inches of packing under each colony. On top of the colonies eight inches of shavings were placed. One colony was wintered in a single case. The colonies in cases with permanently packed bottoms wintered equally as well as those in cases with a single bottom and loose shavings.

The winter of 1922-23 was one of the hardest on bees that has been experienced for years. All colonies were strong going into winter quarters but in spring were very weak. The average number of combs covered in the spring was 4.2 per colony. The main causes of the heavy losses were the long period of confinement, and the unwholesome stores of golden rod and aster honey that granulated and so were inaccessible to the bees. Some colonies that were fed sugar syrup in addition to their natural stores did not survive the winter, probably due to the bees living on the sugar syrup during the earlier part of the winter thus leaving only natural stores, which in many cases were granulated hard in the combs, for the spring.

SOURCES OF HONEY

In addition to fruit bloom the other most important sources of honey are golden rod, aster, alsike, and Dutch clover. Other valuable plants that are either nectar-secreting or pollen-producing are given below, with the date first seen in bloom.

SECONDARY SOURCES OF NECTAR OR POLLEN

Flower	Bees first seen working thereon, 1923
Mayflower	May 6
Red Maple	" 14
Dandelion	" 20
Wild Strawberry	" 21
Cherry (Cultivated)	" 22
Willow	" 23
Blueberry	" 31
Kalmia	June 1
Strawberry (Cultivated)	" 4
Apple Blossom	" 2
Dutch clover	" 12
Alsike clover	" 15
Raspberry (Cultivated)	July 7
Golden Rod	Aug. 16

HONEY PRODUCTION FROM FRUIT BLOOM

Records have been kept since 1919 of the amount of honey gathered during the apple blossom period, and are tabulated here.

HONEY FROM APPLE BLOOM

Year	Period of bloom	Number of favourable days	Number of colonies	Honey produced	Average honey per colony
				lbs.	lbs.
1919	May 25 to June 11	7	21	701	33·4
1920	May 28 to June 15	9	32	184	5·7
1921	May 20 to June 1	7	43	649	15·1
1922	May 25 to Jund 7	6	41	156½	3·8
1923	June 10 to June 20	11	44	61	1·4

COLONIES ON SCALES

On May 21 three colonies were placed on scales and left there during the active season, which lasted until the end of September. Of the 132 days the colonies were on scales, an increase in weight was shown on 74 days. The greatest increase in one day was 11½ pounds.

QUEEN REARING

Queen rearing was continued this season. Practically all the queens raised were from the larvæ of a queen procured in 1922. Seventy-one per cent of the queens in the colonies are purely mated.

For the purpose of comparing the honey-gathering qualities of the three races of bees, black and hybrid bees are still being kept. For this reason the percentage of young Italian queens raised that are purely mated is less than if only Italian bees were kept.

INCREASE

On July 19 twelve nuclei were made up by taking two frames of emerging brood with adhering bees, one comb of honey and an old queen from each of twelve colonies. Young queens of selected parentage raised earlier in the season were introduced into the old colonies. Each nuclei was placed in an empty hive on a new stand. A division board was put in close to these combs to conserve the heat, and entrances were reduced to two inches until the nuclei became strong. As the season advanced empty drawn combs were given as required.

SWARM CONTROL

The de-queening of colonies that had a tendency to swarm and re-queening of them nine days later with young queens of selected parentage proved one of the best methods of swarm control practised in the management of this apiary.

Shallow Super Method.—In the spring when the bees covered ten frames in the regular brood chamber, twelve colonies were each given a shallow super without a queen excluder. Additional supers given during the season were placed over a queen excluder. Of the twelve colonies, only one developed queen cells, all of which could be seen by tipping the shallow super. All queen cells were along the bottom bars of the shallow super. This method does away with going through the colony and examining every comb for queen cells.

PRODUCTION FROM COLONIES ALLOWED TO SWARM AND FROM THOSE WHERE SWARMING WAS CONTROLLED

This experiment to determine the average profit of colonies that were increased through division, as compared with those that were not divided or did not swarm, was continued this year. In the table below, honey is valued at fifteen cents a pound, and a colony of bees without a hive at $7.

Number of colonies	Number of increase from six colonies	Amount of honey gathered	Total value of honey and increase
		lbs.	$ cts.
Six	7	315½	96 32
Six	.....	549	82 35

The results would indicate that a greater profit is obtained in this district, during a cool season like the last summer at least, by increasing the colonies rather than by depending on the honey gathered. A similar conclusion was indicated from the results of this test during the wet summer of 1922.

POISONING OF BEES BY ARSENICAL DUST

During the summer of 1923 the bees at this Station were not affected by the arsenical dust, probably due to the fact that very little bloom was under the trees at the time of dusting.

As one of the out-apiaries is situated in the fruit area, and the other is not, and as they contain the same number of colonies, an interesting comparison as to the effect of arsenical poisoning was made possible. The following table shows that the increase in the colonies at Bridgetown, where dusting is carried on, was considerably less during the three weeks or so after dusting than in the colonies at Kennetcook, where there is no dusting.

Out-apiary	Date of Examination (before dusting)	Average Number combs covered	Date of Examination (after dusting)	Average Number combs covered	Average increase, per cent
Bridgetown	June 14	8·6	July 5	11·2	30
Kennetcook	June 16	10·8	July 9	17·7	64

JUMBO VS STANDARD TEN-FRAME HIVES

Of the two types of hives, the standard ten-frame has given the best results at this Station. The Jumbo hive would probably be more suitable in a locality where spring opens up earlier and brood rearing starts earlier; but where colonies are confined for a long time they become weakened and do not build up as quickly in the spring in large brood chambers as in smaller ones.

OUT-APIARIES

On May 30 four colonies were moved to Bridgetown, Annapolis County, and on June 2 four colonies were taken to Kennetcook, Hants County, this place being outside the fruit area. During the summer both apiaries were increased to eight colonies. The average production per colony, spring count, was 84 pounds of honey at Bridgetown, and 92.5 pounds at Kennetcook.

PRODUCTION

The conditions during the summer and fall months were quite favourable for the secretion of nectar, there being an abundance of flowers, with weather conditions more favourable than they have been for the last three years. Many colonies, because of coming through the winter in a weak condition, did not build up sufficiently strong to take advantage of the clover flow. They were, however, in better condition by the time golden rod and aster were in bloom.

The production from all sources for the season was 2,542½ pounds. The table below gives the production of the apiary for the last five years.

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
1922	41	69	1,685½	41·1
1923	36	61	1,836½	51·0

CONDITION OF COLONIES IN THE AUTUMN

Conditions being favourable for the gathering of honey in the early part of the fall, nuclei built up very rapidly, brood rearing continuing until a late date. Wintered colonies also were strengthened by an abundance of young bees. The average number of combs covered on October 9 was 8.8 per colony.

TWO-QUEEN SYSTEM OF WINTERING

After the queen-rearing season was over mating boxes that were strong in bees, covering three combs, were transferred to ten-frame hives. Two of these nuclei were placed in one hive that had a solid division down the centre to prevent the bees from intermingling. A special portico was placed at the entrance of the hive to provide for two openings. Two empty drawn combs were given each nucleus.

Four nuclei are being wintered in the above manner, and in the ordinary packing case. These extra queens are introduced in the spring to colonies that have lost their queens during the winter, or that have failing or drone-laying queens. If only one of the queens in a double hive is required the two nuclei are united, making a strong colony. If neither queen is needed in the spring one of the nuclei is put on an empty hive, the remaining space in both hives being filled with drawn frames, thus making two separate hives.

WINTER CARE

Four out of fifty-three colonies at the Kentville apiary are being wintered, 1923-24, on natural stores, the source of which is principally golden rod and clover. The remaining forty-nine, having a smaller amount of natural stores than the others, were fed sugar syrup. This consists of two parts of sugar and one of water by measure, and was fed to the bees in ten-pound friction-top honey tins before October 20.

The sixteen colonies in the two out-apiaries were given a shallow super of honey in addition to the honey they had in their brood chambers.

FIBRE PLANTS

FLAX FOR FIBRE

The land used for this test was a second year sod land that had been in clover followed by timothy. This had been summer ploughed and disced the previous year. The ground was worked up in spring with the disc harrow, followed by the cultivator. The seed was scattered broadcast May 19, at the rate of 85 pounds per acre, covered with the harrow, and levelled with a smoothing harrow. The growth was uniform. Five varieties were included in the test, and all tests were on plots of one-fortieth acre each, in duplicate. Tests were also made to determine the best date for seeding, one variety being seeded at four successive weekly intervals. The results of this test are given in

the table below, and also the product per acre of fibre and tow as obtained from the Fibre Division, Ottawa, where the straw was shipped to be converted into fibre. The results would indicate that there are great possibilities of growing a fibre of high quality, the climate evidently favouring such development.

Plots of flax for fibre.

FLAX FOR FIBRE, 1923

Variety	Date seeded	Date pulled	Dry weight per acre	Seed produced per acre	Total yield of fibre and tow per acre	Yield of fibre per acre	Yield of tow per acre	Scutched fibre per 100 lbs. of dry straw	Scutched tow per 100 lbs. of dry straw	Remarks on quality of fibre
			lbs.	bush.	lbs.	lbs.	lbs.	per cent	per cent	
Riga Blue.....	May 19	Aug. 16	4416	7·12	753	440	313	9·96	7·08	Good length, good quality, strong.
Longstem.....	" 19	" 15 and 16	4440	3·39	750	420	330	9·45	7·43	Very long, resembling Courtrai flax.
Saginaw.....	" 19	" 15 and 16	4840	4·50	740	460	280	9·50	5·78	Very long, strong, open.
Pure Line No. 3	" 19	" 16	4810	9·46	740	460	280	9·56	5·82	Good length, good quality.
Pure Line No. 5	" 19	" 15 and 16	5040	9·73	710	480	230	9·50	4·56	Good quality, medium length, strong and open.

FLAX SEED AT DIFFERENT DATES

Riga Blue.....	May 19	Aug. 15	4260	7·13	760	500	260	11·73	6·10	Good length, strong, good quality.
Riga Blue.....	" 26	" 23	4650	10·89	840	500	340	10·75	7·31	Similar to above.
Riga Blue.....	June 2	Sept. 5	4380	10·62	730	340	390	7·74	8·88	Not quite so strong as above.
Riga Blue.....	" 9	" 12	5500	8·80	850	460	390	8·36	7·09	Good length, but strength and quality medium.

COST OF GROWING FLAX

The following information was secured covering the cost of growing flax. The heaviest expense is the cost of pulling, when inexperienced help is used, and should the land be weedy, this cost is increased. After a little practice, however, a man can pull an acre in from four to six days. It will be noted that 120 hours represented the time required to pull an acre at this Station. With machines now developed to pull flax, this cost may be greatly reduced.

COST OF ONE ACRE OF FLAX

	$ cts.
Rental of land	3 00
Use of machinery	1 00
Seed, 85 pounds at 8 cents	6 80
Ploughing, 8 hours at 49 cents	3 92
Discing and cultivating, 3 hours at 49 cents	1 47
Seeding	0 40
Covering and smoothing, 2½ hours at 49 cents	1 23
Pulling, 120 hours at 25 cents	30 00
Tying and stooking, 8 hours at 25 cents	2 00
Loading and hauling, 1½ hours at 74 cents	1 11
Total cost	50 93

HEMP

The test made with hemp was on land similar to that on which the flax was grown. The seed was sown broadcast May 19 at the rate of 55 pounds per acre. The growth was not as strong as had been expected. This no doubt was due to the soil not having been very high in fertility. This crop evidently is a gross feeder and requires a fairly rich land to produce tall plants to give a good length of fibre. The yield of dry straw was 4,920 pounds per acre, and from this 400 pounds of fibre and 560 pounds of tow per acre were obtained. Further tests will be made with this crop.

EXPERIMENTAL PROJECTS UNDER WAY AT THE EXPERIMENTAL STATION, KENTVILLE, N.S.

ANIMAL HUSBANDRY

BEEF CATTLE

Project No.	Title
A. 171.	Roots vs. ensilage for steer feeding.
A. 185.	Feeding choice vs. inferior steers.
A. 188.	Fish meal vs. oil meal vs. cottonseed meal for steers.
A. 189.	Value of Shorthorn steers for baby beef.
A. 255.	Cost of milk production from dual-purpose herd.
A. 270.	Economy of feeding light vs. heavy steers.
A. 271.	Light vs. heavy feeding of concentrates to steers.
A. 371.	Economy of corn ensilage for steer feeding.
A. 372.	Influence of minerals on abortion.
A. 373.	Molasses for steer feeding.
A. 374.	Cost of beef production in early vs. latter part of feeding period.
A. 375.	Cost of feeding beef-breed calves and heifers.
A. 376.	Cost of rearing beef-breed bulls and bull calves.
A. 377.	Cost of raising steers.
A. 378.	Raising calves on cow vs. pail feeding.
A. 379.	Influence of minerals on production of milk.
A. 380.	Bibby's cakeletts for cow feeding.

DAIRY CATTLE

A. 267.	Feeding Bibby's cakeletts to milch cows.

HOGS

A. 138.	Soaking ground vs. unground grains vs. dry feeding.
A. 163.	Cost of pork production.
A. 331.	Ground oats vs. oat flour for hogs.
A. 381.	Buttermilk vs. oil meal and meat meal for rearing pigs.

FIELD HUSBANDRY

ROTATION EXPERIMENTS

F. 1.	Three-year rotation—Corn; oats; clover.
F. 10.	Four-year rotation—Corn; oats; clover; timothy.
F. 18.	Four-year rotation—Oats; clover; timothy; timothy.
F. 25.	Five-year rotation—Corn; oats; clover; timothy; oats.

FARM MANAGEMENT EXPERIMENTS

F. 90.	Cost of operating tractor.
F. 91.	Cost of producing farm crops.

HORTICULTURE

POMOLOGY

H. 4.	Currant, variety experiment.
H. 6.	Gooseberry, variety experiment.
H. 11.	Raspberry, variety experiment.
H. 21.	Strawberry, variety experiment.
H. 33.	Apple, variety experiment.
H. 358.	Apple stock, effect of grade stock in ultimate growth.
H. 359.	Apple trees for fillers.
H. 360.	Apple stock, variety experiment.
H. 361.	Intercropping trees 20 feet by 20 feet apart.
H. 362.	Home-grown versus imported stock.
H. 363.	Heading back fruit trees.
H. 364.	Pruning, cost of.
H. 332.	Peach, variety experiment.
H. 365.	Cherry stock, variety experiment.
H. 35.	Cherry, variety experiment.

POMOLOGY—*Concluded*

Project No.	Title
H. 44.	Pear, variety experiment.
H. 366.	Pear, growing commercially.
H. 48.	Plum, variety experiment.
H. 367.	Nursery stock, best grade to plant.
H. 338.	Filbert, variety experiment.
H. 40.	Grape, variety experiment.
H. 368.	Orchard rotation.
H. 369.	Dusting vs. spraying; cost of
H. 370.	Dusting vs. spraying.
H. 371.	Spraying experiments.
H. 372.	Amount of liquid passed through different types of nozzles.
H. 373.	Orchard heating.

VEGETABLE GARDENING

H. 61.	Bean, bush, variety experiment.
H. 68.	Beet, variety experiment.
H. 77.	Cabbage, variety experiment.
H. 83.	Carrot, variety experiment.
H. 88.	Cauliflower, variety experiment.
H. 94.	Celery, variety experiment.
H. 102.	Corn, variety experiment.
H. 106.	Cucumber, variety experiment.
H. 108.	Herbs, variety experiment.
H. 116.	Lettuce, variety experiment.
H. 138.	Onions, variety experiment.
H. 153.	Peas, variety experiment.
H. 157.	Pepper, variety experiment.
H. 164.	Potato, different sizes of sets.
H. 374.	Potato, from different sources.
H. 165.	Potato, distances of planting.
H. 375.	Potato, seed required per acre.
H. 179.	Potato, seed treated chemically vs. not treated.
H. 186.	Potato, variety experiment.
H. 188.	Pumpkin, variety experiment.
H. 199.	Spinach, variety experiment.
H. 201.	Squash, variety experiment.
H. 211.	Tomato, variety experiment.
H. 214.	Turnip, variety experiment.

ORNAMENTAL GARDENING

H. 261.	Annual flowers, variety experiment.
H. 271.	Geranium, variety experiment.
H. 274.	Perennial flowers, variety experiment.
H. 376.	Ornamental evergreen shrubs and trees.
H. 302.	Roses, variety experiment.
H. 307.	Trees and shrubs, ornamental and shelter.

GREENHOUSE PROJECTS

H. 222.	Chrysanthemum, variety experiment.
H. 194.	Rhubarb, forcing.
H. 255.	Tomato, variety experiment.

FORAGE CROPS

Ag. 1.	Indian corn, variety tests for ensilage purposes.
Ag. 16.	Mangels, variety tests for yield and purity.
Ag. 17.	Mangels, breeding of pure strains.
Ag. 36.	Carrots, variety tests for yield and purity.
Ag. 51.	Swedes, variety tests for yield and purity.
Ag. 52.	Swedes, breeding of pure strains.
Ag. 55.	Swedes, testing club-root-resistant varieties.
Ag. 56.	Swedes, soil treatments for club-root.
Ag. 66.	Sugar beets, variety tests for yield and purity.
Ag. 76.	Sunflowers, variety tests for yield and purity.

FORAGE CROPS—*Concluded*

Project No.	Title
Ag. 126.	Alfalfa, variety tests, hardiness, yield, suitability.
Ag. 127.	Alfalfa, inoculation.
Ag. 128.	Alfalfa, liming.
Ag. 129.	Alfalfa, broadcast vs. rows for hay production.
Ag. 133.	Alfalfa, seeding with vs. without a nurse crop for seed production.
Ag. 146.	Red clover, variety tests for yield and general suitability.
Ag. 147.	Red clover, inoculation.
Ag. 148.	Red clover, rows vs. broadcast for seed production.
Ag. 161.	Sweet clover, variety tests.
Ag. 181.	Soybeans, variety tests for forage.
Ag. 201.	Timothy, variety tests for yield and purity.
Ag. 202.	Timothy, seed production.
Ag. 221.	Western rye, variety tests for yield and purity.
Ag. 231	White Dutch clover, variety tests for yield and suitability.
Ag. 258 (D).	Hay and pasture mixtures experiments—Red clover as a base.
Ag. 258 (E).	Hay and pasture mixtures experiments—Mixed clover as a base.

CHEMISTRY

C. 12.	Distribution of fertilizer in the rotation. (Experiment E.-21.)
C. 13.	Orchard fertilizer. (Experiment No. 4.)
C. 15.	Fertilizer and ground limestone. (Experiment No. 5.)
C. 23.	Ground limestone at different rates per acre. (Experiment 1917.)
C. 26.	Basic slag experiment 1923.
C. 10.	Sugar beet investigation.
C. 11.	Agricultural meteorology.

POULTRY

P. 1.	Best types or make of incubator (Prairie State, Buckeye, Belle City, Tamlin).
P. 17.	Natural vs. artificial incubation.
P. 32.	Feeding methods in rearing.
P. 39.	Costs of feeding and producing capons.
P 42.	Methods and rations for fattening and finishing roasters.
P. 45.	Crate fattening hens.
P. 46.	Crate fattening pullets.
P 56.	Pedigree breeding for egg production.
P. 58.	Best hatching date for egg production.
P. 60.	Pullets vs. hens for egg production (B.R. and W.W.).
P. 70.	Best type of floor for laying house.
P. 76.	Standard (home-mixed) vs. commercial grain.
P. 79.	Standard (home-mixed) vs. commercial mash.
P. 87.	Fish-meal vs. beef-scrap.
P. 94.	Roots vs. clover vs. sprouted oats.
P. 98.	Oyster shell vs. clam shell.

APIARY

Ap. 1.	Control of swarming by dequeening and requeening.
Ap. 2.	Control of swarming by separation of brood and queen.
Ap. 8.	Wintering in 4-colony cases.
Ap. 9.	Wintering in 2-colony cases.
Ap. 10.	Wintering in single-colony cases.
Ap. 11.	Comparison of different stores for wintering.
Ap. 20.	Returns from apiaries.
Ap. 21.	Comparison of different sizes of hives.
Ap. 28.	Study of honey flows.
Ap. 34.	Queen rearing.
Ap. 45.	Methods of increase without natural swarming.
Ap. 48.	Fruit bloom as a source of nectar.
Ap. 49.	Wintering in double-brood chamber.

FIBRE PLANTS

E. 3.	Testing varieties of flax.
E. 4.	Testing varieties of hemp.
E. 7.	Seeding test—Sowing at different dates.

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