DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

EXPERIMENTAL STATION

KENTVILLE, N.S.

REPORT OF THE SUPERINTENDENT

W. SAXBY BLAIR, D.Sc.

FOR THE YEAR 1929

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DOMINION EXPERIMENTAL STATION
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REPORT OF THE SUPERINTENDENT, W. SAXBY BLAIR, D.Sc.

THE SEASON

The winter of 1928-29 was practically normal. December was a mild, open month, ploughing being possible on the drier soils until the 22nd. The precipitation totalled 5·45 inches, of which only 0·37 of an inch fell as snow. The month closed without frost in the ground, which was bare of snow. January was noteworthy for its changeable weather. A total snowfall of 17·25 inches was so affected by subsequent rains that the month passed with but brief coverings of snow upon the ground. February was nearly normal with a total snowfall of 21 inches. There was sufficient snow for sleighing from the first to the 8th and from the 20th to the 28th. Snowfalls kept the ground covered with snow until the middle of March, and the balance of the month was spring-like. The snow disappeared by the 23rd. Pruning was general the latter part of the month. April was a normal month, with three light flurries of snow. The frost was out of the ground by the 6th. Soils on dry areas were ready for cultivation and seeding at the close of the month.

Vegetative growth started early in May. Fruit buds developed rapidly and spraying was general on the 4th. Fertilizers were applied to the orchards on the 14th. From the 11th to the 18th, when the pre-pink spray was being applied generally throughout the valley, the weather was showery and windy, making it difficult to maintain a protective coating of fungicide upon the rapidly developing apple foliage. Unfavourable weather with rains from the 19th to the 22nd, inclusive, aggregating 3·57 inches, resulted in a delay in farming and orcharding operations, particularly spraying. The precipitation for May was 6·52 inches (the average for the previous fifteen years being 2·23 inches), otherwise the month was practically normal. The pre-blossom spray was applied between the 23rd and the 28th. In many districts the orchards were so wet that it was impossible to operate a sprayer. Undoubtedly this was the period when the apple scab infection of the foliage occurred which was later to re-infect the fruit and cause such disappointing results after the fruit had been harvested and stored. Indications at this time promised a very heavy apple bloom throughout the valley. Bright weather, with a gradual increase in temperature to 89 degrees, from the 23rd to the 29th, brought the blossoms of the earlier varieties out very rapidly.

The first four days of June were cold and dull, retarding the blossom development of the late-blossoming varieties. This was followed by excellent weather, with a gradually increasing temperature, until a maximum of 90 degrees was reached on the 12th. Only one shower, of 0·12 of an inch, occurred during this time. Practically all varieties were in full bloom on the 9th, so that almost ideal atmospheric conditions existed during the pollination and fertilization of their flowers. The June precipitation of 2·3 inches was below the previous fifteen-year average (3 inches). However, following the heavy precipitation of May, it enabled the farmers and fruit growers to seed their crops and to till their orchards. This thorough cultivation at this time doubtless resulted in the conservation of soil moisture, materially lessening the effects of the drought that followed during July and August. The

calyx spray was applied between 11th and 15th of June, and the after-calyx spray between June 27 and July 3. A rain of 1·16 inches on the 24th and 25th of June, combined with 0·56 of an inch on the 29th, materially aided in the development of all crops, especially strawberries. Strawberries were available for the local markets at the close of the month.

July was a bright, dry month. Strawberries suffered considerably from the dry weather. The fruit matured rapidly and was undersized, and the season for this fruit was of short duration. A rain of 0·84 of an inch fell on the 19th and 20th aiding all crops. Early sweet cherries lacked size and ripened prematurely.

August continued bright and dry. The effects of this continued drought were noticeable on all crops, particularly fruits, potatoes, grain and field roots. Fruits and potatoes ripened prematurely. Potatoes were being dug early in August. Early apples were small in size but of fair colour and quality. Raspberries suffered badly. Plums were a fair crop. The total precipitation in 1929 for the months of June, July and August was 6·22 inches, as compared with 9·43 inches, the previous fifteen-year average.

The September precipitation was 4·46 inches, as compared with 2·77 inches, the average for the previous fifteen years. This rainfall, although late, was of great benefit in the development of size and colour in the late-maturing varieties of apples. Apples generally were small-sized, due both to lack of rainfall during their development and to the heavy set of fruit upon the trees. The yields of practically all varieties over-ran the estimated crop, resulting in a serious shortage of apple barrels. The only frost of the month, 2 degrees, occurred on the 2nd. Seasonal conditions were such during late September and October as to favour the development of late scab. This is more fully referred to by the Plant Pathologist, Kentville, in the report of the Division of Botany, Ottawa.

October was practically normal, excepting for the rainfall, which was 2·40 inches, as compared with 4·24 inches, the average for the previous fifteen years. Four degrees of frost was the coldest weather recorded until the 30th, when 11 degrees were recorded. All fruits were harvested at this Station by the 28th, although there was a considerable quantity of apples in the valley still to be harvested.

The early part of November was without damaging frosts until the 11th, and at that date the fruit in the valley was harvested. Cold weather set in on the 18th, with the temperature gradually lowering to 8 degrees on the 24th. The freeze-up for the winter came at this time.

December was a dark, cold month, with a covering of snow on the ground practically throughout the month.

Meteorological Records at the Dominion Experimental Station, Kentville, N.S., for the Year 1929

Month	Temperature (Fahrenheit)						Precipitation				Sunshine	
	Mean		Maximum		Minimum		Rainfall	Snowfall	Total precipitation, 1929	Average, previous 15 years	1929	Average, previous 15 years
	1929	Average, previous 15 years	Highest	Mean maximum	Lowest	Mean minimum						
	°	°	°	°	°	°	inches	inches	inches	inches	hours	hours
January	20·99	19·90	57	28·58	−3	13·39	3·26	17·25	4·99	3·72	79·1	78·3
February	21·12	19·31	48	28·89	−4	13·36	1·63	21·00	3·73	3·18	105·9	98·1
March	30·52	28·73	59	38·87	−3	22·16	1·53	12·75	2·81	2·88	115·3	134·5
April	38·57	38·87	64	46·43	19	30·70	2·43	3·50	2·78	2·85	135·6	152·7
May	51·68	49·49	89	62·42	32	40·93	6·52	.....	6·52	2·23	208·8	198·1
June	60·25	58·80	90	71·77	36	48·73	2·30	.....	2·30	3·00	217·9	211·7
July	65·94	64·57	86	78·64	41	53·23	1·60	.....	1·60	3·06	286·0	219·8
August	63·58	64·33	88	74·84	41	52·32	2·32	.....	2·32	3·37	224·0	209·4
September	59·58	56·88	81	69·93	30	49·23	4·46	.....	4·46	2·77	158·5	178·3
October	47·19	47·98	76	55·65	21	38·74	2·40	.....	2·40	4·24	131·4	144·3
November	36·05	36·82	64	42·80	8	29·30	2·88	7·50	3·63	3·80	97·8	84·5
December	22·39	25·45	46	28·13	−1	16·64	2·06	19·25	3·98	3·87	43·7	58·6
Totals or averages	43·15	42·59	.....	52·25	.....	34·06	33·39	81·25	41·52	38·97	1,804·0	1,768·3

ANIMAL HUSBANDRY

CATTLE

DUAL-PURPOSE SHORTHORN HERD

The Shorthorn herd at the end of the year 1929 consisted of one herd bull, thirty-two cows, one 2-year-old heifer, twelve yearling heifers, ten heifer calves, and five bull calves, a total of sixty-one head. Eighteen bull and thirteen heifer calves were born during the year.

There were disposed of during the year 1929 a total of twenty-seven head: one cow, seven yearling heifers, fourteen bull calves and two heifer calves for breeders, and one yearling heifer and two yearling steers for beef. One heifer calf died when five days old. The general good health of the herd has been maintained during the year, clean tests for both tuberculosis and contagious abortion having been passed. The herd bull, Comet 3rd, —176361— continues to sire good uniform calves. Twenty-two heifers by this bull are on hand. There is an increasing demand for young stock of both sexes.

Twelve heifers by the former herd bull, Major Maud, —116374— have finished lactation periods, and six of these have qualified in the Record of Performance. This qualifies Major Maud as a Record of Performance sire, making the third herd sire to qualify at this Station.

The meal mixtures used during the year for the milking cows varied somewhat, depending on the prices and the feeds available. The aim was to maintain a protein content of from 18 to 20 per cent at as low a cost as possible. Four mixtures were used during the year made up as follows: (1) 200 pounds of wheat bran, 200 pounds of ground oats and 100 pounds of cotton seed meal, costing $2.47 per cwt., and fed from January to April; (2) 300 pounds of wheat bran, 100 pounds each of linseed oilmeal, wheat middlings and corn meal, and 300 pounds of 22 per cent Union Dairy feed, costing $2.52 per cwt., and fed during April and May; (3) 200 pounds of wheat bran, 100 pounds each of wheat middlings and ground oats, and 400 pounds of 22 per cent Union Dairy Feed, costing $2.46 per cwt., and fed during June, July and part of August; and (4) 200 pounds of wheat bran, 200 pounds of ground oats, 100 pounds each of linseed oil and wheat middlings, and 600 pounds of 22 per cent Union Dairy Feed, costing $2.45 per cwt., and fed for the remainder of the year. Each mixture contained in addition one pound of salt and two pounds of edible bone meal for each 100 pounds of meal.

The tabulated data show the feed consumption, and the milk production of twenty-four cows which completed their lactation periods during the year. These are made up of eight mature cows with an average production of 5567·8 pounds of milk and 254·32 pounds of butter; four 4-year-olds with an average production of 5,164·9 pounds of milk and 244·69 pounds of butter; six 3-year-olds with an average of 5,276 pounds of milk and 250·26 pounds of butter, and six 2-year-olds with an average of 4,365·7 pounds of milk and 203·86 pounds of butter. The average production of the twenty-four cows and heifers was 5,127·2 pounds of milk and 239·08 pounds of butter.

The price of butter varied during the year from 50 cents per pound in the month of March to 38 cents per pound in the month of June, the average value for the lactation periods tabulated being 42·83 cents per pound. Skim-milk is valued at 20 cents per hundred pounds. It will be noticed that the prices of feeds as given for the year 1929 will not apply to the lactation periods finished in this year, as eight out of the twenty-four periods began early in the year 1928, when different prices prevailed. The cow is charged with the feed consumed from calving to calving, at the prices paid for the feed for the month, and is credited with the skim-milk at 20 cents per cwt., and for the butter produced according to the wholesale prices for the month. The difference between costs and value of production is the profit or loss for the lactation period.

AMOUNT AND VALUE OF MILK PRODUCED BY SHORTHORN COWS WHICH COMPLETED LACTATION PERIODS DURING THE YEAR ENDING DECEMBER 31, 1929

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 fat	Butter produced	Value of butter	Value of skim milk	Total value of product
					lb.	lb.	%	lb.	$	$	$
Kentville Lady	9	Mar. 31, 1928	50	365	8,588·1	23·52	3·90	395·56	167 37	16 50	183 87
Kentville Meadow Flower 2nd	9	Jan. 10, 1929	51	264	5,531·3	20·95	3·78	246·23	108 30	10 64	118 94
Kentville Jessamine 4th	9	April 1, 1929	153	213	5,598·4	26·28	3·79	250·04	104 91	10 77	115 68
Kentville Jessamine 6th	8	April 29, 1929	118	224	4,312·9	19·25	3·56	180·79	75 08	8 32	83 40
Kentville Jessamine 12th	5	April 17, 1928	104	289	6,112·5	21·15	4·14	297·79	122 33	11 72	134 05
Kentville Primrose 4th	5	Feb. 16, 1929	125	266	5,402·3	20·31	3·79	241·13	105 68	10 39	116 07
Kentville Susan 9th	5	April 12, 1929	148	199	3,562·0	17·90	3·95	165·37	68 93	6 84	75 77
Kentville Victoria 12th	5	Feb. 4, 1929	126	239	5,434·7	22·74	4·03	257·67	113 46	10 43	123 89
Kentville Fairy 6th	4	Jan. 18, 1929	122	251	6,135·0	24·44	4·12	297·74	130 85	11 76	142 61
Kentville Jessamine 16th	4	Feb. 18, 1929	79	263	5,236·9	19·91	3·92	241·75	105 90	10 06	115 96
Kentville Fairy 7th	4	April 9, 1929	193	173	2,620·7	15·15	3·95	121·75	51 71	5 03	56 74
Kentville Susan 11th	4	Jan. 25, 1929	125	270	6,667·0	24·69	4·05	317·51	140 33	12 79	153 12
Kentville Victoria 15th	3	Mar. 1, 1929	68	271	4,406·6	16·26	4·22	218·58	96 17	8 44	104 61
Kentville Jessamine 17th	3	Mar. 10, 1928	*	326	5,331·9	16·35	4·35	272·67	114 41	10 20	124 61
Kentville Meadow Flower 4th	3	Mar. 31, 1929	41	255	4,752·9	18·63	3·43	192·22	80 35	9 18	89 53
Kentville Fairy 8th	3	Mar. 15, 1928	*	399	5,777·0	17·04	4·03	273·63	114 51	11 09	125 60
Kentville Jessamine 18th	3	Feb. 20, 1928	*	364	6,870·0	18·87	4·16	336·19	141 63	13 16	154 79
Kentville Victoria 16th	3	April 18, 1929	109	205	4,517·9	22·04	3·92	208·27	86 31	8 68	94 99
Kentville Meadow Flower 4th	2	Mar. 3, 1928	*	351	4,872·9	13·88	3·79	217·16	92 15	9 37	101 52
Kentville Jessamine 19th	2	Mar. 2, 1928	*	358	5,241·4	14·64	3·87	238·76	101 05	10 08	111 13
Kentville Jessamine 20th	2	Oct. 10, 1928	*	226	2,509·9	11·11	3·84	113·38	50 85	4 83	55 68
Kentville Victoria 18th	2	Feb. 3, 1929	*	286	5,021·3	17·56	3·95	233·44	102 11	9 65	111 76
Kentville Susan 14th	2	Jan. 29, 1929	*	334	5,472·6	16·38	4·24	273·41	119 15	10 48	129 63
Kentville Victoria, 20th	2	Jan. 20, 1929	*	232	3,076·2	13·26	4·06	147·00	64 23	5 90	70 13
Totals	101	.....	1,612	6,563	123,052·4	.....	.....	5,738·04	2,457 77	236 31	2,694 08
Averages	4·2	.....	107	273·4	5,127·2	18·75	3·97	239·08	102 41	9 85	112 25

* First calf.

AMOUNT AND COST OF FEED CONSUMED BY SHORTHORN COWS WHICH COMPLETED LACTATION PERIOD DURING 1929

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 pounds of milk	Cost to produce 1 pound of butter	Profit on one pound of butter, skim-milk not considered	Profit on cow
			lb.	lb.	lb.	lb.		$	$	cts.	cts.	$
Kentville Lady	9	Mar. 31, 1928	3,834	9,720	5,350	500	1·75	132 00	1 54	33·37	8·94	51 87
Kentville Meadow Flower 2nd	9	Jan. 10, 1929	2,253	8,120	3,542	2,510	.....	90 15	1 63	36·61	7·37	28 79
Kentville Jessamine 4th	9	April 1, 1929	2,723	9,670	4,246	2,510	.....	102 38	1 83	40·95	1·01	13 30
Kentville Jessamine 6th	8	April 29, 1929	1,690	9,390	3,806	2,510	.....	76 94	1 78	42·56	1·03	6 46
Kentville Jessamine 12th	5	April 17, 1928	2,605	8,360	4,936	500	1·75	98 87	1 62	33·20	7·88	35 18
Kentville Primrose 4th	5	Feb. 16, 1929	2,363	9,170	4,254	2,510	.....	94 96	1 76	39·38	4·45	21 11
Kentville Susan 9th	5	April 12, 1929	1,602	9,590	3,866	2,510	.....	75 06	2 11	45·39	−3·71	0 71
Kentville Victoria 12th	5	Feb. 4, 1929	2,557	8,440	4,370	2,510	.....	102 02	1 87	39·59	4·44	21 87
Kentville Fairy 6th	4	Jan. 18, 1929	2,682	8,800	4,370	2,480	.....	106 28	1 73	35·69	8·26	36 33
Kentville Jessamine 16th	4	Feb. 18, 1929	2,273	9,030	3,806	2,510	.....	90 80	1 73	37·56	6·25	25 16
Kentville Fairy 7th	4	April 9, 1929	1,456	10,660	4,094	2,510	.....	73 62	2 81	60·47	−18·00	−16 88
Kentville Susan 11th	4	Jan. 25, 1929	2,808	9,240	4,628	2,510	.....	111 15	1 67	35·01	9·19	41 97
Kentville Victoria 15th	3	Mar. 1, 1929	1,852	9,330	3,774	2,510	.....	81 86	1 86	37·45	6·55	22 75
Kentville Jessamine 17th	3	Mar. 10, 1928	2,115	5,640	4,086	500	1·75	79 46	1 49	29·14	12·82	45 15
Kentville Meadow Flower 4th	3	Mar. 31, 1929	1,944	7,310	3,182	2,510	.....	77 15	1 62	40·14	1·66	12 38
Kentville Fairy 8th	3	Mar. 15, 1928	2,101	6,160	4,254	500	1·75	80 79	1 40	29·53	12·32	44 81
Kentville Jessamine 18th	3	Feb. 20, 1928	2,672	7,160	4,460	500	1·75	96 70	1 41	28·76	13·37	58 09
Kentville Victoria 16th	3	April 18, 1929	1,698	8,270	3,470	2,510	.....	74 03	1 64	35·55	5·89	20 96
Kentville Meadow Flower 4th	2	Mar. 3, 1928	2,247	6,720	4,334	500	1·75	85 43	1 75	39·34	3·09	16 09
Kentville Jessamine 19th	2	Mar. 2, 1928	2,379	6,920	4,394	500	1·75	89 19	1 70	37·36	4·96	21 94
Kentville Jessamine 20th	2	Oct. 10, 1928	1,356	7,980	2,912	.....	.....	58 35	2 32	51·46	−6·61	−2 67
Kentville Victoria 18th	2	Feb. 3, 1929	2,235	6,050	3,048	2,510	.....	84 25	1 68	36·09	7·65	27 51
Kentville Susan 14th	2	Jan. 29, 1929	2,485	9,070	3,648	2,510	.....	97 60	1 78	35·69	7·89	32 03
Kentville Victoria 20th	2	Jan. 20, 1929	1,770	4,760	2,398	2,000	.....	67 16	2 18	45·69	−2·00	2 97
Totals	101	.....	53,700	195,560	95,228	43,120	12·25	2,126 20	.....	.....	.....	567 88
Averages	4·2	.....	2,237	8,148	3,968	1,797	0·51	88 59	1 73	37·05	5·78	23 66

RECORD OF PERFORMANCE

All normal cows and heifers are entered for Record of Performance testing. Eleven qualified in 1929 with an average production of 6,058·7 pounds of milk and 285·34 pounds of butter.

No special effort has been made to force the cows for high records. They are all entered in the Record of Performance for each lactation period, are given equal attention under good farm conditions, and are fed according to their capacity to produce economically. Twice-a-day milking only has been the rule. The result of this method is that while there are no spectacular records, there are quite a number of cows that have good life records, they having qualified in most lactation periods with very creditable production. Such cows should be reliable stock to breed from.

The following table gives the individual records of the Record of Performance test during 1929:—

RECORD OF PERFORMANCE

Name of cow	Age	Number of days milking	Milk produced	Fat produced	Average per cent fat
	yrs.		lb.	lb.	
Kentville Lady	9	365	8,588·1	336·23	3·90
Kentville Jessamine 4th	9	213	5,598·4	212·54	3·79
Kentville Meadow Flower 2nd	9	264	5,531·3	209·30	3·78
Kentville Jessamine 12th	5	289	6,112·5	253·12	4·14
Kentville Fairy 6th	4	251	6,135·0	253·08	4·12
Kentville Susan 11th	4	270	6,667·0	269·89	4·05
Kentville Fairy 8th	3	339	5,777·0	232·59	4·03
Kentville Jessamine 18th	3	364	6,870·0	285·76	4·16
Kentville Meadow Flower 4th	2	351	4,872·9	184·58	3·79
Kentville Victoria 18th	2	286	5,021·3	198·42	3·95
Kentville Susan 14th	2	334	5,472·6	232·40	4·24
Averages	4·7	302	6·058·7	242·54	4·00

SUMMER FEEDING

The pasture areas at this Station being somewhat limited, the milking cows cannot be pastured for any length of time during the summer. Usually a few weeks in June is about the extent of the pasture feeding. During the summer of 1929 the milking cows were stable-fed the entire season, only being turned out for exercise during the afternoon. This method greatly increases cost of production, and is not recommended when suitable pasture can be procured. Corn silage, hay and soiling crops are fed in their season during the summer and fall months. Grain is fed during the entire season, and must be used in greater quantities than would be necessary were the cows on good pasture. The dry cows were given the advantage of good pasture, and did well without grain feeding until they were brought in shortly before calving. All the young stock over nine months of age were at pasture during the entire season and made very satisfactory gains. As the feed got dry toward the end of the season the pasture was supplemented by soiling crops of various kinds, and other green feeds that might otherwise have gone to waste. This was hauled to the pasture and fed from a rack built inside and running parallel with the fence. No grain was fed the young stock while on pasture.

WINTER FEEDING

The roughage feeds used for the winter ration are corn silage, sunflower silage, turnips, mangels, unmarketable apples and hay. The quality of the hay varies considerably in respect to the grasses it contains, but is usually well-made clover, timothy and clover, all timothy, or dyke hay, the latter being

mostly mixed grasses and clover. With these roughages are fed the various mixtures of grain already mentioned, as the needs of the individual animals require. The practice followed is to feed the turnips the first of the season to avoid loss in storage. These are followed by the ensilage, which continues through the season, and some years well into the summer. The mangels are reserved for the cows as they approach calving time and for a few weeks after, for the younger calves, and the pigs and hens. The turnips are fed at the rate of from 40 to 50 pounds per day, the silage 40 pounds per day, and hay from 12 to 15 pounds per day to all cows. The heifers are fed according to their age and capacity, and will average about 25 pounds of ensilage or roots and from 6 to 8 pounds of hay. Grain is fed to milking cows at the rate of about one pound of grain to 3 pounds of milk produced. Dry cows and heifers receive light grain rations as their needs require.

The routine work followed in the barn may be of interest. Work begins at 6 a.m., with preparation for milking. The milking is done satisfactorily with a machine. Each cow is milked, stripped, and the milk weighed. Whole milk is fed to those calves receiving it, and the skim-milk fed warm from the separator. After the milking, the cattle are fed one-half their daily ration of silage or roots, and grain. While this is being eaten the gutters are cleaned out and the stock bedded. During this time the milk is being looked after in the dairy and the utensils washed and sterilized. Hay is then fed, and the animals groomed, after which they are left unmolested until three o'clock. During the middle of the day while the cows are resting, other work is being done, such as mixing feeds, pulping roots, preparing bedding, filling hay chutes, cleaning pens, making repairs or any work connected with the barns that may be necessary. About 3 p.m. the mangers and gutters are cleaned, and the second feed of ensilage, or roots, and meal is given. While this is being eaten the cows are cleaned up for milking, which starts at 4.30. After the milking is finished hay is fed and the barns tidied up. The milk is cared for and the calves fed their allowance of skim-milk, the work being completed at 6 o'clock. During the late evening the herdsman visits the barns, making sure that everything is in order for the night.

ROOTS VS. APPLES FOR MILK PRODUCTION (Project No. A612)

Owing to the fact that there are always more or less cull apples to be utilized in some way, it was thought advisable in the autumn of 1926 to test their feeding value for milch cows as compared with turnips. In consideration of the popular belief that apples fed in quantity tend to dry up the milk flow, only a medium amount was fed in this test, 25 pounds per day in two feeds. The same quantity of turnips was also used. Both apples and turnips were pulped and fed with the meal ration. All other feeds were similar in every case. The feeding periods were three weeks in length, but the milk yields are tabulated for the last two weeks only in each period, allowing the first week in the period for adjustment to the change in feed. In the table the total production for the period, and the shrinkage in each succeeding period are noted.

Five cows began the test and three more were added at the beginning of the third period. Of the first lot of five, the first cow, Kentville Lady 4th, calved May 21; the others calved between August 12 and September 22. The test began October 24. The other three cows calved between October 23 and November 6.

It will be seen that the natural decrease between successive periods is variable, so that, so far as can be told from this test, the difference in the feeding value of turnips and apples for milch cows is very little. Possibly a test over a longer period would give different results, but as the season for apple feeding is comparatively short it would seem that many of the cull apples could be used satisfactorily for feed in the dairy herd.

ROOTS VS. APPLES FOR MILK PRODUCTION (PROJECT A 612)

(Milk production of last two weeks of each three-week period)

Name of cow	Apples, Oct. 31 to Nov. 13	Roots, Nov. 21 to Dec. 4	Roots, Dec. 11 to Dec. 24	Apples, Jan. 2 to Jan. 15	Roots, Jan. 23 to Feb. 5
	lb.	lb.	lb.	lb.	lb.
Kentville Lady 4th	205·0	192·3	179·2	173·0	160·2
Kentville Primrose 6th	226·6	215·8	190·7	175·1	140·0
Kentville Victoria 11th	312·3	286·7	264·5	280·4	243·1
Kentville Primrose 5th	332·9	286·1	266·9	262·0	242·2
Kentville Susan 10th	339·8	352·2	308·1	274·1	268·4
Totals	1,416·6	1,333·1	1,209·4	1,164·6	1,053·9
Decrease from previous period	.....	83·5	123·7	44·8	110·7
Per cent decrease	.....	(5·9)	(9·3)	(3·7)	(9·5)
Kentville May 3rd	.....	.....	464·5	393·7	278·9
Kentville Victoria 12th	.....	.....	335·0	334·0	301·0
Kentville Victoria 13th	.....	.....	342·5	335·4	324·5
Totals	.....	.....	1,142·0	1,063·1	904·4
Decrease from previous period	.....	.....	.....	78·9	158·7
Per cent decrease	.....	.....	.....	(7·0)	(14·9)

YOUNG SHORTHORN STEERS FOR BEEF

To determine the cost of producing beef from dual-purpose Shorthorns, a test was conducted with nine steer calves. These were kept on a ration sufficient to keep them doing well throughout the period, with a more generous meal allowance during the last four months. They were all hand-fed, receiving whole milk for four to five weeks, and skim-milk until six months or more of age. Six were stall fed throughout the period and three were on pasture for four months during the feeding period. The meal fed these steers up to January 1, 1928, was made up of two parts of bran, one part of oats and one part of oil-cake meal. From January 1 to the end of the period they were all in a feeding test, when three different meal mixtures were fed composed of wheat bran, ground oats, linseed oil meal and Fasterfat fish meal. Not considering the first thirty days of the period, the steers consumed of these various meal mixtures an average of 3·8 pounds daily. The hay fed was of fair quality, containing a small percentage of clover. The succulent feeds were turnips, mangels, and corn ensilage. The feeds were charged at the following prices: whole milk, $2; skim-milk, 20 cents; meal, $2.25; hay, 40 cents; roots and ensilage, 16 cents per cwt., and pasture, 50 cents per month.

The milk production back of these steers is very good, there being twenty-three Record of Performance cows and four Record of Performance bulls represented in the various pedigrees. The average milk production of the twenty-three cows is 8,000 pounds.

The steers were sold to a local dealer and shipped to Newfoundland.

The result of this test shows that first class beef can be produced from steers out of Shorthorn cows that are good milk producers. These steers also proved early-maturing, as they were ready for market at an average age of 487 days, even though reared by hand, or pail fed. It will be noted that the two steers making the largest profit had four months on pasture. Other things being equal it would seem that calves born in the fall, put on pasture the following summer, and finished during the second winter, should be the most profitable.

YOUNG SHORTHORN STEERS FOR BEEF; FEED CONSUMPTION BY PERIODS

Feed	Premier	Prince George	Morning Star	Sultan	Hero	Prince	Star	Monarch	Leader	Totals	Averages
BIRTH TO SIX MONTHS											
Whole milk..... lb.	336	420	420	494	392	352	352	304	268	3,338	371
Skim-milk..... lb.	2,619	2,436	2,436	2,205	2,436	2,507	2,507	2,549	2,549	22,244	2,472
Meal..... lb.	224	182	182	187	280	308	280	273	336	2,252	250
Roots..... lb.	.....	630	630	634	634	450	350	.....	.....	3,328	370
Hay..... lb.	223	322	322	266	294	343	343	266	343	2,722	302
SIX MONTHS TO ONE YEAR											
Skim-milk..... lb.	.....	882	882	680	239	.....	588	.....	.....	3,271	363
Meal..... lb.	308	231	231	644	651	728	728	875	896	5,292	588
Hay..... lb.	500	434	434	1,120	1,162	1,015	975	1,090	1,120	7,850	872
Pasture..... months	3	4	4	.....	.....	.....	.....	.....	.....	11	.....
Roots and ensilage..... lb.	1,400	790	790	1,180	1,460	1,840	1,840	2,200	2,480	13,980	1,553
ONE YEAR TO SALE											
Meal..... lb.	1,327	1,201	1,201	998	914	746	746	452	410	7,995	888
Hay..... lb.	1,880	1,600	1,600	1,264	1,152	928	928	561	480	10,393	1,155
Pasture..... months	1	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
Roots and ensilage..... lb.	3,385	2,905	2,905	2,065	1,785	1,365	1,365	630	525	16,930	1,881
TOTAL PERIOD—BIRTH TO SALE											
Whole milk..... lb.	336	420	420	494	392	352	352	304	268	3,338	371
Skim-milk..... lb.	2,619	3,318	3,318	2,885	2,675	2,507	3,095	2,549	2,549	25,515	2,835
Meal..... lb.	1,859	1,614	1,614	1,829	1,845	1,782	1,754	1,600	1,642	15,539	1,727
Hay..... lb.	2,603	2,356	2,356	2,650	2,608	2,286	2,246	1,917	1,943	20,965	2,329
Pasture..... months	4	4	4	.....	.....	.....	.....	.....	.....	12	.....
Roots and ensilage..... lb.	4,785	4,325	4,325	3,879	3,879	3,655	3,555	2,830	3,005	34,238	3,804

YOUNG SHORTHORN STEERS FOR BEEF: WEIGHTS, GAINS AND COSTS

——	Premier	Prince George	Morning Star	Sultan	Hero	Prince	Star	Monarch	Leader	Total	Average
Date of birth 1926	Aug. 31	Nov. 4	Nov. 6	Dec. 4							
1927					Jan. 2	Feb. 2	Feb. 2	Mar. 26	April 2		
Number of R.O.P. bulls in ancestry	8	2	2	3	6	5	5	2	5	38	4
Number of R.O.P. cows in ancestry	9	6	6	5	8	7	9	6	8	64	7
Quality as a beef steer	Very good	Fair	Very good	Good	Fair	Good	Very good	Good	Fair		
Weight at birth lb.	75	70	80	75	73	75	70	78	75	671	75
Weight at sale lb.	980	840	900	850	740	800	740	770	705	7,325	814
Gain lb.	905	770	820	775	667	725	670	692	630	6,654	739
Number of days in period	653	538	536	498	479	448	448	396	389	4,385	487
Average gain per day lb.	1·39	1·43	1·53	1·56	1·39	1·62	1·50	1·75	1·62		1·52
Total cost of feed $	73 86	69 69	69 69	73 61	71 34	67 13	67 36	59 38	59 98	612 04	68 00
Cost of one pound of gain ct.	8·16	9·05	8·50	9·50	10·70	9·26	10·05	8·58	9·52		9·20
Selling price at 9 cents per pound $	88 20	75 60	81 00	76 50	66 60	72 00	66 60	69 30	63 45	659 25	73 25
Profit or loss (−) over cost of feed $	14 34	5 91	11 31	2 89	−4 74	4 87	−0 76	9 92	3 47	47 21	5 25

FISH MEAL VS. OIL MEAL FOR FEEDING YOUNG STEERS FOR BEEF

Two lots of the above steers, three in a lot, were for the last five months of the period fed similarly, except that one lot received oil meal in the meal ration and the other lot Fasterfat fish meal. The data obtained were as follows:—

FISH MEAL VS. OIL MEAL FOR FEEDING YOUNG STEERS FOR BEEF

Items		Lot 1	Lot 2
		300 bran, 200 oats, 100 oil meal	300 bran, 200 oats, 50 Fasterfat
Number of steers in lot		3	3
Number of days fed		145	145
Total weight at beginning of test	lb.	1,445	1,350
Total weight at finish of test	lb.	2,295	2,175
Total gain during period	lb.	850	825
Average gain per steer	lb.	283	275
Average gain per steer per day	lb.	1·95	1·90
Feed costs:—			
3,456 pounds hay at $8 per ton	$	13 82	13 82
5,355 pounds ensilage at $3.20 per ton	$	8 56	8 56
2,742 pounds meal at $2.10 per cwt	$	57 58	.....
2,742 pounds meal at $2.28 per cwt	$	.....	62 52
Total cost of feed for period	$	79 96	84 90
Average cost of feed per steer	$	26 65	28 30
Average cost of feed per steer per day	ct.	18·4	19·5
Cost per pound of gain	ct.	9·41	10·29

SWINE

The swine on hand January 1, 1929, numbered twenty-one, consisting of one herd boar, five breeding sows and fifteen young feeders. During the month of March five litters were born, averaging ten pigs each. Owing to the very cold weather at time of farrowing the losses were heavy, sixteen pigs dying when very young. Only one litter was raised in the fall, the other four sows losing their pigs after being turned out to pasture. It is believed this was caused by ringing the sows after they became pregnant, just before turning them to pasture. A similar loss occurred with one sow the previous year. Another condition which cut down the profits was the losses due to crippling, it being necessary early in the year to slaughter nine out of the fifteen feeder pigs that were hopelessly afflicted with this disease.

Six boars and twelve sows were sold for breeding purposes, nine for feeders and twelve for bacon. There were on hand at the end of the year one herd boar, five breeding sows and six young boar pigs. The three younger sows are entered in the Advanced Registry policy for Swine.

The meal mixture for the breeding hogs was made up of 100 pounds of wheat bran, 200 pounds of wheat middlings, 100 pounds of ground oats and 40 pounds of oil meal. The average cost per hundred pounds was $2.15. Apples and mangels were fed during the fall, winter and spring months and skim-milk was fed to the sows while nursing their young. During the summer months the sows were out to pasture, which was charged at 50 cents per month.

The following table shows the feed consumption and maintenance costs of the mature breeding swine for the year:—

FEED CONSUMED BY MATURE BREEDING SWINE FOR THE YEAR 1929

—	Herd boar	Kentville Bonnie	Kentville Rose	Kentville Rose's Princess	Kentville Rose's Beauty	Kentville Rose's Lass
Age..... yr.	1	4·5	5	1	1	1
Number of days fed.....	365	365	365	365	365	365
Total meal eaten (at $2.15 per cwt.). lb.	1,820	1,900	1,705	1,648	1,600	1,675
Average meal eaten per day..... lb.	5	5·3	4·7	4·5	4·4	4·6
Total mangels eaten (at $3.20 per ton)lb.	2,891	2,639	2,639	2,600	2,600	2,600
Total skim-milk eaten (at 20 cents per cwt.)..... lb.	.....	674	777	1,370	1,370	1,370
Months on pasture (at 50 cents per month).....	.....	3	4	4	4	4
Total cost of feed..... $	43 76	47 92	44 43	44 33	43 30	44 91
Average cost per day..... ct.	12·0	13·1	12·2	12·1	11·9	12·3

COST OF PORK PRODUCTION

Five Yorkshire pigs six weeks old were fed for 168 days, and fitted for the bacon market. These were all from one litter and were fed to obtain data for the advanced registry of the dam. The following data relative to the cost of production were obtained.

COST OF PORK PRODUCTION

Value of 5 pigs at beginning of test at $5 each.....	$	25 00
5,552 pounds of skim-milk at 20 cents per cwt.....	$	11 10
2,872 pounds of meal at $2.44 per cwt.....	$	70 08
Commission for selling at 1 per cent.....	$	1 04
Total cost of 5 pigs delivered.....	$	107 22
Value of 4 pigs sold for bacon.....	$	104 46
Value of one pig held for further feeding.....	$	26 00
Total sale value of 5 pigs.....	$	130 46
Profit over feed and cost of pigs.....	$	23 24
Average profit per pig.....	$	4 65
Total weight of pigs at beginning of test.....	lb.	122
Average weight of pigs at beginning of test.....	lb.	24·4
Total weight of pigs at end of 168 days.....	lb.	1,104
Average weight of pigs at end of 168 days.....	lb.	221
Total gain in 168 days.....	lb.	982
Average gain per pig in 168 days.....	lb.	196·4
Average daily gain per pig.....	lb.	1·17
Average cost per pound of gain.....	ct.	8·27

MANGELS VS. APPLES FOR GROWING PIGS

To determine the comparative value of mangels and apples in the ration of growing pigs, eight Yorkshire pigs were divided into two lots of four pigs each. Lot 1 was fed meal and mangels and lot 2 was fed an equal amount of meal and waste apples. The following data were obtained:—

RESULTS FROM FEEDING MANGELS AND APPLES

Items	Lot 1 Meal and mangels	Lot 2 Meal and apples
Number of pigs in lot.....	4	4
Number of days in test.....	90	90
Total weight at start..... lb.	128	131
Total weight at finish..... lb.	335	346
Total gain..... lb.	207	215
Average gain per pig..... lb.	51·7	53·7
Cost of one pound of gain..... ct.	8	7·7

The results of this test would show that apples can be used with advantage in the growing of hogs.

FIELD HUSBANDRY

Work started on the land May 3, when an area was prepared for steckling turnips. These were planted May 4. Ploughing in the orchard began May 6, and the first oats, peas and vetches was seeded May 9. Farm work was fairly general by May 11. Conditions for the germination of seeds were good, and early growth was quite rapid. The dry weather of July and August, when the rainfall was 2·51 inches less than the average for the previous fourteen years, had a very serious effect on crops, especially roots, with the result that yields of turnips, mangels, etc., were very low. The mangel yield was the lowest in eight years, and the turnip yield the lowest but two since the Station's inception. Grain and hay crops did not suffer to the same extent as root crops, and fair yields of both were secured. Corn suffered somewhat from lack of moisture, and the yield, especially on the "Comparison of Fodder Crops" plots, was low.

The roots harvested were: turnips, 2,352·4 bushels; mangels, 1,544 bushels; carrots, 322·4 bushels, and sugar beets, 40 bushels; a total of 4,258·8 bushels. The corn ensiled amounted to 193 tons, and the sunflowers to 8 tons; a total of 201 tons of ensilage. The following grain was harvested: oats, 1,011 bushels; barley, 68 bushels; wheat, 11 bushels; a total of 1,090 bushels. The hay (clover and timothy) amounted to 103 tons, and the alfalfa to 11 tons; a total of 114 tons.

A COMPARISON OF DIFFERENT FODDER CROPS

This test was begun in 1922 and has been carried out each year since that time. It consists of the growing on half-acre plots of mangels, turnips, corn, sunflowers, and oats, peas and vetches, the plots all being treated alike as to cultivation and fertilization, and being selected with due regard to uniformity. The test has for its object the determination of the average yields and the costs of production.

The yields this year were exceptionally low owing to the very dry weather during a large part of the growing season. The land used for this work in 1929 had been in oats in 1928, and was seeded to clover and timothy. Weather conditions during the winter of 1928-29 were very unfavourable to the young clover and timothy plants, and in the spring it was found that practically all the plants had been thrown out of the ground and there was no prospect of a crop of hay. Fifteen tons of manure were applied per acre and the land ploughed, prepared for seeding, and 900 pounds per acre of a 5-8-5 fertilizer applied. This was worked into the soil with the smoothing harrow, and rows were then run with the horse hoe for turnips and mangels. These rows were lightly rolled previous to seeding, which was done with garden drills. The corn and sunflowers were seeded with the grain drill. The varieties used were Hall's Westbury turnip, Danish Sludstrup mangel, Longfellow corn, and Mammoth Russian sunflower. The O.P.V. was mixed as follows: oats, 2½ bushels; peas, ½ bushel; and vetches, ⅓ bushel. The following amounts of seed were used per acre: turnip, 3 pounds; mangels, 15 pounds; corn, 30 pounds; sunflower, 15 pounds; and O.P.V., 3 bushels. Seeding was done May 29, except of corn and sunflower, which were seeded June 7. Corn and sunflowers were harvested September 25; mangels, October 10; O.P.V., August 10; and turnips, November 4.

In figuring production costs manure is valued at $2 per ton, spread, and 40 per cent of the cost is charged to the first crop of the rotation. Labour is charged at 30 cents per hour. Ten cents per hour is allowed for each horse, $1.25 for tractor and operator per hour, and $2.85 per acre is charged for the use of machinery. The land rental is based on a valuation of $50 per acre at 6 per cent interest.

The yield of oats following these crops grown in 1928 is reported in one of the tables, these records being kept to secure information as to the growth following each of these crops.

COST PER ACRE OF PRODUCING CORN

Item	1929	Average, 1922–1929
	$ cts.	$ cts.
Rent	3 00	3 00
Manure and fertilizer	27 30	21 48
Seed	1 60	1 36
Machinery	2 85	2 62
Twine	0 51	0 53
Manual labour	15 70	19 54
Horse and tractor labour	6 42	6 20
Gasoline and oil	1 15	1 05
Total cost per acre	58 53	55 78
Yield per acre ..... tons	10·04	16·90
Cost per ton ..... $	5 83	3 30

COST PER ACRE OF PRODUCING SUNFLOWERS

Item	1929	Average, 1922–1929
	$ cts.	$ cts.
Rent	3 00	3 00
Manure and fertilizer	27 30	21 48
Seed	1 80	1 48
Machinery	2 85	2 62
Twine	0 51	0 53
Manual labour	18 00	26 44
Horse and tractor labour	6 42	6 51
Gasoline and oil	1 15	1 23
Total cost per acre	61 03	63 29
Yield per acre ..... tons	10·69	19·36
Cost per ton ..... $	5 70	3 27

COST PER ACRE OF PRODUCING TURNIPS

Item	1929	Average, 1922–1929
	$ cts.	$ cts.
Rent	3 00	3 00
Manure and fertilizer	27 30	21 48
Seed	1 50	1 11
Machinery	2 85	2 62
Manual labour	31 00	35 44
Horse and tractor labour	6 20	6 37
Total cost per acre	71 85	70 02
Yield per acre ..... bush.	546·0	647·3
Cost per bushel ..... cents	13·2	10·8
Yield per acre ..... tons	13·65	16·18
Cost per ton ..... $	5 26	4 33

COST PER ACRE OF PRODUCING MANGELS

Item	1929	Average, 1922–1929
	$ cts.	$ cts.
Rent	3 00	3 00
Manure and fertilizer	27 30	21 48
Seed	3 60	3 06
Machinery	2 85	2 62
Manual labour	29 50	34 09
Horse and tractor labour	6 20	6 42
Total cost per acre	72 45	70 67
Yield per acre ..... bush.	487·4	749·5
Cost per bushel ..... cents	14·9	9·4
Yield per acre ..... tons	12·19	18·74
Cost per ton ..... $	5 94	3 77

COST PER ACRE OF PRODUCING O.P.V.

Item	1929	Average, 1922–1929
	$ cts.	$ cts.
Rent	3 00	3 00
Manure and fertilizer	27 30	21 48
Seed	4 70	4 73
Machinery	2 85	2 39
Manual labour	5 55	6 43
Horse and tractor labour	4 50	3 95
Gasoline and oil	0 40	0 52
Total cost per acre	48 30	42 50
Yield per acre ..... tons	5·63	7·60
Cost per ton ..... $	8 58	5 60

SUMMARY—COMPARISON OF DIFFERENT FODDER CROPS

Year	Yield per acre				
	Corn	Sunflower	Turnip	Mangel	O.P.V.
	ton	ton	ton	ton	ton
1922	19·92	20·80	21·28	17·59	5·01
1923	14·00	19·80	19·14	16·47	8·26
1924	13·31	18·13	13·41	19·62	4·95
1925	23·18	27·50	17·37	25·56	10·30
1926	16·86	17·44	16·63	19·30	7·40
1927	15·56	20·98	12·46	18·47	10·70
1928	21·39	19·56	15·53	20·70	8·51
1929	10·04	10·69	13·65	12·19	5·63
Average yield per acre	16·89	19·36	16·18	18·74	7·59

Cost per acre

	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
1922	60 78	63 73	69 34	69 89	47 37
1923	45 32	53 91	58 25	69 60	30 44
1924	56 57	69 70	69 34	72 08	41 46
1925	60 55	73 59	80 84	77 52	43 48
1926	54 93	61 25	66 35	67 90	38 43
1927	52 51	63 90	68 76	63 76	43 21
1928	57 23	59 18	75 48	72 20	47 32
1929	58 53	61 03	71 85	72 45	48 30
Average cost per acre	55 80	63 29	70 03	70 67	42 50
Average cost per ton	3 30	3 27	4 33	3 77	5 60

COST PER ACRE OF PRODUCING OATS

Item	1929	Average, 1922–1929
	$ cts.	$ cts.
Rent	3 00	3 00
Manure and fertilizer	13 00	12 03
Seed	3 00	2 96
Machinery	2 85	2 38
Twine	0 51	0 54
Manual labour	4 58	7 04
Horse and tractor labour	4 80	3 95
Total cost per acre	31 74	31 90
Yield per acre: grain ..... bush.	62·8	63·1
straw ..... tons	1·47	1·34
Cost per bushel after deducting value of straw at $6 per ton ..... ct.	36·5	37·8

COST PER ACRE OF PRODUCING CLOVER HAY

Item	1929	Average, 1922–1929
	$ cts.	$ cts.
Rent	3 00	3 00
Manure	6 00	6 13
Seed	3 72	3 56
Machinery	2 85	2 85
Manual labour	6 53	7 79
Horse labour	1 28	1 50
Total cost per acre	23 38	24 83
Yield per acre ..... tons	2·14	2·72
Cost per ton ..... $	10 93	9 13

YIELD OF VICTORY OATS FOLLOWING DIFFERENT FODDER CROPS

1928		1929		
Crop	Yield per acre	Crop	Yield per acre	
			Grain	Straw
	tons		bush.	tons
O. P. V.	8·51	Victory oats	62·7	1·59
Sunflowers	19·56	Victory oats	63·0	1·36
Corn	21·39	Victory oats	54·2	1·17
Mangels	20·70	Victory oats	68·1	1·35
Turnips	15·53	Victory oats	42·06	0·82

CROP ROTATIONS

Crop rotations of various lengths and with different sequences of crops are being tested under different soil treatments, and the annual results tabulated. These will be published when sufficient data of value are accumulated.

HORTICULTURE

APPLES

PRUNING

Pruning of the young, rapidly growing apple tree is advocated so that a suitable framework will be developed upon which in later years heavy crops of fruit may be borne without serious losses from weak crotches resulting from broken or split branches. An annual pruning of young apple trees is necessary to remove suckers, broken, crossing or interfering branches, to correct weak crotches by cutting out one branch, and to keep the branches thin enough on the trunk so that all that are left will be well spaced and have sufficient room to develop good support branches. After the second year, if the main branches are not developing strong lateral growth to form the framework, a heading-in of the stronger branches may be necessary. To develop an evenly balanced tree the weak branches should be pruned very lightly, if at all, and the strong branches should be controlled by a vigorous heading back of the main and lateral branches.

Pruning of apple trees that have reached the bearing age also requires annual attention. As the age of the apple tree increases the tendency is for it to make, even in good soil, less terminal growth. A vigorous terminal growth is essential for the development of new fruit spurs which later will take the place of the weaker spurs on older branches. The thinning out of the smaller lateral branches stimulates growth on the remaining lateral branches on which strong fruit spurs will be developed.

Annual renewal pruning not only increases the tendency of weak trees to form fruit buds, but it may to an even greater extent increase the percentage of developing blossoms that will set fruit, and will materially assist in increasing the size of the fruit that does set.

It is the endeavour at this Station, by judicious pruning, to maintain the maximum vigour of the trees by thinning out weak wood, without, however, reducing the size of the trees below that which gives the largest well-exposed bearing surface upon which high-grade fruit can be borne.

ORCHARD CULTIVATION

The sod-belt method of cultivation has been adopted in most of the Station orchards since 1921. This method allows a strip of sod to develop equally on either side of the row of trees to a width that permits of cultivation without injury to the spreading branches. The grass growing in this sod strip is cut twice, mid-June and mid-August, during the growing season, to prevent excessive transpiration of the soil moisture, and is left as a mulch about the trees. Outside of this strip of sod cultivation is practised. In the apple, plum and cherry orchards where the trees are planted 20 feet by 20 feet the entire area between these sod strips was ploughed in the autumn of 1928 and cultivated as soon as the soil would permit in the spring. Cultivation continued until early July. In the orchard that is set 40 feet by 20 feet some inter-crops are still grown, necessitating a bare strip 8 feet to 10 feet wide between the inter-crop and the branches of the apple trees, to permit of the passage of the sprayer on either side of the apple row. This strip is cultivated until early July. Autumn ploughing is followed, allowing the weed growth or cover crop to be incorporated in the soil in a more succulent condition and aiding in the destruction of the apple-scab fungus by turning under the leaves in the late autumn. Early spring cultivation as soon as the soil will permit aids in the retention of soil moisture and in the more rapid formation of nitrate nitrogen for the rapidly developing leaf growth and blossom buds.

ORCHARD FERTILIZATION

Commercial fertilizers are applied annually to the orchards at this Station. Cultivation was general in the orchard by May 6, and the fruit buds were at the pre-pink stage by the 16th. The fertilizer was applied from the 14th to the 18th of May, which was after the soil had dried out sufficiently for cultivation and when the fruit buds were expanding. The application of fertilizers to the orchard before the soil has dried out sufficiently to permit of cultivation is not advised. The fertilizer used was composed of 200 pounds each of nitrate of soda and sulphate of ammonia, 300 pounds of superphosphate and 100 pounds of muriate of potash, which would approximate an 8.8-5.6-6.2 fertilizer. The trees set 40 feet by 20 feet and 16 years planted received the above mixture at the rate of 8 pounds per tree, or 432 pounds per acre. Trees of the same age in the close-planted block, where the trees are set 20 feet by 20 feet, received 7 pounds per tree, or 765 pounds per acre, while in the mature orchard, where the trees are 30 years or older and set 33 feet by 33 feet, or 40 trees to the acre, the fertilizer was applied at the rate of 600 pounds per acre. In the close-planted orchard, and where the trees are headed low, the fertilizer was carefully sown by hand to an area of soil under and about each tree to a few feet beyond the spread of its branches. Where the trees are headed higher in the mature orchard a distributor was used for sowing the fertilizer. Only one application of fertilizers was made.

ORCHARD: SOIL MANAGEMENT, AND FERTILIZERS APPLIED AT DIFFERENT DATES

This experiment has two objects in view: one to determine the value of different methods of tillage, and the other to determine the best time for applying fertilizers to the orchard. The trees used were McIntosh and Wagener alternating, spaced 20 feet apart in the row and the rows 20 feet apart. Up to the spring of 1924 all the trees had received similar treatment and were fertilized alike. The trees were set in 1915, and were given clean cultivation until 1921, when a strip of grass six feet wide under the trees was allowed to remain uncultivated. These strips were clipped in mid-June and again in mid-August, and the clippings allowed to remain as a mulch. The area outside of the strips was cultivated to July 1. By 1924 the grass strip had widened to 8 feet (4 feet at each side of the tree-row), a space of 8 feet on each side of the grass strips was cultivated, and the areas between the cultivated rows were in a three-year rotation of field crops.

In 1924 the cultivated strips on either side of the tree were seeded down in one row and have not been cultivated since. Another row was left with the sod strip, and has been cultivated at each side of the strip to July 1. A third was ploughed, and has been kept cultivated close to the tree and for a distance as wide as that with the sod strip cultivation. The grass on the areas in sod was cut twice each season and allowed to remain as a mulch. No additional mulching material has been used.

Under the clean and partial cultivation treatments the trees show a better and more healthy foliage, with better growth conditions and larger fruit than the trees in sod. The trees in sod show the effect of dry weather in a marked degree, as was evidenced during the dry summers of this and the previous year.

The three rows under the different methods of management were each divided into four plots of five trees each, and the same fertilizer was applied to one plot in each row on April 25, to another three plots, May 17, and to another three plots June 8, one plot in each row being left unfertilized. The fertilizer used was made up of 150 pounds of nitrate of soda, 300 pounds of superphosphate and 50 pounds of muriate of potash, which is a 4.5-9.6-5 fertilizer. This was used at the rate of 5 pounds per tree in 1924, 1925 and 1926, and 7 pounds per tree in 1927 and 1928. In 1929 the regular orchard fertilizer mixture used on

the Station orchards, 200 pounds of nitrate of soda, 200 pounds of sulphate of ammonia, 300 pounds of superphosphate and 100 pounds of muriate of potash, was applied at the rate of 8 pounds per tree. The fertilizer is applied broadcast around each tree to cover the area occupied by the roots of the tree, a distance around and under the tree three feet greater than the spread of the branches.

The early application of fertilizers to the orchard is not advised, as at that time in most orchards it is difficult to move readily because of the ground being soft. The time that suits the best is about the middle of May, and the practice of applying fertilizer from the 10th to the middle of May is, we think, satisfactory. The results indicate that the best yields were obtained from the plots fertilized on June 8. This we should think to be too late, and advise the mid-May application until further data are secured on this point.

The yields in the table below are the average of two trees each of McIntosh and Wagener from each plot, for the six years since this experiment started. The value of the McIntosh is calculated at $3 and of the Wagener at $2.50 per barrel, tree run. The trees are calipered each year at a distance of ten inches from the ground, and the average diameter of these two trees is given in the table. These trees are planted 54 to the acre, so that the yield per acre of each variety is calculated on the basis of 27 trees of the variety per acre.

ORCHARD: SOIL MANAGEMENT, AND FERTILIZERS APPLIED AT DIFFERENT DATES—RESULTS, 1929

Plot	When fertilized	Variety	Average diameter of trees at present	Average yield per tree since 1924	Average yield per acre since 1924	Value of apples per acre since 1924	Cost of fertilizer per acre since 1924	Value of apples above cost of fertilizer
			in.	brl.	brl.	$	$	$
	Grass Mulch Method							
100	Not fertilized	McIntosh	6·50	5·17	139·59	418 77		418 77
		Wagener*	6·25	2·32	62·64	156 60		156 60
101	April 25	McIntosh	6·56	7·32	197·64	592 92		575 86
		Wagener	6·56	6·41	173·07	432 67	34 12	415 61
102	May 17	McIntosh	6·63	8·47	228·69	686 07		669 01
		Wagener*	6·77	4·09	110·43	276 07	34 12	259 01
103	June 8	McIntosh	7·56	11·04	298·08	894 24		877 18
		Wagener	5·74	2·64	71·28	178 20	34 12	161 14
	Sod Belt Method							
105	Not fertilized	McIntosh	7·24	8·82	238·14	714 42		714 42
		Wagener	6·12	4·48	120·96	302 40		302 40
104	April 25	McIntosh	6·77	9·85	265·95	797 85		780 79
		Wagener	6·24	5·00	135·00	337 50	34 12	320 44
106	May 17	McIntosh	6·28	9·94	268·38	805 14		788 08
		Wagener*	6·55	3·77	101·79	254 47	34 12	237 41
107	June 8	McIntosh	7·13	14·55	392·85	1,178 55		1,161 49
		Wagener*	6·75	7·55	203·85	509 62	34 12	492 56
	Clean Cultivation Method							
111	Not fertilized	McIntosh	8·13	11·28	304·56	913 68		913 68
		Wagener	6·68	4·16	112·32	280 80		280 80
108	April 25	McIntosh	7·65	7·83	211·41	634 23		617 17
		Wagener*	7·75	5·98	161·46	403 65	34 12	386 59
109	May 17	McIntosh	7·93	7·90	213·30	639 90		622 84
		Wagener*	6·12	4·89	132·03	330 07	34 12	313 01
110	June 8	McIntosh	7·06	7·36	198·72	596 16		579 10
		Wagener	6·68	5·52	149·04	372 60	34 12	355 54

* Records from one tree only.

NITROGENEOUS FERTILIZERS FOR APPLE TREES

This experiment, begun in 1927, is an attempt to determine the relative values for apple production of the different nitrogenous fertilizers offered commercially. The same amount of nitrogen is given to each tree. Nitrate of soda and nitrate of lime, each containing 15 per cent of nitrogen, are applied in spring at the rate of 5 pounds per tree; sulphate of ammonia, 20 per cent nitrogen, 3¾ pounds per tree, and cyanamide, 21·5 per cent nitrogen, 3½ pounds per tree.

In addition to the nitrogenous fertilizer each tree receives in spring 2 pounds of superphosphate and 1 pound of muriate of potash, except in plot 6, which receives no fertilizers of any kind. Plot 5 does not receive any nitrogenous fertilizer. (The fertilizers were applied on May 4 in 1927, and on May 14 in 1928 and 1929.)

The experiment is conducted on three varieties of apple, Baldwin, King, and Wagener, all planted in 1915. These trees are 20 feet apart in rows 40 feet apart, the Wageners being used as fillers in Baldwin and King rows. This makes 54 trees per acre, 27 Baldwin or King alternated with 27 Wageners.

The records given in the table are the average of four Baldwin and four King trees, and eight Wageners. The Baldwin and King are valued at $3.50 per barrel, tree run, and the Wagener at $3.

NITROGENOUS FERTILIZERS FOR APPLE TREES: RESULTS, 1929

Plot	Pounds of fertilizer applied per tree yearly	Variety	Average diameter of trees at present	Average yield per tree since 1927	Average yield per acre (27 trees) since 1927	Value of apples per acre (27 trees) since 1927	Cost of fertilizer per acre (27 trees) since 1927	Value of apples above cost of fertilizer
			in.	brl.	brl.	$	$	$
1	Nitrate of soda, 5; superphosphate, 2; muriate of potash, 1.	Baldwin	8·36	5·26	142·02	497 07	14 82	482 25
		King*	8·07	5·46	147·42	515 97	14 82	501 15
		Wagener	6·43	4·66	125·92	377 76	14 82	362 94
2	Cyamide, 3¼; superbosphate, 2; muriate of potash, 1.	Baldwin	8·59	5·25	141·75	496 12	11 58	484 54
		King**	9·35	4·94	133·38	466 83	11 58	455 25
		Wagener	6·35	3·74	100·98	302 94	11 58	291 36
3	Superphosphate, 2; muriate of potash, 1.	Baldwin	8·37	3·04	82·08	287 28	3 08	284 20
		King	8·68	4·27	115·29	403 51	3 08	400 43
		Wagener	6·20	3·53	95·31	285 93	3 08	282 85
4	Sulphate of ammonia, 3¾; superphosphate, 2; muriate of potash 1.	Baldwin	7·77	3·97	107·19	375 16	11 88	363 28
		King	8·60	3·64	98·28	343 98	11 88	332 10
		Wagener***	6·36	4·68	126·36	379 08	11 88	367 20
5	Nitrate of lime, 5; superphosphate, 2; muriate of potash, 1.	Baldwin	8·00	6·54	176·58	618 03	14 82	603 21
		King*	8·82	7·32	197·64	691 74	41 82	676 92
		Wagener***	5·82	4·26	115·02	345 06	14 82	330 24
6	Not fertilized	Baldwin	8·46	3·95	106·55	373 27	.....	373 27
		King*	8·77	3·10	83·70	292 95	.....	292 95
		Wagener	6·49	4·82	130·14	390 42	.....	390 42

* Records from two trees only.
** Records from three trees only.
*** Records from seven trees only.

ORCHARD FERTILIZER EXPERIMENT

The object of this experiment is to gain information as to the best fertilizers for apple production. The experiment embraces a series of forty-two plots fertilized in different ways, and nine unfertilized or check plots located in different parts of the area.

Records have been kept from the time of planting the trees in 1913. The ground not occupied by the growing trees has been in rotation with potatoes,

grain, and hay, and summaries of the yields of these crops have been published in the Station reports for 1923 (p. 59) and 1925 (p. 69). The apple trees are in rows, forty feet apart, of Gravenstein and McIntosh, with Wagener as fillers in each row, the trees in the row being 20 feet apart, making 54 trees to the acre. Each plot consists of four trees fully separated from adjacent plots. These four trees consist of two Gravenstein or two McIntosh alternated with two Wagener, and the yields tabulated are of these four trees in each plot. Plots 1 to 24 were started in 1913, and the others in 1916.

From 1913 to 1922, while the trees were still small, the fertilizers were applied only the first and second years of the rotation; consequently there were no fertilizer applications in 1915, 1918, or 1921. The manure application, 15 tons per acre, was made at the beginning of each three-year rotation. From 1922 onwards annual applications of the commercial fertilizers and 5 tons per acre of manure have been made. Ground limestone at the rate of two tons per acre was applied to the plots indicated in 1916, 1919, 1923, 1926, and 1929.

The fertilizers have been charged at the average market prices prevailing during the period, which were, per ton, approximately: nitrate of soda, $66; sulphate of ammonia, $70; superphosphate, $21; slag, $22.50; muriate of potash, $42; bone meal, $45; ground limestone, $4.25. Manure has been charged at $2 per ton. The value of the apples is calculated on an average tree-run valuation for the period of $3 for Gravenstein and McIntosh and $2.50 for Wagener, per barrel.

The table records for each plot the present diameter of the trees, the total production to date, the total cost of the fertilizers, and the value of the apples above the cost of fertilizers.

ORCHARD FERTILIZER EXPERIMENT: TOTAL FRUIT YIELDS, ETC., FROM PLANTING (1913) TO 1929

Plot	How fertilized, pounds per acre	Variety	Average diameter of trees at present	Average yield per tree since planting	Average yield per acre since planting	Value of apples per acre since planting	Cost of fertilizer per acre since planting	Value of apples above cost of fertilizer
			in.	brl.	brl.	$	$	$
1	Nitrate of soda, 150; superphosphate, 350; muriate of potash, 150.	Gravenstein..	8·32	4·89	132·03	396 09	164 85	313 66
		Wagener.....	6·45	4·77	128·79	321 97		239 55
2	Nitrate of soda, 150; slag, 500; muriate of potash, 150.	Gravenstein..	9·44	9·81	264·87	794 61	192 15	698 53
		Wagener.....	6·65	6·40	172·80	432 00		335 93
3	Nitrate of soda, 150; bone meal, 500; muriate of potash, 150.	Gravenstein..	9·53	6·83	184·41	553 23	270 90	417 78
		Wagener.....	7·06	6·20	167·40	418 50		283 05
4	Sulphate of ammonia, 150; superphosphate, 350; muriate of potash 150.	Gravenstein..	9·97	6·65	179·55	538 65	169 05	454 12
		Wagener.....	7·15	6·41	173·07	432 67		348 15
5	Nitrate of soda, 150; superphosphate 350; muriate of potash, 100.	Gravenstein..	9·67	9·54	257·58	772 74	150 15	697 66
		Wagener.....	7·06	7·23	195·21	488 02		412 95
6	Check.....	Gravenstein..	9·41	6·28	169·56	508 68		508 68
		Wagener.....	6·53	2·91	78·57	196 42		196 42
7	Nitrate of soda, 93·2; superphosphate, 215·4; muriate of potash, 92·3.	Gravenstein..	8·53	5·80	156·60	469 80	101 45	419 07
		Wagener.....	7·79	9·61	259·47	648 67		597 95
8	Nitrate of soda, 138·5; superphosphate, 323; muriate of potash, 138·5.	Gravenstein..	9·40	7·81	210·87	632 61	152 19	556 51
		Wagener.....	7·18	4·16	112·32	280 80		204 71
9	Nitrato of soda, 150; superphosphate, 350; muriate of potash, 60.	Gravenstein..	9·21	7·80	210·60	631 80	138 39	562 60
		Wagener.....	7·01	6·66	179·82	449 55		380 36
10	Nitrate of soda, 150.....	Gravenstein..	10·65	7·45	201·15	603 45	69 30	568 80
		Wagener.....	5·93	5·90	159·30	398 25		363 60
11	Check.....	Gravenstein..	10·31	9·75	263·25	789 75	.....	789 75
		Wagener.....	6·02	2·58	69·66	174 15		174 15
12	Nitrate of soda, 184·6; superphosphate, 430·8; muriate of potash, 184·6.	Gravenstein..	9·97	9·16	247·32	741 96	202 90	640 51
		Wagener.....	6·52	6·92	186·84	467 10		365 65

ORCHARD FERTILIZER EXPERIMENT: TOTAL FRUIT YIELDS ETC., FROM PLANTING (1913) TO 1929—*Continued*

Plot	How fertilized, pounds per acre	Variety	Average diameter of trees at present	Average yield per tree since planting	Average yield per acre since planting	Value of apples per acre since planting	Cost of fertilizer per acre since planting	Value of apples above cost of fertilizer
			in.	brl.	brl.	$	$	$
13	Nitrate of soda, 150; superphosphate, 350; muriate of potash, 30.	Gravenstein..	9·29	8·29	223·83	671 49	129 57	606·70
		Wagener.....	5·87	4·50	121·50	303 75		238 97
14	Check.....	Gravenstein..	8·05	5·73	154·71	464 13	.....	464 13
		Wagener.....	6·60	4·44	119·88	299 70		299 70
15	Muriate of potash, 150.....	Gravenstein..	8·34	10·26	277·02	831 06	44 10	809·01
		Wagener.....	6·00	5·97	161·19	402 97		380 92
16	Nitrate of soda, 150; superphosphate, 350; muriate of potash, 150.	Gravenstein..	9·72	10·39	280·53	841 59	164 85	759 16
		Wagener.....	7·09	8·75	236·25	590 62		508 20
17	Superphosphate, 350.....	Gravenstein..	9·68	8·50	229·50	688 50	51 45	662 77
		Wagener*.....	5·38	3·56	96·12	24 03		−1 69
18	Bonemeal, 500.....	Gravenstein..	9·21	8·50	229·50	688 50	157 50	609·75
		Wagener.....	7·74	8·67	234·09	585 22		506 47
19	Check.....	Gravenstein..	9·55	13·90	375 30	1,125 90	.....	1,125 90
		Wagener.....	6·15	6·58	177·66	444 15		444 15
20	Superphosphate 350; muriate of potash, 150.	Gravenstein..	9·43	10·97	296·19	888 57	95 55	840 79
		Wagener.....	7·34	6·85	184 95	462 37		414 60
21	Slag, 500.....	Gravenstein*.	9·90	12·61	340·47	1,021 41	78 75	982 03
		Wagener.....	7·21	9·83	265·41	663 52		624 15
22	Nitrate of soda, 150; slag, 500.....	Gravenstein..	10·95	12·69	342·63	1,027 89	148 05	953 86
		Wagener.....	7·53	11·59	312·93	782 32		708 30
23	Nitrate of soda, 150; muriate of potash, 150.	Gravenstein..	9·87	11·77	317·79	953 37	113 40	896 67
		Wagener.....	7·71	10·57	285 39	713 47		656 77
24	Nitrate of soda, 150; superphosphate, 350.	Gravenstein..	9·59	10·39	280·53	841 59	120 75	781 21
		Wagener.....	6·62	4·68	126·36	315 90		255 53
25	Manure (5 tons).....	Gravenstein..	9·20	8·32	222 ·64	667 92	170 00	582 92
		Wagener.....	6·81	6·45	174 ·15	435 37		350 37
26	Check.....	Gravenstein..	9·88	5·71	154·17	462 51	.....	462 51
		Wagener.....	5·50	3·22	86·94	21 73		21 73
27	Superphosphate, 250; slag, 250; manure, (5 tons).	Gravenstein..	9·91	11·01	297·27	891 81	246 12	768 75
		Wagener.....	6·09	9·11	245·97	614 92		491 86
28	Slag, 500; limestone (2 tons); manure (5 tons).	Gravenstein*.	9·44	12·07	325·89	977 67	291 25	832 04
		Wagener.....	6·64	5·58	150·66	376 65		231 03
29	Superphosphate, 250; limestone (2 tons); slag, 250; manure (5 tons).	Gravenstein*.	10·70	11·32	305·64	916 92	288·62	772·61
		Wagener.....	7·03	8·97	242·19	605 47		461 16
30	Slag, 500; manure (5 tons).....	Gravenstein..	9·58	6·86	185·22	555 66	248·75	431 28
		Wagener.....	6·81	6·28	169·56	423 90		299 53
31	Superphosphate, 500; manure (5 tons).	Gravenstein..	9·06	8·18	220·86	662 58	243 50	540 83
		Wagener.....	6·01	7·81	210·87	527 17		405 42
32	Limestone (2 tons); manure (5 tons)	Gravenstein..	9·62	6·76	182·52	547 56	212 50	441 31
		Wagener.....	7·34	6·40	172·80	432 00		325 75
33	Superphosphate, 500; limestone (2 tons); manure (5 tons).	Gravenstein..	10·96	8·95	241 65	724 95	286 00	581 95
		Wagener.....	7·59	6·22	167·94	419 85		276 85
34	Check.....	Gravenstein..	8·89	9·45	255·15	765 45	.....	765 45
		Wagener.....	6·87	5·10	137·70	344 25		344 25
35	Slag, 500; manure (5 tons).....	McIntosh.....	6·00	6·39	172·53	517 59	248 75	393 21
		Wagener.....	6·46	7·19	194·13	485 32		360 95
36	Nitrate of soda, 150; limestone (2 tons); slag, 500.	McIntosh.....	7·53	6·64	179·28	537 84	190 55	442 56
		Wagener.....	5·13	2·48	66·96	167 40		72 13
37	Nitrate of soda, 150; superphosphate, 250; slag, 250; limestone (2 tons).	McIntosh.....	6·83	9·41	254·07	772 21	187 92	678 25
		Wagener.....	7·23	5·78	156·06	390 15		296 19
38	Slag, 500; limestone (2 tons).....	McIntosh.....	9·40	11·72	316·44	949 32	121 25	888 69
		Wagener.....	6·67	4·81	129·87	324 67		264 05
39	Nitrate of soda, 150; slag, 500; muriate of potash, 150; limestone, (2 tons).	McIntosh.....	7·99	19·55	527 85	1,583 55	234 65	1,466 22
		Wagener*.....	7·18	8·98	242·46	606 15		488 83
40	Check.....	McIntosh.....	7·05	8·25	222·75	668 15	.....	668 15
		Wagener*.....	6·06	3·84	103·68	259 20		259 20

ORCHARD FERTILIZER EXPERIMENT: TOTAL FRUIT YIELDS ETC., FROM PLANTING (1913) TO 1929—*Concluded*

Plot	How fertilized, pounds per acre	Variety	Average diameter of trees at present	Average yield per tree since planting	Average yield per acre since planting	Value of apples per acre since planting	Cost of fertilizer per acre since planting	Value of apples above cost of fertilizer
			in.	brl.	brl.	$	$	$
41	Nitrate of soda, 150; superphosphate, 500; limettone (2 tons).	McIntosh	6·92	5·93	160·11	480 33	185 30	387 68
		Wagener	6·34	4·85	130·95	327 37		234 72
42	Nitrate of soda, 150; limestone (2 tons).	McIntosh	8·96	13·66	368·82	1,106 46	111 80	1,050 56
		Wagener	6·64	8·03	216·81	542 02		486 12
43	Superphosphate, 500; limestone (2 tons).	McIntosh	7·75	10·72	289·44	868 32	116 00	810 32
		Wagener	7·05	5·76	155·52	388·80		330 80
44	Check	McIntosh	7·06	12·52	338·04	1,014 12	.....	1,014 12
		Wagener	5·62	3·30	89·10	222·75		222 75
45	Nitrate of soda, 150; slag, 500	McIntosh	7·09	8·07	217·89	653 67	148 05	579 64
		Wagener	5·93	4·34	117·18	292 95		218 93
46	Check	McIntosh	6·74	9·43	254·61	763 83	.....	763 83
		Wagener	5·06	2·91	78·57	196 42		196 42
47	Nitrate of soda, 150; superphosphate, 500; muriate of potash, 150.	McIntosh	7·43	14·80	399·60	1,198 80	186 90	1,105 35
		Wagener	6·67	5·05	136·35	340 87		247 42
48	Limestone (2 tons)	McIntosh	8·38	15·45	417·15	1,251 45	42 50	1,230 20
		Wagener*	5·75	5·73	154·71	386 77		365 52
49	Nitrate of soda, 150; superphosphate, 500.	McIntosh	6·71	9·44	254·88	774 64	142 80	703 24
		Wagener	6·37	6·12	165·24	413 10		341 70
50	Nitrate of soda, 150; slag, 500; muriate of potash, 150.	McIntosh	7·63	16·07	433·89	1,301 67	192 15	1,205 59
		Wagener	6·37	7·32	197·64	494 10		398 03
51	Superphosphate, 500	McIntosh	6·82	10·77	290·79	872 37	73 50	835 62
		Wagener	6·71	6·97	188·19	470 47		433 72

*Records obtained from one tree only.

ORCHARD FERTILIZER EXPERIMENT (1924)

This test was started in 1924 on an orchard set in 1915, composed of Gravenstein apple trees, with Wagener as fillers, the trees set 40 feet by 20 feet. The experiment is an attempt to ascertain the influence of the different fertilizing elements, nitrogen, phosphoric acid and potash, applied separately and in combination. Each plot contains two Gravenstein and two Wagener trees, and there are 27 trees of each variety per acre. The fertilizer is applied broadcast annually in the spring, immediately after the first cultivation, usually about May 20. The sod-belt method of culture has been practised since 1921.

From 1924 to 1928 nitrate of soda was applied at 100, 200, or 400 pounds per acre. It was considered in 1929 that not enough nitrogen was being supplied, and these rates were increased that year to 200, 400, and 600 pounds per acre, respectively. The amounts of superphosphate and muriate of potash were not changed.

The yields in the table below are the average of two trees each of Gravenstein and Wagener in each plot. The apples are valued at $3 for Gravenstein and $2.50 for Wagener, per barrel, tree run. The fertilizers are valued as follows: nitrate of soda, $58; superphosphate, $18, and muriate of potash, $40 per ton.

ORCHARD FERTILIZER EXPERIMENT (1924): TOTAL FRUIT YIELDS, ETC., FROM 1924 TO 1929

Plot	How fertilized, pounds per acre	Variety	Average diameter of trees at present	Average yield per tree since 1924	Average yield per acre since 1924	Value of apples per acre since 1924	Cost of fertilizer per acre since 1924	Value of apples above cost of fertilizer
			in.	brl.	brl.	$	$	$
80	Nitrate of soda, 200; superphosphate, 300; muriate of potash, 100.	Gravenstein..	9·17	6·16	166·32	498 96	48 50	474 71
		Wagener.....	7·03	5·18	139·86	349 65		325 40
81	Nitrate of soda, 400; superphosphosphate, 300; muriate of potash, 100.	Gravenstein..	8·22	6·34	171·18	513 54	68·80	479 14
		Wagener.....	5·68	2·58	69·66	174 15		139 75
82	Superphosphate, 300; muriate of potash, 100.	Gravenstein..	8·81	5·57	150·39	451 17	28 20	437 07
		Wagener.....	7·17	4·69	126·03	316 57		302 47
83	Nitrate of soda, 600; superphosphate, 300; muriate of potash, 100.	Gravenstein..	9·18	8·73	235·71	707 13	103 60	655 33
		Wagener.....	7·06	5·05	136·35	340 87		289 07
84	Nitrate of soda, 200; superphosphate, 300.	Gravenstein..	9·18	9·05	244·35	733 05	36 50	714 80
		Wagener*.....	6·75	6·09	164·43	411 07		392 82
85	Nitrate of soda, 400; superphosphate, 300.	Gravenstein*.	9·06	7·82	211·14	633 42	56 80	605 02
		Wagener.....	6·96	3·94	106·38	265 95		237 55
86	Superphosphate, 300.....	Gravenstein*.	7·12	6·82	184·14	552 42	16 20	544 32
		Wagener.....	7·17	3·83	103·41	258 52		250 42
87	Nitrate of soda, 600; superphosphate, 300.	Gravenstein*.	9·00	11·86	320·22	960 66	91 60	914 86
		Wagener*.....	6·82	7·81	210·87	527 17		481 37
88	Nitrate of soda, 200; muriate of potash, 100.	Gravenstein..	8·52	6·90	186·30	558 90	32 30	542 75
		Wagener.....	6·71	4·99	134·73	336 82		320 67
89	Check, not fertilized.....	Gravenstein..	8·96	7·47	201·69	605 07	.....	605 07
		Wagener*.....	6·31	4·25	114·75	286 87		286 87
90	Nitrate of soda, 400; muriate of potash, 100.	Gravenstein*.	9·12	8·29	223·83	671 49	52 60	645 19
		Wagener.....	7·06	4·84	130·68	326 70		300 40
91	Muriate of potash, 100.....	Gravenstein*.	9·68	5·73	154·71	464 13	12 00	458 13
		Wagener.....	6·40	4·15	112·05	280 12		274 12
92	Nitrate of soda, 600; muriate of potash, 100.	Gravenstein..	8·87	7·35	198·45	595 35	87 40	551 65
		Wagener.....	6·43	4·86	131·22	328 05		284 35
93	Nitrate of soda, 200.....	Gravenstein..	9·52	5·28	142·56	427 68	20 30	417 53
		Wagener.....	6·50	4·39	118·53	296 32		286 17
94	Nitrate of soda, 400.....	Gravenstein..	8·97	7·17	193 59	580 77	40 60	560 47
		Wagener.....	6·95	5·55	149·85	374 62		354 32
95	Nitrate of soda, 600.....	Gravenstein..	8·71	6·36	171·72	515 16	75 40	477 46
		Wagener.....	6·38	3·48	93·96	234 90		197 20

* Records from one tree only.

HIGH-BUSH BLUEBERRIES *(Vaccinium corymbosum)*

Because large areas of land throughout Nova Scotia, including the Annapolis valley, are the natural habitat of the common wild low-bush blueberry, and as the native wild blueberry is becoming an increasingly popular berry upon both local and distant markets, it was thought advisable to test out in a limited way some of the varieties of high-bush blueberries that are being propagated and offered for sale by American nurserymen. In the spring of 1926 an area of land upon which the native low-bush blueberry was thriving was ploughed and prepared for planting to cultivated high-bush blueberries. This soil was a sandy loam, containing a fair proportion of peat, leaf mold and other decaying vegetable matter, and distinctly acid in character. Although the water-table was not so near the surface as is advocated, the soil was well supplied with and retentive of moisture.

The bushes were set out May 31, 1926, in rows eight feet apart and five feet apart in the row. The following table lists the varieties planted and gives some particulars regarding their hardiness, growth and productiveness.

VARIETIES OF HIGH BUSH BLUEBERRIES TESTED AT KENTVILLE

Variety	Number of plants set	Number alive spring, 1927	Condition in September, 1927	Number alive spring, 1928	Condition, growth and fruitfulness, summer, 1928	Number alive spring, 1929	Condition, growth and fruitfulness, summer, 1929
Pioneer	50	39	21 good; 11 replanted, fair: 18, weak.	43	21 plants showed winter injury; 1 quart fruit.	37	Plants made but little growth during dry summer of 1929.
Adams	30	13	17 replanted; 9 good, 4 weak.	29	9 bushes grew well and produced a few fruits each.	19	Only two plants have grown vigorously.
Grover	30	30	16 good, 9 fair, 5 weak	27	9 plants showed considerable winter injury; only few fruited.	24	Foliage lacks colour and plants lack vigour.
Harding	15	15	4 good, 4 fair, 7 weak	12	Plants suffered from winter injury; some fruit.	12	Fruit darker blue and sweeter than others
Sam	8	8	2 good, 6 weak	6	Plants gradually dying from winter injury; a few fruits.	3	Plants upright.
Katherine	6	6	6 good	6	Plants hardy and show vigour; a few fruits.	6	Variety seems hardy but not as yet productive.
Rubel	6	5	5 weak	2	Plants show no vigour; weak and unfruitful.	2	Plants not hardy; some remain alive, but do not thrive.
1232C or Rancocas	5	5	5 good	5	Plants alive and fairly vigorous; no fruit.	5	Plants upright, vigorous, but not as yet productive.
1232B	3	3	2 weak	0	All dead	.....	
Greenfield	4	4	4 alive but weak	4	Slight winter injury at tips of branches; a few fruits.	4	Variety apparently hardy but of low bush character.
Cabot	3	0	Dead	Replanted	Weak	.....	Dead.

The culture of the high-bush blueberry is still in the experimental stage in Canada. From the tests at this Station and from observation in other parts of Nova Scotia it would appear that the high-bush blueberry does not thrive nor succeed upon soil that is the natural habitat of the common low-bush blueberry. The present high cost of the plants makes it imperative for those who wish to start a small plantation of this fruit to study the soil requirements of this fruit and to know whether they have the proper soil and location.

The land used successfully for cultivated blueberries is all of the same general type. The surface soil is peat mixed with coarse sand, with a sandy subsoil underlaid with a hardpan within three or four feet of the surface, and a water-table eighteen to twenty-four inches below the surface. In starting a plantation more than one variety should be planted as blueberries must be thoroughly cross-pollinated for best results.

In 1928 seventy-five plants of a variety known as 803N were secured for experiments with different methods of planting. Four hundred pounds of soil from the blueberry bogs of T. C. White, Inc., Whitesbog, New Jersey, were secured for use in the test. Twenty-five bushes were planted in our native soil, 25 were planted in a soil composed of equal parts of our soil and Whitesbog soil, and 25 were planted in sites from which native soil had been removed and Whitesbog soil substituted. No material difference could be detected in the plants in these different areas.

In 1927 various fertilizer treatments were tested on small plots of cultivated blueberries. Nitrogen was applied in various organic and inorganic forms; such as, tankage, bone meal, cottonseed meal, nitrate of soda, nitrate of lime, and sulphate of ammonia; phosphoric acid was applied in the form of tankage, bone meal, superphosphate and ground rock phosphate, while potash was applied in the form of muriate of potash. Applications of these fertilizer ingredients in varying proportions were made at the rate of 600 pounds per acre, but as the growth of this plantation has been disappointing no material difference can as yet be seen to warrant the use of any commercial fertilizer.

VEGETABLES

ASPARAGUS

Seeds of the variety Mary Washington were started in flats in the greenhouse April 23, 1925, and the plants from these were set to the field on June 8, six inches apart in rows two feet apart. Half of these plants were set to permanent beds May 6, 1926, as one-year-old plants, and the other half were set May 6, 1927, as two-year-old plants. Seeds were also sown in the field on May 8, 1925, and the plants transplanted July 6, in rows similar to the greenhouse-started plants, and these were set permanently May 6, 1926.

The permanent plantings were set also with the object of finding out the distance plants should be spaced in the row. The plots of each planting were 33 feet long, and the plants were set 1½, 2, 2½ and 3 feet apart in different rows with the rows spaced 4 feet apart. The cuttings made in 1929 were as set forth in the table below.

A planting of Argenteuil set in 1913 yielded 277 tips weighing 5 pounds 3 ounces from a row 33 feet long. This planting was spaced 2 by 4 feet.

ASPARAGUS MARY WASHINGTON: YIELDS, 1929

Distance apart in rows	Number of tips cut	Weight of tips	
		lb.	oz.
One-year plants started in the greenhouse and transplanted to field in 1925; set to field permanently in 1926.			
1½ feet	344	7	13
2 "	348	10	8
2½ "	264	6	2
3 "	274	7	5
Total yield, 132 feet	1,230	31	12
Two-year plants started in the greenhouse and transplanted to field in 1925; set to field permanently in 1927.			
1½ feet	177	4	0
2 "	134	3	0
2½ "	129	2	9
3 "	100	2	3
Total yield, 132 feet	540	11	12
One-year plants started in the field and transplated in 1925; set to field permanently in 1926.			
1½ feet	275	6	2
2 "	372	9	4
2½ "	229	6	4
3 "	209	5	9
Total yield, 132 feet	1,085	27	3

BUSH BEANS

Test of Varieties.—Twenty varieties and strains were compared for their yield of green beans. They were sown May 30 in rows 3 feet apart, a 33-foot row of each, and thinned to 3 inches apart in the row.

Of the new varieties this year Langport Wonder, a late green-pod, was outstanding both for healthy appearance and yield. This variety gave the largest yield of the twenty tested. For early use Princess Artois, a dwarf variety that can be grown very close in the row, is excellent. Interloper Challenge Black Wax is a good early wax-pod variety. For late use Hodson Long Pod is the best wax, and Refugee or 1000 to 1 the best green-pod variety. Yellow Pod Bountiful is a fine second-early variety.

The same varieties and strains were similarly grown in other 33-foot rows for their yields of seed, as noted in the table.

There was less anthracnose (rust) than in any previous year, the only varieties noticeably affected being Round Pod Kidney Wax (both strains), Pencil Pod Black Wax, and the variety listed as Plentiful French, which was not true to name. About 25 per cent of the pods of these varieties had one or more spots of anthracnose. When grown for seed the same varieties and also Wardwell Kidney Wax, Stringless Green Pod, and Refugee were slightly affected by anthracnose on the seeds.

BUSH BEANS—TEST OF VARIETIES FOR GREEN PODS

Variety and source of seed	Length of pods	Ready for use	Weight of green pods from 33-foot row		Weight of seed beans from 33-foot row	
	in.		lb.	oz.	lb.	oz.
Langport Wonder (Kelway)	5½	Aug. 1	36	6	4	8
Plentiful French (C.E.F.)	5	July 24	34	0	3	0
Masterpiece (Harrow)	6	July 24	27	10	3	0
Bountiful (Ott. 10707)	5½	July 26	24	4	4	8
Yellow Pod Bountiful (Schiel)	5½	July 26	24	2	2	4
Stringless Green Pod (Burpee)	4¾	July 26	23	14	2	14
Round Pod Kidney Wax (McD.)	4½	July 28	21	8	2	0
Brittle Wax (Graham)	4¾	July 27	21	4	3	2
Henderson Bountiful (D. & F.)	5½	July 24	20	10	3	0
Hodson Long Pod (Rennie)	6½	Aug. 8	20	6	3	4
Interloper Challenge Black Wax (C.E.F.)	5½	July 20	19	12	2	10
Wardwell Wax (Graham)	5¼	July 26	18	8	2	0
Hodson Long Pod (C.E.F.)	6½	Aug. 8	18	6	3	4
Yellow Eye Yellow Pod (C.E.F)	4¼	July 27	18	6	2	10
Pencil Pod Black Wax (C.E.F.)	5½	July 28	18	4	2	6
Refugee (C.E.F.)	4	Aug. 10	17	14	3	0
Round Pod Kidney Wax (C.E.F.)	4½	July 28	17	8	2	4
Princess Artois (C.E.F.)	4½	July 20	16	8	4	4
Yellow Eye Green Pod (C.E.F.)	4	Aug. 10	15	10	..	..
Stringless Green Pod (C.E.F.)	4	July 26	15	8	2	0

CULTURAL TEST.—Two varieties were grown in rows 3 feet apart, and thinned, in different rows, to 2, 4 and 6 inches apart in the row. In both varieties the plants thinned to 4 inches apart in the row gave the lightest yields, and those thinned to 2 inches apart the earliest pods. The yields in the table are from rows 16½ feet long.

BUSH BEANS THINNED TO DIFFERENT DISTANCES APART

Variety and source of seed	Distance between plants	Ready for use	Yield of green pods, July 31		Total weight of green pods		Per cent anthracnose on pods
	in.		lb.	oz.	lb.	oz.	p.c.
Stringless Green Pod (C.E.F.)	2	July 27	5	4	7	4	20
	4	July 27	4	10	7	2	15
	6	July 27	4	10	8	0	15
Round Pod Kidney Wax (C.E.F.)	2	July 28	5	6	11	6	0
	4	July 31	3	8	9	12	0
	6	July 31	2	14	10	12	0

BROAD BEANS

The variety Windsor was grown. It was ready for use August 24 and gave a good yield. Black aphids, as is usual with broad beans, were very plentiful.

POLE BEANS

Three varieties, Kentucky Wonder Wax, No. 1 Pole and Golden Cluster, were tested, and gave yields in the order named. No. 1 Pole is a green-podded variety. Golden Cluster is rather late.

BEETS

TEST OF VARIETIES.—Twelve varieties and strains were sown May 9 in rows 8¼ feet long, and 2 feet apart, and the plants thinned to 4 inches apart in the row. The Ottawa strain of Detroit Dark Red was the best in both quality and earliness. The yields were as follows:—

BEETS—TEST OF VARIETIES AND STRAINS

Variety and source of seed	Number of marketable roots	Weight of marketable roots		Number of roots not marketable
		lb.	oz.	
Eclipse (Vaughan)	34	8	0	
Early Flat Egyptian (Moore)	33	7	8	
Detroit Dark Red (Moore)	35	7	6	
Detroit Dark Red (Ott. 8935)	29	6	12	
Crosby Egyptain (D. & F.)	34	5	12	
New Oval Gem (Henderson)	36	5	8	
Detroit Dark Red (McD.)	36	5	6	
Early Model (Graham)	32	4	6	
Early Wonder (Burpee)	29	4	4	
Cardinal Globe (Rennie)	35	4	0	
Half Long (Kelway)	28	3	10	
Black Red Ball (Burpee)	8	1	2	21

LATE SOWING.—The same varieties and strains were similarly grown from a seeding made June 19, and gave slightly better yields than did the earlier sowing.

BEETS—RESULTS FROM LATE SOWING

Variety and source of seed	Number of roots		Weight of roots			
	Marketable	Unmarketable	Marketable		Unmarketable	
			lb.	oz.	lb.	oz.
Eclipse (Vaughan)	28	5	8	8	0	4
New Oval Gem (Henderson)	23	3	8	0	0	6
Crosby Egyptian (D. & F.)	26	5	7	14	0	4
Cardinal Globe (Rennie)	29	5	7	4	0	6
Early Model (Graham)	30	3	6	6	0	4
Detroit Dark Red (Ott. 8935)	26	12	6	0	0	10
Early Flat Egyptian (Moore)	28	8	6	0	0	6
Early Wonder (Burpee)	23	8	5	12	0	6
Detroit Dark Red (Moore)	29	8	5	8	0	6
Detroit Dark Red (McD.)	29	2	4	8	0	4
Detroit Dark Red (D. & F.)	22	14	3	8	1	0

SUCCESSIONAL SOWING.—The variety Detroit Dark Red (McD.) was sown at intervals from May 9 to June 19 in 15-foot rows and also in 8¼-foot rows. The longer rows were pulled as the roots became of marketable size, and the shorter rows were allowed to grow until fall. The June sowings gave higher yields in both cases than did the May sowings, as will be noted in the tables.

BEETS, SUCCESSIONAL SOWING: ROOTS PULLED WHEN READY

Date of sowing	Date of taking records	Number of marketable roots	Weight of marketable roots		Number of roots not marketable	Number of days from sowing to taking of records
			lb.	oz.		
May 9	July 25	66	8	2	.....	77
May 23	July 25	46	5	12	.....	63
June 1	Aug. 6	43	9	0	.....	66
June 10	Aug. 6	36	10	8	12	57
June 19	Sept. 17	62	16	8	6	90

BEETS, SUCCESSIONAL SOWING: ROOTS LEFT TO GROW TILL FALL

Date of sowing	Number of roots		Weight of roots			
	Marketable	Unmarketable (overgrown)	Marketable		Unmarketable (overgrown)	
			lb.	oz.	lb.	oz.
May 9	13	18	4	0	24	0
May 23	5	15	1	6	23	0
June 1	14	10	5	8	10	0
June 10	21	11	5	8	10	0
June 19	30	2	9	0	0	2

BRUSSELS SPROUTS

Seed was sown in the greenhouse March 23, the plants transplanted 2 inches apart in flats April 8, and set to the field May 10 in rows 3 feet apart and the plants 2 feet apart in the row. A duplicate planting was made in the field May 9, and transplanted June 25 at the same distances apart as mentioned. It was noted that there is a variation in the different strains of Long Island sprouts, some proving to be better selections than others. The plants of the late seeding were more vigorous than the early ones but the sprouts were soft and not well developed. It is apparent that early seeding is necessary to get a good quality of sprouts.

CABBAGE

TEST OF VARIETIES.—Sixteen varieties and strains were sown in the greenhouse March 23, and transplanted to the field May 10, twenty-five plants of a variety, except Early Winnigstadt, of which there were only 20 plants. The best varieties (listed in order of maturity) are Golden Acre, Copenhagen Market, Enkhuizen Glory, Succession, Summer Ballhead and Danish Ballhead. The records obtained are given in the table.

CABBAGE—RESULTS OF TEST OF VARIETIES SOWN IN GREENHOUSE AND TRANSPLANTED

Variety and source of seed	Number of days to maturity	Weight of three average heads		Number of heads ready		
		lb.	oz.	July 16	July 23	Aug. 3
Golden Acre (Dreer)	115	5	0	9	21	24
Jersey Wakefield (McD.)	118	5	0	4	13	21
Copenhagen Market (Rice)	115	6	0	9	15	24
Copenhagen Market (Graham)	118	8	0	2	13	22
Copenhagen Market (Strandholm)	118	9	0	1	12	21
				Aug. 6	Aug. 19	
Enkhuizen Glory (Rennie)	136	9	0	6	19	
Succession (Ewing)	133	9	8	10	23	
Midsummer Market (Harris)	140	7	0	2	16	
Early Winnigstadt (McD.)	139	6	8	0	6	
				Aug. 19	Aug. 29	Sept. 10
Summer Ballhead (Harris)	139	10	8	13	21	24
						Sept. 26
Danish Ballhead (Rice)	154	10	0	2	8	22
Danish Roundhead (Burpee)	159	9	0	0	3	24
Danish Ballhead S.S. (Harris)	154	10	0	3	10	25
Extra Amager Danish Ballhead (Harris)	154	10	8	0	7	25
Extra Amager Danish Ballhead (O. 8937)	159	9	8	0	3	24
Danish Ballhead M.S. (Bruce)	165	9	0	0	0	19

The same varieties and strains were sown in the field May 9, and planted out June 25, twenty plants of each variety, in rows 3 feet apart, the plants 1½ feet apart in the row, with results as given in the table below.

CABBAGE—SOWN IN FIELD AND PLANTED OUT

Variety and source of seed	Number of days to maturity	Weight of three average heads	Number of heads ready		
		lb. oz.	Aug. 19	Aug. 29	Sept. 10
Golden Acre (Dreer)	102	8 0	8	18	19
Golden Acre (D. & F.)	102	7 6	8	16	18
Jersey Wakefield (McD.)	106	5 10	3	10	20
Copenhagen Market (Strandholm)	109	7 4	0	12	19
Copenhagen Market (Rice)	108	7 8	4	14	16
Copenhagen Market (Graham)	109	7 4	0	11	20
Copenhagen Market (D. & F.)	112	7 4	0	4	13
			Sept. 10	Sept. 26	
Midsummer Market (Harris)	120	7 8	12	18	
Enkhuizen Glory (Rennie)	126	8 0	3	9	
Early Winnigstadt (McD.)	120	7 0	7	20	
Succession (Ewing)	124	6 0	5	18	
			Sept. 26	Oct. 7	Nov. 2
Summer Ballhead (Harris)	138	10 8	10	18	18
Danish Roundhead (Burpee)	138	15 0	9	12	17
Danish Roundhead (D. & F.)	138	14 0	9	13	19
Extra Amager Danish Ballhead (Harris)	140	14 0	4	11	19
Extra Amager Danish Ballhead (O. 8937)	142	10 8	2	4	18
Danish Ballhead (Strandholm)	142	14 0	3	7	19
Danish Ballhead S.S. (Harris)	142	14 0	3	8	20
Danish Ballhead M.S. (Burpee)	142	11 0	3	5	18
Danish Ballhead (Rice)	142	11 0	3	8	18

SUCCESSIONAL SOWINGS.—Successional sowings from March 5 to June 10 were made of a number of varieties, with results as given in the table.

CABBAGE—RESULTS FROM SUCCESSIONAL SOWINGS

Variety and source of seed	Sown	Planted in field	Ready for use	Weight of three average heads
				lb. oz.
Golden Acre (D. & F.)	Mar. 5	May 10	July 11	4 8
	Mar. 13	May 10	July 24	5 0
Golden Acre (Dreer)	Mar. 23	May 10	July 16	5 0
	May 9	June 25	Aug. 19	7 0
Copenhagen Market (D. & F.)	Mar. 5	May 10	July 16	5 0
Copenhagen Market (Rice)	Mar. 13	May 10	July 18	5 8
Copnehagen Market (Graham)	Mar. 23	May 10	July 24	6 8
	May 9	June 25	Aug. 24	7 0
	May 23	June 25	Aug. 20	7 0
	June 1	June 25	Sept. 10	6 0
	June 10	Early July	Sept. 10	6 0
Danish Roundhead (D. & F.)	Mar. 13	May 10	Aug. 26	12 0
Extra Amager Danish Ballhead (O. 8937)	Mar. 23	May 10	Sept. 10	7 8
	May 9	June 25	Sept. 29	10 8
	May 23	June 25	Sept. 26	9 8
	June 1	June 30	Nov. 2	*
	June 10	July 2	**	

* No weights taken.
** No heads ready to cut November 2.

KEEPING QUALITIES.—Copenhagen Market and Extra Amager Danish Ballhead were stored at the end of October. The former is not a suitable variety to store for winter. All heads of this variety were rotted by February 27. Of the Ballhead the heads which had the roots removed kept better than those with the roots on. These latter were hung from joists, and the ones with the roots removed were stored on slatted shelves. The best time to sow to obtain heads for winter storage appears to be early in May, and a late variety should be sown.

SAVOY AND RED CABBAGES.—Six varieties of Savoy and seven of red cabbage were grown. The weather was not very satisfactory for the Savoy varieties, practically all varieties giving small and spongy heads. Best of All seems the best Savoy. The field sowings of the red cabbages did not do well, the heads being very small. Delicatesse is one of the best red cabbages. Red Stonehead and Danish Stonehead are similar to Delicatesse.

CARROTS

TEST OF VARIETIES.—From the first sowing, made May 9, no records could be obtained, the crop being very badly injured by the carrot rust fly. A second sowing, made June 19, escaped the fly. It would appear that from the 14th to the 24th of June is the best time to sow carrots in this vicinity to escape rust fly damage. Most of the varieties attained to suitable size for winter storage from the second sowing, and the quality seems superior to that of the earlier sowing. Chantenay is a good, reliable variety for general purposes. Coreless is a distinct kind, coreless and of fine quality. Thirteen varieties and strains were tested, in 16½-foot rows, two feet apart, the plants thinned to 3 inches apart in the row. The yields are given in the table.

CARROTS—RESULTS OF TEST OF VARIETIES

Variety and source of seed	Number of marketable roots	Weight of marketable roots		Number of roots not marketable
		lb.	oz.	
Favourite Intermediate (Sutton)	70	21	0	8
Chantenay (O. 285A)	69	21	0	7
Golden Ball or Early Model (Andrewes Mountain)	84	20	8	3
Danvers Half Long (Rennie)	74	20	0	6
St. Valery (D. & F.)	80	18	8	9
Henderson Intermediate (Rennie)	75	18	8	7
Scarlet Intermediate (Patmore)	80	18	8	9
Early Market (Graham)	85	18	0	6
Long Orange (Vaughan)	71	17	8	7
Coreless (Rice)	69	17	8	10
Chantenay (McD.)	74	14	8	12
Early Scarlet Horn (D. & F.)	73	14	8	13
Champion Scarlet Horn (Sutton)	72	14	8	6

SUCCESSIONAL SOWING.—The variety Chantenay was sown at intervals from May 9 to June 19, in 15-foot rows. The results very definitely bear out the recommendation as to date of sowing made in the previous section.

CARROTS—RESULTS FROM SUCCESSIONAL SOWINGS TEST

Date of sowing	Number of marketable roots	Weight of marketable roots	Number of roots not marketable	Remarks
		lb. oz.		
Chantenay (McD.)				
May 9	6	.....	38	None really fit for use; deformed from root fly injury.
May 23	0	.....	10	None really fit for use; deformed from root fly injury.
June 1	39	11 0	45	Marketable roots, fair to good, showing slight injury.
June 10	42	11 0	44	Marketable roots, fair to good, showing slight injury.
June 19	76	17 0	5	Clean, fine, even crop of good size; no injury.

KEEPING QUALITIES.—Twenty-five roots of each variety (from the second sowing) were stored early in November in flats in a cellar at a temperature of 35 to 38 degrees Fahr. On March 7, when they were examined, there was no rot or damage evident in any variety.

CAULIFLOWER

TEST OF VARIETIES.—Nine varieties and strains were sown in the field May 9 and planted out June 25 in rows 3 feet apart, the plants 1½ feet apart in the row, twenty plants of each sort. Two varieties, Autumn Giant (Sutton), and Veitch Autumn Giant (McD.) headed prematurely. One variety, Nine Star Broccoli, a perennial cauliflower, was cut down by frost without showing heads. The records of the other six are given in the table.

A sowing was also made in the greenhouse March 25, but gave much poorer results than the field sowing.

CAULIFLOWER—RESULTS OF TEST OF VARIETIES

Variety and source of seed	Number of days to maturity	Weight of six average heads	Number of heads ready		
		lb. oz.	Aug. 29	Sept. 7	Sept. 26
Early Dwarf Erfurt (McD.)	111	5 6	9	15	20
Early Snowball (Graham)	115	3 10	2	7	20
Early Dwarf Erfurt (Strandholm)	125	3 0	0	2	18
Danish Dryweather (McD.)	125	3 0	.....	4	20
Danish Perfection (Madsen)	125	4 8	.....	3	20
Large Late Algiers (D. & F.)	125	2 0	.....	2	18

CELERY

The season was very dry for celery, and only those plants grown in a moist hollow made at all satisfactory growth. Golden Self-Blanching and Winter Queen are two good varieties.

CORN

TEST OF VARIETIES.—Twenty-seven varieties and strains were sown on May 30, and thinned eight inches apart in the row June 22. The rows were 66 feet long and 3½ feet apart, there being 100 plants of each variety. Although the season was dry the plants stood up well and gave a fine crop. The late

varieties gave better yields than in any previous year. The earliest varieties were ready for a first picking on August 13, and the latest variety on the 15th of September. The table gives the yield and other particulars of each variety.

CORN—RESULTS OF TESTS OF VARIETIES

Variety and source of seed	Height	Date of first picking	Number of ears			Weight of six average ears
			Marketable	Fair	Poor	
	ft.					lb. oz.
Early Malcolm (C.E.F.)	5	Aug. 28	130	28	47	3 2
Alpha (Harris)	4½	Aug. 17	116	18	22	2 14
Early Bantam (Harris)	5½	Aug. 24	113	14	13	3 4
Early Dighton (Maule)	5	Aug. 21	101	5	13	3 10
Buttercup (Harris)	5	Aug. 28	101	10	12	3 4
Golden Bantam (Moore)	5	Aug. 26	98	7	10	2 12
Stowell Evergreen (Graham)	6	Sept. 15	96	3	19	5 10
New Firestone (Schiel)	4¾	Aug. 24	96	7	15	3 2
Early Cory (Moore)	4¾	Aug. 22	96	6	7	—
Pickaninny (C.E.F.)	3½	Aug. 17	92	26	34	1 14
Earliest Catawba (Burpee)	4¾	Aug. 28	90	19	14	2 6
Banting (C.E.F.)	3½	Aug. 13	89	26	32	1 12
White Cory (McD.)	6	Aug. 24	88	7	17	3 0
Golden Bantam (Graham)	6½	Sept. 2	84	11	18	3 0
Golden Sunshine (Andrewes Mountain)	5	Aug. 22	78	6	0	3 8
Golden Bantam (McD.)	5	Aug. 30	77	12	4	3 2
Evergreen Bantam (Vaughan)	5½	Sept. 7	77	13	34	5 8
Golden Country Gentleman (Henderson)	5½	Sept. 11	75	20	25	3 8
Mayflower (McD.)	4¾	Aug. 20	74	11	13	3 0
The Burpee (Burpee)	4	Aug. 20	73	15	24	2 6
Seymour Sweet Orange (Burpee)	6	Sept. 3	68	6	5	3 8
Whipple Early Yellow (Rice)	6½	Sept. 6	59	7	31	3 6
Golden Giant (Rennie)	5¾	Sept. 8	47	12	20	3 10
Sixty Day (Childs)	4¾	Aug. 24	36	2	5	3 10
Burbank (Stark)	4¾	Sept. 3	35	10	16	3 4
White Evergreen (Burpee)	6	Sept. 11	28	9	34	4 0
Aristocrat (Dreer)	4¼	Sept. 7	22	16	18	4 0

SUCKERING TEST.—Two varieties, Early Malcolm and Golden Bantam, were grown as detailed above, two rows of each variety. In one row the suckers were removed and in the other were allowed to remain. The yield in each case from the row of plants with the suckers removed was noticeably greater than from the row where the suckers were allowed to remain, and the ears seemed a little larger.

CORN—RESULTS OF SUCKERING TEST

Variety and source of seed	Date of first picking	Number of ears, Aug. 31	Number of ears			Weight of six average heads
			Good	Fair	Poor	
						lb. oz.
Early Malcolm (C.E.F.)—						
Suckers removed	Aug. 28	36	74	7	7	3 0
Suckers left on	Aug. 28	23	68	11	16	3 0
Golden Bantam (Moore)—						
Suckers removed	Aug. 24	63	64	4	8	2 10
Suckers left on	Aug. 24	48	51	8	12	2 8

CUCUMBERS

TEST OF VARIETIES.—Fifteen varieties, including two pickling varieties and one gherkin, were sown May 31 in plots 12 feet by 16½ feet, 12 plants of each variety to a plot. The records are given in the table.

CUCUMBERS—RESULTS OF TEST OF VARIETIES

Variety and source of seed	Length of average fruit	Yield to Aug. 9	Total number of fruit	Total weight of fruit
	in.	lb. oz.		lb. oz.
XXX Table (Rennie)	7 to 8	3 10	198	100 2
Long White Spine (Stokes)	9	1 0	172	96 12
Early Fortune (Bruce)	7	5 4	235	90 10
Long Green (McD.)	7	8 12	180	89 14
Early White Spine (Burpee)	6	5 10	213	87 12
Early Fortune (Rice)	6½ to 7	4 4	195	81 4
Davis Perfect (Graham)	7	6 14	187	79 12
Double Yield (Harris)	7	12 8	183	77 8
Arctic White (Stark)	5	4 10	225	75 0
Early Frame (McK.)	6	9 12	187	78 2
Perfection (Harris)	6	5 4	130	63 0
China (Harris)	12	.....	60	40 0
Pickling				
Snows Pickling (Rennie)	.....	10 14	.....	61 0
Jersey Pickling (Ferry)	.....	6 0	.....	48 12
Gherkin (Burpee)	.....	.....	.....	15 2

LETTUCE

TEST OF VARIETIES.—Sowings were made inside on March 13 and April 12, and in the field at intervals from May 9 to July 12, and certain plants were transplanted, given a succession of this vegetable throughout the season. The records given below are from the field sowing made May 9, the plants having been thinned to 8 inches apart in the row.

LETTUCE—RESULTS OF TEST OF VARIETIES

Variety and source of seed	Ready for use	Number of days to maturity	Weight of three average heads
			lb. oz.
			July 8
Tom Thumb (Sharpe)	July 10	62	0 11
Grand Rapids (Burpee)	July 10	62	1 6
Black Seeded Simpson (Ewing)	July 10	62	1 4
			July 20
Denver Market (Vaughan)	July 12	64	4 4
Salamander (McD.)	July 20	72	2 8
All Heart (Dreer)	July 20	72	2 8
Iceburg (Ewing)	July 20	72	3 6
New York (Graham)	July 20	72	4 6
			July 25
Cos (Graham)	July 22	74	5 6
Crisp As Ice (Wills)	July 24	76	1 14
			July 28
Hard Head (Burpee)	July 28	80	2 2
Brittle Ice (Burpee)	July 28	80	3 8

ONIONS

TEST OF VARIETIES.—In order to have good, strong plants able to withstand the cold weather when set out, and the attack of the root maggot, it is advisable to sow the seed inside early, towards the end of February being probably the best time. This year the field sown onions did better than usual, the maggot

not being so troublesome. It is difficult to control this maggot with a poison solution so that early sowing inside seems advisable for large crops. In the tables below the inside sowing of March 16 may be compared with the field sowing of May 9. In all cases the plants were three inches apart in the row and the yields are from single rows of each variety, 16½ feet long.

ONIONS—TEST OF VARIETIES, SOWN INSIDE ON MARCH 16

Variety and source of seed	Number of marketable bulbs	Weight of marketable bulbs		Number of unmarketable bulbs
		lb.	oz.	
Cranston Excelsior (D. & F. Wilson)	57	25	8	1
Denia (D. & F.)	57	22	8	0
Giant Prizetaker (Steele, Briggs)	51	22	8	0
Cranston Excelsior (Ewing)	52	21	8	1
Ailsa Craig (Graham)	53	20	0	0
Flat Red (Graham)	55	18	0	0
Southport Red Globe (Graham)	54	16	0	0
Large Red Wethersfield (O. 8929)	57	16	0	0
Southport Red Globe (Steele, Briggs)	46	15	0	0
Large Red Wethersfield (Graham)	55	14	8	0
Southport White Globe (Steele, Briggs)	53	14	8	3
Selected Large Red Wethersfield (McD.)	48	13	0	0
Yellow Globe Danvers (Steele, Briggs)	54	11	8	0
Yellow Globe Danvers (Graham)	50	11	8	1
White Portugal (McD.)	44	10	0	4
Yellow Globe Danvers (O. 1854)	43	9	8	2
Silver King (Graham)	.....	.....		.....

ONIONS—TEST OF VARIETIES, SOWN IN FIELD ON MAY 9

Variety and source of seed	Number of marketable bulbs	Weight of marketable bulbs		Number of bulbs not marketable	Number of bulbs with thick neck
		lb.	oz.		
Cranston Excelsior (Ewing)	54	14	8	8	4
Denia (D. & F.)	54	13	8	2	0
Prizetaker (D. & F.)	52	13	0	9	7
Giant Prizetaker (Steele, Briggs)	56	13	0	7	5
Ailsa Craig (D. & F.)	56	13	0	9	5
Ailsa Craig (Graham)	56	12	0	5	0
Large Red Wethersfield (Graham)	49	10	12	9	6
Yellow Globe Danvers (D. & F.)	52	10	0	8	3
Yellow Globe Danvers (Rice)	54	10	0	5	5
Yellow Globe Danvers (Graham)	53	9	0	3	—
Yellow Globe Danvers (Kent)	53	9	0	11	4
Flat Red (Graham)	50	8	8	5	0
Southport Red Globe (Steele, Briggs)	43	8	0	12	7
Australian Brown (Rice)	45	5	4	10	0
White Varieties					
Mammoth Silver King (Graham)	50	8	0	9	3
White Portugal (McD.)	52	7	4	3	0
Southport White Globe (Steele, Briggs)	50	7	0	10	0

SUCCESSIONAL SOWING INSIDE.—Sowings were made inside on February 11, February 23, and March 5. It will be noted that the earliest sowing gave the largest yields. The yields are from single rows 16½ feet long.

ONIONS—RESULTS OF SUCCESSIONAL SOWINGS TEST

Variety and source of seed	Number of marketable bulbs	Weight of marketable bulbs	Number of bulbs not marketable
		lb. oz.	
Sown February 11			
Cranston Excelsior (D. & F.) (Wilson Strain)	45	24 0	5
Cranston Excelsior (D. & F.)	55	18 0	1
Denia (D. & F.)	52	18 0	3
Yellow Globe Danvers (Rice)	46	17 8	3
Ailsa Craig (D. & F.)	47	16 0	2
Extra Selected Large Red Wethersfield (D. & F.)	43	14 8	2
Sown February 23			
Cranston Excelsior (D. & F.) (Wilson Strain)	43	23 8	4
Denia (D. & F.)	40	17 0	2
Extra Selected Large Red Wethersfield (D. & F.)	57	16 8	0
Ailsa Craig (D. & F.)	46	16 4	4
Cranston Excelsior (D. & F.)	38	13 0	4
Australian Brown (Rice)	39	9 8	7
Sown March 5			
Cranston Excelsior (D. & F.) (Wilson strain)	47	19 0	3
Extra Selected Large Red Wethersfield (D. & F.)	53	15 0	0
Ailsa Craig (D. & F.)	38	14 0	2
Danvers Yellow Globe (D. & F.)	44	13 8	3
Danvers Yellow Globe (Rice)	39	13 8	2
Cranston Excelsior (D. & F.)	41	13 0	6
Denia (D. & F.)	37	12 8	4
Australian Brown (Rice)	43	10 0	2

MULTIPLIER ONIONS.—The multiplier onion is a small, firm, late-keeping onion very suitable for the home garden. It increases by dividing into several sections, whence the name. Small, medium, and large sections were planted, and, as is usual, the yield was practically the same from each size. The small divisions may thus be used satisfactorily for planting, being put aside for that purpose as the onions are used. Further, the larger sections are more apt to go to seed during the summer.

STORAGE TEST.—Twenty-five average bulbs from each of a number of sowings, made at intervals from February 11 to May 9, were stored in a cool cellar September 9. Those from the earlier sowings did not keep so well as the later-sown ones, the bulbs, with few exceptions, rotting at the neck and down into the heart. This rotting was no doubt due to the new growth brought about by the wet weather that followed the dry summer, during which the bulbs had partially ripened.

PARSNIPS

TEST OF VARIETIES.—Six varieties and strains were sown May 9, and thinned to 4 inches apart in 16½-foot rows. The yields were as follows:—

PARSNIPS—RESULTS OF TEST OF VARIETIES

Variety and source of seed	Number of marketable roots	Weight of marketable roots	Number of roots not marketable
		lb. oz.	
Hollow Crown (Graham)	40	24 0	3
Elcombe Improved Hollow Crown (Graham)	36	22 0	3
Cooper, Champion (D. & F.)	44	21 0	4
Dobbie Selected (Ewing)	37	15 0	7
Hollow Crown (O. 2916)	34	12 0	10
Early Round (Rice)	27	13 0	6

SUCCESSIONAL SOWINGS.—Five successional sowings were made, with yields as given in the table from rows 15 feet long. The roots from the June sowings are somewhat small, so that towards the end of May would seem to be the best date to sow.

PARSNIPS—RESULTS OF SUCCESSIONAL SOWINGS TEST

Variety and source of seed	Date of sowing	Number of marketable roots	Weight of marketable roots	Number of roots not marketable
			lb. oz.	
Hollow Crown (Graham)	May 9	75	36 0	3
	May 23	26	*17 0	7
	June 1	101	32 0	11
	June 10	114	38 0	10
	June 19	100	19 0	17

* Row depleted by maggot.

PEAS

TEST OF VARIETIES.—Twenty-one varieties and strains were sown May 9 in 33-foot rows 3½ feet apart, one row of each variety for green peas and one row for seed. The table gives the yields and other particulars.

PEAS—RESULTS OF TEST OF VARIETIES

Variety and source of seed	Height	Ready for use	Total weight of green pods	Yield of seed	Per cent moth injury in seed
	ft.		lb. oz.	lb. oz.	%
Quite Content (Vaughan)	4½	July 19	22 4	3 0	12
No. 6 (Invermere)	4½	July 16	21 14	4 6	15
Gradus (Andrewes, Mountain)	4	July 16	21 4	4 0	25
Telephone (McD.)	4½	July 19	20 8	5 2	15
Thomas Laxton (McD.)	2½	July 6	20 12	3 10	15
Pioneer (Gregory)	1½	July 12	19 10	3 8	20
Stratagem (Rennie)	3	July 22	19 8	4 4	10
Bruce (Invermere)	3	July 20	18 8	4 8	12
Market Gardener (Andrewes, Mountain)	4½	July 19	18 6	4 0	5
No. 42 (Invermere)	3	July 20	17 14	5 8	15
Blue Bantam (Graham)	2¼	July 16	17 12	4 8	12
Laxtonian (Graham)	1½	July 14	17 10	3 0	15
Lincoln (Sharpe)	2	July 18	17 10	4 0	10
Director (Invermere)	2¾	July 16	17 8	4 0	25
Kootenay (Invermere)	4	July 20	17 0	5 2	12
Daisy or Dwarf Telephone (Sharpe)	2	July 23	16 12	1 8	30
McLean Advancer (Ferry)	2	July 19	16 12	5 0	2
Laxton Superb (McK.)	1½	July 12	16 10	3 0	20
Lincoln (Invermere)	2	July 18	15 6	5 8	10
Gregory Surprise (Gregory)	2½	July 4	15 0	3 2	10
English Wonder x Gradus (C.E.F.)	1½	July 15	7 10	1 0	25
English Wonder x Gregory Surprise (C.E.F.)	5½	July 16	5 0	4 4	10
Gradus x English Wonder (C.E.F.)	3½	July 19	4 2	3 0	20

GROWN AT DIFFERENT DISTANCES APART.—Three varieties were each thinned to 1, 2 and 3 inches apart in rows 33 feet long. There was very little difference in the total yields of the 1-inch-apart and 2-inch-apart rows; they were each slightly better than the 3-inch-apart row.

PEAS—RESULTS OF PLANTING DIFFERENT DISTANCES APART

Variety and source of seed	Distance apart	Ready for use	Weight at first picking	Total yield of green pods
	in.		lb. oz.	lb. oz.
			July 9	
Thomas Laxton (McD.)	1	July 8	3 8	16 10
	2	July 9	2 2	12 14
	3	July 9	1 8	10 6
			July 16	
English Wonder (C.E.F.)	1	July 16	2 4	16 0
	2	July 16	2 10	18 6
	3	July 16	2 0	16 4
			July 23	
Stratagem (Graham)	1	July 22	3 2	21 4
	2	July 23	2 2	21 2
	3	July 23	2 0	21 14

POTATOES

SPROUTED VS. NOT SPROUTED.—The variety Irish Cobbler, put in the greenhouse April 10, and allowed to sprout in full light, was compared with tubers of the same variety planted in the field direct from the cellar on April 10 and others planted May 3.

Seven hills from each lot were dug at different dates. The heaviest yield of tubers to August 1, and also the heaviest total yield was from tubers sprouted in the greenhouse.

POTATOES—RESULTS FROM SPROUTED AND UNSPROUTED SEED

Date of digging	Number of marketable tubers	Weight of marketable tubers	Weight of tubers not marketable
		lb. oz.	lb. oz.
Sprouted in Greenhouse			
July 18	34	5 6	0 8
July 25	40	6 4	0 8
August 1	34	6 8	0 8
August 8	32	7 4	0 2
August 16	34	7 0	0 10
August 23	28	6 14	0 6
August 29	31	7 4	0 4
September 4	36	7 8	0 8
Totals	269	54 0	3 6
From Cellar direct, April 10			
July 18	30	4 6	0 12
July 25	31	5 0	0 10
August 1	35	6 8	0 6
August 8	40	7 4	0 2
August 16	31	6 8	0 8
August 23	28	4 8	0 8
August 29	32	6 0	0 8
September 4	39	7 0	0 12
Totals	266	47 2	4 2
From Cellar direct May 3			
July 18	35	4 8	1 0
July 25	38	6 0	0 8
August 1	36	5 8	0 10
August 8	42	7 4	0 12
August 16	43	5 12	1 4
August 23	33	5 4	1 4
August 29	38	7 0	0 4
September 4	33	6 12	0 8
Totals	298	48 0	6 2

PUMPKIN, SQUASH, AND VEGETABLE MARROW

TEST OF VARIETIES.—Four varieties and strains of pumpkin, eight of squash, and five of vegetable marrow were sown May 31, in plots 12 by 16½ feet, six plants to a plot. The yields, etc., are given in the table. Small Sugar is an excellent small pumpkin and Connecticut a good main-crop variety. Golden Hubbard and Green Hubbard are two of the best squashes and Long White Bush one of the best vegetable marrows.

PUMPKIN, SQUASH AND VEGETABLE MARROW—RESULTS OF TESTS OF VARIETIES

Variety and source of seed	Total number of fruit	Weight of three average fruit
		lb. oz.
Pumpkin		
Pie Pumpkin (Brand)	13	20 0
Small Sugar (Graham)	15	17 8
Small Sugar (O. 11015)	26	17 8
Connecticut Field (McD.)	5	28 0*
Squash		
Golden Hubbard (McD.)	13	33 0
Green Hubbard (Graham)	7	32 0
Hubbard (McD.)	6	46 0
Boston Marrow (McD.)	9	44 0
Blue Hubbard (Rice)	6	42 0
Kitchenette (Vaughan)	9	17 0
Golden Hubbard (O. 11014)	4	20 0
Vegetable Marrow		
English Vegetable Marrow (Steele, Briggs)	20	26 8
Cocoselle (Vaughan)	21	11 0
Italian Marrow (Vaughan)	19	8 8
Long White Bush (McD.)	17	15 8
White Bush Scallop (Graham)	40	7 8

* One fruit only.

FORCING RHUBARB IN THE GREENHOUSE (PROJECT NO. 193)

Three roots each of rhubarb plants grown from seed sown in 1924, 1925, 1926, 1927 and 1928 were lifted in early November, 1929, and allowed to freeze outside until December 28. They were then stored in the cool end of the greenhouse under a bench, with some soil around the roots, and the space curtained off from the light. The first stalks were ready for use on January 25, and the last picking was March 8. It would appear that the age of the root makes little or no difference in the earliness of the forcing, but the older roots give the larger yields.

SPINACH

TEST OF VARIETIES.—Nine varieties and strains were sown May 9 in 8¼-foot rows. The season was rather dry for this vegetable, so that the yields were not so large as usual.

SPINACH—RESULTS OF TEST OF VARIETIES

Variety and source of seed	Ready for use	Weight from 8¼-foot row, June 26	Number of plants seeding June 22
		lb. oz.	
Bloomsdale (McD.)	June 20	3 0	9
King of Denmark (Graham)	June 26	2 10	7
Bloomsdale Long Standing (Rice)	June 20	2 8	2
Princess Juliana (Rice)	June 26	2 8	6
Broad Flanders (McD.)	June 24	2 0	2
Noble Gandy (Stokes)	June 22	1 12	2
Viroflay (Graham)	June 22	1 12	35
Victoria (McD.)	June 22	1 12	4

TOMATOES

TEST OF VARIETIES.—Twenty-eight varieties and strains were sown in the greenhouse March 29, and set out to the field May 29, six plants of each variety, in rows 5 feet apart, the plants spaced 4 feet apart in the row. The table gives the yields of both ripe and green fruit of the highest-yielding fifteen varieties. Six of the earliest varieties were Alacrity x Earlibel, Fifty Day, Alacrity, Herald, Burbank and Earliana.

TOMATOES—RESULTS OF TEST OF VARIETIES

Variety and source of seed	Ready for use	Number of ripe fruit		Weight of ripe fruit		Weight of green fruit		Total weight ripe and green fruit marketable
		Marketable	Not marketable	Marketable	Not marketable	Marketable	Not marketable	
				lb. oz.	lb. oz.	lb. oz.	lb. oz.	lb. oz.
Pink No. 2 (O. 11387)	Aug. 18	504	53	110 10	8 8	41 0	11 0	151 10
Ailsa Craig (Dobbie)	Aug. 17	448	56	70 8	5 8	68 0	11 0	138 8
Selected Earliana (Rice)	Aug. 21	337	80	102 14	13 14	11 8	17 0	114 6
Australian Dwarf (Hawkin)	Aug. 15	452	85	100 10	16 2	7 4	18 4	107 14
Early Mascot (Graham)	Aug. 16	372	124	96 2	27 14	9 4	13 8	105 6
The Landreth (Landreth)	Aug. 17	233	96	76 14	26 14	25 8	13 8	102 6
Adirondack Earliana (Langdon)	Aug. 22	282	55	83 8	10 12	13 0	9 0	96 8
Alactricity x Earlibell (O. 11385)	Aug. 12	440	193	82 6	27 10	14 0	25 0	96 6
Pink No. 1 (O. 11388)	Aug. 16	360	99	74 0	14 10	22 0	11 8	96 2
Bonny Best (Keith)	Aug. 24	315	162	75 10	32 6	20 0	11 8	95 10
Marglobe (Stokes)	Aug. 20	192	38	64 10	7 14	29 8	9 8	94 2
Chalk's Jewel (Andrewes, Mountain)	Aug. 24	331	156	75 4	30 0	17 8	13 14	92 12
L. G. & B. B. (O. 11392)	Aug. 27	159	61	56 12	14 14	32 8	10 12	89 4
Canadian (Harris)	Aug. 18	284	64	79 14	16 6	5 8	10 10	85 6
Alacrity (O. 3531-41)	Aug. 15	281	74	73 8	13 4	11 12	15 0	85 4

TRAINING TO SINGLE STEMS AND STAKING.—Two varieties were planted in rows 2½ feet apart, the plants one foot apart in the row and tied to stakes, all laterals being kept removed. Certain plants were cut off above the second, third, and fourth trusses of fruit respectively, and others were allowed to grow full length, twenty plants of each, and these are compared in the table with three bush plants, which occupied approximately the same space as twenty plants trained to single stems. It will be noted that, as might be expected, the pruned and trained plants gave at least twice the yield of the bush plants. Of the former, the plants stopped above the third truss gave the highest yield of ripe fruit in the case of Alacrity, while the Bonny Best stopped above the fourth truss gave the greatest yield of ripe fruit. As the pruning and staking take considerable time this practice is probably of value only in the home garden.

TOMATOES—RESULTS FROM TRIMMING TO SINGLE STEMS AND STAKING

—	First ready for use	Yield of ripe fruit to Aug. 24	Number of fruit			Yield of fruit				Total yield of ripe and green fruit, marketable
			Marketable		Unmarketable	Marketable		Unmarketable		
			Ripe	Green		Ripe	Green	Ripe	Green	
		lb. oz.				lb. oz.	lb. oz.	lb. oz.	lb. oz.	lb. oz.
Alacrity (O. 3531-14)										
Single stem, two trusses	Aug. 15	23 6	125	6	73	37 2	3 0	11 8	3 0	40 2
Single stem, three trusses	Aug. 14	31 4	270	4	82	77 14	1 0	12 10	4 0	78 14
Single stem, four trusses	Aug. 14	26 14	192	7	126	47 10	1 6	15 8	6 8	49 0
Single stem, full grown	Aug. 12	28 0	233	30	104	55 12	6 0	15 4	11 0	61 12
Bush plants	Aug. 15	5 9	140	.....	37	36 12	5 14	6 10	7 8	42 10
Bonny Best (Stokes)										
Single stem, two trusses	Aug. 15	30 10	176	3	26	68 6	1 0	7 4	2 12	69 6
Single stem, three trusses	Aug. 14	26 10	229	15	55	81 4	3 0	14 14	4 0	84 4
Single stem, four trusses	Aug. 14	14 6	258	16	79	84 2	3 2	22 10	5 8	87 4
Single stem, full grown	Aug. 14	16 8	183	63	109	51 14	10 8	25 4	9 6	62 6
Bush plants	Aug. 24	1 4	126	.....	67	30 13	6 4	13 12	5 8	37 1

CEREALS

The first seeding of oats in 1929 at this Station was on May 14. At that time the land was in good condition for seeding, and the grain germinated rapidly and emerged quickly. The rainfall from May 20 to May 30 was heavy, being 3·56 inches for the eleven days, which exceeds the average precipitation for the whole month. The rainfall for June, July, and August was much below the normal, and the grain on dry sandy land suffered considerably.

Rod-rows.—There were tested in rod-rows 24 varieties of oats, 22 varieties of wheat and 16 varieties of barley. These were replicated four times in different parts of the field. The grains were seeded June 6 and harvested as they ripened. Unfortunately this grain was all destroyed in a fire in the building in which it was stored, so that no records of the yield are available for this season.

The total grain harvested this season was 1,090 bushels: oats, 1,011 bushels; barley, 68 bushels, and wheat, 11 bushels.

TEST OF VARIETIES

The test of cereal varieties was carried out on land which had grown potatoes in 1928 and had been fertilized for that crop at the rate of 15 tons of manure and 1,000 pounds of commercial fertilizer per acre. The land was ploughed in the fall of 1928, well worked up in the spring of 1929, no commercial fertilizer applied, and the different grains seeded May 17. Grass seed, consisting of 8 pounds of red clover, 8 pounds of timothy and 2 pounds of alsike clover, was sown with the grain at the rate of 20 pounds per acre. All seeding was done with the grain drill. The weeder was drawn over the land immediately after seeding to ensure an even covering of the timothy and clover seeds.

The test included three varieties of barley, one of wheat and two of oats, one of which was a hulless variety. All grain was given the dry formalin treatment for smut, except the hulless oat which was treated with Bayer's dust. The oat smuts and covered smut of barley were well controlled. The hot water treatment was given one variety of barley which had developed considerable loose smut. This treatment was effective in controlling the loose smut, but very seriously injured the germination of the grain. Victory oats was seeded at the rate of 3 bushels, Liberty (hulless) oats at 2½ bushels, barley at 2 bushels and wheat at 1½ bushels per acre. All the grain except Victory oats and Charlottetown No. 80 barley was grown on a particularly dry part of the field and ripened quickly. Liberty oats, and Gold Swedish and Chinese barleys were harvested August 6; Charlottetown No. 80 barley, August 15; Victory oats, August 16, and Huron wheat, August 21. In the tables below will be found the yields for 1929, and the relative yields for the years 1914 to 1929.

Cereals—Test of Varieties

Variety and source of seed	When ripe	Number of days to maturity	Height	Per cent stand	Yield per acre	
			in.		lb.	bush.
Oats—						
Victory	Aug. 19	94	46	100	1,972	58·0
Liberty (Ott. 480)	Aug. 6	81	34	100	1,266	37·2
Barley—						
Chinese (Ott. 60)	Aug. 6	81	35	100	1,084	22·6
Gold Swedish	Aug. 6	81	33	100	1,084	22·6
Charlottetown, No. 80	Aug. 15	90	40	100	1,455	30·3
Wheat—						
Huron (Ott. 3)	Aug. 21	96	40	100	1,400	23·3

RELATIVE YIELDS OF VARIETIES OF OATS, 1914–1929

Year	Yield of Banner per acre	Percentage of yield of Banner			
		Victory	Daubeney (Ott. 47)	Liberty (Ott. 480)	Alaska (Ott. 10307)
	lb.				
1914	1,981	.....	90·6	.....	.....
1915	1,872	108·8	63·5	.....	.....
1916	1,474	120·2	98·3	59·7	.....
1917	1,487	95·8	87·4	57·3	.....
1918	2,595	95·6	89·0	58·9	.....
1919	2,423	117·2	.....	47·5	.....
1920	2,539	102·1	.....	61·9	.....
1921	1,776	118·0	.....	108·5	.....
1922	2,052	108·2	.....	72·1	.....
1923	1,788	123·3	.....	66·1	.....
1924	2,594	105·1	.....	68·6	.....
1925	2,065	99·4	.....	69·4	70·8
1926	1,528	121·4	.....	105·2	90·1
1927	1,848	108·6	.....	40·2	66·6
1928	2,001	103·6	.....	69·3	78·0
1929	1,564	126·1	.....	80·9	.....

RELATIVE YIELD OF VARIETIES OF BARLEY, 1916–1929

Year	Yield of Charlottetown No. 80 (2-row) per acre	Percentage of yield of Charlottetown No. 80				
		Duckbill Ott. 57 (2-row)	Gold Swedish (2-row)	Manchurian Ott. 50 (6-row)	Canadian Thorpe, (6-row)	Chinese, Ott. 60 (6-row)
	lb.					
1916	1,408	.....	.....	72·7	66·6	.....
1917	1,060	.....	.....	70·5	81·1	.....
1918	1,623	.....	.....	88·7	73·6	.....
1919	1,873	93·9	.....	84·8	.....	.....
1920	1,797	69·4	.....	62·3	.....	.....
1921	1,912	61·7	.....	.....	.....	.....
1922	2,171	68·2	.....	.....	.....	52·5
1923	1,122	62·8	.....	.....	.....	87·1
1924	1,789	100·7	.....	.....	.....	103·8
1925	1,575	61·1	.....	.....	.....	90·6
1926	1,936	73·1	52·8	.....	.....	68·1
1927	784	88·7	103·1	.....	.....	136·7
1928	1,740	.....	53·2	.....	.....	59·5
1929	1,455	.....	74·5	.....	.....	74·5

RELATIVE YIELDS OF VARIETIES OF WHEAT, 1914–1929

Year	Yield of Marquis per acre	Percentage of yield of Marquis		
		Huron (Ott. 3)	Red Fife (Ott. 17)	Charlottetown No. 123
	lb.			
1914	1,575	.....	87·9	.....
1915	994	.....	102·4	.....
1916	1,107	.....	95·3	.....
1917	899	.....	96·6	.....
1918	1,273	130·4	115·3	.....
1919	1,489	97·3	107·4	.....
1920	1,245	99·9	111·8	.....
1921	1,294	110·6	105·2	.....
1922	947	99·2	84·2	.....
1923	606	95·0	82·1	.....
1924	1,780	60·4	82·1	81·9
1925	1,199	90·6	94·1	90·0
1926	748	176·4	144·3	.....
1927	432	261·1	.....	.....
1928	1,150	150·1	.....	.....
1929	1,116	125·4	.....	.....

FORAGE PLANTS

MANGELS, TEST OF VARIETIES AND STRAINS

The land used for this test was in oats in 1928. It was ploughed in the fall of 1928 about 7 inches deep and in the spring of 1929 was given a dressing of manure at the rate of 20 tons per acre, again ploughed and disked. A 5-8-5 fertilizer at the rate of 900 pounds per acre was applied broadcast and well worked into the soil with the wheel cultivator. Rows 2½ feet apart were run with the horse hoe, and these were lightly rolled down with the two-row turnip seeder with the seed spouts removed.

The mangel seed was sown with the garden drill, May 29, at the rate of 12 pounds per acre. Moisture conditions at the time of seeding were good and the stand of plants was even and uniform. Thinning was done June 27, the plants being left 10 inches apart. Cultivation sufficient to keep down weeds was given through the season, and the crop harvested October 10. The dry weather of July and August was very unfavourable to growth, and the yield was below the average.

MANGELS—TEST OF VARIETIES AND STRAINS

Variety and source of seed	Average yield per acre				
	Green weight			Dry matter	
	tons	lb.	bush.	tons	lb.
Danish Sludstrup (D. & F.)	19	1,864	797·3	2	703
Danish Sludstrup (Ewing)	16	340	646·8	1	1,182
Elvethan Mammoth (Hartman)	12	1,872	517·4	1	1,658
Taaroje Barres (Hartman)	15	1,152	623·0	1	1,651
Golden Giant Intermediate (D. & F.)	12	1,476	509·5	1	1,541
Fjeritslev Barres (Hartman)	15	360	607·2	1	1,464
Eclipse (McKenzie)	15	1,680	633·6	1	1,415
Giant Sugar (Rennie)	14	248	564·9	1	1,333
Red Tankard (McDonald)	15	1,548	630·9	1	1,328
Giant White Feeding (Steele, Briggs)	14	776	575·5	1	1,260
Yellow Intermediate (C.E.F.)	14	1,172	583·4	1	1,258
Eckendorfer Yellow (Hartman)	16	868	657·3	1	1,158
Stryno Barres (Hartman)	15	888	617·7	1	1,088
Mammoth Long Red (D. & F.)	13	664	533·3	1	927
Improved Tankard Cream (Rennie)	13	1,060	541·2	1	900
Jumbo (Rennie)	13	400	528·0	1	721
Sludstrup Barres (Hartman)	12	1,344	506·9	1	711
Giant Yellow Intermediate (Bruce)	14	512	570·2	1	605
Mammoth Long Red (Sutton)	12	816	496·3	1	521
Elvethan Long Red (Sutton)	12	340	486·8	1	499
Gate Post (Bruce)	11	704	454·0	1	411
Golden Tankard (D. & F.)	13	4	520·0	1	397
Eckendorfer Red (Hartman)	11	472	449·4	1	316
Yellow Leviathan (Bruce)	10	1,912	438·2	1	226
Giant Yellow Globe (Rennie)	10	1,648	432·9	1	173
Mammoth Red Intermediate (Bruce)	10	592	411·8	0	1,754
Yellow Intermediate (Sutton)	12	420	488·4	.....	

TURNIPS, TEST OF VARIETIES AND STRAINS

The land used for this test grew a crop of oats in 1928 and was treated in 1929 in the same way as that used for the mangel test. The seeding was done May 29 at the rate of 3 pounds per acre. The plants were thinned July 5 and 6 to one foot apart. The crop was harvested November 4, the yield being much reduced by the dry weather of July and August.

TURNIPS—TEST OF VARIETIES AND STRAINS

Variety and source of seed	Average yield per acre				
	Green weight			Dry matter	
	tons	lb.	bush.	tons	lb.
Bangholm (Purple Top) (D. & F.)	17	56	681·1	1	1,977
Sutton's Champion Purple Top (Rennie)	14	1,040	580·8	1	1,403
Up to Date (Sutton)	15	888	617·7	1	1,391
Wilhelmsnurger (D.L.F.)	14	1,832	596·6	1	1,308
Canadian Gem (Steele, Briggs)	16	208	644·1	1	1,285
Magnum Bonum (Rennie)	12	1,872	517·4	1	1,234
Canadian Gem (Rennie)	14	1,568	591·3	1	1,163
Bangholm (Kentville)	12	816	496·3	1	1,082
Invicta Bronze Top (Ewing)	14	1,436	588·7	1	1,011
Best of All (Rennie)	14	1,568	591·3	1	944
New Century (Rennie)	13	928	538·5	1	859
Crimson King (Sutton)	12	288	485·7	1	829
Invicta (Carter)	14	1,832	596·6	1	819
Hartley's Bronze Top (McDonald)	12	816	496·3	1	811
D. & F. Favorite (D. & F.)	12	1,080	501·6	1	763
Bangholm Purple Top (Rennie)	13	664	533·3	1	749
Hartley's Bronze Top (Rennie)	12	24	480·5	1	702
Best of All (Graham)	12	848	496·9	1	688
Selected Westbury (Purple Top) (Steele, Briggs)	11	492	449·8	1	663
Ne Plus Ultra (D. & F.)	13	400	528·0	1	640
Derby Bronze Green Top (Rennie)	12	816	496·3	1	618
Kangaroo Bronze Green Top (Rennie)	11	176	443·5	1	581
Durham (Purple Top) (Steele, Briggs)	13	1,984	559·7	1	580
Champion Purple Top (Graham)	11	968	459·3	1	565
Good Luck (Steele, Briggs)	13	268	525·3	1	545
New Universal (Purple top) (D. & F.)	12	1,080	501·6	1	477
Kangaroo (Purple top) (Steele, Briggs)	11	1,496	469·9	1	387
Ditmars (McNutt)	12	24	480·4	1	299
Hall's Westbury (Rennie)	10	1,120	422·4	1	160
Lyngby x Studsgaard (D.L.F.)	9	480	369·6	1	101
Jumbo or Elephant (Rennie)	9	1,536	390·7	1	74
Bangholm Studsgaard (D.L.F.)	7	1,840	316·8	1	35
Bangholm (E.F., Nappan)	8	1,688	353·7	1	25

CARROTS, TEST OF VARIETIES AND STRAINS

Oats were grown on this area in 1928 and the land was treated in the same manner as that used for the mangel and turnip tests. The carrots were seeded May 29 at the rate of 4 pounds per acre, thinned June 24 to 3 inches apart, and harvested November 4. This crop was not so badly affected by moisture conditions as the mangels and turnips, and the yield was fair.

CARROTS—TEST OF VARIETIES AND STRAINS

Variety and source of seed	Average yield per acre				
	Green weight			Dry matter	
	tons	lb.	bush.	tons	lb.
Danish Champion (C.E.F.)	16	1,264	665·3	1	1,545
White Belgian (D. & F.)	13	928	538·5	1	1,304
Ontario Champion (Graham)	15	624	612·4	1	1,301
White Half-long Champion (McFayden)	16	1,264	665·2	1	1,196
Improved Short White (McD.)	17	584	691·6	1	1,133
New Yellow Intermediate (Ewing)	13	1,192	543·8	1	1,026
Long Orange Belgian (Rennie)	11	1,232	464·6	1	985
Mammoth White Intermediate (Rennie)	12	1,344	506·8	1	929
Giant Green Top White (D. & F.)	12	816	496·3	1	675
Improved Intermediate White (Ewing)	14	248	564·9	1	570
Long White Belgian (Steele, Briggs)	12	24	480·4	1	551
Improved Danvers (Graham)	12	288	485·7	1	523
Improved White Vosges (McD.)	11	1,232	464·6	1	232
Long Red Surrey (Steele, Briggs)	7	1,840	316·8	0	1,992
Large White Vosges (Graham)	9	1,536	390·7	0	1,709

SUGAR BEETS, TEST OF VARIETIES

Three varieties of sugar beets were tested on land which was treated in a similar manner to that used for the mangel, turnip, and carrot tests. These were seeded May 29 and harvested October 10. The results are given in the following table, and the Dominion Chemist notes that they are very satisfactory both as to sugar content and purity.

SUGAR BEETS FOR SUGAR

Variety	Yield per acre	Dry matter per acre	Per cent of sugar in juice	Co-efficient of purity
	lb.	lb.	%	%
Fredericksen (Division of Chemistry)	25,344	6,176	18·10	87·62
Horning (Division of Chemistry)	24,288	5,540	17·96	88·6$_1$
Rabbethge & Giesecke (Division of Chemistry)	19,536	4,571	19·41	89·6$_2$

CORN FOR ENSILAGE, TEST OF VARIETIES AND STRAINS

The land on which this test was made received the same treatment in every way as that used for the mangel test. Seeding was done June 17 with the grain drill. All lots were harvested September 25. The yields, etc., are recorded in the following table:—

CORN FOR ENSILAGE—TEST OF VARIETIES AND STRAINS

Variety and source of seed	Average height	Stage of maturity when harvested	Average yield per acre			
			Green weight		Dry matter	
	ft.		tons	lb.	tons	lb.
Pride of the North (Disco)	6	Early dough	14	600	2	1,139
Pride Yellow Dent (Disco)	6	Late dough	13	840	2	949
Northwestern Dent (Disco)	5½	Late dough	12	1,520	2	644
Bailey (Duke)	5¾	Early dough	11	1,320	2	372
Hall's Golden Nugget (J. Harris)	6	Early dough	11	1,760	2	362
Sweepstakes (J. Harris)	6½	Early dough	12	200	2	300
Northwestern Dent (Bruce)	5½	Late dough	9	480	2	207
Burr Leaming (Carter)	6	Early silk	11	1,320	2	162
Twitchell's Pride x Wisconsin (C.E.F.)	5½	Dough	10	460	2	83
Longfellow (Duke)	5½	Silk	11	1,320	2	71
Ninety Day White Dent (Disco)	5½	Late dough	10	1,560	1	1,999
North Dakota, White Flint (Steele, Briggs)	5¾	Silk	11	0	1	1,900
Wisconsin No. 7 (Duke)	5¾	Late silk	10	900	1	1,837
Leaming No. 9 (Duke)	5¾	Late silk	9	1,360	1	1,630
Amber Flint (Whimple)	5½	Early dough	9	1,800	1	1,387
Golden Glow (Duke)	5½	Late milk	9	920	1	1,369
Hybrid (Whimple)	6	Late silk	9	40	1	1,178

SUNFLOWERS, TEST OF VARIETIES AND STRAINS

The land on which the sunflowers were grown received the same treatment in every way as that used for the roots and corn test. The seeding was done with the grain drill, June 17, and the crop harvested September 25. The yield was very low owing to the dry weather.

SUNFLOWERS, TEST OF VARIETIES AND STRAINS

Variety and source of seed	Average height	Stage of maturity when harvested	Average yield per acre			
			Green weight		Dry matter	
	ft.		tons	lb.	tons	lb.
Mammoth Russian (McD.)	6	Full bloom	12	200	2	537
Ottawa 76 (C.E.F.)	4½	Seed late dough	8	1,160	1	1,298
Mennonite (Rosthern)	3	Seed ripe	4	800	0	1,230

SOY BEANS FOR SEED, TEST OF VARIETIES AND STRAINS

These were seeded on land which had received the same cultural and fertilizer treatment as that used for mangel test. The seeding was done, however, on the level instead of on raised rows. The different varieties were seeded May 29 at the rate of 1 bushel per acre, and were harvested October 23.

SOY BEANS FOR SEED—TEST OF VARIETIES AND STRAINS

Variety	Days to maturity	Yield of seed per acre
		bush.
Manchu	143	7·2
Manchu (Disco)	144	6·4
Chinaton Echo	129	4·6
O. A. C. No. 211	142	4·6
Black Eyebrow	142	4·6
A. K.	(Not all ripe Oct. 23)	3·9
Early Brown	121	3·6
Ito San	139	3·5
St. Anne's No. 92	117	3·4

SOY BEANS FOR HAY, TEST OF VARIETIES

The land on which this test was conducted had been in hay for three years. It was ploughed in the fall of 1928 and in the spring of 1929 received manure at the rate of 25 tons per acre. No other fertilizer was used. The manure was well worked into the soil with a heavy tractor disk and the seed sown with a grain drill at the rate of 1¼ bushels per acre, on June 8. Part of the area was cut on August 3 and part August 29. The yield per acre of green material as well as of absolute dry matter from each of these cuttings is given in the table.

SOY BEANS FOR HAY—TEST OF VARIETIES

Variety and source of seed	Cut August 3				Cut August 29			
	Stage of maturity	Average yield per acre			Stage of maturity	Average yield per acre		
		Green weight	Cured hay	Dry matter		Green weight	Cured hay	Dry matter
		tons	tons	tons		tons	tons	tons
Early Korean (Ott.)	Before bloom...	2·52	0·54	0·47	Pods formed....	3·36	1·02	0·89
O.A.C. 211 (Ott.)	Before bloom...	3·12	0·66	0·57	Pods forming...	3·84	1·21	1·05
Summerland (Ott)	Before bloom...	2·96	0·62	0·54	Pods forming...	3·52	1·10	0·96
A.K. (Ott.)	Before bloom...	3·16	0·66	0·57	Blooming.....	3·63	1·14	0·99

ALFALFA

One and one-half acres of alfalfa were seeded in the spring of 1929 on land which had been in corn in 1928 and had received for that crop 20 tons of manure and 600 pounds of a complete fertilizer per acre. Two and one-half pounds of ground limestone per acre were also applied. The alfalfa seed was treated with Azotogen, an inoculating medium sent here for trial. The seeding was done with a grain drill through the grass-seed box, at the rate of 22 pounds per acre. A good stand of plants was secured, but no cutting was made in 1929.

For purposes of comparison a small area was seeded in rows one foot apart with the garden drill, on land which had received a dressing of manure at the rate of 25 tons per acre, the land having been previously limed. The stand and

growth were exceptionally good on this area. A cutting August 29, 1929, gave a yield of 3,840 pounds per acre of green material, and 1,034 pounds of absolute dry matter.

From the area seeded in 1922 6,650 pounds per acre of green material were harvested, which gave a yield of absolute dry matter of 1,662 pounds per acre.

JAPANESE MILLET AND HAIRY VETCH

The land on which these were grown had been in hemp in 1928, and was manured for that crop at the rate of 25 tons per acre. The millet and vetch were seeded June 11, and harvested October 22.

JAPANESE MILLET AND HAIRY VETCH

Crop	Yield of green matter per acre
	tons
Japanese Millet (Gunson)	3·54
Hairy Vetch (Gunson)	2·68

GRASSES AND CLOVERS

The work of testing different clovers and grasses for yield and general suitability for this district was again carried on this year, with results as given in the following table. Before the records are taken a border one foot wide is removed from all the plots.

GRASSES AND CLOVERS, 1929 (SEEDED 1928)

Variety or source of seed	Average yield per acre		Notes on winter killing
	Green weight	Cured hay	
	tons	tons	
Red Clovers—			
Welsh (Sutton)	1·84	0·57	30 per cent winter killed.
Chateauguay	3·49	1·28	Good stand.
Alta Swede	6·29	2·53	Good, thick stand.
St. Clet	3·04	0·98	Fairly good stand.
English Broad	2·72	0·96	30 per cent thrown out.
Mammoth (Ont. grown)	2·82	1·24	15 per cent thrown out.
Early Swedish	4·00	1·68	Good stand.
Late Swedish	5·88	2·48	Good stand.
Alsike Clover—			
Alsike	3·04	1·76	10 per cent thrown out.
White Dutch Clovers—			
White Dutch, common	4·12	1·80	Good stand.
Wild White, Scottish	3·32	1·32	Good, thick stand.
Mammoth White, Suttons	2·16	0·92	Fairly good stand.
Danish Morso	3·36	1·44	Good stand.
Danish Stryno	4·92	1·88	Good stand.
Sweet Clovers—			
Yellow Blossom	7·52	3·68	Some thrown out.
White Blossom	8·00	4·40	Some thrown out.
Timothy—			
Boon (C.E.F.)	4·44	2·64	Very good stand.
Gloria (G.S.S.)	4·92	2·88	Good stand.
Grasses—			
Kentucky Blue	3·48	1·92	Poor to fair stand.
Red Top	4·32	2·56	Good stand.
Orchard Grass	3·28	1·92	Good stand.
Meadow Fescue	3·68	1·76	Good stand.
Alfalfa—			
Grimm	3·28	1·68	Good stand.

DIFFERENT GRASS MIXTURES FOR PASTURE

With the idea of securing some information as to the best mixture to use when seeding down for pasture five different grass mixtures were seeded in half-acre plots with a nurse crop of oats in 1928. The land used had grown in 1927, fleshy pasture plants and steckling turnips, and had been manured for these crops at the rate of 15 tons per acre. It was ploughed in the fall of 1927, disked in the spring of 1928, and 1½ tons of ground limestone applied per acre. In addition to the lime the whole area received 950 pounds per acre of Belgian slag, 16 per cent. The oats and the different grass mixtures were seeded June 7, 1928. The yields of hay in 1929 will be found in the following table. The hay was harvested July 20.

DIFFERENT GRASS MIXTURES FOR PASTURES

Mixture seeded, pounds per acre	Average yield per acre		
	Green weight	Cured hay	Dry matter
	tons	tons	tons
Red clover, 8; Timothy 8; alsike, 2	7·13	2·26	1·97
Timothy, 10; red clover, 5; alsike, 2; white clover, 2	5·30	1·62	1·41
Kentucky Blue 20; white clover, 2; timothy, 5	3·61	1·23	1·07
Red Top; 20; white clover, 2; timothy, 5;	3·60	1·14	0·99
Red top, 10; Kentucky Blue, 10; white clover, 2; timothy, 5	2·88	1·01	0·88

TURNIP SEED PRODUCTION

The stecklings used for this work were stored, as usual, in a pit located on a well-drained piece of ground, and came through the winter in excellent condition. The roots were carefully selected for planting, all bruised and poorly shaped roots being discarded. No forks or shovels were used in handling and the roots were never poured from one receptacle to another. Experience has shown the importance of planting perfectly sound roots free from bruises.

The land on which the seed was grown was manured at the rate of 15 tons per acre, and ploughed May 2. A fertilizer mixed as follows was applied at the rate of 500 pounds per acre; nitrate of soda, 100 pounds; sulphate of ammonia, 50 pounds; superphosphate, 250 pounds; muriate of potash, 100 pounds. This was well worked into the soil with the cultivator, the land smoothed with the smoothing harrow, rows run 3 feet apart with the potato planter, and the stecklings set 2 feet apart in the rows, May 4. Growth commenced with very little delay, nearly all the roots starting directly from the centre of the crown, and by May 20 the plants were showing a dark green over all the field. The weather later on became very dry and was not favourable to a high yield of seed. The crop was harvested August 5, and threshed August 10. The yield of seed was 320 pounds, or at the rate of 640 pounds per acre.

EXPERIMENTS WITH FERTILIZERS

NITROPHOSKA, 1929

This experiment was carried out to compare the concentrated fertilizer, Nitrophoska, containing 15 per cent of nitrogen, 30 per cent of phosphoric acid and 15 per cent of potash, with other complete fertilizers furnishing the same amounts of plant food but in which the nitrogen is derived from a number of sources. The phosphoric acid was furnished by superphosphate and the potash by muriate of potash. On one series of plots the nitrogen was left out entirely. This area was ploughed in the fall of 1928 and well worked up in the spring of 1929. The fertilizers were applied June 1 and well worked in with a two-horse spring-tooth cultivator. Green Mountain potatoes were planted June 4 and the crop harvested October 31. There was no scab. The plots were one-eightieth acre, replicated four times, and well distributed throughout the area. The results are tabulated in the following table.

NITROPHOSKA, 1929

Plot	How fertilized, 1929: pounds per acre	Average yield of potatoes per acre		
		Marketable	Unmarketable	Total
		bush.	bush.	bush.
1	Nitrophoska (15-30-15), 400	180·0	22·7	202·7
2	Nitrate of soda, 400; superphosphate, 750; muriate of potash, 120.	192·0	24·0	216·0
3	Sulphate of ammonia, 300; superphosphate, 750; muriate of potash 120	190·7	28·0	218·7
4	Check, not fertilized	124·0	21·3	145·3
5	Calcium nitrate, 400; superphosphate, 750; muriate of potash, 120.	208·0	21·3	229·3
6	Cyanamide, 285; superphosphate, 750; muriate of potash, 120	145·3	30·7	176·0
7	Check, not fertilized	120·0	22·7	142·7
8	Urea, 130·5; superphosphate, 750; muriate of potash, 120	180·0	25·3	205·3
9	Nitro-chalk, 400; supephosphate, 750; muriate of potash, 120	192·0	25·3	217·3
10	Superphosphate Superphosphate, 750; muriate of potash, 120	140·0	29·3	169·3

GYPSUM AND SULPHUR EXPERIMENT, 1924 (Project C. 104)

This experiment, started in 1924, was reported upon on page 51 of the 1928 report. The object of the experiment was (1) to ascertain the effect of gypsum and sulphur on crop yields; and (2) to ascertain the effect of gypsum, sulphur and superphosphate on the suppression of potato scab. There are approximately 100 pounds of sulphur in 550 pounds of gypsum, and the same amount in 890 pounds of superphosphate. Sulphur has been advised for use in soils infested with scab, and as this land has been limed twice at the rate of two tons per acre when seeding down in two three-year rotations, and had been in potatoes in 1923 with a slight scab infection noticeable in the crop, it was thought suitable for the experiment. Sulphur was supplied to plots, 5, 6 and 7 at the rate of 100, 200 and 400 pounds per acre. The gypsum applied to plots 1, 2 and 3 furnished approximately 100, 200 and 400 pounds of sulphur per acre, respec-

tively, while the superphosphate applied to plots 8 and 9 supplied approximately 100 and 200 pounds of sulphur per acre, respectively. The land was in good fertility at the start of the experiment, and no plant food was supplied except to plots 8, 9 and 11. Plots 8 and 9 received 150 and 300 pounds of phosphoric acid, respectively, in the form of superphosphate. Plot 11 received 150 pounds of phosphoric acid as ground rock phosphate. Plots 15 and 16 each received 10 tons of manure per acre.

In 1929, on June 1, the land was treated as in 1924, and in addition 1,000 pounds per acre of 5-8-5 fertilizer was applied to all plots, including the check plots. Untreated Irish Cobbler potatoes, 100 per cent scabby, were used. The yields per acre are tabulated according to size, as marketable and unmarketable. The percentage of scab in the crops harvested is classified as "slight," showing only traces, and "medium," showing considerable scab on the tubers. The scab was not sufficiently severe to render the marketable potatoes unmarketable locally.

GYPSUM AND SULPHUR, 1929 (PROJECT C 104)

All plots received 1,000 pounds per acre of 5-8-5 fertilizer in 1929. Crop: Irish Cobbler potatoes.

Plot	How treated 1929, pounds per acre	Average yield per acre			Average per cent scab		
		Marketable	Unmarketable	Total	Slight	Medium	Total
		bush.	bush.	bush.	%	%	%
1	Gypsum, 550	110·7	26·0	136·7	20·0	35·1	55·1
2	Gypsum, 1,100	115·3	26·0	141·3	19·8	34·9	54·7
3	Gypsum, 2,200	103·3	18·7	122·0	16·3	44·8	61·1
4	Check	93·3	26·0	119·3	17·8	31·8	49·6
5	Sulphur, 100	106·7	21·3	128·0	19·8	38·0	57·8
6	Sulphur, 200	115·3	33·3	148·6	16·1	20·6	36·7
7	Sulphur, 400	122·7	26·7	149·4	18·8	26·9	45·7
8	Superphosphate, 890	104·0	34·0	138·0	18·3	33·3	51·6
9	Superphosphate, 1,780	112·0	30·7	142·7	21·4	40·6	62·0
10	Check	96·0	30·7	126·7	26·3	44·2	70·5
11	Ground natural rock phosphate, 500	116·0	26·0	142·0	21·6	38·0	59·6
12	Ground limestone, 4,000	100·0	26·0	126·0	14·7	59·7	74·4
13	Sulphur, 200; ground limestone, 4,000	82·7	28·0	110·7	34·9	40·9	75·8
14	Check	92·7	28·7	121·4	23·6	41·7	65·3
15	Gypsum, 500; manure (10 tons)	145·3	26·0	171·3	27·2	38·5	65·7
16	Manure (10 tons)	112·0	35·3	147·3	42·0	34·3	76·3
17	Check	103·3	30·0	133·3	52·0	20·0	72·0
18	Check	106·0	25·3	131·3	18·7	29·9	48·6

TOTAL (MARKETABLE AND UNMARKETABLE) YIELDS PER ACRE

Average, check plots	126·4 bush.
Average, plots receiving gypsum	133·3 "
Average, plots receiving sulphur	142·0 "
Average, plots receiving superphosphate	140·3 "
Average, plots receiving natural rock phosphate	142·0 "
Average, plots receiving ground limestone	126·0 "
Average, plots receiving manure	147·3 "
Average, plots receiving manure and gypsum	171·3 "
Average, plots receiving ground limestone and sulphur	110·7 "

TOTAL SCAB

Average, checks	61·2 per cent
Average, gypsum	57·0 "
Average, sulphur	46·7 "
Average, superphosphate	56·8 "
Average, natural rock phosphate	59·6 "
Average, ground limestone	74·4 "
Average, manure	76·3 "
Average, gypsum and manure	65·7 "
Average, ground limestone and sulphur	75·8 "

AMMO-PHOS EXPERIMENT, 1926

An experiment covering a four-year rotation of turnips, grain, clover hay and timothy hay was started in 1926 to test the value of Ammo-phos, a fertilizer containing nitrogen and phosphoric acid in combination, as compared with nitrate of soda and sulphate of ammonia used with superphosphate or slag, and with or without muriate of potash. One grade of Ammo-phos contains 13 per cent of ammonia (10·7 per cent nitrogen) and 48 per cent of phosphoric acid, and another grade contains 20 per cent of ammonia (16·45 per cent nitrogen) and 20 per cent of phosphoric acid. The Sydney slag used contained 14 per cent of phosphoric acid. The fertilizer treatments, it will be noticed, are based on the plant food supplied in a stated quantity of the Ammo-phos products. Plots 1, 2, 8, 9 and 10 contain the equivalent in plant food of one ton of 2·7-12-0 (2·7 per cent of nitrogen and 12 per cent of phosphoric acid) mixed fertilizer; plots 3 and 4 the equivalent in plant food of one ton of 2·7-12-3 (2·7 per cent of nitrogen, 12 per cent of phosphoric acid and 3 per cent of potash) mixed fertilizer; plot 5 the equivalent of one-half ton of 2·7-12-0 mixed fertilizer; plots 6 and 7 the equivalent of one-half ton of 2·7-12-6 mixed fertilizer; plots 11, 12, 15, 16 and 17 the equivalent of one ton of 4·1-5-0 mixed fertilizer; plots 13 and 14 the equivalent of one ton of 4·1-5-3 mixed fertilizer, and plots 18 and 19 the equivalent of one-half ton of 4·6-10-6 mixed fertilizer per acre. In the summary below these similar plots are grouped together.

The land on which the test was conducted was uniform, but in a low state of fertility. The land was well prepared, after which the fertilizer was applied broadcast and worked into the various plots before seeding to turnips in 1926. In 1927 oats, with clover and timothy, were seeded. The yields as given in the table are calculated from the average of four plots located at different places in the area devoted to this experiment. Fourteen individual plots were left without treatment in different parts of the field to serve as check plots, and the figures given for the check are the average of these fourteen plots. In estimating the value of the product turnips are priced at 5 cents and oats at 70 cents per bushel, and straw at $6 and hay at $10 per ton.

Ammo-Phos Experiment, 1926

Plot	How treated 1926, pounds per acre	Plant food supplied, pounds per acre			Average yield per acre					Total value of crops
		Nitrogen	Phosphoric acid	Potash	Turnips, 1926	Oats, 1927		Clover hay, 1928	Timothy hay, 1929	
						Grain	Straw			
					bush.	bush.	tons	tons	tons	$ cts.
1	Ammo-phos (13-48), 500	53·5	240	.....	561·6	30·6	0·94	1·28	0·72	75 14
2	Sulphate of ammonia, 255; superphosphate, 1,500	53·5	240	.....	697·6	37·1	0·77	1·53	1·04	91 17
3	Ammo-phos (13-48), 500; muriate of potash, 120	53·5	240	60	582·4	33·5	0·80	1·74	0·88	83 57
4	Sulphate of ammonia, 255; superphosphate, 1,500; muriate of potash, 120	53·5	240	60	596·8	34·7	0·81	1·21	0·72	78 29
5	Ammo-phos (13-48), 250	26·7	120	.....	556·8	34·7	0·73	1·44	1·28	83 71
6	Ammo-phos (13-48), 250; muriate of potash, 120	26·7	120	60	545·6	34·7	0·69	1·42	1·04	80 31
7	Sulphate of ammonia, 128; superphosphate, 750; muriate of potash, 120	26·7	120	60	545·6	36·7	0·80	1·48	0·88	81 37
8	Nitrate of soda, 356; superphosphate, 1,500	53·5	240	.....	654·4	39·4	1·05	2·22	1·28	101 60
9	Sulphate of ammonia, 255; Sydney slag, 1,714	53·5	240	.....	587·2	30·6	0·80	1·85	1·28	86 88
10	Nitrate of soda, 356; Sydney slag, 1,714	53·5	240	.....	556·8	30·0	0·75	2·30	1·29	89 24
11	Ammo-phos (20-20), 500	82·2	100	.....	614·4	32·3	0·73	1·36	0·73	78 73
12	Sulphate of ammonia, 391; superphosphate, 625	82·2	100	.....	681·6	34·7	0·95	1·26	0·88	85 47
13	Ammo-phos (20-20), 500; muriate of potash, 120	82·2	100	60	654·4	31·1	0·77	1·58	1·00	84 91
14	Sulphate of ammonia, 391; superphosphate, 625; muriate of potash, 120	82·2	100	60	728·0	33·9	0·77	1·44	1·09	90 05
15	Nitrate of soda, 548; superphosphate, 625	82·2	100	.....	673·6	32·0	0·94	1·95	1·12	92 42
16	Sulphate of ammonia, 391; Sydney slag, 714	82·2	100	.....	510·4	27·3	0·65	1·06	0·72	66 33
17	Nitrate of soda, 548; Sydney slag, 714	82·2	100	.....	553·6	34·7	0·75	1·82	1·20	85 67
18	Ammo-phos (13-48), 125; Ammo-phos (20-20), 200; muriate of potash, 120	46·0	100	60	534·4	33·0	0·81	1·80	0·96	82 28
19	Sulphate of ammonia, 219; superphosphate, 625; muriate of potash, 120	46·0	100	60	507·2	33·0	0·65	1·37	0·84	74 46
20	Checks, C1 to C14, not fertilised	.....	.....	.....	294·8	28·3	0·77	1·31	0·80	60 27

AMMO-PHOS EXPERIMENT, 1926: SUMMARY

Plot	How treated, 1926, pounds per acre	Total value of crops, 1926 to 1929, inclusive
		$
	Each equivalent to 1 ton of 2-7-12-0 fertilizer	
1	Ammo-phos (13-48), 500	75 14
2	Sulphate of ammonia, 255; superphosphate, 1,500	91 17
8	Nitrate of soda, 356; superphosphate, 1,500	101 60
9	Sulphate of ammonia, 255; Sydney slag, 1,714	86 88
10	Nitrate of soda, 356; Sydney slag, 1714	89 24
	Each equivalent to 1 ton of 2-7-12-3 fertilizer	
3	Ammo-phos (13-48), 500; muriate of potash, 120	83 57
4	Sulphate of ammonia, 255; superphosphate, 1,500; muriate of potash, 120	78 29
	Each equivalent to ½-ton of 2-7-12-0 fertilizer	
5	Ammo-phos (13-48), 250	83 71
	Each equivalent to ½-ton of 2-7-12-6 fertilizer	
6	Ammo-phos (13-48), 250; muriate of potash, 120	80 31
7	Sulphate of ammonia, 128; superphosphate, 750; muriate of potash, 120	81 37
	Each equivalent to 1 ton of 4-1-5-0 fertilizer	
11	Ammo-phos (20-20), 500	78 73
12	Sulphate of ammonia, 391; superphosphate, 625	85 47
15	Nitrate of soda, 548; superphosphate, 625	92 42
16	Sulphate of ammonia, 391; Sydney slag, 714	66 33
17	Nitrate of soda, 548; Sydney slag, 714	85 67
	Each equivalent to 1 ton of 4-1-5-3 fertilizer	
13	Ammo-phos (20-20), 500; muriate of potash, 120	84 91
14	Sulphate of ammonia, 391; superphosphate, 625; muriate of potash, 120	90 05
	Each equivalent to ½-ton 4-6-10-6 fertilizer	
18	Ammo-phos (13-48), 125; Ammo-phos (20-20), 200; muriate of potash, 120	82 28
19	Sulphate of ammonia, 219; superphosphate, 625; muriate of potash, 120	74 46
C1 to C14	Checks, not fertilized	60 27

BASIC SLAG EXPERIMENT, 1926

This experiment was reported upon fully in the 1928 report, page 53, but it was considered advisable to continue it for another year. As the 1929 data complete the experiment it has been thought desirable to give here the complete yields for the four years.

It is interesting to note that after a period of four years since the application was made the Belgian slag plots are giving higher yields than the Sydney slag plots, and that all treatments have given a profit above the cost of the fertilizers. It may also be noted that the application of slag at the heavier rates has been more profitable than at the lower rates per acre.

BASIC SLAG EXPERIMENT, 1926

Plot	How treated 1926, pounds per acre	Average yield per acre					Total value of product per acre	Cost of fertilizers used	Value of crops above cost of fertilizers	Value of increase over check plot
		Oats, 1926		Clover hay, 1927	Timothy hay, 1928	Timothy hay, 1929				
		Grain	Straw							
		bush.	tons	tons	tons	tons	$ cts.	$ cts.	$ cts.	$ cts.
1	Sydney slag, 14 p.c., 1,000	52·94	1·44	1·08	2·46	1·53	96 40	8 50	87 90	16 90
2	Sydney slag, 14 p.c., 500	50·59	1·36	1·06	2·16	1·12	86 97	4 25	82 72	11 72
3	Belgian slag, 16 p.c., 875	54·11	1·42	1·94	2·99	1·95	115 20	8 75	106 45	35 45
4	Belgian slag, 16 p.c., 437·5	47·18	1·36	1·45	2·51	1·48	95 59	4 38	91 21	20 21
5	Sydney slag, 1,000; nitrate of soda, 100; muriate of potash, 50	54·11	1·58	0·99	2·48	1·53	97 36	12 50	84 86	13 86
6	Sydney slag, 500; nitrate of soda, 100; muriate of potash, 50	56·47	1·67	0·80	2·11	1·31	91 75	8 25	83 50	12 50
7	Belgian slag, 875; nitrate of soda, 100; muriate of potash, 50	60·59	1·82	1·90	3·37	1·76	123 63	12 75	110 88	39 88
8	Belgian slag, 437·5; nitrate of soda, 100; muriate of potash, 50	58·23	1·74	1·32	2·24	1·52	102 00	8 38	93 62	22 62
9	Sydney slag, 1,000; muriate of potash, 100	42·94	1·28	0·97	2·48	1·61	88 34	10 50	77 84	6 84
10	Belgian slag, 875; muriate of potash, 100	54·71	1·55	1·50	2·91	1·77	109 40	10 75	98 65	27 65
11	Superphosphate, 16 p.c., 875	46·47	1·37	1·30	2·73	1·77	98 75	8 75	90 00	19 00
12	Superphosphate, 875; muriate of potash, 100	46·47	1·54	1·30	2·64	1·84	99 57	10 75	88 82	17 82
C1 to C6	Checks, not fertilized	45·49	1·16	0·46	1·55	1·21	71 00	.....	.....	.....

NITRATE OF SODA ON ALFALFA, 1929

The field where this test was made was seeded to alfalfa in 1926, and gave a yield of 3·92 tons per acre in 1927, and 3·14 tons in 1928. The alfalfa had killed out considerably and was replaced by couch grass, redtop and timothy. The stand was about one-third alfalfa. It is not considered to be necessary to fertilize alfalfa or clovers with nitrogenous fertilizers, and this experiment was undertaken to find out whether the yields on such fields could profitably be increased.

Plots of one-third acre each were treated May 9, 1929, as stated in the table below. The data show that although nitrate of soda gave about the same increase in yield at both rates of application, the lighter application resulted in a profit over the cost of the fertilizer, whereas from the heavier application there was a loss. The gain, however, no doubt was due to the increased growth of grasses rather than to alfalfa. These results are in accord with previous experiments which have shown that from 100 to 150 pounds of nitrogenous fertilizers applied to grass lands will return a profit above the cost of the fertilizer used.

RESULTS WITH NITRATE OF SODA ON ALFALFA

Plot	How treated, pounds per acre	Yield of hay per acre	Increase over check plot	Value of gain	Cost of fertilizer	Profit or loss (−) above fertilizer
		lb.	lb.	$ cts.	$ cts.	$ cts.
1	Nitrate of soda, 350	4,530	1,200	7 20	13 50	−6 30
2	Nitrate of soda, 125	4,410	1,080	6 48	3 75	2 73
3	Not fertilized	3,330				

NITROGENOUS FERTILIZERS ON GRAIN IN 1927 AND ON TIMOTHY HAY IN 1929

This experiment was started in 1927 to test the relative value of various nitrogenous fertilizers being offered on the market. Those indicated in the table were tried out with different phosphatic fertilizers and with ground limestone. It was considered advisable to apply muriate of potash to the whole area, including the check plots, at the rate of 100 pounds per acre.

The plots were replicated three times. In the spring of 1929 two plots out of each three, designated as A and B, were given applications of nitrogenous fertilizers similar to those applied in 1927. This was in the form of a surface dressing, and was applied May 18. The results would seem to indicate that nitrate of soda is the best to apply to a timothy sod. It will be noticed that on the range where Sydney slag was used in 1927 there was no profit above the cost of the fertilizers. There is no way whereby we can explain the cause of this.

The results from the four ranges, when averaged, show the following increases in hay from the use of the fertilizers stated: nitrate of soda, 0·77 ton; sulphate of ammonia, 0·46 ton; cyanamide, 0·06 ton; urea, 0·3 ton; nitrate of lime, 0·3 ton. It is quite evident that the various nitrogenous fertilizers have responded better on range A, Belgian slag, than on any of the others.

NITROGENOUS FERTILIZERS ON GRAIN IN 1927 AND ON TIMOTHY HAY IN 1929—AVERAGE YIELDS PER ACRE, 1927-1929 INCLUSIVE

Plot	Nitrogenous fertilizers, pounds per acre	RANGE A Belgian Slag, 500 pounds per acre				RANGE B Sydney Slag, 570 pounds per acre				RANGE C Superphosphate 500 pounds per acre				RANGE D Ground Limestone, 2 tons per acre			
		Oats, 1927		Clover hay, 1928	Timothy hay, 1929	Oats, 1927		Clover hay, 1928	Timothy hay, 1929	Oats, 1927		Clover hay, 1928	Timothy hay, 1929	Oats, 1927		Clover hay, 1928	Timothy hay, 1929
		Grain	Straw			Grain	Straw			Grain	Straw			Grain	Straw		
		bush.	tons	tons	tons	bush.	tons	tons	tons	bush.	tons	tons	tons	bush.	tons	tons	tons
1	Nitrate of soda, 150	18·8	0·64	1·63	1·28	22·6	0·60	1·48	2·08	14·1	0·65	1·48	1·28	20·7	0·60	2·51	1·48
1a, 1b	Nitrate of soda, 150 (1929)	.....	.....	.....	2·48	.....	.....	.....	2·00	.....	.....	.....	2·16	.....	.....	.....	2·56
2	Sulphate of ammonia, 110	18·8	0·77	1·68	1·60	21·6	0·62	1·28	1·92	19·6	0·59	1·68	1·44	20·8	0·60	2·24	1·92
2a, 2b	Sulphate of ammonia, 110 (1929)	.....	.....	.....	2·64	.....	.....	.....	1·44	.....	.....	.....	2·40	.....	.....	.....	2·24
3	Cyanamide, 110	25·4	0·66	1·84	1·92	19·6	0·66	1·23	1·76	21·2	0·79	1·71	2·08	22·6	0·60	1·96	1·12
3a, 3b	Cyanamide, 110 (1929)	.....	.....	.....	2·64	.....	.....	.....	1·28	.....	.....	.....	2·16	.....	.....	.....	1·04
4	Urea, 50	21·2	0·65	1·40	1·60	21·2	0·63	1·84	1·92	19·6	0·67	1·47	1·28	22·7	0·65	2·43	1·60
4a, 4b	Urea, 50 (1929)	.....	.....	.....	2·24	.....	.....	.....	1·44	.....	.....	.....	1·84	.....	.....	.....	2·08
5	Nitrate of lime, 150	21·6	0·70	1·84	2·24	16·9	0·40	1·55	1·76	18·1	0·57	1·96	1·28	19·6	0·59	2·13	1·60
5a, 5b	Nitrate of lime, 150 (1929)	.....	.....	.....	2·72	.....	.....	.....	1·36	.....	.....	.....	2·24	.....	.....	.....	1·76
Checks	No nitrogenous fertilizers	14·8	0·46	2·19	2·24	11·8	0·44	1·80	0·91	9·4	0·32	1·63	1·00	9·4	0·43	2·32	1·48
	Average gain from 1929 application	.....	.....	.....	0·81	.....	.....	.....	0·38 (loss)	.....	.....	.....	0·69	.....	.....	.....	0·39

UREA AND CYANAMIDE EXPERIMENT

Urea, sold under the trade name "Floranid," is a concentrated nitrogenous fertilizer manufactured in Germany by the fixation of atmospheric nitrogen, and contains approximately 45 per cent of nitrogen. Cyanamide contains approximately 20½ per cent of nitrogen, and is manufactured by the American Cyanamide Company at Niagara Falls by fixation of atmospheric nitrogen.

The object of the experiment is to determine the yields from the above materials as compared with nitrate of soda and sulphate of ammonia, when used in conjunction with superphosphate and muriate of potash. It will be seen from the table that plots 1, 2, 3 and 4 were treated at double the rate per acre of plots 6, 7, 8 and 9, respectively.

The land on which this experiment was conducted was low in fertility but uniform throughout. The land was worked thoroughly, and the fertilizer scattered broadcast and worked into the plots. Potatoes were planted in 1926, at which time the fertilizers as stated in the table below were applied. In the case of cyanamide the application was made ten days before the date of planting. In 1927 oats, with clover and timothy, were seeded to the different plots. The yields per acre are calculated from the average of four plots, except in the case of the check plots, where six plots were used.

In calculating the value of the product per acre from 1926 to 1929, inclusive, the following prices were set as to the value of the different crops: potatoes, 60 cents per bushel; oats, 70 cents; straw, $6, and clover and timothy hay, $10 per ton. It will be seen that the average profit from the larger applications (plots 1, 2, 3 and 4) was $189.11. The average from the half of the above applications (plots 6, 7, 8, and 9) was $142.74, a difference of $46.37. On plots 5 and 10, where no nitrogenous fertilizers were used, there was a difference of only $8.64 in the value of the crop in favour of the higher application. Where urea and sulphate of ammonia were used alone without superphosphate (plots 11 and 12). there is a gain of $2.48 in favour of the urea. Comparing plot 4 with plot 11 one finds a difference in value of $59.61, due to the superphosphate and muriate of potash used. Similarly, with plots 2 and 12, there is a difference in value of $65.45 due to the use of superphosphate and muriate of potash. It will be noticed also that plots 6, 7, 8 and 9, all containing nitrogen, did not produce as valuable crops as plot 10, which had the same superphosphate and muriate of potash applications but had no nitrogen, though there is no apparent reason why such should be the case.

Urea and Cyanamide Experiment

Plot	How treated, 1926, pounds per acre	Plant food per acre			Average yield per acre							Total value of product, 1926-1929, inclusive
					Potatoes, 1926			Oats, 1927		Clover hay, 1928	Timothy hay, 1929	
		Nitrogen	Phosphoric acid	Potash	Marketable	Not marketable	Total	Grain	Straw			
					bush.	bush.	bush.	bush.	tons	tons	tons	$
1	Nitrate of soda, 520; superphosphate, 1,000; muriate of potash, 240	78	160	120	210·9	13·3	224·2	26·3	0·68	1·58	0·80	180 81
2	Sulphate of ammonia, 380; superphosphate, 1,000; muriate of potash, 240	78	160	120	247·3	13·0	260·3	24·1	0·69	0·96	0·72	193 99
3	Cyanamide, 380; superphosphate, 1,000; muriate of potash, 240	78	160	120	226·6	18·1	244·7	28·8	0·79	1·13	0·80	191 02
4	Urea, 174; superphosphate, 1,000; muriate of potash, 240	78	160	120	233·3	15·6	248·9	30·1	0·77	0·88	0·68	190 63
5	Superphosphate, 1,000; muriate of potash, 240	.....	160	120	198·6	12·0	210·6	23·5	0·70	1·05	0·49	162 41
6	Nitrate of soda, 260; superphosphate, 500; muriate of potash, 120	39	80	60	172·8	11·6	184·4	24·5	0·67	0·67	0·49	143 41
7	Sulphate of ammonia, 190; superphosphate, 500; muriate of potash, 120	39	80	60	162·6	9·0	171·6	22·6	0·52	0·72	0·57	134 80
8	Cyanamide, 190; superphosphate, 500; muriate of potash, 120	39	80	60	181·6	13·3	194·9	24·3	0·67	0·89	0·56	152 47
9	Urea, 87; superphosphate, 500; muriate of potash, 120	39	80	60	172·0	11·6	183·6	21·2	0·63	0·72	0·43	140 28
10	Superphosphate, 500; muriate of potash, 120	.....	80	60	181·2	10·3	191·5	27·3	0·76	0·96	0·56	153 77
11	Urea, 174	78	.....	.....	148·0	9·6	157·6	28·2	0·77	0·64	0·57	131 02
12	Sulphate of ammonia, 380	78	.....	.....	151·4	8·0	159·4	26·4	0·67	0·56	0·48	128 54
Ch'ck	Not fertilized	.....	.....	.....	109·8	7·4	117·2	17·9	0·51	0·52	0·32	94 31

POULTRY

BREEDING STOCK

The breeding pens for 1929 had thirty-three S.C. White Leghorn hens with an average pullet-year production of 210 eggs, and seventy-five Barred Plymouth Rock hens with an average pullet-year production of 203 eggs. The pullet-year production has shown a considerable annual increase since 1927, which has been obtained by means of trap-nesting and pedigree breeding, using only cockerels from dams with a pullet-year production of over 200 eggs.

Below is shown the average second-year production of the hens carried to the end of their second year, as compared with their pullet-year production.

EGG PRODUCTION OF PULLETS AND HENS

Number of hens	Breed	Average production, first year (1928)	Average production, second year (1929)
17	S. C. White Leghorn	217	173
17	Barred Plymouth Rocks	233	168

The hatching results for 1929 were as follows:

Eggs set	Per cent fertile	Number of chicks	Per cent of total eggs to hatch	Per cent of fertile eggs to hatch	Number of chicks alive at three weeks	Per cent of mortality to three weeks of age
1,923	93·8	950	49·4	52·7	892	6·1

The chickens were raised to ten weeks of age in two shed-roof laying houses, 16 feet by 32 feet, heated by coal-burning brooder stoves. They were then put into the colony houses on range, where they made steady growth. Early in September 391 pullets were put in laying quarters in good condition.

EFFECT OF MALE BIRD ON SIZE OF EGGS LAID BY PULLETS

In the flock of Barred Plymouth Rocks at Kentville the progeny of two males, Nos. 263 and 7, have been under observation during the past two years. In the spring of 1927 both males were mated to hens whose egg weights were equal, no hen laying eggs weighing below 24 ounces to the dozen. Unfortunately male No. 7 died before the spring of 1928, so that progeny from a son of his, No. 16, were used in comparing results in 1928.

EFFECT OF MALE BIRDS ON SIZE OF EGGS

Male No.	Year	Progeny	Remarks
263	1927	28 pullets....	Seventeen culled for laying eggs below 23 ounces to the dozen. No pullet laying eggs over 25 ounces to the dozen. Ten pullets kept for breeding; average egg weight, 24 ounces to the dozen.
7	1927	15 pullets....	No pullets laying below 23 ounces to the dozen. Six pullets laying 27 ounces to the dozen or over. Eight pullets kept for breeding; average egg weight, 25 ounces to the dozen.
263	1928	8 pullets....	Only 3 pullets laying 23 ounces to the dozen; average, 22 ounces to the dozen.
16 (son of (No. 7)	1928	13 pullets....	Only 3 pullets laying below 23 ounces to the dozen; average, 24 ounces to the dozen.
2 sons of No. 263	1928	28 pullets....	Eleven laying below 23 ounces to the dozen, or 39·3 per cent.
6 sons of No. 7	1928	147 pullets....	Twenty-seven laying below 23 ounces to the dozen, or 18·4 per cent.

In 1928 male No. 263 was mated to a pen of birds laying unusually large eggs, and male No. 16 to a pen laying medium-sized eggs averaging 24 ounces to the dozen, with the results as shown. These results indicate the value of the male in obtaining pullets that will lay large eggs.

FEEDING EXPERIMENTS

BEEF MEAL VERSUS FISH MEAL

The purpose of this experiment is to determine the best amounts of these feeds to add to the laying mash, and also to determine if they are better fed separately or in combination. Eight pens of 25 Barred Plymouth Rock pullets each were used in the test, which extended from November 1, 1928, to May 1, 1929, a period of six months. The basis of the dry mash was equal parts of cornmeal, bran, middlings and oatmeal with one per cent of fine salt and five per cent of fine charcoal. The beef and fish meals were added to this as required for the individual pens. This mixture, with five per cent of bone meal added, was also used, moistened with buttermilk and cod live oil, as a wet mash.

VALUE OF FEED CONSUMED AND EGGS LAID.—These, together with the profit over cost of feed, and the mortality, are given in the following table.

BEEF MEAL VS. FISH MEAL: VALUE OF FEED CONSUMED AND EGGS LAID

—	Beef meal, 20 per cent	Beef meal, 15 per cent	Beef meal, 10 per cent; fish meal, 5 per cent	Beef meal, 5 per cent; fish meal, 5 per cent	Beef meal, 5 per cent; fish meal 5 per cent; cod liver meal, 2 per cent	Beef meal, 5 per cent; fish meal, 10 per cent	Fish meal, 15 per cent	Fish meal, 20 per cent
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Scratch grain	15 01	14 47	13 72	13 93	13 97	14 62	14 58	14 83
Mash	16 07	16 76	16 07	16 78	15 85	14 41	16 24	16 67
Buttermilk	0 68	0 68	0 68	0 68	0 68	0 68	0 68	0 68
Green feed	0 92	0 92	0 92	0 92	0 92	0 92	0 92	0 92
Grit	0 10	0 16	0 19	0 15	0 16	0 20	0 20	0 16
Shell	0 29	0 30	0 35	0 35	0 30	0 35	0 40	0 36
Cod liver oil	1 13	1 13	1 13	1 13	1 13	1 13	1 13	1 13
Wet mash	3 83	3 83	3 83	3 83	3 83	3 83	3 83	3 83
Cost of feed	38 03	38 25	36 89	37 77	36 84	36 14	37 98	38 58
Value of eggs	57 43	60 45	53 31	53 62	55 62	70 29	66 43	64 47
Profit over cost of feed	19 40	22 20	16 42	15 85	18 78	34 15	28 45	25 89
Birds died	2	2	2	0	0	2	1	5

HATCHING RESULTS.—Barred Plymouth Rock yearling hens were used in the breeding pens to determine the value of different percentages of beef meal and fish meal in promoting egg fertility and hatchability.

BEEF MEAL VS. FISH MEAL: HATCHING RESULTS

Mash	Eggs set	Number infertile	Number hatched	Per cent fertile	Per cent fertile hatched	Per cent total hatched
Beef meal, 20 per cent	147	7	83	95·2	59·3	56·5
Beef meal, 15 per cent	74	3	40	96·0	56·3	54·1
Beef meal, 10 per cent; fish meal 5 per cent	87	2	46	97·7	54·1	52·9
Beef meal, 5 per cent; fish meal, 5 per cent	120	6	58	95·0	50·9	48·3
Beef meal, 5 per cent; fish meal, 5 per cent; cod liver meal, 2 per cent	99	8	55	91·9	60·4	55·6
Beef meal, 5 per cent; fish meal, 10 per cent	135	7	82	94·8	64·1	60·7
Fish meal, 15 per cent	140	9	92	93·6	70·2	65·7
Fish meal, 20 per cent	92	1	58	98·9	63·7	63·0

As this is the first year that this experiment has been conducted, it is not advisable to draw any definite conclusions. However, from this year's results it would appear that the addition of fish meal to the dry mash for breeding and laying stock is to be recommended. When using a product with over 50 per cent protein content, it would appear that 15 per cent is sufficient to add to the dry mash, as the mortality was high when 20 per cent was fed.

NOVA SCOTIA SOUTHERN EGG-LAYING CONTEST

The fifth egg-laying contest to be held at this Station commenced November 1, 1928, and closed October 23, 1929. The mortality was very high this year, and shows the necessity of rearing the birds on clean soil. Intestinal worms were directly responsible for twenty-six deaths.

The total number of eggs laid during the year was 32,335, an average of 161·6 eggs per bird. The number of birds registered this year was 30. Pen 7, S.C. White Leghorns, owned by Hillside Orchard Farm, Canning, N.S., was the best pen, with four birds qualifying. A pen of Barred Plymouth Rocks, owned by J. Fairservice, Blyth, Ont., was high pen, with 2,076·4 points and 1,961 eggs. Pen 7, S.C. White Leghorns, owned by Hillside Orchard Farm, was second, with 1,932·6 points and 1,928 eggs, and a pen of Barred Plymouth Rocks owned by Stewiacke Poultry Farm came third, with 1,916·7 points and 1,736 eggs.

COST OF FEED FOR THE YEAR 1928-29, NOVA SCOTIA SOUTHERN EGG LAYING CONTEST

Scratch feed, 10,550 pounds at $3.60 per cwt	$ 379 80
Mash, 9,496 pounds at $2.94 per cwt	279 18
Green feed, 9,880 pounds at 25 cents per cwt	24 70
Buttermilk, 3,575 pounds at 35 cents per cwt	12 51
Grit, 214 pounds at $1.25 per cwt	2 68
Oyster shell, 767 pounds at $1.25 per cwt	9 59
Cod liver oil, 25 gallons at $1 per gallon	25 00
Epsom salts, 29 pounds at $3.92 per cwt	1 14
	$ 734 60

Total revenue (sale of eggs), $955.99
Profit over cost of feed, $221.39.

APIARY

The fall of 1928 was favourable for the preparation of the bees for winter, and they were put into winter quarters in good condition. On November 21 forty-seven colonies were put in a room in the basement of the warehouse which proved to be too cold and damp, making it necessary to remove the colonies to a room on the first floor of the warehouse. This was done February 7. On April 11 the colonies were removed to the apiary.

The fifty-eight colonies wintered in cases outside came through the winter in much better condition than those wintered inside. This in part can be attributed to the occasional flights that the bees wintered outside had during December and January.

The months of April and May being very cold, brood-rearing was retarded, and many colonies had to be fed to prevent them from starving. Although the month of June was very dry there was an abundance of Dutch and white clovers, the result being a good crop of honey of extra quality. Owing to very dry weather in July and August very little honey was gathered from golden-rod and aster. For this reason brood-rearing was not carried on as late as in other years, and the colonies were consequently not as strong in young bees when prepared for winter.

BEES USED IN POLLINATION EXPERIMENTS

To continue this experiment on a much larger scale fifty 2-pound packages of bees were purchased from Alabama.

Seventy-six colonies were placed in eight orchards at different points in the valley, sixteen colonies in tents covering apple trees, and forty-two colonies in the Station orchards to insure complete pollination of the blossoms.

The moving of the bees from the apiary to the Station orchards and back again weakened these colonies considerably, as a large number of bees went back to their stands.

Although most of the colonies placed in the outside orchards were fairly strong before they were taken out they came back in such a weakened condition, through the effects of poisoning, that they became non-producing colonies. The following table gives an idea of the effect of the poisoning on these colonies.

RECORD OF COLONY STRENGTH BEFORE AND AFTER PLACING IN ORCHARD

Number colony	Time colony was in orchard	Number of combs covered before colony was in orchard	Approximate amount of brood when colony was in orchard	Number of combs covered when removed from orchard	Amount of brood when removed from orchard
	Affected by Poison				
70	May 30—June 19	6½	3½	5	3
47	"	4½	2¼	2½	¾
137	"	5	3	3	1½
28	"	4	2½	1½	½
27	"	5½	2½	4	2
A13	"	5	2½	4	2½
46	May 30—June 20	4	2½	2½	1
111	"	6½	3¼	4	2½
A 3	"	5½	3½	5	2
	Totals	46½	25½	31½	15¾
	Not affected by Poison				
18	May 28—June 11	7	4	14	11
16	"	5	2½	10	5
14	"	5½	2½	11	6
17	"	4	1	8	4
3	"	5½	1½	9	4
32	May 28—June 13	4	2	10	6½
22	"	5	3½	9½	5½
136	"	5	2½	12	6½
33	"	4½	1½	10	7½
	Totals	45½	21	93½	56

PACKAGE BEES AS A MEANS OF ESTABLISHING AN APIARY

Of the fifty 2-pound packages imported from Alabama eleven came through the bloom period without being poisoned to any extent. These colonies, having very prolific queens, built up very rapidly from the time they were received (May 3), and were able to take advantage of the clover flow. As very little honey was gathered from fall flowers the production of the eleven colonies (average, 31·7 pounds) was not as high as it would have been in an ordinary year. The greatest production from any one of these packages was 74 pounds.

QUEEN REARING

Queen rearing was continued this year on a larger scale than heretofore. Practically all the queens raised were from a four-year-old queen whose colony had for the past four years produced a good crop of honey and had not shown any signs of swarming.

Sixty-three colonies were re-queened with queens raised at this Station, and ten queens were sold. Also, twenty-nine imported queens were used for re-queening and making increase. During the summer five colonies superseded and were allowed to raise their own queens.

COMPARISON OF DIFFERENT TYPES OF HIVES

The three types of hives in use at this Station are eleven-frame Modified Dadant, ten-frame Jumbo, and ten-frame Langstroth. The table below gives a comparison of the strength of the colonies in the spring and the yields per colony, the figures in each case being those from the highest-yielding colony in each type of hive respectively.

Type of hive	Number of combs covered in spring	Weight of honey produced
		lb.
Eleven-frame Modified Dadant	5	61
Ten-frame Jumbo	6·5	70
Ten-frame Langstroth	6	84

COLONIES IN KOOTENAY CASES

In the fall of 1927 a comparison of colonies in Kootenay cases was made with those in quadruple cases. In the former the brood chambers are protected from extremes of heat and cold the entire year, while the colonies in quadruple cases are packed from late fall to early spring only. No advantage was noted for the Kootenay cases until this year, when, of two colonies, one wintered in a Kootenay case and one in a quadruple case, both colonies being of equal strength in the spring, the colony in the Kootenay case produced one hundred and forty pounds of honey while the other produced eighty-four pounds.

WINTERING, 1929-30

One hundred and sixty-two colonies were prepared for the winter of 1929-30. Of these fifty-six are wintering in quadruple cases; two in Kootenay cases and one hundred and four in a cellar 20 feet by 12 feet; constructed during the summer of 1929. All the colonies were fed sugar syrup in October. The colonies were put in the cellar on November 11.

FIBRE PLANTS

FLAX

Work with flax in 1929 consisted of seeding two half-acre plots of uniform land, treated in every way alike as to cultivation and fertilization, and under the same crop in 1928. One half-acre was to be pulled by hand, stooked and left until dry, deseeded, spread on the ground to dew-ret, and then raked up and made into tossed flax. The other half-acre plot was to be cut with the mower and allowed to lie where cut until retted, then raked up and made into tossed flax.

Seeding was done May 4 on land which had grown mangels in 1928, and had been manured for that crop at the rate of 20 tons per acre. The land was ploughed in the fall of 1928, and well worked up in the spring of 1929. No fertilizer was applied previous to seeding the flax. Grass seed made up of eight pounds of red clover, eight pounds of timothy and two pounds of alsike clover was seeded at the same time as the flax, at the rate of 20 pounds per acre.

Rain fell on May 5, 6 and 7, and the temperature was fairly high, ranging around 60 degrees in the daytime, with a night temperature of 42 degrees. Conditions were thus good for germination, and the flax came up quickly. Dry weather in July, however, retarded growth and at the time of harvest, August 2, the plants were only 30 inches high, but very even, all standing straight and fairly thick. The half-acre pulled by hand was hauled in and deseeded August 10, and 170 pounds of cleaned seed secured, or at the rate of 340 pounds per acre. The weight of the flax from this half-acre was: before deseeding, 1,460 pounds; after seeding, 1,100 pounds; after retting, 930 pounds; or 2,920, 2,220 and 1,860 pounds respectively, per acre. The flax from the half-acre cut with the mower, allowed to ret where it fell, and not deseeded, was 1,130 pounds, or 2,260 pounds per acre. This was all stored in good condition, but was lost when the building was destroyed by fire.

The object of the test was to determine the cost of production by the two methods of handling.

HEMP

One half acre of hemp was seeded May 28. The land was manured on the sod in the fall of 1928, and ploughed, well worked up in the spring of 1929, and a 5-8-5 fertilizer applied at the rate of 600 pounds per acre. The hemp made good growth, and was harvested September 13. This material was also lost in the fire.

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