DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

EXPERIMENTAL STATION

SIDNEY, B.C.

REPORT OF THE SUPERINTENDENT

E. M. STRAIGHT, B.S.A.

FOR THE YEAR 1930

Published by Authority of the Hon. Robert Weir, Minister of Agriculture, Ottawa, 1931

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DOMINION EXPERIMENTAL STATION, SIDNEY, B.C.

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THE SEASON

The need for water on the Saanich peninsula becomes a matter of greater concern with the years. Our seasons are becoming drier, at least during the growing period. November, usually the month of very great rainfall, for a few years has become dry like the others. This dry period during the autumn is having much to do with the shortage of water for household and manufacturing purposes. Farm operations, such as ploughing, seeding, etc., are made extremely difficult in all cases, if possible at all. As one goes north on the Island the rainfall increases with a corresponding change in the flora of the country, until one comes to Courtenay and Comox, where the climate is more like that of Vancouver, with precipitation almost double that of Saanich. At Alberni, crops seldom suffer for water, while on some parts of the west coast of Vancouver Island the rainfall is abnormal—too wet for agricultural operations in the main, even if land were available for the purpose.

The field crops for the year were rather disappointing, and below the average, especially mangels and potatoes. Oats yielded 72 bushels, wheat 45, peas 26 to the acre. Hay, usually an excellent crop on the Island, gave about half a normal yield. The fall sown cereals suffered much from the hard frost of January, when there was no snow on the ground.

The fruit crop was the best so far harvested here. The yield of plums, cherries, pears was exceptionally heavy. Some very good apples were also produced, especially Kings. This apple does much better than most sorts at the station Farm. The abundant fruit crop here and elsewhere depressed prices considerably. This coupled with a limited ability to buy, seriously reacted against the fruit growing industry.

METEOROLOGICAL RECORDS, 1930

Month	Temperature			Precipitation	Sunshine	Possible sunshine
	High	Low	Mean			
	°F.	°F.	°F.	in.	hours	hours
January	46·0	20·0	30·2	1·63	115	273
February	53·0	30·0	40·7	6·49	100	286
March	64·0	30·0	43·5	1·46	172	370
April	64·0	31·0	49·0	2·09	183	411
May	67·0	35·0	52·3	1·52	277	473
June	80·0	42·0	57·3	1·03	243	482
July	82·0	43·0	62·0	0·03	364	486
August	79·5	45·0	62·5	0·06	316	444
September	75·0	40·0	57·2	0·78	211	377
October	61·0	35·0	47·0	5·05	120	335
November	54·0	29·0	41·8	1·28	74	276
December	52·0	31·5	40·8	1·07	63	259

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PRECIPITATION AT SIDNEY, B.C.

Month	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	Average 17 years
	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
January	3·28	4·23	1·86	6·80	3·06	5·50	3·92	3·53	5·25	3·17	1·63	3·98
February	0·61	3·97	1·81	3·62	6·00	3·88	3·21	3·91	0·33	1·06	6·49	3·41
March	2·33	1·68	1·20	2·09	0·47	1·46	0·85	1·89	3·49	3·03	1·46	2·23
April	1·45	1·13	0·71	1·68	1·08	1·75	0·93	1·25	2·38	1·51	2·09	1·60
May	1·24	1·57	0·54	1·29	0·16	0·51	1·60	1·08	0·77	0·77	1·52	0·97
June	1·17	1·36	0·27	0·51	0·33	0·37	0·25	0·91	0·84	1·31	1·03	0·83
July	0·67	0·04	0·00	0·92	0·31	0·23	0·08	0·25	0·76	0·24	0·03	0·47
August	2·52	1·02	0·92	0·65	0·77	0·81	1·09	0·49	0·47	0·38	0·06	0·68
September	2·96	2·74	1·96	1·62	3·12	0·59	0·66	2·27	0·68	0·71	0·78	1·43
October	4·03	4·80	2·21	1·95	3·35	1·06	3·91	4·49	4·42	1·08	5·05	2·99
November	3·36	4·40	1·47	2·58	5·80	2·49	3·93	8·54	1·98	0·04	1·28	3·75
December	3·78	3·60	9·08	6·88	4·61	5·43	5·77	2·94	3·27	4·81	1·07	5·11

Totals

1920—27·40; 1921—30·54; 1922—22·03; 1923—30·59; 1924—29·08; 1925—24·08; 1926—26·20; 1927—31·56 1928—24·64; 1929—18·09; 1930—22·49.

ANIMAL HUSBANDRY

There has been little change in the livestock industry on Vancouver Island during recent years. The interest in sheep raising increases, and this is as it should be, for there are many large acreages of logged-off land, hillsides, rock outcrops, etc., fit only for the pasturage of sheep. The dairy industry certainly is not more than holding its own. Holsteins are common but the Jersey is the most popular breed and fits in with our climate and other conditions as other breeds do not. The Jersey is the only breed kept at the Farm. Horses are kept for farm work only. No breeding work has been undertaken with them.

Our work having to do with abortion control has been referred to in former reports. Some account of this will be found in this report under Abortion Control. We have reached a new stage in our fight with this disease, and for the first time for several years we are able to report a herd with no reactors. The work has been slow and has demanded exact attention to every detail, but the satisfaction attendant upon the accomplishment of our endeavour is worth much.

DAIRY CATTLE

The breeding herd, in so far as numbers go, varies little from year to year. Individual records are kept of milk production and the profit over feed determined. Changes are made in the meal mixture to suit individual animals in the herd, and the period of lactation. The following may be regarded as a basic mixture for the cows in full milk:—

	Pounds
Bran	500
Ground oats	400
Gluten meal	100
Cottonseed meal	100
Oil cake meal	100

This mixture is fed at the rate of about one pound of meal to four pounds of milk. No reference is made to straw for bedding, manure or calves in the following table. As the price received for butter fat varied at different seasons of the year, it was considered advisable to indicate the actual value of this con-

stituent at the price received, and also to give a corresponding comparison with the fat valued at fifty cents per pound. This is shown in the table. We wish also to point out that our study in abortion control has interfered seriously with our milk production and R. O. P. work.

MILK PRODUCTION AND VALUE

Cows completing lactation period during 1930

Name of cow	Age	Date of dropping calf	Number of days in milk	Total milk produced in period	Average percentage of fat in milk	Total fat produced	Value of fat when marketed	Total value of product with fat at 50 cents per pound
	years		days	lb.	%	lb.	$	$
Majesty's Honeymoon Bess	14	April 25–29	279	9,402·7	4·8	453·0	288 10	226 50
Aviator's Florence of V.I.S.	6	Mar. 30–30	167	2,780·9	4·9	136·7	95 69	68 35
Aviator's Queen of V.I.S.	5	Mar. 10–29	324	3,594·3	6·9	247·5	157 02	123 75
Aviator's Queen of V.I.S.	6	May 22–30	169	2,006·1	6·0	121·2	84 84	60 60
Aviator's Blossom of V.I.S.	5	April 25–29	304	5,580·1	5·9	329·5	207 75	164 75
Aviator's Blossom of V.I.S.	6	Mar. 4–30	193	1,936·3	5·7	110·2	77 14	55 10
Sidney Aviator Flo	4	Nov. 12–29	209	3,553·3	6·2	221·7	155 19	110 85
Sidney Aviator Cowslip	3	Feb. 6–30	221	3,677·1	6·68	245·6	171 93	122 80
Sidney Aviator Buttercup	3	Nov. 19–29	203	3,528·0	6·4	226·8	158 78	113 40
Sidney Aviator Lassie	3	Feb. 2–30	127	2,070·7	5·32	110·1	77 07	55 05
Sidney Aviator Jessie	3	Mar. 6–30	148	2,519·4	5·0	127·5	89 25	63 75
Sidney Honeymoon Lady	3	May 26–30	95	1,478·1	6·55	97·6	68 3	48 80
Totals	.....	.....	2,439	42,127·0	.....	2,427·4	1,631 06	1,213 70
Average	.....	.....	203·2	3,510·5	5·76	202·2	135 92	101 14

FEED CONSUMPTION AND COST

Cows completing lactation periods during 1930

Name of cow	Age	Number of days fed	Meal at $50 per ton	Roots and ensilage at $5 per ton	Hay at $20 per ton	Total cost of feed	Cost of 100 pounds of milk	Cost of 1 pound of fat	Profit over cost of feed
	yrs.	days	lb.	lb.	lb.	$	$	cents	$
Majesty's Honeymoon Bess.	14	279	2,938	8,168	1,953	113 40	1 21	25	174 70
Aviator's Florence of V.I.S.	6	349	2,398	4,872	3,335	105 48	3 80	77	9 79
Aviator's Queen of V.I.S.	5	324/29	2,258	9,984	2,280	104 21	2 90	42	52 81
Aviator's Queen of V.I.S.	6	281/30	1,506	8,756	2,680	86 34	4 30	71	1 50
Aviator's Blossom of V.I.S.	5	304/29	2,546	8,164	2,853	112 59	1 98	33	95 16
Aviator's Blossom of V.I.S.	6	193/30	1,906	2,392	1,845	72 08	3 72	65	5 06
Sidney Aviator Flo	4	209	2,186	5,192	2,275	90 38	2 54	40	64 81
Sidney Aviator Cowslip	3	252	2,320	3,572	2,361	90 54	2 46	41	81 39
Sidney Aviator Buttercup	3	203	2,146	5,192	2,275	89 38	2 53	39	69 40
Sidney Aviator Lassie	3	219	1,792	4,732	2,275	79 38	3 83	72	2 31
Sidney Aviator Jessie	3	238	1,890	4,192	2,285	80 58	3 19	63	8 67
Sidney Honeymoon Lady	3	184	1,430	2,492	1,975	61 73	4 17	63	6 57
Totals	.....	3,035	25,316	67,708	28,392	1,086 09	.....	.....	544 97
Average	.....	252·9	2,109·6	5,642·3	2,366	90 50	2 57	44·7	45 41

Dairy cattle require large quantities of mineral feed, and do obtain it, no doubt, in the food eaten. Whether it is obtained in sufficient quantity to meet the drain on the animal's body in producing milk and carrying a calf is still uncertain. It is believed that undue emphasis has been given to this phase of the breeding problem. At the Experimental Station the atempt is made to meet any deficiency that might arise by feeding a mineral ration composed as follows:—

	Pounds
Bone meal	25
Charcoal (chick size)	25
Sulphur	3

This fifty-three pounds is mixed with the twelve hundred pounds of meal and fed with it. We are satisfied that this simple mixture is quite as valuable as complex and more expensive ones.

FEEDING MINERALS TO CALVES AND HEIFERS

In the feeding of calves and heifers there is not the daily drain of material through the milk pail as with cows, yet the growth demand by these animals is enormous, especially in bone making materials. It has been argued that resistance to some diseases, such as abortion, may be built up by feeding the proper mineral food to calves and heifers, and cows when dry. We believe that such contention is not supported by experimental evidence. For this purpose some such mixture as the following is used:—

10 pounds calcium phosphate.
10 pounds sodium phosphate.
10 pounds epsom salt.
10 pounds bone meal.
10 pounds sulphur.
4 pounds glauber salts.
4 ounces potassium iodide.

COST OF RAISING HEIFERS AND BULLS

The cost of rearing dairy heifers is always great, greater than one would expect, yet the future of the industry demands that calves should be raised. The one thing that may be learned from such a study is the fact that it is only profitable to rear good animals.

COST OF REARING DAIRY CATTLE FROM BIRTH UNTIL FIRST CALVING

Herd No.	Date of birth	Length of period	Meal at $50 per ton	Roots and ensilage at $5 per ton	Hay at $20 per ton	Skim-milk at 50 cents per 100 pounds	Whole milk at $3 per 100 pounds	Calf meal at $5 per 100 pounds	Months on pasture	Cost of feed		
										One year	Two years	Entire period
		yrs. days	lb.	lb.	lb.	lb.	lb.	lb.	months	$	$	$
27	Feb. 20–26.....	1 324	783	1,673	1,849	3,042	1,078	.....	6	70 16	107 79	107 79
28	Nov. 18–26.....	2 ...	1,558	3,373	3,860	2,783	461	.....	.....	49 29	113 72	113 72
29	Dec. 20–26.....	1 333	1,471	2,028	2,735	2,894	646	.....	.....	57 34	102 72	102 72
30	Mar. 19–27.....	1 344	1,944	5,879	4,517	3,452	1,242	.....	.....	80 41	162 98	162 98
32	Mar. 15–27.....	2 127	2,688	10,801	5,577	4,017	697	.....	.....	66 72	142 73	190 95
33	Mar. 22–28.....	2 69	1,338	6,838	2,313	75	2,136	98·5	1	77 76	130 16	146 03
34	Mar. 12–28.....	2 109	1,456	6,918	2,557	134	2,378	44·0	1	82 40	134 83	156 45
35	May 12–28.....	2 140	1,700	8,262	3,182	.....	1,889	59·0	1	74 29	130 37	157 59
36	May 19–28.....	2 165	1,568	7,508	2,869	.....	1,930	63·0	3	75 74	131 87	158 71
37	Nov. 15–28.....	1 349	1,294	5,632	2,041	.....	2,610	.....	2½	99 37	155 14	155 14
	Totals.....	16 1,960	15,800	58,912	31,500	16,397	15,057	264·5	14½	733 48	1,312 31	1,452 08
	Average.....	2 50	1,580	5,891·2	3,150·1	1,639·7	1,505·7	26·4	1·45	73 34	131 23	145 20

NOTE.—It will be noticed that rearing a calf is a costly procedure. One should not expect to purchase heifers for little money.

RELATION BETWEEN GROWTH AND AGE IN DAIRY CATTLE

Some investigators have found that Jersey heifers mature normally and rapidly during the first year, and that the increase during the next six months is comparatively slow, after which the rate of increase slides up as during the first year. The weight of the small numbers of calves available has been determined month by month and tabulated. Certainly heifers increase raipdly at one time and slowly at another. Though the age of some calves will not permit of complete comparison with others, when this is possibe it would seem that the facts are consistent with the theory.

RELATION BETWEEN GROWTH AND AGE IN DAIRY CALVES

Herd No.	Date of birth	Weight at birth	Increase in weight each three month period								Total weight
			1-3	3-6	6-9	9-12	12-15	15-18	18-21	21-24	
		lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
25	Nov. 18-25	52	143	115	135	85	60	35	95	30	750
27	Feb. 20-26	50	100	200	102	88	45	70	45	50	750
28	Nov. 18-26	62	163	150	125	120	90	.....	.....	.....	710
29	Dec. 20-26	60	90	145	155	30	35	.....	.....	.....	515
30	Mar. 19-27	52	118	160	110	75	.....	.....	.....	.....	515
32	Mar. 15-27	57	158	145	130	75	.....	.....	.....	.....	565
33	Mar. 22-28	54	71	125	106	34	110	100	65	60	725
34	Mar. 2-28	45	110	140	105	50	100	50	110	.....	710
35	May 12-28	59	76	125	65	110	115	100	85	75	810
36	May 19-28	60	115	90	45	125	75	100	50	80	740
37	Nov. 15-28	51	115	129	120	110	60	75	105	.....	765
	Totals	602	1,259	1,524	1,198	902	690	530	555	295	7,555
	Average	54·7	114·4	129·4	108·9	82·0	62·7	48·1	50·4	26·8	686·8

ARTICHOKES

Artichokes have been used in the form of ensilage for cattle feeding on the southern end of Vancouver Island, and the tubers fed in the place of roots for a number of years. Considerable work was done at the Station along cultural lines to determine the relative value of artichokes, sunflowers, corn, etc., so far as yield, dry matter and chemical analyses were concerned. From all these standpoints artichokes have stood high. There remained the matter of palatability, digestibility and value as a milk producer in practical feeding work, the ultimate test of any feed in the dairy herd. During 1929 the dairy herd were fed artichokes in some quantity, but during the feeding periods the weather was bad and very changeable, hence the figures were not submitted, as from them, conclusions could not be safely drawn. Artichokes were fed again during the winter of 1929 and 1930 as follows:—

WHEAT, OATS AND VETCH VS. ARTICHOKES FOR SILAGE

Period		1	2	3	Average 1 and 3
Experimental Ration		W O V Silage	Artichoke Silage	W O V	W O V
Number of cows in test	No.	2	2	2	2
Duration of test	days	21	21	21	21
Milk produced during first 7 days	lb.	302·4	296·0	267·2	284·8
Milk produced during second 7 days	lb.	302·7	275·0	261·9	282·3
Milk produced during third 7 days	lb.	300·6	270·8	258·5	279·5
Milk produced during whole period	lb.	911·1	841·8	787·6	849·3

NOTE.—It should be observed that in conducting this feeding test only two cows were available for the work. The difference in milk as we changed from one feed to the other was very slight, and not greater than might be expected from time to time without change of feed. Certainly artichokes have not proven themselves to be superior to other forms of ensilage.

CONTAGIOUS ABORTION

For several years we have reported contagious abortion in our dairy herd and the methods used to combat it. We are pleased to report no abortion at the Experimental Station at present, thus proving the efficacy of the blood test as a diagnostic agent with reference to infection of the bacillus abortus. In a word the plan followed was as follows:—

As a result of the test all animals were classed either positive or negative and were divided, placing the positive ones in a rented barn, and the negative animals in a barn at the Station. All calves from the reacting herd were reared in a shed and joined the negative herd only when they had undergone one or more tests and had been declared free from disease. The calves so reared were not allowed any of their mother's milk at any time. Olive oil made up for the deficiency in the milk given for the first few days. This procedure has built up a clean junior herd, clean from the standpoint of the blood test, and without any of the manifestations usually associated with the disease.

FIELD HUSBANDRY

Information regarding the character of the growing season is given in the general introduction to the annual report. Hay, mangels, potatoes and "wheat, oats and vetch" gave yields below the average. Corn, spring sown oats and winter wheat produced crops well up to or better than usual. Winter sown oats suffered severely from the low temperature accompanied with continued strong wind from the north east, during the early part of January. An abundance of rain fell during the spring permitting the crops to get away to a good start. The summer period, however, was exceptionally dry, a total of only 0·87 of an inch of rain fell during the months of July, August and September. This condition had much to do with the low yields from root crops.

ROTATION A—THREE YEAR'S DURATION

Wheat (winter).
Timothy and clover hay.
Roots (manured).

The wheat is usually sown in October at the rate of two bushels per acre. The timothy is also sown at this time at the rate of six pounds per acre. In February ten pounds of red clover and four pounds of alsike are sown broadcast with a hand seeder. Ten tons of barnyard manure and the second growth from the clover are ploughed in every third year, thus maintaining a high standard of fertility. The cultivation necessary to grow the root crops keeps the weeds in check.

SUMMARY OF YIELDS—VALUE AND PROFIT OR LOSS PER ACRE

Crop	Year	Yield per acre	Value	Cost of production	Profit or loss per acre
			$	$	$
Wheat, Sun	1922	38 bush.	93 80	66 43	Profit 27 37
Timothy and clover hay	1923	3·32 tons	83 00	56 69	Profit 26 31
Summer-fallow	1924			45 65	Loss 45 65
Wheat, Sun	1925	42·18 bush.	108 47	54 79	Profit 53 68
Timothy and clover	1926	3·0 tons	60 00	52 19	Profit 7 81
Potatoes, Sir Walter Raleigh	1927	9·23 tons	230 75	124 41	Profit 106 34
Wheat, Bluestem	1928	37·0 bush.	69 95	62 00	Profit 7 95
Timothy and clover	1929	4·08 tons	89 76	57 81	Profit 31 95
Corn, Longfellow	1930	11·10 tons	85 13	86 33	Loss 1 20

Over three three-year periods the wheat has given an average yield of 39·1 bushels per acre with an average profit of $29.66 per acre. The hay during the same period gave an average of 3·47 tons per acre with an average profit of $22.02. Summer-fallow replaced the roots in the rotation in 1924, and the cost of operations entered as a loss. Potatoes yielded a good crop in 1927, costing $13.48 per ton to produce. The corn in 1930 cost $7.80 per ton to produce.

ROTATION B—FOUR YEARS' DURATION

Wheat, winter.
Peas.
Corn (manured).
Wheat, oats and vetch (ensilage).

SUMMARY OF YIELDS—VALUE AND PROFIT OR LOSS PER ACRE

Crop	Year	Yield per acre	Value	Cost of production	Profit or loss per acre
			$	$	$
Wheat, Sun	1923	25·2 bush.	84 86	67 10	Profit 17 76
Peas, Maple	1924	22·0 bush.	59 70	68 34	Loss 8 64
Corn, Longfellow	1925	7·16 tons	42 96	86 69	Loss 43 73
Wheat, oats and vetch	1926	11·93 tons	79 45	81 64	Loss 2 19
Wheat, Sun	1927	42·0 bush.	88 52	62 29	Profit 26 24
Peas, Maple	1928	26·0 bush.	96 46	62 77	Profit 33 69
Corn, Longfellow	1929	9·22 tons	67 67	79 91	Loss 12 24
Wheat, oats and vetch	1930	5·77 tons	64 62	74 72	Loss 10 10

A disadvantage in this rotation is that wheat follows wheat, oats and vetch, and cannot be kept free from vetch. Wheat and peas show a profit but the corn and wheat, oats and vetch were grown at a loss. The yield from the wheat, oats and vetch in 1930 was light, due to the winter-killing of a large percentage of the oats and vetch.

ROTATION C—FIVE YEARS' ROTATION

Vetch.
Corn.
Peas
Wheat.
Timothy.

SUMMARY OF YIELDS—VALUE AND PROFIT OR LOSS PER ACRE

Crop	Year	Yield per acre	Value	Cost of production	Profit or loss per acre
			$	$	$
Vetch, common spring	1923	16·7 bush.	83 62	73 20	Profit 10 42
Corn, Longfellow	1924	9·69 tons	58 14	99 59	Loss 41 45
Peas, Maple	1925	27·0 bush.	73 20	66 87	Profit 6 33
Oats, replacing wheat	1926	34·0 bush.	34 23	60 30	Loss 26 07
Peas and oats, replacing timothy	1927	2·20 tons	50 60	51 98	Loss 1 38
Vetch	1928	10·8 bush.	49 51	59 07	Loss 9 55
Corn, Longfellow	1929	8·75 tons	64 22	80 41	Loss 16 19
Peas, oats replacing peas	1930	6·53 tons	61 38	73 44	Loss 12 06

Peas and oats were sown in place of peas only. This was done to make good the deficiency in the ensilage crop caused by loss through winter-killing of the oats and vetch in rotation B.

ROTATION D—FOUR YEARS' DURATION

Winter wheat.
Timothy and clover hay.
Roots.
Peas.

SUMMARY OF YIELDS—VALUE AND PROFIT OR LOSS PER ACRE

Crop	Year	Yield per acre	Value	Cost of production	Profit or loss per acre
			$	$	$
Wheat, Red Rock	1923	26·3 bush.	85 31	67 25	Profit 18 06
Timothy and clover	1924	2·05 tons	49 20	53 64	Loss 4 44
Mangels	1925	12·13 tons	121 30	112 37	Profit 8 93
Peas	1926	20·0 bush.	45 34	61 75	Loss 16 41
Wheat, Red Rock	1927	33·25 bush.	77 04	73 73	Profit 3 31
Timothy and clover	1928	2·51 tons	57 73	49 71	Profit 8 02
Potatoes, Irish Cobbler	1929	5·34 tons	320 40	127 41	Profit 192 99
Peas	1930	26·6 bush.	73 64	61 06	Profit 12 58

In 1930 the peas cost $1.99 per bushel to produce and the straw $8.28 per ton. Bluebell was the variety grown.

ROTATION E—FOUR YEARS' DURATION

Wheat oats and vetch.
Potatoes.
Oats.
Hay.

SUMMARY OF YIELDS—VALUE AND PROFIT OR LOSS PER ACRE

Crop	Year	Yield per acre	Value	Cost of production	Profit or loss per acre
			$	$	$
Wheat, oats and vetch	1924	2·69 tons	61 87	63 38	Loss 1 51
Potatoes	1925	4·39 tons	131 70	137 61	Loss 5 91
Oats	1926	51·0 bush.	55 70	57 37	Loss 1 67
Timothy and clover	1927	2·83 tons	65 09	51 91	Profit 13 18
Wheat, oats and vetch	1928	8·69 tons	85 42	70 91	Profit 14 51
Summer-fallow	1929	.....	.....	42 51	
Oats, Victory	1930	72 bush.	61 64	84 20	Loss 22 56

A large percentage of the Kanota oats sown in September, 1929, were winter-killed. The remainder were ploughed down in the spring and the cost of the operations added to the cost of summer-fallowing and charged against the whole rotation. The winter oats was replaced with Victory, registered seed being used. This field was summer-fallowed to keep the Canadian thistle in check. A two-wheel stiff-tooth cultivator was used for the purpose with excellent results.

DATE OF SEEDING GRAIN CROPS—WHEAT, BARLEY, OATS

This experiment commenced in autumn of 1926. The object was to ascertain the best time to sow winter cereals. Plots of equal size were sown under field conditions one week apart, commencing on September 21 and ending November 2.

DATE OF SEEDING WINTER WHEAT

Plot	Date of seeding	Per cent winter-killed	Date ripe	Yield per acre 1930		Average yield for 4 years	
				Grain	Straw	Grain	Straw
				bush.	tons	bush.	tons
1	Sept. 21	Nil	Aug. 7	56·4	2·11	43·1	2·79
2	Sept. 28	Nil	Aug. 7	42·5	2·71	41·0	2·75
3	Oct. 5	Nil	Aug. 7	50·2	2·24	42·9	2·11
4	Oct. 12	20	Aug. 7	35·70	1·43	41·4	1·81
5	Oct. 19	40	Aug. 16	22·0	0·96	37·8	1·69
6	Oct. 26	40	Aug. 16	22·7	1·27	35·1	1·53
7	Nov. 2	40	Aug. 16	24·5	1·27	35·3	1·51

If the winter proves to be mild the wheat sown at the end of October will do as well as that sown earlier, but if the weather conditions are severe during the winter the earlier the grain is sown the better will be the yield. The above figures would indicate that wheat should not be sown later than October 12; for good results, in fact, the earlier the seeding the better the crops. If the grain is sown earlier than September 15, there is not moisture enough in the soil to germinate the seed.

DATE OF SEEDING OATS

Plot	Date of seeding	Per cent winter-killed	Date ripe	Yield per acre 1930		Average yield for 4 years	
				Grain	Straw	Grain	Straw
				bush.	tons	bush.	tons
1	Sept. 21	86	July 5	8·4	0·48	44·5	2·17
2	Sept. 28	78	July 5	8·8	0·60	43·3	2·00
3	Oct. 5	80	July 5	7·4	0·53	33·9	1·46
4	Oct. 12	90	July 5	3·7	0·24	29·5	1·27
5	Oct. 19	94	July 10	0·7	0·05	24·5	1·08
6	Oct. 26	90	July 10	2·2	0·10	19·0	0·92
7	Nov. 2	98	July 10	0·2	0·008	16·0	0·75

To obtain the best results from winter oats, it is necessary to sow early; in fact, just as soon as there is moisture enough in the soil to germinate the seed. The average of both grain and straw, for the past four years, shows a rapid decline in yields as the date of seeding advances. Winter oats must be sown in September for the best results.

DATE OF SEEDING BARLEY

Plot	Date of seeding	Per cent winter-killed	Date ripe	Yield per acre 1930		Average yield for 4 years	
				Grain	Straw	Grain	Straw
				bush.	tons	bush.	tons
1	Sept. 21	Nil	July 10	51·5	1·46	47·7	2·52
2	Sept. 28	Nil	July 10	34·1	1·22	46·3	2·36
3	Oct. 5	Nil	July 10	38·1	1·20	45·7	2·18
4	Oct. 12	Nil	July 14	38·1	1·27	47·6	2·23
5	Oct. 19	12	July 17	25·8	0·88	41·0	1·92
6	Oct. 26	15	July 17	23·2	0·82	31·8	1·68
7	Nov. 2	15	July 17	20·1	0·72	27·5	1·49

Over a period of four years, fall-sown barley has done fairly well. It may be sown any time before October 12, and good results obtained, but as with wheat and oats the earlier seedings usually give the best yields.

COMPARATIVE YIELDS OF CORN, SUNFLOWER, ARTICHOKE STEMS AND LEAVES, "WHEAT OATS AND VETCH"

Plots of one-third of an acre were used for this work. On September 30, 1929, a mixture of thirty pounds of Sun Wheat, forty pounds of Kanota Oats, and fifty pounds of common spring vetch were sown at the rate of two bushels per acre. Artichokes were planted on March 31, and the corn and sunflowers May 21.

COMPARATIVE VALUE OF ENSILAGE CROPS

Crop	Date of harvest	Per cent dry matter	Yield per acre 1930		Average yield for four years	
			Green weight	Dry weight	Green weight	Dry weight
			tons	tons	tons	tons
Wheat, oats and vetch	July 15	36·77	8·25	3·03	9·32	3·36
Sunflowers	Oct. 9	21·05	14·52	3·05	15·66	3·16
Corn	Oct. 9	20·46	15·40	3·15	12·34	2·55
Artichokes	Oct. 14	28·55	13·02	3·71	*18·86	*5·35

*Average for three years only.

Corn did much better than usual, but the yields from artichokes, and wheat, oats and vetch and sunflowers were below average.

HORTICULTURE

Horticulture receives greater attention than any other branch of agriculture at the Sidney Station. The exceedingly temperate climate and mild winter season experienced here, make possible the growing of many flowers and ornamental shrubs and trees that cannot be grown in many other parts of Canada. The picking of roses at Christmas time is not an unusual occurrence, while geraniums sometimes come through the winter without protection in certain favoured locations. Conditions which made these things possible are ideal for a wide and diversified horticulture.

Many distinct projects are being carried and are in various stages—some complete, others in progress. In previous reports some attempt has been made each year to give the data obtained to date on as many of the projects as possible. This has meant repetition, objectionable from several standpoints. In the case of variety experiments with tree fruits the reader is referred to the 1929 report of this Station. Some phases of work will, however, be dealt with and progress noted, but no attempt is being made to cover all the work under way.

The 1930 season was marked by long continued drought. As will be noted in the report of the past season, the precipitation has been much below the average. As the summer advanced the dry conditions became more marked, vegetable and seed crops suffering most. Tree fruits gave an abundant crop despite the conditions, while in the case of pears the heaviest crop that has ever been known here was harvested.

Careful and frequent cultivation throughout the season, whereby a deep mulch was maintained, no doubt is an important factor in maturing a heavy fruit crop such as has just been harvested. The demands of the trees on the available moisture are large, and it can hardly be expected that a crop of any kind can be grown in the orchard during the summer without seriously affecting both the yield and quality of the fruit.

A program of spraying designed to meet conditions in the orchards of the Station has given good results. Trees are all in a thrifty condition with pests and diseases well under control. Anthracnose or Western Canker is common

throughout the whole district. The importance of this disease renders it advisable to give a brief description of it along with how infection takes place, and control measures. This story is set forth in the following paragraphs:—

An examination of the fruit trees, especially apple, on the Pacific Coast, including all the southern end of Vancouver Island, reveals the fact that they are not in a healthy condition. A closer examination will show the presence of dead or dying branches, cankers on the younger growth, being most common on branches under two inches in diameter. The cankers reach maturity in the fall of the year, and at that time show elliptical dark coloured sunken lesions, varying in size from one-half inch in diameter to others ten or twelve inches long,

Anthracnose or western canker on apple tree branches.

and three or four inches in diameter. The whole tree presents a picture of distress, well remembered by those who have seen it. The difficulty is caused by a disease commonly called Anthracnose, scientifically spoken of as *Neofabraea malicorticis* (Cord) Jackson. Strange as it may seem one may travel across Canada and not see it until you reach the Coast; yet on Vancouver Island, the apple suffers more from this disease than from all others put together.

The disease is most often found on apple, but is destructive on pear and quince trees. In 1904 Lawrence recorded the presence of similar cankers on alder, cherry and willow, but did not prove that they were identical with apple Anthracnose.

INFECTION.—It has been found that infection takes place at the beginning of the fall rains. Though the fungus is capable of penetrating uninjured bark, small injuries may, and probably do, permit of the easy spread of the disease. The first apparent result of an infection is the formation of a small circular reddish brown spot on the bark. During the winter the development of the canker is arrested but in the spring the spread of the difficulty is marked, until active growth of the tree begins. At this time a well-marked crack will be noticed separating the diseased tissue from that of the normal. The dead bark of the canker becomes shrunken and shrivelled and may or may not fall out. This disease must not be confounded with "Perennial Canker," much at home in the dry districts of the interior, but not found in the coast districts of British Columbia to the knowledge of the writer.

PREVENTION OR CONTROL.—Since every canker is a potential source of infection, it is evident that all twigs and single branches with cankers on them should be pruned out. Even the cutting out of large branches must be recommended at times. If the cankered branch is a very important one, the dead bark should be cut out and the wound painted with a paint composed of white lead and raw linseed oil. One must remember that cankers are a source of danger for a long time, for the fungus may continue to mature spores on fallen branches for several years, hence the need of burning all pruned-off branches. Spraying is by far the most effective of any as a means of control, yet of no value when applied in the spring. One hesitates to recommend the spraying of trees before the fruit is picked, yet in many cases the first application will be needed previous to the picking of the fruit, as the fungus becomes active at the beginning of the fall rains.

Bordeaux mixture, one of the copper fungicides, has been found not only of the greatest use, but the best among many. Lime sulphur solution, a fungicide of great worth, has not been a complete success in controlling anthracnose. Bordeaux mixture 4-4-40 may be used where there is no danger of staining the fruit. The Burgundy mixture does not stain the fruit. Whatever spray is used the program should keep the bark and fruit covered with the fungicide during the period when infection is likely to occur. The thoroughness with which the work is done, coupled with attention to exact time, are factors of first importance.

The fruit picked from trees attacked by anthracnose may show depressed circular areas of rotting tissue, which are usually more or less dry and leathery. The advance of the rot is usually slow, but hastened in many cases by the presence of bitter rot, blue or grey mould, etc. This anthracnose rot, though slow, is persistent. Often it begins in the field and develops in storage until the crop is a total loss. At other times, apples appearing sound at harvest, develop the rot in storage, resulting in one hundred per cent infection.

This disease may be cleaned up, and it must be done if the best fruit is to be produced on Vancouver Island.

FERTILIZER EXPERIMENT

VARIOUS RATES OF APPLICATION OF NITRATE OF SODA TO FRUIT TREES

Fertilizer work in the orchard in past years would indicate that the soil is naturally deficient in nitrogen. A greater response has been obtained through the use of nitrate of soda than through either potash or phosphate used singly or in combination. The question often arises as to how much nitrate should be applied to a tree or how much will a tree stand without being affected adversely.

As a continuation of work already done, a project was formulated to be run on both apple and pear trees in which nitrate of soda was applied at the rate of two, four, eight, sixteen and thirty-two pounds per tree. This was done in duplicate on rows of trees of the same variety. Measurement of the trunk diameter and season's growth were embodied in the project as well as a study of the storage qualities of the resulting fruit.

A study of the data collected on the first year's work concerning the growth of the trees does not reveal any marked increase in growth with the heavier applications of nitrate. In making deductions however the seasonal conditions have to be kept in mind.

FERTILIZER EXPERIMENT (Pears)

Amount of nitrate of soda per tree	Date stored	Increase in diameter	Season's growth	Yield per tree	Days stored until breaking down
lb.		in.			
32	Nov. 5	3/16	6	451	28
32	Nov. 5	2/16	9	435	38
16	Nov. 5	1/16	8	153	31
16	Nov. 5	10/16	5	324	31
8	Nov. 5	5/16	8	262	31
8	Nov. 5	9/16	6	204	28
4	Nov. 5	4/16	9	337	31
4	Nov. 5	2/16	5	256	28
2	Nov. 5	1/16	6	267	31
2	Nov. 5	4/16	4	375	38
	Nov. 5	x	4	238	35
	Nov. 5	x	4	250	31

x Unknown.

Storage was carried out in a basement under usual conditions until all pears showed signs of breaking down. In determining this, the various lots were inspected twice each week from November 5 on, and ten pears cut at time of each inspection. Beurre d'Anjou was the variety used in the work and almost invariably breakdown began at the core. From the one year's results it would seem that the storage qualities of the various lots of fruit had not been seriously impaired by heavy application of nitrate.

At the time of writing, the work with apples is not complete hence no detailed report can be made. The project is the same as that for pears and the fruit held in storage under observation.

PEAR POLLINATION

The study in pear pollination begun in 1929 was carried on throughout the past season with the result that much valuable data have been added to those already at hand. In commercial plantings, where the number of varieties profitably grown is necessarily limited, a knowledge of the degree of fertility or sterility of each would seem to be of prime importance.

Some fifty varieties are grown at this station so it will be seen that every advantage is offered under open crossing conditions to insure a set of fruit. In order to determine the result of self-pollination it is obvious foreign pollen would have to be excluded during the period the flowers were open. In doing this one branch on a tree was selected and fitted with a cylindrical wire frame-work, about fourteen inches in diameter, over which a slightly larger cotton bag was drawn. These cages were fitted on the trees before the blossoms opened and at the same time the number of blossoms, thus enclosed, counted. On another branch of the same tree a similar number of flowers were set aside but left uncaged. At the end of the flowering season the cages were removed and the number of fruits set counted both on caged and uncaged branches.

The expression "normal set" is used in designating the percentage of fruit which the tree sets under normal conditions when left to open pollination. The term "self" indicates fruit obtained through self pollination.

The following table presents the data obtained on the setting of fruit during the past two seasons.

POLLINATION OF PEAR VARIETIES

	Variety	Self 1929	Self 1930	Normal 1929	Normal 1930
		%	%	%	%
1	Anjou	.....	.....	2·4	8·0
2	Beurre Diel	.....	.....	18·8	16·1
3	Crocker Bartlett	.....	.....	17·3	39·0
4	Doyenne de Comice	.....	.....	14·7	17·5
5	Goodale	.....	.....	13·3	25·5
6	Louise Bonne de Jersey	.....	.....	16·8	48·1
7	Madame Ballet	.....	.....	11·2	21·0
8	Madame Ernest Baltet	.....	.....	24·1	21·6
9	Passe Crassane	.....	.....	8·8	11·0
10	Pitmaston Duchess	.....	.....	15·5	20·7
11	Princess	.....	.....	4·2	7·2
12	Souvenir du Congrés	.....	.....	25·5	4·5
13	Triomphe du Vienne	.....	.....	2·3	14·8
14	Virginie Baltet	.....	.....	35·2	17·7
15	Vicar of Winkfield	.....	.....	28·0	31·7
16	Winter Nelis	.....	.....	17·6	3·0
17	Beurre d'Amanlis	.....	4·3	18·2	42·2
18	Doyenne d'Alençon	.....	1·7	2·7	3·9
19	Glou Morceau	.....	0·4	41·2	7·1
20	Royale Vendee	.....	2·3	60·0	19·6
21	Koonce	0·6	.....	30·1	20·7
22	Forelle	0·5	.....	25·0	18·8
23	Barry	1·2	.....	35·9	9·6
24	Le Lectier	0·5	.....	10·3	8·6
25	Charles Ernest	1·4	10·7	17·7	34·8
26	Boussock	1·1	.....	13·9	33·3
27	Worden Seckel	0·9	.....	15·0	15·6
28	Clairgeau	0·9	.....	14·1	17·3
29	Howell	1·0	.....	14·3	9·2
30	Easter Beurré	0·6	10·9	7·2	26·5
31	Jargonelle	3·0	2·6	36·3	40·0
32	Seckel	3·7	2·8	38·3	38·7
33	Clapp's Favourite	3·5	.....	24·6	20·7
34	Flemish Beauty	3·0	0·6	20·0	29·2
35	Besi de Chaumontel	6·4	2·1	30·0	43·6
36	Bosc	16·5	2·2	76·0	53·0
37	Foudante Thirriot	5·7	.....	22·7	21·8
38	Marguerite Marillat	12·5	18·0	42·7	41·0
39	Winter Bartlett	12·3	.....	41·8	25·7
40	Belle Lucrative	11·0	.....	37·2	29·0
41	Wilder's Early	5·8	12·9	18·6	39·5
42	Nouvelle Fulvie	8·3	0·3	25·7	19·7
43	Emile d'Heyst	5·7	1·6	17·3	38·0
44	Rossney	16·4	4·1	43·6	53·4
45	Beurre d'Avril	6·5	25·8	17·7	8·6
46	President Deviolaine	0·6	1·7	1·2	0·8
47	Duchess	4·5	.....	10·0	10·8
48	Beurre Bachelier	19·4	.....	26·0	19·6
49	Bartlett	22·1	.....	14·3	28·0
50	Dr. Jules Guyot	43·8	.....	33·0	36·8

From the preceding table it will be noticed that the first sixteen varieties listed have proved to be self-sterile on the two years' work and several other varieties are nearly so. It will also be seen that varieties showing a greater or lesser degree of fertility in 1929 were absolutely sterile in 1930. This would suggest that seasonal conditions influence the degree of self-fertility or sterility. Twenty varieties showed self-sterility in the 1929 season and thirty-two varieties in the 1930 season. Two commonly grown varieties showing a complete reversal in the two years' work are Bartlett and Dr. Jules Guyot.

A study of the pollination requirements of Anjou, Boussock, Louise Bonne de Jersey and Souvenir du Congress was carried out during the 1930 season in which pollen from several of the more common varieties grown was introduced to the cages of the varieties named. The work as carried out, with resulting data, is presented in the table following:—

POLLINATION OF PEAR VARIETIES

Variety	Number of blooms counted	Number fruit set	Per cent set
Anjou—Normal set	225	18	8·0
X self	225	.....	.....
X Bartlett	100	4	4·0
X Dr. Jules Guyot	160	4	2·5
X Clairgeau	93	18	19·4
X Bosc	102	17	16·6
Boussock—Normal set	54	18	33·3
X self	54	.....	.....
X Bartlett	40	.....	.....
X Bosc	41	3	7·3
X Dr. Jules Guyot	69	7	10·1
Louise Bonne de Jersey—			
Normal set	232	114	49·1
X self	232	.....	.....
X Bartlett	83	1	1·2
X Bosc	89	30	33·7
X Dr. Jules Guyot	66	27	40·9
Souvenir du Congrès—Normal set	67	3	4·5
X self	67	.....	.....
X Bartlett	66	9	13·6

From the preceding table it will be noted that the four varieties in question proved to be self-sterile and hence inadvisable to plant in solid blocks or alone.

While Bartlett as a pollinizer gave a fair yield of fruit with Souvenir du Congress, the set with the other varieties shows it to be very ineffective. With some varieties in years of heavy bloom, a three per cent set may give a satisfactory yield but with many varieties taking one year with another, a normal set of from seven to eight per cent is more likely to produce a satisfactory crop.

Bosc and Clairgeau would seem to be good pollinizers for Anjou. Bosc pollen seemed to be very effective wherever used.

Dr. Jules Guyot pollen gave best results when used on Boussock and Louise Bonne de Jersey.

Careful study would indicate that there is comparatively little variation in the amount of pollen produced by various pear varieties. There is always an abundant supply. Records taken at the Station over many years show the blooming period of most pear varieties to be relatively short. With the exception of a very few of the earliest and latest bloomers, all pear varieties overlap in their period of bloom.

If by chance a self-sterile variety has been planted without the precautions of providing for its pollination the necessary pollinizer may be introduced by grafting. Some relief may be obtained while waiting for the grafts to bear by cutting off branches from pollinizing varieties, placing the cut ends in buckets of water and placing them near the tree or trees to be pollinated, during the blooming period. Such limbs will live for several days and continue to bloom, forming pollen for the bees and wind to transfer to the self-sterile blossoms.

THERMOGEN THE PAPER MULCH

During the past few years it has been demonstrated to the satisfaction of many, that the yield of several crops, if not all, was greatly increased through the use of "thermogen," the paper mulch. During the past season some crops, and especially those most noticeably influenced by the mulch, have been grown and records taken. This has been done, not so much to demonstrate the value of the paper, as to determine why such marked difference should occur. Possible causes seem to group themselves around one or more of the following: I. Physical conditions. II. Chemical conditions. III. Bacteriological conditions. For the season of 1930 we have confined our investigations to the physical.

MOISTURE.—One would naturally suppose that the moisture content of soils where the paper mulch had been used would be greater than in such soils where evaporation from the surface had not been interfered with. To determine this point, on August 1 soil samples were taken, by means of auger, from many places over the fields in question, composite samples from all levels one to ten inches.

SOIL MOISTURE—PAPER VS. NO PAPER

Soil sample	Number of saucer	Weight of saucer	Weight of saucer and soil	Weight of soil	Dry weight saucer and soil	Dry weight of soil	Per cent moisture
							%
No.1, without paper.....	1	131·1g	362·4g	231·3g	319·2g	188·1g	18·67
	2	138·1g	331·3g	193·2g	295·3g	157·2g	18·64
	3	142·4g	377·7g	235·3g	334·5g	192·1g	18·36
No. 2, with paper.....	4	108·0g	350·0g	242·0g	307·0g	199·0g	17·77
	5	133·4g	382·9g	249·5g	339·4g	206·0g	17·82
	6	105·4g	292·7g	187·3g	XX	.....	.....

XX NOTE.—Owing to a mishap in No. 6 the figures are not considered.

The per cent of soil moisture without paper to a depth of 10 inches was greater than where Thermogen was used.

The drops of water adhering to the underside of the paper, and the wet surface soil led us to continue our investigation on August 11, *re* soil moisture in 1½ inches of surface soil.

SOIL MOISTURE, 1½ INCHES OF SURFACE SOIL

PAPER VS. NO PAPER

Soil sample	Weight of saucer	Weight of saucer and soil	Weight of saucer and dry soil	Per cent loss of weight by drying
				%
No mulch.....	105·3g	351·7g	333·6g	7·34
Mulch.....	133·3g	316·6g	291·1g	13·96

It will be noticed that though the moisture in the top 10 inches of soil was considerably less under the paper, the top 1½ inch contained more water, in fact nearly all the water to be found in the 10 inches of the soil.

Root Fibre, Humus, etc.—Directly under the paper and occupying the inch and a half of soil referred to, may be found a great quantity of root fibre. These fibres, white in colour, may be traced back and forth in every direction, in fact, an amazing quantity of them. It would seem that the water is at the surface, the plant knows it and occupies the space in order that it may be obtained with greatest ease. Several attempts were made to separate this fibre from the soil by means of running water, but the method was not accurate enough. Finally the attempt was given up and the fibre along with the humus, etc., determined by means of burning.

Root Fibre, Humus, Etc., Determined by Burning

Paper vs. No Paper

Number of sample	Weight of crucible	Before burning, weight of crucible and soil	After burning, weight crucible and soil	Per cent loss of weight by burning
				%
No mulch				
1	15·972g	25·972g	24·997g	9·75
2	15·083g	25·083g	24·095g	9·88
3	15·921g	25·921g	24·935g	9·86
4	14·373g	24·373g	23·393g	9·80
Mulch				
5	15·972g	25·972g	24·853g	11·20
6	15·083g	25·083g	23·911g	10·82
7	15·921g	25·921g	24·830g	10·91
8	14·373g	24·373g	23·288g	10·85

Average per cent loss of weight under mulch	10·94
Average per cent loss of weight without mulch	9·82
Therefore: per cent increase of fibre, humus, etc., of soil under mulch over soil without mulch	1·12

The humus in both cases would probably differ little, therefore the difference found is due, for the most part, to increased fibre under the paper in the top inch and a half of soil.

TEMPERATURE

Starting in May, by means of standardized soil thermometers, temperatures were taken morning, noon and night throughout the summer.

TEMPERATURE RECORDS

Date	Paper			No Paper		
	7 a.m.	1 p.m.	6 p.m.	7 a.m.	1 p.m.	6 p.m.
	°F	°F	°F	°F	° F	°F
May 23	53	64·5	68·5	49	60·5	64
26	65	73	77	61	69	71
27	59	73	72	54	71	69
28	60	62	63·5	54	59	61·5
29	56	67·5	71	52	66	67
30	56	72·5	72	51·5	70	67·5
31	59	64	64	54	59·5	59·5
June 2	57	65	65·5	53	62	62
4	57	70	73	53	67·5	69·5
5	59·5	77	79·5	55·5	74	76
6	63	74	79	58	70	75
7	65·5	78	79	60	72·5	75
9	62	63·5	63·5	58·5	65	60
10	59	71	70	56	66	63·5
11	59·5	67	72	54	65·5	68·5
12	58	69	72	52	65	67
13	59	72	79	54	69·5	74
14	59·5	78	83	54	75·5	80
16	66	77·5	.....	60	71·5	.....
17	63	75	79·5	57·5	71	75
18	62	79·5	84	58	77	80
19	64·5	83	88	59·5	81	85
20	68·5	81	86	64	78	72
21	67·5	74	76	62·5	69·5	72·5
23	66	79·5	84	61	78·5	80·5
24	66	76	78	60	74·5	75
25	65	68	68·5	60	65	66
26	62	70	73	58·5	68·5	70
27	61	68·5	69	58	65	65
28	59	68	71	56	64	66
30	61·5	80	80·5	58	82	82
July 2	62	71·5	74	58	70	72
3	60	74	76	56	72	74
4	64	74	80	60	72	80
5	64	82	85	60	82	85
7	65·5	84	83	62	82	79
8	65	84	88·5	60	80	86·5
10	70	83·5	88	66	79·5	84
11	66	84	90	62	80	86·5
12	70	88	90·5	66	84	86·5
14	66·5	78	86	63·5	76	82
15	66	83	86	62	76	82
16	67	78	76	62·5	74	73
17	64	79	80	60·5	74·5	78
18	63	80	83	61	76	80
19	65	79	84	62	73·5	79
21	66·5	86	91	64	80·5	87
22	69·5	88	92·5	66	82	90
24	58·5	80	87	56·5	76	84
25	64	79·5	80	62	75·5	76
26	64	79·5	85	60	74	82·5
28	68·5	79·5	.....	66·5	77	.....
29	67	83	88	66	78	84
30	65·5	81	84	63	76	81
31	64	80	86	62	76	84
Aug. 2	65	82	86	65	76	80
4	65	83	88	65	78	86
5	66	83	86	65	76	85
6	65	83	86·5	64	80	85
7	67	84	88	65	78	86
8	66	75	83	64	72·5	80
13	66	89	93	66	78	88
14	67	88	92	66	78	86
15	67	74	76	65	71	73
16	63·5	73	76	64	68	73
18	62·5	80	84	61·5	72	76

TEMPERATURE RECORDS—*Concluded*

Date	Paper			No Paper		
	7 a.m.	1 p.m.	6 p.m.	7 a.m.	1 p.m.	6 p.m.
	°F	°F	°F	°F	°F	°
Aug. 19	62	76	78	62	68	72
20	60·5	74	80	60	67	73
21	60	80	83·5	60	76	79
22	62	71	74	61	66	70
23	61	74·5	77	61	69	72
25	62	74	78	61·5	69	72
26	61	80	83·5	61·5	70	76
27	62	81	83·5	62·5	72	76
28	62	81	82	62	72·5	76
29	61·5	76	79	61·5	70	73·5
30	62	66	66	67	62	62
Sept. 2	62	81	83	62·5	74	76
3	62	81	80	62	73	75
4	60·5	74	75	60	70	70
5	60	68	69	60	64	65
6	60	64·5	64	60·5	61	62
8	61·5	74	74	61·5	68	70
9	58	72	74	58	68	70
10	59	71	72	59	68	67
11	60·5	74	75	60	69	71
12	60·5	67	67	60·5	64	63
15	57	70	71·5	57	65	69
16	58	74	73·5	58	67	70
17	58	70	.....	57	65	.....
18	58	72	70	59	67	67
19	56	72	71·5	56	67	68·5
20	55	72	72	55	68	69
22	55	62	63	54	60	59·5
23	51	57	51	51	56	51·5
24	51·5	62	59	50	58·5	58
25	51	55	56	52	55	55
26	54	64	61	53	62	60

SOIL TEMPERATURE

Month	7 a.m.		1 p.m.		6 p.m.	
	Highest	Lowest	Highest	Lowest	Highest	Lowest
	°F	°F.	°F.	°F.	°F.	°F.
May—						
Paper	65	53	73	62	77	63·5
Without paper	61	49	71	59	71	59
June—						
Paper	68	57	83	63·5	88	63·5
Without paper	64	52	81	62	85	60
July—						
Paper	70	58·5	87	71·5	92·5	74
Without paper	66·5	56	84	70	90	72
August—						
Paper	67	60	89	71	93	66
Without paper	66	60	80	67	88	62
September—						
Paper	62	51	81	55	83	51
Without paper	62·5	50	74	55	76	51·5

Soil temperatures have been higher because of the paper, and more uniform at least for a part of the season. It will also be noticed that as the season advanced the difference in soil temperature, with and without the paper became less in the morning and greater at 1 and 6 p.m.

In conducting the work during the summer, only those vegetables which had been much benefited by the paper during the previous year were grown. The yields of these crops confirm our former findings in the main as will be seen.

CUCUMBER HARRIS PERFECTION

Plants 1 foot apart in row, rows 6 feet apart

—	Date sown	Date planted	Date ready	Number of fruits marketable	Weight marketable	Number of fruits unmarketable	Weight unmarketable	Total number of fruits	Total weight
	Mar.	May	July		lb. oz.		lb. oz.		lb. oz.
With paper, 160 plants	30	23	10	1,550	1,025 8	607	232 4	2,157	1,257 12
Without paper, 160 plants	30	23	20	483	282 2	395	124 14	878	407 ..

RESULT.—The paper shows an advantage of over three times in total number of marketable cucumbers, and over three and a half times in marketable weight. The paper also induced earliness by ten days.

SPINACH "KING OF DENMARK"

Rows 18 inches apart. Plants thinned to 4 inches apart

—	Date sown	Ready for use	June 5	June 11	June 18	June 27	July 8	Total weight
	April	June	lb.	lb.	lb.	lb.	lb.	lb.
With paper, 200 lineal feet	23	5	25	90	57	89	49	310
Without paper, 200 lineal ft.	23	11	.....	28	44	46	25	143

The above table shows that the use of the paper more than doubled the crop, that the crop was about a week earlier. Also in the first two pickings, while the market price was higher, the crop was four times more than that without paper.

ONION "YELLOW GLOBE DANVER"

Rows 18 inches apart. Thinned to 1 inch apart

—	Date sown	Date harvested	Onions over 2 inches diameter	Onions under 2 inches	Pickling	Total weight
	April	Sept.	lb.	lb.	lb.	lb.
With paper, 200 lineal feet	22	15	239	90	21	350
Without paper, 200 lineal feet	22	10	68	64	40	172

The experiment shows that the paper increased the crop of onions over 2 inches in diameter three and a half times, and more than doubled the total yield.

TOMATO "BEST OF ALL"

50 plants 2 feet apart in row and rows 3 feet apart

—	Date sown	Date planted	Date of first six fruits	Weight marketable	Weight unmarketable	Blossom end rot	Green	Total weight
	Mar.	May	Aug.	lb. oz.	lb. oz.	lb. oz.	lb.	lb. oz.
With paper	4	6	12	248 4	73 6	7 9	51	380 3
Without paper	4	6	19	124 11	41 4	0 14	30	196 13

Average weight per plant	Marketable	Total
With paper	4 pounds, 14 ounces	7 pounds, 10 ounces
Without paper	2 pounds, 7 ounces	3 pounds, 15 ounces

MELON "HOODOO"

Plants 1 foot apart in row. Rows 6 feet apart

——	Date sown	Date planted	Date ready for use	Number of fruits marketable	Weight marketable	Number unmarketable	Weight unmarketable	Total number of fruits	Total weight
	Mar.	May	Sept.		lb.		lb.		lb.
With paper, 240 plants...	30	22	12	451	466	540	402	991	868
Without paper, 240 plants.....	30	22	23	81	89	150	88	231	177

Further work comparing the cost of paper with value of increased crop would indicate that for many specialized crops the paper pays. On the other hand, the use of paper in the growing of field crops is not to be recommended.

THE STRAWBERRY

The improvement in strawberries has been recent as compared with some other fruits. The fact is indicated by the following words written by Thomas Hyll, in 1593, showing how small the fruit was at that time in England: "Strawberries be much eaten at all men's tables in the summer with wine and sugar and they will grow in gardens until the bigness of a mulberry." There was evidently little further increase in the size of the fruit until the early part of the nineteenth century. Until recent times, botanists passed the garden strawberry and left it without a name. Horticulturists contented themselves with giving the plant its generic name, Fragaria. During the early nineties Bailey interested himself in the history and development of many of the garden plants, among which he included the strawberry, and as a result of his studies the cultivated strawberry has been assigned to a well-recognized botanical species, Fragaria Chiloensis.

Near the middle of the eighteenth century the Pine strawberry appeared in Europe, and became the principal progenitor of the garden strawberry. The botanical origin of the Pine is obscure. The first of the modern race of large fruited varieties was the Keen's Seedling, originated by Michael Keen, of England, in 1819. It was a Pine, and from it have sprung most of the European varieties of to-day. Hovey, who may be considered the father of the American strawberry industry, used the native wild plants of America along with imported plants of the Pine type as the foundation of a number of crosses which resulted in the production of two varieties, the Hovey and the Boston Pine.

Owing to loss of records the true parentage of these could never be determined. It was Mr. Hovey's opinion that the Hovey sprang from a cross of Mulberry and Keen's Seedlings, both of the Pine type. Thus it will be seen that the cultivated varieties of America have come to us from the so-called Pine type of berries, which in turn arose from Fragaria Chiloensis, supposedly brought to Europe from Chile in 1712 by M. Frezier, formerly of France.

Another advance was made when the Wilson Albany was offered by John Wilson, Albany, N.Y., in 1857. The Wilson was popular for a long time, and may yet be found in some Eastern gardens. Since that time hundreds of new varieties have been named and sold, showing in some cases improvement in size, quality and productiveness, and the good work still goes on.

The plant is readily propagated by seed, which is of course the only means of securing new fruits. The seeds may be selected from plants showing the desired tendencies, or they may be produced by crossing two plants possessing characteristics which it would be desirable to combine in one plant. When a

new variety has been produced the usual method of propagating strawberries is from runners. Owing to the comparatively short time from the sowing of seed until the plant bears fruit, and the ease with which the grower may perpetuate any plant he may develop without fear of loss or change of character, the strawberry becomes one of the most interesting subjects with which the horticulturist may work.

As is well known, the Magoon is the berry most grown on Vancouver island.

THE NEW VICTORIA

During the last few years one might hear from many sources such statements as these: "The Magoon strawberry is not what it used to be"; "The Magoon has all gone to Monkey Faces"; "The Magoon does not carry well,"

The New Victoria strawberry.

etc., etc. Though the Magoon has had a wonderful past; though it has excellent qualities in large measure, there has been an increasing desire on the part of many to find a better variety. With the hope of finding such a berry, possessing such qualities as were demanded by the Saanich growers, work was undertaken by the Experimental Station in 1925. Four hundred seedlings, arising from seeds taken from some of the standard sorts, were grown during the year, carried in the cold frame during the winter, and taken to the field in March, 1926. During 1926 the plants were not allowed to fruit. Runners were also cut back. These plants bore fruit in 1927. Records were kept on individual plants as to size and vigour, sex of flowers, date of first bloom, amount of bloom and length of fruit stalk. It was obvious when the fruit began to ripen that

many plants had little or no value. These were discarded immediately, and no further record kept. The following table gives the name of the parent plants from which the seedlings arose, also the number grown and those retained:—

STRAWBERRY SEEDLINGS

Parent	Number seedlings grown	Number seedlings retained
Mariana	78	5
Burrill	61	5
Greenville	69	8
Bisel	73	8
Glen Mary	78	12
Lavinia	21	.....

Wide variation was shown in the character of the seedlings retained. In the same family of seedlings there was a difference in the date of ripening of from eight to ten days.

Storage tests showed that some berries would stand up for long periods after picking and still retain their good qualities, while others were of little or no use after having been picked forty-eight hours. Size, flavour and yield were decidedly variable characters. After careful study, thirty-eight plants were saved as worthy of further trial.

In addition to the work outlined, considerable hybridizing has been done, using several of the more prominent varieties. Eight hundred of these have fruited, making a total of twelve hundred. Each plant of the twelve hundred has been examined, described and accepted or rejected as the merits or demerits of the plant became known. The crosses made were as follows:—

Magoon x Royal Sovereign
Royal Sovereign x Magoon
Greenville x Mariana
Greenville x Magoon
Paxton x Mariana

The mother plant has been mentioned first in each instance. The way of the plant breeder is hard, for of the 637 crosses, only 28 had sufficient value to be retained for further work. The plants retained of the open seedlings, and the crosses made as indicated, fruited in 1930 under ideal conditions, and were again rogued. Of the original 1,237 varieties, comprising the two lots, only 40 had real value. One of these, a cross between the Royal Sovereign and Magoon, is the berry which will probably be known as "The New Victoria." Our notes concerning the new variety are as follows: Plants large and vigorous, bushy. Fruit stalks long, well protected by the vigorous foliage. Flowers perfect. Date first ripe fruit, June 10. Colour, bright red, seeds prominent, fruit solid, stands up well in storage. Prolific, fruit conical, large to very large.

In the opinion of the writer, this berry is very promising. It possesses the vigour of the old Magoon and the aroma of the Royal Sovereign. It carries with it many of the characteristics demanded by the Saanich fruit men. A variety to suit Saanich must be made to order. It must resist drought, it must yield well, the fruit must be firm and stand up well in storage; the fruit must be bright, of good flavour, and devoid of "monkey faces." The foliage must be strong and free from disease. These characters are to be found in great measure in the "New Victoria."

STRAWBERRY ROOT WEEVIL

During recent years the strawberry root weevil, among strawberry growers, has been a matter of first concern. So serious did the matter become that at one time it looked as if the strawberry industry was doomed. The weevil and its work are so well known that little need be said concerning it, especially on Vancouver Island. The larva, when newly hatched, is a characteristic weevil larva in shape and colour. The body is slightly covered with minute hairs, is slightly curved, whitish, with a head of the same colour, but smooth. In a short time the head assumes a light shade of brown, the body remaining white, sometimes coloured pink or grey from the nature of the contents of the intestines. The adult is dark brown, almost black in fact, egg shaped in general outline, about one-quarter of an inch long. The legs are very strong, capable of walking rapidly and for long distances. The larvae of the beetle working underground could not be reached by stomach poisons or contact sprays. After many attempts at control with indifferent success, Forsell, an American entomologist, discovered that apples would attract mature beetles and that by poisoning the pulp, the beetles could be killed before the damage to the strawberry root was done. This bait was put on the market and was well received, but it was found that the price charged for the bait together with the royalty was excessive. Following this Mr. Downes, one of our federal entomologists, found that raisins would also attract the beetles. Wormy raisins were to be had at a few cents per pound. These combined with shorts and mixed with a proper poison was the bait that was used by the Saanich growers for the past year or two. Unfortunately raisins are a Californian product, and as the demand for wormy raisins increased, the price went up, until wormy raisins cost quite as much as any other sort. Our experimental work would indicate that the beetles were not attracted by apples or raisins, but by certain inverted sugars, such as dextrose and levulose—sugars which come down during the process of dehydration. Each year tons of pears, either too small or too scabby, go to waste on Vancouver Island. The only cost is the cost of dehydration. Analysis showed some quantity of these pears, dehydrated by us, to contain sucrose, dextrose and levulose. These pears formed the base of the bait offered by us. When mixed with bran or shorts and poisoned, preferably with sodium fluosilicate, the product resulted in a diet exceedingly attractive to weevils and one that gave one hundred per cent control. The bait was used by many Saanich growers last year on their own plantations with unqualified success.

STRAWBERRY DEMONSTRATION WORK

On the request of the growers at Gordon Head and Keatings, some strawberry demonstration work has been done during the past season. One acre of land was secured for the purpose at Gordon Head on land owned by Mr. W. T. Edwards and a similar plot at Keating owned by Mr. J. N. Wood. The plan was practically the same as that followed in field Illustration Station work, the owner doing the work, under direction, on his own land and exercising all rights of ownership in so far as the resulting crop was concerned. All extra expense, such as new varieties of plants, special fertilizers, etc., to be furnished by the department in exchange for the special care, records, etc. Work to be done by the operator. The acre was divided in three equal parts in each instance. Part one manured, part two fertilized with chemical fertilizer, and part three left without fertilizer of any sort. The rows consisting of several standard sorts ran the entire length of the plantation over plots one, two and three. One row was papered on both sides with thermogen, the paper mulch. The plot at Gordon Head was irrigated, while the dry system of farming was followed at

Keating. Thus the shipping quality of the berries may be noted where water was used as well as the yield. Insect pests were entirely controlled by means of the bait made by the Experimental Station.

No crop has yet been harvested so that further report concerning the work will have to remain until next year.

SEED GROWING

The growing of seed on Vancouver Island is becoming an industry of some magnitude. The Sunset Seed Company of Keating, and James Bros. of Cowichan, formerly of Salt Spring Island, and others are well and favourably known. The seeds going out from these concerns are making a reputation both for the growers and for Vancouver Island. Undoubtedly the seed grown here is of the highest germinating quality, and ranks high so far as appearance is

Drying seed. Note the paper on the ground and canvas above, yet the seed is exposed to free currents of air.

concerned. Though seed growing is not new at the Experimental Station, it was not until 1928 that a systematic attempt was made to grow "Elite" stock seed under the regulations governing the Canadian Seed Growers' Association. All provincial institutions as well as Experimental Farms have been carrying on with their own select list of vegetables grown for the production of stock seed. The list as assigned to us was as follows:—

BEANS—Kentucky Wonder, Green Pod.
CAULIFLOWER—Early Dwarf Erfurt.
LETTUCE—Hanson.
ONION—White Portugal.
PEAS—Advancer.
SPINACH—New Zealand.

At the beginning of our work the seed was obtained from many seed houses and the plots grown of each variety were of considerable size. The plants were studied from the standpoint of size, quality, production, etc., and the selection made of one plant in each instance whenever it seemed possible so to do. The plants selected were, of course, the best found, at least from our standpoint. The seed arising from this plant or plants has been sown for the past few years, except in the case of cauliflower. Seed sufficient to sow a considerable acreage is now available.

Cauliflower seed has not been grown in Canada to any extent and presents many difficulties. A glance at any seed catalogue will convince one that this is true, for the price asked for the seed runs to many dollars per pound. At the beginning of our work the plant was treated as an annual with the hope that our long season would permit us to ripen the seed from the plant the first year, if seed were planted early enough. A small quantity of seed was grown in this way, but it soon became evident that the plan would not work in the production of seed in any commercial quantity, unless the seed could be ripened before the advent of the fall rains. The plan that we have adopted for the last year or two works so well that it has attracted wide attention from many parts of the country. This plan is here outlined:—

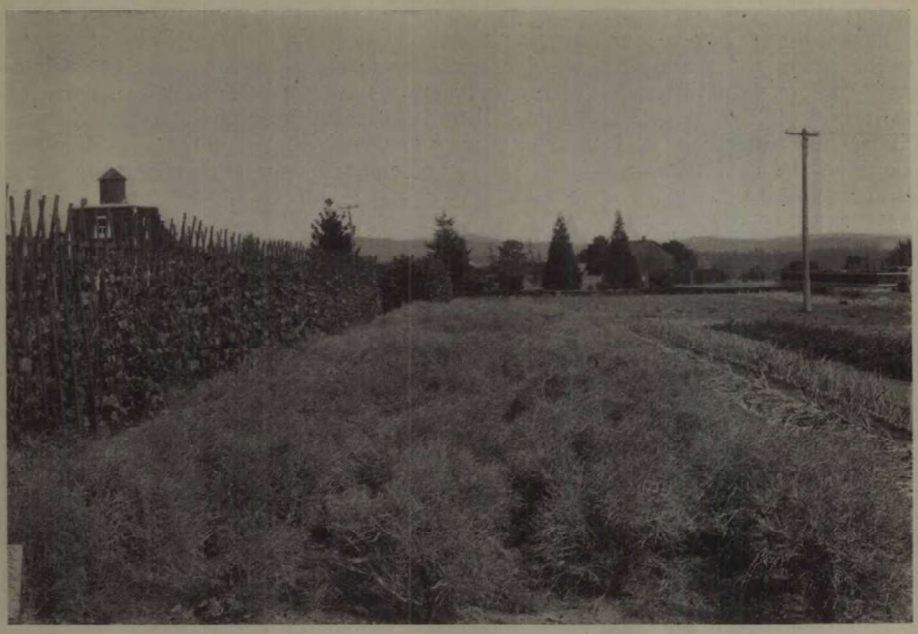
The cauliflower belongs to the genus Brassica, including cabbage, cauliflower, kale, kohl-rabi, and Brussels sprouts. Members of this group are so closely related that they will freely intercross. This fact must be taken into account when growing seeds of many varieties, but especially is this true when growing seed from any of the cabbage tribe.

In the fall of 1929 the seed was sown in September in cold frames, and the seedlings transplanted into other frames in October, spaced about 4 inches apart. By manipulating the glass and water, the plants were kept in the best condition possible, notwithstanding the excessive cold weather.

Cold weather was experienced indeed, for 18 degrees of frost was registered later on. During that time the plants were covered with sash, yet the soil in the frames was frozen hard. This is ample proof that the plants will stand a

Cauliflower grown for seed—Early Dwarf Erfurt, June 10, 1930.

25952—5½



Cauliflower grown for seed—Early Dwarf Erfurt, in the pod.

considerable amount of bad weather. About the first week in February the plants were lifted and planted in 4-inch pots. This procedure may not be essential in all cases, but we have every reason to recommend it, as the plants when set in their permanent location receive no check when so treated. These plants went to the field about the first week in March set in rows 3 feet apart and 2 feet 6 inches apart in the rows.

If any difficulty should be experienced in obtaining clay pots, paper pots are now available and may be obtained at very reasonable rates. Failing this, bits of sod may be cut about 3 by 3 inches or 4 by 4 inches, turned bottom side up, and the whole covered with good soil. One plant set directly over each piece of sod will occupy it entirely, and will fill the sod with roots, permitting the handling of these plants without disturbance, in much the same way as though they had been planted in pots.

The plan as outlined was so satisfactory that fine marketable heads were produced, weighing 6 pounds each, about the middle of May. This is the time to root out any plants which may be off type, off in colour, etc. In fact everything must come out, from which one does not care to save seed. The object of the grower now should be the development of the flower stalk from what is technically known as the curd, the part eaten when grown as a vegetable.

To do this it may be found necessary to remove about one-half or two-thirds of the curd, using a carving knife. This is not always done in Europe, but the removal of this curd seems to induce the formation of flower stalks in that part which is left. The free circulation of air, brought about by the removal of the curd, seems to discourage the development of rot causing black heads and sometimes the entire breaking down of the curd.

During the hot weather, the cauliflower is subject to plant lice and flea beetles, the same as cabbages are. Unless these insects are controlled the plants will be destroyed outright. Plant lice are sucking insects and if they are allowed to develop during the seed pod formation, the pods will take on a dwarf appearance, while the resulting seed will be of the poorest quality. Many recommendations have been made for the control of these insects. "Black

Leaf 40" is in common use but is rather expensive when freely applied. A mixture of airslacked lime, 47½ pounds and 2½ pounds nicotine sulphate (Black Leaf 40) mixed and blown on the plants with some force with a powder gun is effective. This kills many of the insects and repels others. Another preparation known as "Nicona", a mixture of oil in the form of an emulsion, and Black Leaf 40 is coming into common use. Whatever is used must be freely applied and blown on with force. The plants were ready to be harvested the first week in September at which time they were cut near the ground and placed erect on canvas sheets to dry. They were ready to thresh before the end of September.

The harvest from the 250 plants in the plot yielded 12 pounds 8 ounces equivalent to a yield of 362 pounds 8 ounces per acre. The wholesale price quoted by one seed catalogue is $25 per pound—a return per acre quite worth while. Our seed has just now been reported on, as being of a high germinating power and true to name. There is no good reason why all of the cauliflower seed required in Canada should not be grown on Vancouver Island. We have outlined the procedure to be followed in the production of Elite stock cauliflower seed, the most difficult subject with which we have had to do in the production of vegetable seeds in Canada.

THE DEHYDRATION OF FRUITS AND VEGETABLES

Dehydration has been defined as the process of rendering a substance free of water or the elements of water. Dehydration is at present spoken of industrially as drying by artificially produced heat under carefully controlled conditions of temperature, humidity and air flow.

The dehydration industry in America is young, while in Canada we are just making a beginning. Just as the Civil War in America stimulated the canning industry, so did the Boer War and the World War stimulate the dehydration industry. To conserve cargo space and transportation facilities, enormous quantities of foods were dehydrated during the World War and shipped to the allied armies in Europe. In Germany in 1898 there were only three drying plants. In 1917 the number had increased to about 1,900, a fact which explains in part Germany's ability to maintain her food supply during the war. Among dehydrated products apples and prunes are among the oldest.

The fruit and vegetable product industries depend in most cases upon the control, or proper utilization of micro-organisms. In the canning of foods, micro-organisms capable of causing spoilage are destroyed by heat, and their entrance to the food prevented by the use of hermetically sealed containers. Dried fruits and vegetables do not spoil, because they do not contain sufficient moisture to support the growth of micro-organisms. In the manufacture of vinegar the growth of yeast and certain vinegar bacteria are encouraged. Thus all along the line the sterilization of the product, the control of the growth of ferments or the encouragement of the same, are problems which constantly present themselves.

At the Experimental Station, Sidney, B.C., a dehydrator of the air blast cabinet type was installed in the spring of 1929. The fruit was dried by means of steam heated air driven by fans through the trays of fruit. Considerable work was done of an experimental nature to determine the possibilities of loganberries, blackberries and prunes, from the standpoint of dehydrated fruits. Two tons of logans were put through the first year, with fair results, and a smaller quantity the second year with excellent results. Where the berries were firm, yet ripe when picked, the resulting product was of good size and colour. On the other hand, where the berries were fully ripe, to soft, the result was a poor grade of dried fruit, being "slabbed" and broken down and of poor colour. No preliminary treatment other than sorting was necessary for berries. They were started in the dehydrator at a temperature of about 175 degees F. and finished

at about 140 to 150 degrees F. These temperatures would dry the fruit in about 13 hours. Half a ton of blackberries were also dried with success, the product being of excellent quality and flavour. The ratio of fresh berries to the dry product averaged about 5 or 5½ to 1.

It was found that prunes had to be ready to fall to the ground before picking, to be in prime condition for drying in order to obtain their full flavour and quality. Before being put in the dehydrator prunes were dipped in a hot solution of lye, 1 pound to 20 gallons of water, for 15 to 30 seconds, long enough to slightly check or crack the skin in order to hasten evaporation, and then rinsed in clear water. One-half ton of prunes were dehydrated. They were started at a temperature of 115 to 125 degrees F. and finished at 160 to 175 degrees F. About 30 hours were required to dehydrate this fruit. The drying ratio for prunes averaged 3·5 pounds of fresh fruit to 1 pound of dried.

The dried fruit is stored in bins for some weeks where it undergoes "sweating" and the excess moisture from under-dried fruit is taken up by the drier fruits, so equalizing the product as regards moisture content. Berries are then ready for grading and packing.

Before packing prunes they are usually processed, which consists of immersing them for 2 minutes in water brought to the boiling point. This processing sterilizes the fruit, softens it and gives it a glossy appearance. The fruit is then packed directly from the processor, while still hot, into paper lined boxes, and pressed down flush with the top of the boxes by means of a press.

The price now paid for loganberries and blackberries in British Columbia will not permit one to dehydrate these fruits and meet competition on the world market. Prunes, however, may be purchased for little money and may be grown to perfection on Vancouver Island. They offer an excellent opportunity, as the demand for prunes is quite steady. We should supply our entire need, and no doubt will do so in the near future.

THE WALNUT ON VANCOUVER ISLAND

The walnut attracts much attention on the Pacific coast. In fact all nuts do. On many homesteads in the more settled sections of British Columbia a few nut trees have been planted. Although many of them have been neglected, the remaining trees have given, and still give so much pleasure to their owners that an increasing number of interested nut growers may be found in practically all localities.

Although the walnut tree, when dormant, will stand heavy frost in midwinter, late spring or early autumn frost will cause damage. The walnut succeeds best in a temperate and relatively mild climate, with abundant natural rainfall or with irrigation facilities. Most of the walnuts produced on the American continent come from those sections of California and Oregon having these conditions. The black bottom land, though the best land from many standpoints, is quite subject to frost during the period of bloom and from this standpoint unsuitable. Rolling or bench land, or gentle slopes made up of a good, deep, moist soil and so exposed as to get ample air, drainage, and sunlight, should be chosen.

The American walnuts, *Juglans nigra* and *Juglans cinerea,* are very useful as stocks but otherwise have little commercial value. The Asiatic species produce small thick-shelled nuts, and are useful for pickle making. The Persian species, *Juglans regia,* commonly called the English walnut, has been cultivated for centuries in Southern Europe. Early immigrants brought these thin shelled, rich flavoured, Persian nuts to America. Of these the two varieties which have done best at the Experimental Station are Mayette and the Franquette. They produce large nuts, thin-shelled and full flavoured.

The area given to walnut culture at the Experimental Station amounts to five acres of what is commonly called "red land," with an eastern exposure. In 1915 trees of eighteen grafted varieties and many seedlings were planted. For the most part these trees have done well. Growth, while not great, has been satisfactory considering the soil conditions and character of season. Nuts have been produced in some quantity for several years, with rapidly increasing quantities as the trees become larger. Of the following varieties, the Ordinaire has been the heaviest yielder, but does not occupy first place so far as quality is concerned. All of the following varieties have been grown at Sidney, B.C.: Ordinaire, A Coque tendre, Bijou et Gros Fruit, Fertile, Frenquette (Vrooman), Regia der Agrie, Regia, Franquette grafted on California Black, Franquette, Mayette, Charerte, De Terrijard, Parisienne, De La St. Jean.

The nuts are gathered just at the time they are falling from the trees, washed and dried. Washing at the time of gathering is much easier than after drying, when bits of leaves and dirt adhere very closely to the shell of the nuts. Bleaching then takes place. This consists of dipping in a solution of chloride of lime and sal soda to which sulphuric acid has been added.

The bleaching formula, as given out by the University of California Experimental Station, illustrates the detail of the process. "Six pounds of bleaching powder (chloride of lime), twelve pounds of sal soda, fifty gallons of water. Dissolve the sal soda in about four gallons of water, dissolve the bleaching powder in about four gallons of water. Add one solution to the other and stir well. Let the carbonate of lime settle to the bottom and draw off the clear liquid and add water to make a total of fifty gallons. Put the nuts in a large dipping box or lath crate, immerse in the fluid, and then add one and one-fourth pounds of 50 per cent sulphuric acid and agitate by raising and lowering the dipping box. The bleach should be reached in five to ten seconds. The nuts are then washed in clear water and put to dry. The liquid can be used with new batches of nuts so long as the proper effect is produced and small additions of acid will prolong the efficiency of the liquid."

When the trees were set, the soil, not being of precisely the type that one would have chosen, was shattered by means of blasting powder in the case of some trees, to determine the value, if any, of such treatment. One half stick of stumping powder was used to a hole made by driving a crowbar in as deeply as possible. Walnut trees two years old were planted in the regular manner in dug and blown holes. From the data presented over the whole period it has been shown that the blown holes had no advantage over those dug. In fact the yield is in favour of the trees planted in the dug holes.

The one great disease of the walnut is commonly known as walnut blight. This disease has been very destructive in the United States and British Columbia. No satisfactory control measure has been found, but Bordeaux mixture seems most promising among those that have been tried. The walnut is usually attacked during the early stage of its growth. The brown or black sunken spots are known to most growers of walnuts. The degenerate tissue often extends to the centre of the nuts. Late infection of the leaves does not appear to affect or distort the fruit, yet it may extend until many leaves are involved.

The walnut is very sensitive to spray injury so that one hesitates to recommend control measures. Sharply modified Bordeaux mixture, when properly made and applied, has given excellent control in California. Similar control is being studied in British Columbia.

GREENHOUSE

The work in the greenhouse has continued as formerly outlined. In a word, house No. 1 is used in the growing of some standard greenhouse crop, such as cucumbers or tomatoes, followed by chrysanthemums as a fall crop. Variety tests of cucumbers, tomatoes, etc., have been conducted, and return per square foot of greenhouse space determined for several crops. The greenhouse has continued to be of the greatest aid in supplementing our work in the landscape and in floriculture. Apart from experimental work much has been completed which could not have been attempted without such aid. Various lines of work begun in the greenhouse have been continued in the field.

The excellent display of chrysanthemums attracted considerable attention as the exhibit was outstanding. Visitors came in number and from considerable distance to see these magnificent flowers grown as they should be.

Cucumbers, as intimated, have been grown in house No. 1 for two years. These have been grown on the bench in the one case and on the ground in the other. In no case have they given the return per square foot that tomatoes have given, though they have occupied the bench for nearly the same length of time.

THE ARBORETUM

Sixteen years have now been given to the testing of trees and shrubs at the Vancouver Island Station. The area given over to this work comprises about ten acres in the arboretum proper besides extensive plantings throughout the Station grounds and park area.

Plantings were first made in the spring of 1914 and were of a very complete and comprehensive nature, material being secured from Oriental, American and European nurserymen, with the result that there is at this Station one of the finest collections to be found in Western Canada. Many native species have also been added from time to time. Of the various species attempted by far the greater number have proved hardy; some, while no doubt hardy, failed to withstand the shock of transplanting; others have been unable to adapt themselves to soil and climatic conditions.

In the report for the year 1929 an attempt was made to give a classification, together with a brief description of the Conifers, Junipers and Yews as grown here. In the present report the deciduous trees will be dealt with in a similar manner keeping in mind the behaviour of each as indicated by records obtained since being grown here.

Deciduous Trees

(Acanthopanax)

The members of this genus are trees or large shrubs with stout usually prickly branches, large leaves and small greenish flowers in umbels followed by small black berries.

Acanthopanax ricinifolius, Seem.—A sparingly branched tree with numerous stout prickles. Planted in 1914 this specimen has now obtained a height of 18 feet, is hardy and quite ornamental.

Acer, Maple

The maples are hardy ornamental trees or shrubs with handsome large foliage which in some species shows a remarkable tendency to vary in shape and colouring. The maples are among our most ornamental and valuable trees for park and street planting. Nearly all assume a splendid colour in autumn, especially the species native to North America which surpass by far the European

maples. For purposes of shade the common sugar maple where grown is best and most popular. The maples are not particular as to soil, thriving under a great variety of conditions from dry to swampy soils. Of the many varieties under observation here all have proved to be quite hardy.

Acer compestre, Linn., English Cork Maple.—Tree of moderate dense growth with dull green foliage, does well in dry locations. Planted in 1914, it has now attained a height of 24 feet. Branches are corky.

Acer saccharinum, Linn., White or Silver Maple.—This is a quick growing tree with wide spreading branches, growing best in rich and moist soil, but succeeds almost anywhere. The variety of this genus growing in the arboretum is Wieri, a variety remarkable for its gracefulness, its drooping branches and finely divided foliage. Planted in 1914 its height now is 25 feet. Recommended for planting.

Acer carpinifolia, Sieb. Hornbeam Maple.—This is a very distinct species of the maple family, and reported to be quite hardy, although the specimen received from the Yokohama Nurseries in the spring of 1917, and planted, never became established, being recorded as dead a year later.

Acer drummondii, Hook and Arn. Red Maple.—This is only one of the many red maples which are attractive, especially during the autumn, for their bright scarlet foliage. It does well in moist land and is sometimes called Swamp Maple. Unfortunately the specimen at the Station is in a much drier location than is suitable and hence growth is slow. In its natural habitat the red maple is a very large spreading tree. However it can hardly be recommended over the silver maple for park and street planting.

Acer duretti, Pax.—Rather an uncommon form having little to recommend it over those usually grown. Planted in 1914 the tree in the arboretum has now attained a height of 17 feet.

Acer glabrum, Torr.—A native of British Columbia, handsome and shrubby with graceful foliage. It attains a height of 25 to 30 feet under average conditions. In thirteen years the specimen in question has grown to a height of 18 feet.

Acer grandidentatum, Nutt.—Planted in 1914 this tree is now 21 feet high and doing well. Its bark is much darker than that of many of the maples being almost a dark brown.

Acer heldreichii, Orph.—A native of Southeastern Europe, this tree has done well here though it has little to recommend it over some of the other popular maples. The lower side of the leaves is intensely red.

Acer insigne, Boiss & Buhse.—This is a large tree, from Europe, remarkable for its large handsome foliage. It has done well in its location here being among the tallest of many varieties planted at the same time many years ago.

Acer macrophyllum, Pursh.—Sometimes called the Oregon Maple on the Pacific coast on which it is native. This is a very handsome, round-headed tree making very rapid growth and attaining a height of 100 or more feet.

Acer Monspessulanum, Linn.—A small tree of slow growth planted in 1914, it is now 13 feet in height, in good condition but possessing little value for planting here. Its leaves drop much later in the season than do the leaves of other maples.

Acer opalus hyrcanum, Pax.—A small growing tree attaining at its best a height of only 30 feet in southern Europe and the Orient. Here in sixteen years it boasts a height of 13 feet.

Acer palmatum reticulatum, Andre. Japanese Maple.—This is one of the many varieties belonging to the Japanese maple group. These are extremely handsome low growing trees of graceful habit and are noted for the extreme dissection of the leaves. It is doubtful whether this variety is hardy or not as the records show it dead three years from the time of planting.

Acer palmatum versicolor, Schwerin.—Planted in the arboretum this variety of Japanese maple never became established, dying the same year.

Acer palmatum atropurpureum, Van Houtte.—Received from Yokohama Nurseries in 1917 but never became established.

Acer platanoides, Linn. Norway Maple.—This seems to be a fairly satisfactory maple to grow. It is a large tree with round spreading head. In autumn the leaves turn pale yellow. Height 22 feet.

Acer platanoides rubrum, Herd.—There are many garden forms of *Acer Platanoides,* remarkable for the manner in which the leaves are cut and for their colouring. This variety has striking blood-red leaves in late summer and is a vigorous grower, being in this respect next to the Large-leaved maple.

Acer pseudoplantanus, Linn. Sycamore Maple.—In sixteen years a height of 24 feet has been attained. It forms a large tree with spreading head and is suitable for planting in exposed locations.

Acer rubrum coccineum, Linn. Scarlet Maple.—This variety is closely related to *Acer Drummondii,* is a very vigorous growing tree being one of the largest trees resulting from plantings of maples made in 1914. Height 29 feet. Its foliage is very attractive, especially in the late season.

Acer spicatum, Lam. Mountain Maple.—One of the more shrubby forms and while it is in good condition a height of only 13 feet has been attained in sixteen years. Its leaves are deeply and irregularly lobed.

Acer tataricum, Linn.—Another small shrubby form native of Asia. Sometimes called Tartarian maple. A round headed tree growing best in moist soil. Planted in 1916, height 14 feet.

Acer tataricum ginnala, Maxim. Amur Maple.—A very graceful variety of *Acer tataricum* with handsome foliage turning bright red in autumn. Valuable as a small ornamental tree where hardy species are limited.

Acer trifidum, Hook and Arm.—Received from the Yokohama Nurseries in 1915. Closely allied to Acer tataricum. Has little to recommend it over other varieties. Height 17 feet.

Acer trautuetteri, Medw.—This tree planted in 1914 is now 18 feet high and doing well. It is very similar to *Acer insigne,* but with smaller leaves and panicles.

Aesculus, Horse Chestnut, Buckeye

Trees coming under this head are deciduous, sometimes shrubby with large leaves arranged somewhat like the fingers on a hand, with red, white or yellow flowers in showy terminal panicles. They are cultivated for their showy flowers, handsome foliage and for their usefulness as shade trees. They leaf early and soon give a dense shade. A loamy and moist soil is best suited to their growth.

Aesculus glabra, Willd. Ohio Buckeye.—Planted in 1914 this tree is now 14 feet in height and makes a very good small ornamental tree. It is reported at Ottawa as not being quite so hardy as the horse chestnut.

Aesculus hippocastanum, Linn.—Common Horse Chestnut. This is one of the best shade trees for parks, roadsides and private grounds. It grows into a large tree, possessing dense foliage. In this location during the long dry summer

the foliage suffers somewhat from the drought; in spite of this being true it makes an excellent tree and is highly recommended for use. Planted in 1914, height 18 feet.

Aesculus humilis X, Lutea.—Received from Spain in 1914 and being a cross between the Sweet and Red Buckeye. Height 13 feet.

Aesculus lyonii, Hort.—Received the same time as the other plantings but failed to establish itself.

Aesculus neglecta, Lindl.—One of the less important varieties. The specimen is now 12 feet high and in good condition, distinguished in the flower by purple veined petals.

Aesculus pavia, Linn. Red Buckeye.—A small shapely tree now 11 feet in height with flowers a dark red colour. Condition good.

Aesculus pavia arguta, Lindl.—This variety has red flowers and is one of many hybrids of *Aesculus Hybrida*. Height 10 feet.

Aesculus rubicunda, Loisel.—Develops into a fairly large tree and is a very desirable form being useful for steets and parks. Height 17 feet.

Aesculus versicolor, Wender.—Another one of the many hybrids with bright coloured flowers, height 11 feet, planted in 1914.

Aesculus wilsonii, Rebd.—One of the largest trees of this genus and introduced to America from Central Asia by the U.S. Department of Agriculture. The specimen planted here in 1916 failed to establish itself dying two years later.

Ailanthus

Ailanthus glandulosa, Desf. Tree of Heaven.—This tree is grown chiefly for its handsome large foliage, making it useful for street planting. It grows in almost any soil but best in a light and somewhat moist one. The height of the specimen in the arboretum is 25 feet. Sometimes also called the Paradise Tree.

Betula, Birch

The birches are ornamental trees grown chiefly for their bright green handsome foliage. They are often conspicuous on account of their coloured bark and slender pendulous catkins before the leaves. Both wood and bark are very useful in manufacturing furniture and other articles. The birches made excellent park trees and in most instances are very hardy. A light, moist, loamy soil is preferred for the most part though a few species do satisfactorily in dry locations and poor soil. For the most part the birch is a shortlived tree.

Betula alba, Linn. European White Birch.—This is a very graceful tree with slender pendulous branches. Obtained from an American Nursery in 1925, this tree is now 21 feet in height, very suitable for park planting.

Betula occidentalis, Hook.—Grows into one of the largest of the birches and is native of British Columbia. Considerable care has to be exercised in transplanting.

Broussonetia

Broussonetia papyrifera, Vent.—A small tree with rather low spreading head and could be used in locations where small shade trees are wanted. Planted in 1914 it is now 14 feet high. Valuable chiefly for its attractive foliage and does not seem to be particular as to soil.

Carpinus, Hornbeam

Carpinus betulus, Linn. European Hornbeam.—The hornbeams are grown for their attractive foliage and light green fruit clusters. Their wood is very hard and close grained and hence very useful. Planted in 1914 the European Hornbeam specimen in the arboretum is now 20 feet in height. This tree bears severe pruning well and is very valuable for high hedges.

Carpinus caroliniana, Walt. American Hornbeam.—Sometimes called Blue Beach and distinguished by its dark bluish-green foliage. Changing to scarlet or orange-yellow in autumn. Has not become established in the arboretum, probably due to drought following transplanting.

Carpinus orientalis, Mill.—Failed to become established, planted in 1914, dying the same year. Native of Japan.

Catalpa

These are ornamental trees cultivated for their attractive flowers, that appear in large and showy panicles in summer, and for their heavy foliage. The leaves are exceptionally large emitting usually a disagreeable odour when bruised.

Catalpa bignonioides, Walt.—Indian Bean. Obtained from France in 1915, this tree is now 16 feet high. Its branches are wide spreading. Native of Southern United States.

Catalpa kaempferi, Sieb. and Zucc. Japanese Catalpa.—Native of the Orient and much lower growing than the preceding variety. Height of tree that has been planted sixteen years is now 12 feet.

Catalpa speciosa, Warder. Western Catalpa.—This tree makes a very desirable ornamental, is much the same as *Catalpa bignonioides* but a taller tree, being now 20 feet in height and quite hardy here.

Cedrela

Cedrela sinensis, Juas.—Received from the Yokohama Nurseries in 1914 and now is 21 feet in height. Foliage is large and feathery similar to that of ailanthus. The tree is suitable for planting avenues and for park purposes.

Celtis, Nettle Tree

Celtis occidentalis, Linn.—The nettle trees are valuable as shade trees or as single specimens on the lawn and have wide spreading heads and light green foliage. The specimen in the arboretum planted in 1914 is now 16 feet high and in good condition.

Cercidiphyllum

Cercidiphullum japonicum, Sieb and Zucc.—A native of Japan, bushy in habit with attractive foliage and habit and a very desirable tree for planting. The specimen here is doing well and is now 20 feet in height.

Cladrastis, Yellow Wood

Cladrastis amurensis, Koch.—Obtained from Japan in 1920 and is now 13 feet high. This tree is valuable as an ornamental because of its large panicles of white flowers and showy foliage. It is quite rare in cultivation though apparently hardy here.

Cladrastis lutea, Koch, Yellow Wood.—This is the better known species of the two growing here and is one of the most beautiful flowering native trees. Planted in 1916 the tree is now 11 feet high. The flowers are borne in loose panicles, are fragrant and over an inch across.

Crataegus, HAWTHORN

The hawthorns are hardy ornamentals of somewhat low growth with dense foliage. In springtime and early summer the white, pink or red flowers are very attractive. The brilliantly coloured fruits are retained in most cases until well on into the winter without shrinkage or loss of pulp.

Crataegus cordata, Ait. Washington Thorn.—This tree was received from the California Nursery Co. in 1925 and is now 7 feet high. This species has been much used for hedges in England. Flowers are in large clusters and bright red in colour.

Crataegus oxyacantha paulii, Rehd. Paul's Thorn.—A lower growing form than *Crategus cordata,* planted in 1925 the specimen in the Arboreteum is 4 feet high. Flowers are double and of a bright scarlet colour. One of the most satisfactory forms to grow.

Encommia

Encommia ulmoides, Oliver.—Obtained from the Arnold arboretum in 1914 and is now 13 feet in height. This species is a comparatively hardy rubber-producing tree though the rubber is not easily extracted. It is an upright-growing tree, in habit and foliage somewhat resembling the elm. Native of Central China.

Fagus—BEECH

Fagus sylvatica, Linn. European Beech.—Of the many varieties and species in cultivation this is the only representative that has been planted in the arboretum and while this specimen failed to become established the beeches do well in many locations.

Fraxinus, ASH

Some eight varieties of this interesting ornamental tree appear in the arboretum. The ashes are valuable as street and park trees and grow mostly into tall broad headed specimens, with light green foliage. Though a number of insects and fungi prey on the wood and leaves, the ash is very seldom seriously injured. The wood is straight grained and tough and used extensively in manufacturing many useful articles.

Fraxinus Americana, Linn. White Ash.—The tallest of all the specimens, planted in 1914, this tree is now 23 feet in height. Hardy, being a native tree.

Fraxinus, excelsior, Linn.—A tall tree, native of Europe, height 22 feet, and a rapid-growing tree.

Fraxinus oregona, Nutt.—Native of the Pacific Coast region, planted in 1914, height 19 feet. Attains a height of 80 feet.

Fraxinus pubescens, Lam. Red Ash.—Leaves are, on the lower side, covered with short soft hairs. Planted in 1914, height 17 feet.

Fraxinus quadrangulata, Mich. Blue Ash.—Native of Central North America, growing into a fairly large tree. Planted in 1914, present height 18 feet.

Fraxinus sambucifolia, Lam. Black Ash.—Height 17 feet. Planted in 1914. Native of Canada.

Fraxinus viridis, Michx. Green Ash.—About the same size as the preceding variety. Leaves are green on both sides. Tree is in good condition.

Ginko

Ginko biloba, Linn. Maidenhair Tree.—A native of the Orient and used widely as a street and park tree. Planted in 1914, the specimen in the arboretum is now 7 feet in height. The tree is straight, slender and somewhat sparsely branched, its leaves are fan shaped.

Gleditsia, Honey Locust

Some six species of honey locust are grown in the arboretum. They are valuable chiefly for their attractive finely divided foliage. The trees are large with spreading branches, the foliage is mostly light green in colour, turning yellow in autumn. When planted closely and pruned rather severely, the gleditsias form a very dense hedge.

Gleditsia caspica, Desf.—This form is not as attractive as some of the others, is native of the Orient and quite hardy. Planted in 1916 its height is now 6 feet.

Gleditsia ferox, Desf.—Also a native of the Orient and distinguished by its very stout spines. Planted in the arboretum in 1914, its height now is 12 feet.

Gleditsia macracantha, Desf.—Planted in 1914 the specimen is now 9 feet high. Very similar to *Gleditsia sinensis.* Tree is spiny.

Gleditsia sinensis, Lam.—A tree planted in 1914, that is now 6 feet in height, somewhat spiny.

Gleditsia sinensis nana, Loud.—A variety of sinensis that is less spiny and perhaps more shrubby with smaller and narrower leaflets. Planted in 1914 the tree is now 11 feet high and in good condition.

Gleditsia triacanthos, Inermis, Pursh.—Honey or Sweet Locust. Grows into a large tall tree, almost free from the spines with which most of the gleditsias are armed. This tree is now 10 feet high, planted in 1914.

Hippophae, Sea Buckthorn

Hippophae salicifolia, Don.—Introduced in the spring of 1917 but failed to become established being reported dead in 1918.

Idesia

Idesia polycarpa, Maxim.—Planted in 1916 but failed to become established being reported dead two years later. Introduced from Central China and hardy at the Arnold Arboretum, this plant ought to be hardy here. No further plantings however have been made.

Ilex, Holly

The holly tree is one of the most satisfactory ornamental trees grown in this coast area. Its evergreen spiny foliage is very attractive as are also the clusters of bright red berries. Growth is somewhat slow though trees of 30 feet in height are not uncommon. It stands severe pruning well and can be clipped to form a very fine dense hedge. In planting care must be taken to secure most pistillate plants, and a few staminate ones, otherwise berries will not be borne. Commercial plantings of holly on Vancouver Island up to now have been quite successful as there is a ready market during the Christmas season for twigs and branches bearing foliage and berries. The hollies grow best in rich well drained soil. Most of the species grow slowly and are not easily transplanted when older. The best time for moving holly is the early

autumn when the young wood has almost ripened or in the spring just before the plants start into new growth. Some fourteen varieties of *Ilex Aquifolium* (English holly) were obtained from Barbier Bros. Nurseries, France, and planted in the spring of 1914. For one reason and another several of the varieties planted at that time died, some the same season and others not for several years. The chief cause contributing to this loss was an unfavourable location, a very dry and shallow soil. The behaviour of these varieties since coming here is set forth in the following table.

ENGLISH HOLLY VARIETIES

Variety	Date planted	Condition	Date killed
Ilex aquifolium	1914	good	.....
Ilex aquifolium albo-argentia	1914	good	.....
Ilex aquifolium compacta aurea	1914	good	.....
Ilex aquifolium ferox argentea	1914	dead	1914
Ilex aquifolium handsworthensis	1914	good	.....
Ilex aquifolium latifolia argentea	1914	good	.....
Ilex aquifolium latifolia aurea	1914	good	.....
Ilex aquifolium ingricans aurea	1914	dead	1914
Ilex aquifolium rubricaulis aurea	1914	dead	1922
Ilex aquifolium wateriana variegata	1914	good	.....
Ilex crenata	1915	dead	1922
Ilex corallina	1915	dead	1917
Ilex integra	1916	fair	.....
Ilex sieboldi	1916	dead	1917

Juglans, WALNUT, BUTTERNUT

These trees are valuable both as ornamentals and for their edible nuts. They are usually tall broad-headed trees with large leaves but very inconspicuous flowers. The walnuts are valuable as park trees the foliage being particularly free from disease and insect pests. Besides the plantings in the arboretum there is a five acre orchard at the Sidney Station which is quite promising. This orchard was planted in 1917 and crops of increasing size are being produced each year. A moderately moist, rich deep soil seems to be best suited to the needs of the walnut. In planting the nuts do so in a light sandy soil so as to induce fibrous root growth and then plant into permanent location. Transplanting may safely be done up to the time the tree is three years old.

Juglans cinera, Linn. Butternut or White Walnut.—This is a tree with rather a narrow head and attaining a height of 100 feet. Planting in the arboretum was done in 1914, the specimen being now 9 feet in height. The butternut is native of Southwestern United States, is oblong in shape and prominently ribbed.

Juglans cordiformis, Maxim.—A broad-headed tree planted in 1914 and now 21 feet in height. The nut is heart shaped and much flattened, smooth and rather thin-shelled.

Juglans nigra, Linn.—Black Walnut 12 feet in height. In the eastern states this tree is the tallest of the walnuts attaining a height of 150 feet in many cases. The nut is thick shelled, roundish and strongly ribbed.

Juglans regia, Linn.—Persian or English Walnut. Native of South-eastern Europe and Asia, round-headed and growing to a height of 70 feet. This is a very graceful, shapely tree and the most valuable for planting here because of the excellent quality and size of the nuts. Planted in 1917 some of the trees are now 18 feet in height.

Juglans sieboldiana, Maxim.—This tree planted in 1914 is now 15 feet high and in good condition. The fruit is of fair quality, more or less roundish, rather smooth surface and rather thick shell.

Juglans vilmoriniana, Vilm.—In general appearance the tree resembles *Juglans regia* and the fruit that of *Juglans nigra*. Planted in 1917 the tree is now 16 feet high.

Laburnum, Golden Chain

The golden-chains are handsome small trees with dark green leaves falling late in autumn, without change of colour and with drooping, elongated stalks of flowers in spring. They are adapted for planting in shrubbery borders where they should be allowed enough space to show their graceful drooping stalks of golden flowers which contrast with the dark green foliage. They thrive well under a great variety of conditions and are rarely injured by insect pests or diseases.

Laburnum alpinum, Griseb. Scotch Laburnum.—This is a very attractive tree, flowering about two weeks later than *Laburnum vulgare*, having longer and more slender racemes of flowers and being also more upright and stiffer in growth as well as hardier.

Laburnum adamii Kirchn.—Habit and foliage is similar to that of *Laburnum vulgare* but the flowers are of a dull purplish colour. Planted 1915, height 22 feet.

Laburnum vulgare, Griseb. Golden-chain.—This is one of the best species for planting here. It is a small tree about 20 feet in height, erect with spreading branches. Planted in 1915 the specimen in the arboretum is now 16 feet high. Highly recommended.

Liquidambar

Liquidambar styraciflua, Linn. Sweet Gum.—This tree was obtained from the California Nursery Co. and planted in 1925 and is now 8 feet high. It is a very attractive tree of symmetrical habit and with leaves much resembling the maple. These leaves turn to a deep crimson colour in the fall. Its bark is deeply furrowed and the fruit persists long after the leaves drop.

Liriodendron, Tulip Tree

Liriodendron tulipifera, Linn. Tulip Tree.—This is a very handsome ornamental tree well adapted for park planting and for avenues. Its foliage is clean, of a bluish green colour and of unusual shape. The several specimens here are doing well and vary in height from 20 to 25 feet. In the Eastern States, its native habitat, this tree is reported to reach a height of even 150 feet. The tulip tree grows best in deep, rich and somewhat moist soil.

Magnolia

Much could be written about the beauties of the Magnolia species of which many have been tested here, however in the main it is enough to say that they have not proven very satisfactory. Much winter-killing has been experienced and of the many varieties tried only a few remain. The magnolias are very attractive trees, either deciduous or evergreen, with showy white, pink or purple flowers which are often fragrant. They thrive best in somewhat moist, sandy or peaty soils which are more or less porous. Transplanting is difficult and should be done just when the new growth is starting. Pot-grown plants are much more satisfactory than plants taken up with their roots bare. Some fifteen varieties have been planted and their behaviour is shown in tabular form below.

PERFORMANCE OF MAGNOLIA VARIETIES

Variety	Received from	Date planted	Condition	Date died
Magnolia alexandrina	Layritz, B.C.	1929	dead	1930
Magnolia champaca	Yokohama, Japan	1916	good	.....
Magnolia conspicua	Yokohama, Japan	1916	good	.....
Magnolia friscata	Yokohama, Japan	1914	dead	1916
Magnolia gracilis unicolor	Barbier, France	1916	dead	1918
Magnolia grandiflora	Layritz, B.C.	1929	fair	.....
Magnolia kobus	Layritz, B.C.	1929	good	.....
Magnolia obonate	Layritz, B.C.	1929	fair	.....
Magnolia obovata discolour	Layritz, B.C.	1929	dead	1930
Magnolia parvaflora	Yokohama, Japan	1916	dead	1916
Magnolia rustica floroplens	Layritz, B.C.	1929	good	.....
Magnolia salicifolia	Yokohama, Japan	1914	dead	1918
Magnolia soulangeana	Layritz, B.C.	1929	dead	1929
Magnolia soulangeana nigra	Layritz, B.C.	1929	dead	1929
Magnolia stellate	Layritz, B.C.	1929	dead	1929
Magnolia watsonii	Yokohama, Japan	1914	dead	1918

Paulownia

Paulownia imperialis, Sieb and Zucc. Empress Tree.—This tree was secured from the Yokohama Nurseries and placed in the arboretum in 1915. Growth has been fairly rapid, the tree now being 25 feet in height. The leaves are large and showy, branches are spreading and stout and flowers are large, fragrant and pale violet in colour.

Phellodendron, CORK TREE

Obtained from the Arnold Arboretum in 1914. The plant lived for six years until killed in building operations at the Station. During this time little growth was made, the plant being only two feet high at the time of being removed.

Pistacia

Pistacia chinensis, Bunge, Chinese Pistachio.—This is a fairly rapid growing tree and useful as an ornamental. Obtained from the California Nursery Co. in 1925, this tree has now attained a height of 7 feet.

Platanus, PLANE TREE

Platanus orientalis, Linn.—Sometimes called the European sycamore and the Oriental plane tree. This is a very valuable tree for park planting, for shade purposes and for streets. It has a very broad round head on a comparatively short trunk. They grow best in rich deep moist soil developing in large broad trees. Planted in 1915 some of the specimens are 25 feet in height.

Populus, POPLAR, COTTONWOOD

Populus nigra italica, Du Roi.—Lombardy or Italian poplar. This tree belongs to the great poplar family to which the cottonwood belongs. This is one of the most striking and picturesque ornamentals grown. The branches take on a strong upward turn giving a marked pyramidal effect. Its green foliage is held late into the autumn. Secured and planted in 1925, this tree is now 14 feet in height and doing well.

CEREALS

Considerable damage was done to the fall sown cereals throughout the district by the continued strong northeast winds which accompanied the low temperatures during January, 1930. Seeding began about the end of September and was completed by October 16. All the winter wheats were harvested by August 11. The cutting of fall sown barley commenced on July 2 and was finished by July 21. Barley did remarkably well, several varieties yielding much heavier crops from fall seeding than from spring seeding.

The winter oats were almost entirely wiped out by the severe weather conditions. Grey Winter and Winter Turf proved to be hardier than others.

Spring sown cereals suffered much from the drought experienced during the summer. In all this work with cereals one must take one of two risks: 1. The risk of loss from winter injury. 2. The risk of loss from summer drought.

WHEAT, FALL SOWN—TEST OF VARIETIES

Forty-three varieties and strains of wheat were under test. All were sown on October 16, 1929.

WHEAT, FALL SOWN—RESULTS OF TEST OF VARIETIES

Variety	Date ripe	Length of straw	Strength of straw on scale of 10 points	Weight per measured bushel	Yield per acre 1930	Number of years under test	Average yield per acre
		in.		lb.	bush.	years	bush.
Imperial Amber	July 26	49½	8	62	54·7	3	49·0
Dawson's Golden Chaff	Aug. 4	44	10	62	55·9	5	48·9
Indian 5, x Telford x Marshall Foch	Aug. 2	41½	10	62	45·5	2	45·6
V.I.S. No. 131	Aug. 9	51	10	61	59·0	5	44·0
Velvet	July 26	45	9	61	47·7	5	43·5
Hard Federation x Marshall Foch	Aug. 2	44	10	61	43·0	2	43·2
Marshall Foch	Aug. 11	40½	10	60	41·9	5	41·9
Golden Sun	Aug. 4	44½	10	60	44·7	5	41·6
O.A.C. 104	July 26	51½	8	61	48·8	5	41·5
Victor	Aug. 11	45	10	60	46·6	5	41·3
Red Rock	July 19	49	8	61	51·3	5	40·9
Firbank x 698	July 24	36	10	61	40·6	2	39·7
V.I.S. No. 14	Aug. 2	49	9	63	40·6	3	38·8
Sun	Aug. 6	43¾	10	61	36·1	5	37·3
Firbank x Little Club	July 25	44	7	62	32·2	2	37·1
Yeoman	Aug. 9	44½	10	61	49·7	5	36·9
Canberra	July 19	40	10	60	26·4	2	36·6
Baldmin	July 19	36	10	63	25·1	2	36·5
Major	July 29	38½	10	63	24·7	2	35·8
Austan	July 24	36	10	63	23·5	2	35·2
Federation x 414 (a)	July 26	36	10	63	24·8	2	35·1
Yanward	July 30	43	9	60	27·7	2	34·7
Federation x Bald Polish	July 22	38	9	60	29·7	2	34·7
V.I.S. No. 1	Aug. 6	46½	10	61	30·8	5	34·6
Federation x 170	July 28	40½	10	64	22·6	2	34·1
Florence x 332	July 17	36	10	64	21·7	2	33·5
Hard Federation x 170	July 25	43½	10	60	25·5	2	32·0
Williamson	July 22	45	10	60	20·0	4	31·5
Firbank x Yeoman	Aug. 2	42	10	60	29·1	2	31·1
Gluya x Shira	July 22	38	9	62	18·9	2	31·1
Currawa x 378	July 28	39	9	62	21·5	2	30·2
Firbank x White Lammas x Cedar	Aug. 1	39½	10	60	27·1	2	30·2
Joffre x Huron	July 26	36½	9	63	21·2	2	30·1
Federation x 1414	July 29	36½	10	65	21·7	2	29·6
Kanred	July 21	42	8	61	39·0	5	29·0
Warden	Aug. 1	44	7	62	17·3	2	28·9
Minturki	Aug. 2	44	7	62	34·0	5	28·0
Federation x 129 x Currawa	July 21	34½	9	64	19·3	2	26·8
Minhardi	July 29	40½	9	62	29·6	5	25·4
Cowar 31	July 28	40½	9	61	9·7	2	23·1
Dr. Hart's Durum	Aug. 2	40½	9	64	17·9	5	21·4
Comeback x Minister x 170	Aug. 6	37	9	63	14·9	1	14·9
Cowra 42	July 29	39½	10	63	12·87	1	12·8

Dawson's Golden Chaff has been a very consistent yielder at this Station. It has, however, a tendency to shatter badly, especially if rain should fall when it is in the stook. Imperial Amber yields well, has a medium strength straw, bearded, resembles Red Rock, grain quite hard.

V. I. S. No. 131, is a cross made at this Station in 1916, between Dawson's Golden Chaff and Sun. It has a plump reddish kernel, strong straw and does not shatter.

After being under test for five years Kanred, Minhardi, Minturki and Dr. Hart's Durum have been forced out by better yielding varieties.

SPRING WHEAT—TEST OF VARIETIES

Nine varieties of spring wheat were sown on May 9. In most cases the yields were below the average.

SPRING WHEAT—RESULTS OF TEST VARIETIES

Variety	Date ripe	Length of straw	Strength of straw on scale of 10-pts.	Weight per measured bushel	Yield per acre 1930	Number of years under test	Average yield per acre
		in.		lb.	bush.		bush.
Kitchener	Aug. 21	40	9	63	32·1	5	32·3
Early Red Fife, O. 16	" 21	38½	10	64	30·1	5	29·7
Red Stone	" 22	36	9	62	26·4	5	29·6
Huron O. 3	" 24	38	9	63	27·6	5	28·9
Red Fife, O. 17	" 30	35½	9	62	21·7	5	28·7
Marquis, O. 15	" 24	35½	8	63	17·0	5	27·0
Bluestem x Marquis	" 25	34½	9	60	24·8	3	26·3
Prelude, O. 135	" 9	33	7	65	26·4	2	24·8
Dicklow	Sept. 4	34½	9	60	20·6	5	23·8

Spring wheat does not yield as well as winter wheat on Vancouver Island. The acreage sown is usually very small.

OATS, AUTUMN SOWN—TEST OF VARIETIES

Ten varieties of winter oats were sown on October 15, 1929. The seed germinated well and the plants made a very satisfactory growth. All the plots were in excellent condition at the end of the year. The winter-killing mentioned above took place the second week in January.

OATS, AUTUMN SOWN—RESULTS OF TEST OF VARIETIES

Variety	Date ripe	Length of straw	Weight per measured bushel	Yield per acre, 1930	Number of years under test	Average yield per acre
		in.	lb.	bush.		bush.
Grey Winter	July 18	37½	38	39·2	5	48·0
Winter Turf	" 19	39	40	31·1	5	44·6
Kanota	" 12	32½	36	7·9	5	40·9
Bountiful	" 22	47	.....	0·9	5	40·8
Marvellous	" 16	39	41	1·9	5	37·5
Joanette	" 14	40¾	43	2·5	5	36·8
Hardy Prolific	" 16	42	.....	5·2	2	35·1
Early Ripe White	" 15	30	.....	0·4	5	30·3
O. 713	" 14	35	.....	1·2	5	28·2
Plentiful	" 22	35	36	3·2	2	23·6

OATS, SPRING SOWN—TEST OF VARIETIES

Twenty varieties of oats were sown on May 9, in plots of three rod-rows replicated four times.

OATS, SPRING SOWN—TEST OF VARIETIES

Variety	Date ripe	Length of straw	Weight per measured bushel	Yield per acre 1930	Number of years under test	Average yield per acre
		in.	lb.	bush.		bush.
Conqueror	Aug. 17	34	38	57·8	5	63·4
Star	" 12	34	36	54·5	3	63·4
Victory	" 15	37	38	71·3	5	60·0
Joanette	" 8	38	36	66·9	5	56·5
Gopher	" 4	33	36	46·5	2	56·1
Garton	" 17	35	38	60·0	5	55·5
Prolific	" 16	38	38	57·4	5	55·3
Banner	" 13	36	37	59·8	5	54·5
Columbian	" 15	34	38	56·3	5	54·5
O.A.C. 72	" 20	35½	36	53·5	5	52·2
Leader A	" 6	37½	35	48·3	5	49·8
Gold Rain	" 8	35	38	43·5	5	48·8
Alaska	" 2	36	37	52·9	5	47·3
Longfellow	" 11	39	38	60·6	4	44·6
1006-32	" 6	36	38	40·1	1	40·1
O. 713	" 2	38	40	43·0	5	39·5
1006-115	" 6	36	38	38·6	1	38·6
O.A.C. 3	" 4	35½	33	31·4	5	33·0
Laurel	" 8	36	48	32·6	1	32·6
Laurel, O. 477	" 8	37	47	21·5	5	30·2

BARLEY, AUTUMN SOWN—TEST OF VARIETIES

The following fourteen varieties of barley were sown on October 15, 1929:

BARLEY, AUTUMN SOWN—RESULTS OF TEST OF VARIETIES

Variety	Date ripe	Length of straw	Weight per measured bushel	Yield per acre, 1930	Number of years under test	Average yield per acre
		in.	lb.	bush.		bush.
Dean Bros	July 9	30	45	65·8	5	68·6
Trebi	" 12	32	45	66·2	1	66·2
Bark's	" 18	40	48	69·8	5	59·9
Duckbill	" 12	33	51	37·6	5	54·7
Gold	" 2	29	53	30·6	3	49·9
Manchurian	" 9	31	48	21·5	5	43·9
Bearer	" 9	33	47	31·7	5	43·3
Hulless	" 2	29½	62	12·1	5	40·9
Hannchen	" 17	30½	55	34·7	1	34·7
Himalayan	" 2	24½	63	17·8	5	32·5
Plumage Archer	" 21	34	53	29·8	1	29·8
O.A.C. 21	" 12	29½	50	26·2	1	26·2
Charlottetown 80	" 18	32	55	26·1	1	26·1
Star	" 8	28	49	24·5	1	24·5

Dean Bros.:—This variety was received for test from Messrs. Dean Bros. of Keating, by whom it was introduced from Southern Oregon. It resembles very closely the variety grown largely throughout the Western States under the name of "Coast." It is a six-rowed, bearded variety with large heads that have a slight tendency to break off. The awns are coarse and about five inches long. They do not break off easily in threshing, short pieces of awn being left on many kernels. Where this occurs the weight per measured bushel may be low in spite of the fact that the kernels are large and plump.

The variety does well when sown in the autumn. It also resists the drought of the Vancouver Island summers better than most varieties.

Trebi:—A six-rowed bearded variety, the heads of which resemble those of the above. The awns are more brittle than those of Coast, and in threshing break off more easily from the kernel. It has only been under test for one year at this Station, but promises to do well as a winter variety.

BARLEY, SPRING SOWN—TEST OF VARIETIES

The same varieties and strains of barley as used for autumn sowing were sown on May 9, 1930, in rod-row plots.

BARLEY SPRING SOWN—RESULTS OF TEST OF VARIETIES

Variety	Date ripe	Length of straw	Weight per measured bushel	Yield per acre, 1930	Number of years under test	Average yield per acre
		in.	lb.	bush.		bush.
Dean Bros.	Aug. 4	26	48	41·4	5	55·9
Gold	" 9	21	53	33·5	4	55·1
Bark's	" 18	23½	45	33·8	5	50·9
Bearer, O. 475	" 8	26	44	17·3	5	47·6
Manchurian, O. 50	" 2	36	46	29·6	5	46·2
Duckbill, O. 57	" 14	31	49	30·8	5	45·4
Himalayan, O. 59	July 31	24	58	26·3	5	40·1
Charlottetown 80	Aug. 14	26½	53	36·6	1	36·6
Hulless	" 4	28	57	30·6	5	35·5
Trebi	" 4	28	49	34·1	1	34·1
O.A.C. 21	" 6	36	49	32·2	1	32·2
Plumage Archer	" 14	29¼	50	30·6	1	30·6
Star	" 6	27	48	30·2	1	30·2
Hannchen	" 12	30	55	24·7	1	24·7

All the spring sown barley yielded crops much below the average.

FIELD PEAS—TEST OF VARIETIES

Eighteen varieties of field peas were sown on April 23. Each plot was replicated four times and consisted of two rod-rows seven inches apart. In each row 100 seeds were planted at an equal distance apart. The distance between each plot was four feet. The yields were very high and far surpass any returns that could be obtained under field conditions. This is largely due to the distance between the plots, and constant cultivation in keeping the weeds in check.

FIELD PEAS—RESULTS OF TEST OF VARIETIES

Variety	Date ripe	Length of straw	Weight per measured bushel	Yield per acre, 1930	Number of years under test	Average yield per acre
		in.	lb.	bush.		bush.
Early Blue	July 21	23	60	66·7	4	75·1
Early Feed	" 21	33½	64	61·9	4	70·2
Early Raymond	" 19	38½	63	71·2	5	69·9
Mackay	Aug. 10	39½	62	75·1	6	67·6
Golden Vine	July 29	39	63	57·6	4	67·1
Prussian Blue	Aug. 10	42½	63	65·0	6	67·0
Concordia	July 30	27	61	60·2	5	65·6
Maple	Aug. 8	42	62	68·3	6	65·0
Capitol	July 26	36½	63	66·4	5	63·9
Canadian Beauty	Aug. 4	41½	63	51·1	4	63·5
O.A.C. 181	" 1	42	62	72·3	6	61·6
Stirling	July 31	40	64	72·2	6	61·3
Gryllen	" 24	32¼	63	70·4	6	59·4
Arthur	Aug. 2	36	64	73·2	6	59·6
Cartier	Aug. 6	35½	64	73·2	6	59·3
Solo	Aug. 2	39	61	70·1	6	57·7
Chancellor	July 28	33½	64	58·5	6	57·4
Champlain	Aug. 6	37½	65	62·5	6	55·9

FORAGE CROPS

Forage crops are not extensively grown on Vancouver Island. Ensilage in some form is grown by most dairymen, and roots in some quantity. Clover, combined with one of the grasses is grown in some quantity and yields excellent crops, in fact better than in many other parts of Canada.

CORN FOR ENSILAGE

Twenty-three varieties and strains of corn for ensilage were sown on May 21 in rod-row plots, 36 inches apart. Each plot was replicated four times. The plants were thinned to 12 inches apart in the row.

INDIAN CORN—RESULTS OF VARIETY TEST

Variety	Date cut	Per cent stand	Per cent dry matter	Yield per acre 1930		Average		
				Green weight	Dry weight	For	Green weight	Dry weight
				tons	tons		tons	tons
Wisconsin No. 7	Oct. 9	22·1	26·50	28·38	7·52	7 years	18·04	4·12
Compton's Early	Oct. 9	50·0	27·52	15·62	5·29	6 "	15·60	2·91
Golden Glow	Oct. 1	64·7	24·62	18·53	4·56	7 "	14·83	3·15
90 Day White Dent	Sept. 20	42·6	22·17	20·35	4·51	6 "	17·01	3·38
Burr Leaming	Oct. 14	64·7	20·95	20·35	4·26	6 "	17·38	3·19
Leaming (Duke)	Oct. 4	33·9	25·95	16·22	4·20	6 "	14·38	2·85
North Dakota	Oct. 14	50·0	21·36	18·74	4·00	7 "	14·05	3·01
Bailey	Oct. 2	73·5	24·75	14·08	3·48	4 "	13·35	2·88
Longfellow	Oct. 2	63·2	25·21	13·39	3·37	7 "	14·05	3·15
Northern Prolific	Oct. 14	70·6	22·40	14·90	3·33	4 "	10·90	2·15
Northwestern Dent. (Crookston strain).	Sept. 10	76·5	24·26	13·42	3·25	6 "	12·86	3·00
Hybrid	Oct. 9	89·7	23·61	13·48	3·18	5 "	15·78	3·26
White Cap Yellow Dent	Oct. 14	79·4	23·23	13·53	3·14	7 "	13·97	2·97
Silo King	Oct. 9	17·6	21·39	14·30	3·05	1 "	.....	.....
Northwestern Dent (Disco)	Sept. 8	77·9	22·46	12·13	2·72	6 "	13·86	3·33
Yellow Dent	Oct. 2	89·7	22·77	11·44	2·60	6 "	12·77	2·65
Twichell's Pride	Sept. 8	72·0	22·47	11·33	2·54	7 "	12·20	2·91
Stowell's Evergreen	Oct. 15	67·6	21·96	11·44	2·51	5 "	11·30	1·97
Pride Yellow Dent	Sept 16	73·5	23·83	9·87	2·35	2 "	10·44	2·34
Amber Flint	Sept. 20	92·6	25·55	9·13	2·33	5 "	8·64	1·98
Northwestern Dent. (McKenzie).	Sept. 8	100·0	23·16	10·12	2·33	6 "	10·83	2·72
Early Northwestern Dent	Sept. 8	73·5	28·12	8·08	2·29	5 "	10·40	2·87
Quebec 28	Sept. 20	86·7	26·82	7·70	2·06	7 "	10·05	2·93

The figures in the yield columns are based on one hundred per cent stand. All of the varieties were cut upon reaching the dough state of maturity. Generally speaking, the early maturing varieties do not yield as well as those ripening at a later date.

Wisconsin No. 7 and 90 Day White Dent are two good yielders, maturing early enough on Vancouver Island to permit the seeding of winter wheat. Burr Leaming is good but very late. Northwestern Dent is recommended for an early variety.

SUNFLOWERS—VARIETY TEST

The varieties of sunflowers were sown on May 20. The same method of planting was followed as with corn.

Mammoth Russian is much the best yielding sunflower. Manchurian. Ottawa 76, and Mixed Mennonite are very early maturing varieties.

RESULTS OF SUNFLOWER VARIETY TEST

Variety	Date cut	Per cent stand	Per cent dry matter	Yield per acre 1930		For	Average	
				Green weight	Dry weight		Green weight	Dry weight
				tons	tons		tons	tons
Mammoth Russian (Disco)	Sept. 8	33·9	17·37	23·32	4·05	6 years	22·99	4·41
Mammoth Russian (McDon)	Sept. 20	100·0	19·75	21·78	4·30	7 "	24·36	5·16
Manchurian	Aug. 18	83·8	17·85	17·82	3·18	6 "	14·59	2·76
Mixed Mennonite	Aug. 13	100·0	15·24	7·48	1·13	7 "	11·38	1·97
Early Ottawa 76	Aug. 23	98·5	16·04	13·28	2·13	7 "	15·44	2·74

GRASS AND CLOVER

Duplicate plots, one rod square, or one-one hundred and sixtieth of an acre, were used in this experiment. The seed was sown at the rate of 16 pounds per acre.

ORCHARD GRASS—RESULTS OF VARIETY TEST

Variety	Height, April 15	Height when cut	Date cut	Yield per acre	
				Green weight	Dry matter
	in.	in.		tons	tons
Glostrup	8	60	June 18	10·23	4·50
Commercial	9	50	June 18	10·00	3·67
Scandia	6	52	June 18	9·44	3·42
Svalof Early	8	55	June 16	9·20	3·42
Mowing strain	8	52	June 14	8·40	2·88
Olsgaard	6	48	June 8	7·60	2·82
Grazing strain	8	46	June 16	6·80	2·27

ALFALFA—VARIETY TEST

Five varieties of alfalfa were sown in duplicate plots of uniform size. The seed was sown broadcast at the rate of 20 pounds per acre.

ALFALFA—RESULTS OF VARIETY TEST

Variety	Height when cut	Yield per acre, 1929		Average yield dry matter, 6 years
		Green	Dry	
	in.	tons	tons	tons
Variegated	33	12·88	4·68	2·92
Cossack	28	14·64	4·19	4·74
Registered Grimm	26	14·64	4·04	*3·13
Genuine Grimm	28	12·80	3·82	2·41
Siberian Yellow Flowered	26	13·60	3·67	2·06

* Average for 4 years only.

RED CLOVER—VARIETY TEST

Six strains of red clover were sown in duplicate plots of a uniform size, at the rate of 20 pounds per acre. The yields were above the average, due to favourable weather conditions during the growing period.

RED CLOVER—RESULTS OF VARIETY TEST

Variety	Source	Height when cut	Date cut	Yield per acre, 1930		Five-year average yield dry matter
				Green	Dry	
		in.		tons	tons	tons
Chateauguay	Quebec	28	June 20	24·00	5·68	3·91
St. Clet	Quebec	30	July 2	20·08	4·76	3·61
Early Swedish	Sweden	26	July 2	19·36	4·77	3·37
Late Swedish	Sweden	29	July 20	17·28	4·45	3·30
Kenora	Ontario	28	July 14	16·80	3·94	3·17
St. Rosalie	Quebec	27	July 2	21·76	5·14	.....

All the varieties excepting Late Swedish and Kenora were cut a second time.

The Quebec grown seed again demonstrates its ability to outyield strains from other parts.

WHITE DUTCH CLOVER—VARIETY TEST

The following White Dutch clovers were sown in duplicate plots of one-one hundred and sixtieth of an acre.

WHITE DUTCH CLOVER—RESULTS OF VARIETY TEST

Variety	Source	Date cut	Yield per acre, 1930		Average yield dry matter for 5 years
			Green	Dry	
			tons	tons	tons
Ladino	Denmark	July 2	5·76	1·34	1·59
Morso	Denmark	June 24	3·84	0·99	1·08
Stryno	Denmark	June 24	2·88	0·61	1·16
English Wild	England	June 28	5·04	1·05	*0·96
Commercial		June 24	2·48	0·68	1·22

* Average for 3 years only.

Ladino, a Mammoth variety of White Dutch Clover received from Denmark, has been a consistent yielder at this station. It is also sold under the name of Mammoth White Clover. English Wild is a persistent grower, resists the drought better than most other varieties.

MISCELLANEOUS FORAGE CROPS OTHER THAN GRASSES AND CLOVERS

The object of this experiment was to determine the relative value of Mammoth White Jerusalem Artichokes compared with other forage crops, such as corn and sunflowers.

The following table gives the date of harvest, per cent dry matter, and yield per acre, green and dry matter, also the average yield of dry matter for four years.

Variety	Date when harvested	Per cent dry matter	Yield per acre, 1930		Average yield, dry matter 1 acre, 4 years
			Green	Dry	
			tons	tons	tons
Artichoke Stalks	Oct. 14	28·55	13·02	3·71	5·44
Artichoke Tubers	Oct. 21	21·96	6·04	1·32	*2·10
Sunflowers	Oct. 9	21·05	14·52	3·05	4·12
Corn	Oct. 9	20·46	15·40	3·15	3·19

* Average for 3 years only.

The Artichokes are not increasing in popularity as a forage crop. The tubers are expensive to harvest and hard to keep in storage. Even when the greatest care is exercised, some of the tubers remain in the soil. These are eradicated with difficulty.

EXPERIMENTS WITH FERTILIZERS

No more careful work has been done at the Station farm than that with fertilizers, yet the results have been disappointing. Chemical fertilizers have not given the increased yields that one would look for, nor the results actually obtained in some parts of Canada. The country is comparatively new. Much of our high land does not appear to be suffering for phosphorous or potassium at present since the addition of these elements of plant food to these soils, does not materially affect the yield. On the other hand, the continuous cultivation during the summer, forced upon us by the exceedingly dry weather conditions, make available the nitrogen content of the soil, only to be washed away by the heavy rains of winter. From this standpoint one is not greatly surprised to find the addition of nitrogen, and nitrogen only, having an effect on the yield.

FERTILIZERS FOR THE POTATO CROP

This project was undertaken in the spring of 1923 to determine the influence of nitrogen, phosphoric acid, and potash on the yields of potatoes. Since 1927 the experiment has been made as simple as possible, all plots being one rod square and replicated four times. The plan of the experiment will be made clear by referring to the following table:—

PLAN OF EXPERIMENT—FERTILIZER FOR POTATOES

Plot	Fertilizer material to pounds per acre		Pounds per acre		
			N.	P_2O_5	K_2O
1	Nitrate of soda	400	62	.....	.....
	Superphosphate	800	.....	128	.....
	Muriate of potash	250	.....	.....	125
2	Sulphate of ammonia	300	62	.....	.....
	Superphosphate	800	.....	128	.....
	Muriate of potash	250	.....	.....	125
3	Superphosphate	800	.....	128	.....
	Muriate of potash	250	.....	.....	125
4	Nitrate of soda	400	62	.....	.....
	Superphosphate	800	.....	128	.....
5	Nitrate of soda	400	62	.....	.....
	Muriate of potash	250	.....	.....	125
6	Check (no treatment)		.....	.....	.....

TABLE OF YIELDS, FERTILIZER FOR POTATOES

Pounds of fertilizer applied per acre	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6
	Nitrate of soda 400, superphosphate 800, muriate of potash 250	Sulphate of ammonia 300, superphosphate 800, muriate of potash 250	Superphosphate 800, muriate of potash 250	Nitrate of soda 400, superphosphate 800	Nitrate of soda 400, muriate of potash 250	Check
Yield per acre in tons	7·74	7·83	5·25	4·92	6·80	6·32
Yield per acre in tons	8·28	7·91	8·26	7·58	8·69	6·54
Yield per acre in tons	7·74	8·41	8·00	8·26	8·10	6·68
Yield per acre in tons	9·51	7·74	7·04	6·32	6·64	5·59
Average yield per plot, 1930	8·32	7·97	7·14	6·77	7·56	6·18
Average yield for four years	6·39	6·50	5·82	5·85	5·91	4·98

The above table presents the yields of potatoes obtained in 1930 and the average yields for four years. The largest increase in yield has been obtained from the complete fertilizer treatments (plots 1 and 2), which have given an average increase in the crop of approximately 30 per cent over a period of four years. Nitrate of soda and sulphate of ammonia, as sources of nitrogen appear to be equally effective for this crop.

RESIDUAL EFFECT OF FERTILIZER ON PEAS, SOWN 1930

Pounds of fertilizer per acre	Plot 1		Plot 2		Plot 3		Plot 4		Plot 5		Plot 6	
	Nitrate of soda 400, superphosphate 800, muriate of potash 250		Sulphate of ammonia 300, superphosphate 800, muriate of potash 250		Superphosphate 800, muriate of potash 250		Nitrate of soda 400, superphosphate 800		Nitrate of soda 400, muriate of potash 250		Check, No fertilizer	
	Peas	Straw	Peas	Straw	Peas	Straw	Peas	Straw	Peas	Straw	Peas	Straw
Yield per acre in tons.....	1·14	1·26	1·21	1·35	0·95	1·20	1·04	1·28	0·96	1·24	0·98	1·02
Yield per acre in tons.....	1·25	1·23	1·32	1·79	0·95	1·37	0·76	1·14	1·20	1·70	0·76	1·22
Yield per acre in tons.....	0·79	1·12	1·12	1·46	0·92	1·32	0·74	1·50	1·00	1·08	0·72	1·12
Yield per acre in tons.....	0·60	1·08	0·99	1·33	0·80	1·40	0·80	1·28	0·72	1·44	0·67	1·09
Average yield per acre 1930..	0·95	1·17	1·16	1·48	0·90	1·32	0·83	1·30	0·97	1·36	0·78	1·11

If the seasons are too dry for the best effect of the fertilizers to be shown in the immediate crop, it might be expected that the succeeding crop would be benefited through the residual effect of the fertilizers applied the year previous. The yields of peas, the crop following the potato crop fertilized in 1929, are given in the above table. The data show that the peas crop has benefited to a considerable degree from the fertilizer dressing of the previous year, the increase in yield over the unfertilized plot varying from 1·7 bushels to 12·7 bushels per acre. The complete fertilizer treatment in which sulphate of ammonia was used as the source of nitrogen, has given the largest increase.

SOURCES OF PHOSPHORIC ACID EXPERIMENT, WITH POTATOES AND MANGELS

Pounds of fertilizer applied per acre	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6
	Nitrate of soda 200, cphos 292, muriate of potash 100	Nitrate of soda 200, superphosphate 500, muriate of potash 100	Nitrate of soda 200, basic slag 500, muriate of potash 100	Nitrate of soda 200, mauru rock 200, muriate of potash 100	Nitrate of soda 200, muriate of potash 100	Check
Potatoes yield per acre—tons.....	8·48	8·48	10·66	6·26	9·82	8·36
	7·26	6·81	7·84	9·22	6·64	5·26
	4·59	5·74	7·49	8·00	6·47	9·02
	8·18	6·24	4·00	9·17	8·17	7·13
Average yield per acre.....	7·13	6·82	7·50	8·16	7·77	7·44
Average yield for 4 years...	7·34	7·42	7·44	7·53	7·71	6·98
Mangels yield per acre—tons	27·36	26·72	24·16	17·44	29·60	24·00
	17·78	14·43	22·24	18·24	17·44	14·69
	17·92	15·04	15·04	23·04	19·36	20·96
	17·60	18·72	13·39	19·75	25·60	17·30
Average yield per acre 1930.	20·16	18·73	18·71	19·62	23·00	19·24
Average yield for 3 years...	20·25	20·74	19·76	20·20	21·25	16·00

The above data were obtained from an experiment planned to compare the effectiveness of various sources of phosphoric acid on the market locally. Comparing the yields from plot 5 with those from plots 1, 2, 3 and 4 it will be seen

that there has been no response of the crop to applications of the phosphatic fertilizers. The four year average yield of potatoes on plot 5, which received only nitrogen and potash, was approximately 10 per cent greater than that of the unfertilized plot; in the case of the mangel crop it was about 30 per cent greater.

TIME OF APPLICATION OF FERTILIZERS—POTATOES—TONS PER ACRE

Pounds of fertilizer applied per acre	Plot 1		Plot 2		Plot 3		Plot 4		Plot 5		Plot 6	
	Nitrate of soda 400, superphosphate 800, muriate of potash 250		Sulphate of ammonia 300, superphosphate 800, muriate of potash 250		Superphosphate 800, muriate of potash 250		Nitrate of soda 400, superphosphate 800		Nitrate of soda 400, muriate of potash 250		Check, No fertilizer	
Time of application	6 weeks before planting	At planting	6 weeks before planting	At planting	6 weeks before planting	At planting	6 weeks before planting	At planting	6 weeks before planting	At planting		
1927	6·48	6·80	6·66	5·96	5·56	6·92	6·54	6·50	6·10	7·42	6·08	5·32
1928	5·74	5·62	6 68	6·42	4·52	6·24	5·84	4·78	6·62	3·00	3·84	4·80
1929	5·88	5·72	6·48	5·16	5·08	4·40	6·04	4·54	5·24	4·16	4·88	3·96
1930	8·28	7·74	7·91	8·41	7·04	8·26	6·32	7·58	8·10	6·64	6·68	5·59
Average for 4 years	6·59	6·47	6·93	6·49	5·70	6·45	6·18	5·85	6·51	5·30	5·37	4·92

It will be noticed that usually some advantage is found by applying fertilizers in advance of the planting time. Even this is strikingly reversed in one instance.

SUGAR BEET INVESTIGATION

Three varieties of beets were planted for the purpose of determining the suitability of the district for the production of sugar beets. The seed was sown on May 23, and the roots harvested November 4. The beets were fairly large, well formed and uniform as to type and shape. These qualities ranked them as being satisfactory for factory purposes.

The following analysis was made by the Division of Chemistry, Central Experimental Farm, Ottawa:—

RESULTS OF SUGAR BEET TEST

Variety	Per cent dry matter	Yield per acre		Sugar in juice	Co-efficient of purity	Average weight of one root	
		Green	Dry				
	p.c.	tons	tons	p.c.	p.c.	lb.	oz.
Dieppe	24·22	16·28	3·94	18·74	89·41	2	10
Fredericksen	21·09	20·13	4·24	17·72	87·80	3	2
Rabbethge and Giesecke	23·34	10·78	2·51	17·64	89·62	1	15

The per cent sugar in juice and the co-efficient of purity is good, quite up to the average.

POULTRY

There is no part of Canada, perhaps, where a larger proportion of people are interested in poultry than on Vancouver Island. Hence the attention given to poultry keeping and poultry problems at the Experimental Station, Sidney. White Wyandottes are kept at the Station farm. Of all the breeds the White Leghorn is the most popular in British Columbia, followed by Rhode Island Reds, White Wyandottes and Barred Rocks. Rhode Island Reds increase in popularity with the years. Considerable work of an experimental nature covering incubation, breeding, feeding, housing, egg production and costs, has been carried on.

Owing to an infestation of intestinal parasites, which had given us some concern, the poultry plant was moved to a new location in 1927. One quarter of this area was given to the permanent laying houses. These houses have front and back yards, used in alternate years. The remaining part of the field is run in a three-year rotation, viz., roots, grain, clover hay. The chicks in all cases are reared on the clover sod. The straw arising on the grain area is used in the poultry department and the roots or kale used as green feed. In this way the chicks are run over the area once in three years, and the whole plant made as complete in itself as may be.

For the short time this plan has been in operation the results are remarkable. The birds have more vitality, the eggs are of better size and shape, the hatchability and livability of the chicks have greatly improved and the infestation itself reduced to a minimum. Poultrymen are very rapidly changing their methods of poultry keeping, such change being forced upon them through the infestation of intestinal parasites common to poultry yards throughout the country. The three-year rotation is recommended by the station as one very effective means of overcoming the difficulty.

The registration of poultry, by means of the Laying Contest, was conducted at the farm as heretofore. No major disease gave us trouble during the year. Though the production was not higher than it had been at other times, the Contest occupied the premier place among similar contests in Canada.

EGG-LAYING CONTEST

The seventh annual Egg-laying Contest for Vancouver Island proved to be one of the most successful conducted at this Station. While the average production was somewhat less than that made in the Island Contest in 1925-26, yet it occupied premier place for Canadian Contests for the past year. The management was successful in keeping the various ills and complaints to which poultry are subject, to a minimum. This was possible only by the exercise of the greatest care and attention at all times on the part of those immediately concerned with the handling of the birds.

Year by year the heavy breeds of poultry are claiming larger representation in the Sidney Contest. During the past year fifty per cent of the birds entered belonged to this group. Classification of the thirty-four pens entered, according to breed was as follows: Seventeen White Leghorns, seven Rhode Island Reds, six White Wyandottes, three Barred Plymouth Rocks, and one Light Sussex.

The following table gives the breed average for the 1929-30 Contest:—

BREED AVERAGES

Breed	Eggs per bird	Points per bird
White Leghorns	222·5	235·1
Rhode Island Reds	202·0	216·7
White Wyandottes	201·3	204·4
Barred Plymouth Rocks	201·1	202·1
Light Sussex	151·8	158·4
All Breeds	210·5	220·1

As will be noticed from the foregoing table. the White Leghorns made a remarkable showing both in production and egg size, as indicated by the number of points obtained.

To qualify for registration, a bird must lay at least 200 eggs averaging 24 ounces or more to the dozen. Egg weights were arrived at in the following manner. During the first eight weeks of the contest every egg laid was weighed, and those below twenty ounces to the dozen thrown out. From the ninth week to the end of the Contest one normal egg from each bird per week was weighed and points awarded according to the weight. As mentioned, eggs weighing less

Winning pen in the 1929-30 contest—2,428 eggs, 2,660.3 points. Owned by J. J. Dougan, Cobble Hill, B.C.

than twenty ounces to the dozen were not counted and eggs weighing over twenty-six ounces were considered as twenty-six ounce eggs. The following schedule shows the basis on which points were awarded:—

26 ounce eggs	1·2 points each
25 "	1·1 "
24 "	1·0 "
23 "	0·9 "
22 "	0·8 "
21 "	0·7 "
20 "	0·6 "
Below 20 ounces	not counted

Position of merit is decided by the number of points obtained rather than on the eggs laid. In previous contests credit has been given to eggs up to twenty-seven ounces in weight. The following table gives the final placing of pens in order of merit, contestants, eggs, and points for each pen, number of birds from registered dams, and number of birds registered per pen.

FINAL RESULTS OF THE 1929-1930 EGG-LAYING CONTEST

Contestant	Address	Breed	Eggs	Points	Birds from registered dams	Number of birds registered
1. J. J. Dougan	Cobble Hill, B.C.	W.L.	2,428	2,660·3	10	10
2. N. E. Plaxton	R.R. No. 3, Victoria, B.C.	W.L.	2,323	2,528·8	6	11
3. C. G. Golding	Qualicum Beach, B.C.	W.L.	2,331	2,509·0	5	7
4. R. MacKenzie	3159 Jackson St., Victoria	W.L.	2,344	2,484·3	6	7
5. J. Smyth	Box 323, Nanaimo, B.C.	W.L.	2,210	2,473·0	2	8
6. Wace & Reason	Cobble Hill, B.C.	W.L.	2,257	2,467·3	.....	7
7. Experimental Station	Saanichton, B.C.	W.W.	2,299	2,430·6	3	7
8. Baiss & O'Farrell	Cobble Hill, B.C.	W.L.	2,278	2,405·6	7	9
9. L. Barclay	R.R. No. 1, Victoria, B.C.	W.L.	2,090	2,384·2	3	9
10. Westwood Poultry Farm	Duncan, B.C.	W.L.	2,309	2,356·9	11	7
11. O. G. Hunt	Victoria, R.R. 4, B.C.	R.I.R.	1,994	2,300·2	.....	4
12. Cooke & Mercer	Box 257, Ladysmith, B.C.	R.I.R.	2,027	2,282·2	6	5
13. C. G. Golding	Qualicum Beach, B.C.	B.R.	2,256	2,267·2	9	4
14. R. E. Ault	Sandwick, B.C.	W.L.	2,236	2,260·8	7	4
15. T. H. Hayward	Langford, B.C.	W.L.	2,210	2,239·7	3	6
16. J. Burgess	Qualicum Beach, B.C.	R.I.R.	2,079	2,228·3	4	5
17. R. W. Tull	Duncan, B.C.	W.L.	2,168	2,219·5	4	5
18. H. G. Scott	Port Washington, B.C.	R.I.R.	2,064	2,210·4	1	5
19. Miss E. V. Gwynne	Sidney, B.C.	W.L.	2,068	2,202·9	4	3
20. W. Bradley	Langford, B.C.	W.L.	2,159	2,185·7	4	5
21. Corbett & Tolputt	Pender Island, B.C.	W.W.	2,146	2,185·6	1	7
22. A. Adams	Lake Hill P.O., B.C.	W.L.	2,299	2,167·4	5	3
23. A. Georgeson	Albert Head, B.C.	W.L.	2,173	2,141·1	7	5
24. R. B. Jeffrey	Langford, B.C.	W.W.	2,082	2,109·3	1	3
25. H. D. Reid	306 Georgo Rd., Victoria, B.C.	R.I.R.	2,025	2,091·1	.....	4
26. Dashwood Poultry Ranch	Parksville, B.C. (R.R. 1)	W.L.	1,922	2,079·5	11	3
27. C. L. Cropper	Ganges, B.C.	R.I.R.	2,049	2,041·4	x	.....
28. Mrs. A. G. Jackson	Royal Oak, B.C.	R.I.R.	1,902	2,008·3	.....	4
29. Chaplin & Oswald	Ganges, B.C.	B.R.	2,077	1,985·0	5	4
30. A. R. P. Price	Ganges, B.C.	W.W.	1,987	1,930·8	.....	2
31. W. A. B. Paul	Comox, B.C.	W.W.	1,772	1,838·2	2	5
32. Experimental Farm	Agassiz, B.C.	B.R.	1,702	1,812·8	2	2
33. Experimental Station	Summerland, B.C.	W.W.	1,792	1,763·7	.....	2
34. R. V. Robinson	R.R. No. 1, Royal Oak, B.C.	L.S.	1,518	1,584·6	.....	.....
			71,580	74,849·7	128	172

x Registration not applied for (four birds qualified).

Ten birds constitute a pen, with two spares banded as such. These spares are used to replace casualties as they may occur in the regular pen from time to time. Such spare birds are trapnested and their production recorded in the regular way and are eligible for registration whether used in the pen proper or not.

Number of first generation birds registering	92
Number of birds from registered hens registering	80
Total registered	172
Percentage first generation birds registered	39·0 per cent
Percentage of birds, from registered hens, registered	61·0 per cent

It will be noted from a study of the foregoing data that the advantage in registration lay with those birds coming from a line of registered stock, and it would seem that this advantage was directly proportional to the length of the line of improvement as indicated by the number of generations of registered birds in that line.

Highest Number of Registered Birds per Pen

	Breed	Total
J. J. Dougan, Cobble Hill, B.C.	W.L.	10
N. E. Plaxton, R.R. No. 3, Victoria, B.C.	W.L.	9
J. Smyth, Box 323, Nanaimo, B.C.	W.L.	8
T. Barclay, R.R. No. 1, Victoria, B.C.	W.L.	8

In making the above awards the spare birds in a pen were not considered. In the case of a winning pen the ten original birds completed the year and registered.

Highest Birds for Eggs

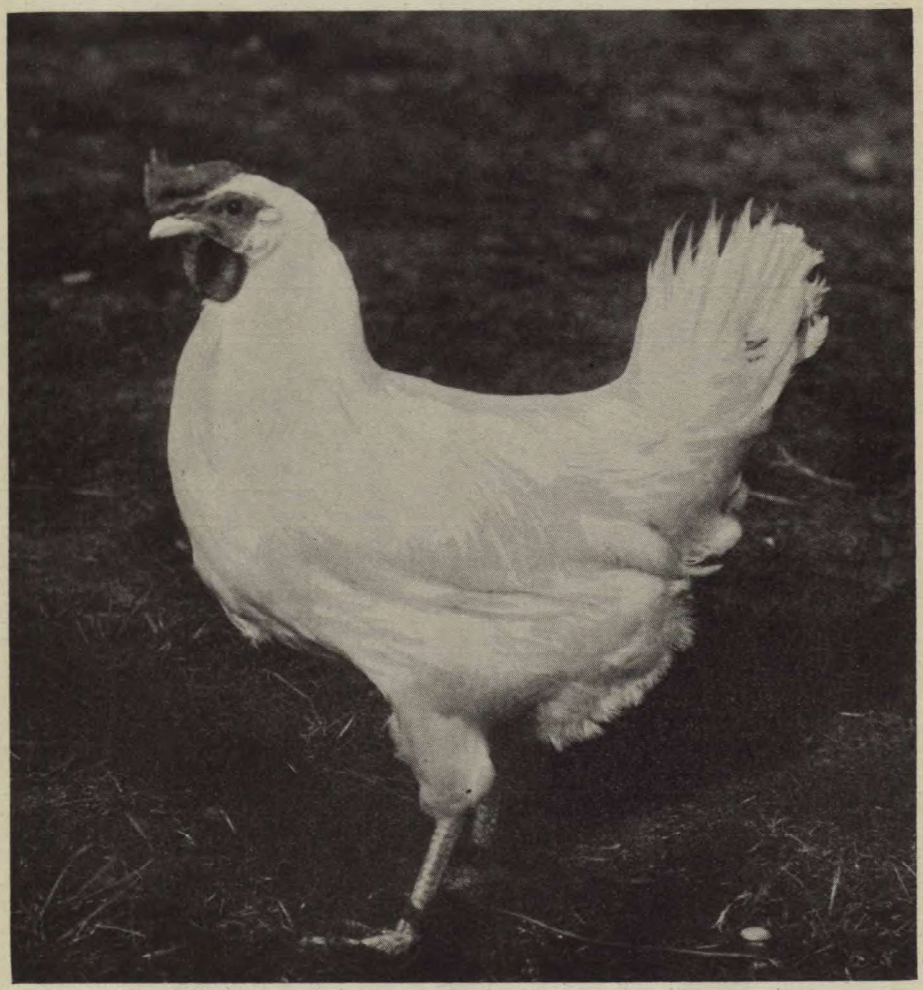
Bird 1, Pen 25, owned by C. G. Golding	306 eggs
Bird 7, Pen 23, owned by J. J. Dougan	293 "
Bird 5, Pen 25, owned by C. J. Golding	293 "

Highest Birds for Points

Bird 1, Pen 25, owned by C. G. Golding	351·1 points
Bird 7, Pen 23, owned by J. J. Dougan	342·3 "
Bird 10, Pen 25, owned by C. G. Golding	313·9 "

BREEDING

In all lines of breeding work the danger is to concentrate on one thing only. If emphasis is so placed, one may find that other things are not what they should be. For instance in breeding for production we may find that egg size



Leading bird in the contest—306 eggs, 351.1 points. Owned by C. G. Golding, Qualicum Beach, B.C.

is down, birds off type, off colour, etc. All these things must be considered, but with all thy getting, get vitality. Without vitality all else must fail. Strong, vigorous birds must first be obtained, and second the vigor must be maintained. Having this, one may reach out, and add character by character to his foundation stock.

For a number of years, an effort has been made to determine whether the factor "egg size" was carried by the male, the female, or both. Prior to 1927 it was very difficult to draw conclusions, as egg size was up at one time and down at another without apparent reason. In the year 1927 the male used had three generations of large sized eggs behind him. Results were more consistent with indications pointing to the male as the carrier of the unit character "egg size." The year of 1928 Sire G175 was used. G175 had four generations behind him of good egg size. The production of his daughters was full of interest. See Report of the Superintendent 1929. The year of 1929 Sire M1 was selected to be used in this experiment. M1 was a large boned bird with every indication of vitality, but M1 had no known pedigree. He was mated to hens that had records between 179 and 239 eggs, running in weight from 22 ounces per dozen to 27 ounces per dozen. The Station had at the time three hens that had registered in the laying contest, with several years of trapnested records behind them. A male H3 was selected arising from a line with 10 years of trapnested records showing production and egg size. He was mated to the three hens H214, D348 and E103. Daughters from these two matings were trapnested for comparison. The results of these two matings follow. It will be noted that it is not always the best layer that makes the best breeder.

BREEDING RESULTS

Male H3 bred to: Dam			Daughters		
Dam No.	Production	Egg size	Leg band No.	Production	Egg size
H214	214	24	N1	265	24
			89	199	24
			113	249	27
			276	250	25
			G97	189	25
			J463	221	24
	Average			229	24·8
D348	213	25	N55	203	25
			105	252	24
			272	208	23
			G99	254	26
	Average			229	24·5
E103	208	24	N204	195	24
			273	201	24
			J461	207	26
			G417	238	24
	Average			210	24·5

The results of this mating are exceptionally good. Few matings at this station have produced so many high producing birds of good egg size as this one. The daughters were, on the average, distinctly higher in egg production than their dams, outstanding so far as egg size is concerned. It will be noted that the three hens that registered in the contests did not have high records but have been bred from hens that have for several generations carried good records and good egg size. G97 of the five daughters entered was the only one to fail to qualify in the contest. No doubt late hatching accounted for this.

G99 laid 254 eggs that averaged 26 ounces per dozen in the V.I.L.C.
G417 laid 238 eggs that averaged 24 ounces per dozen in the V.I.L.C.
J461 laid 207 eggs that averaged 26 ounces per dozen in the B.C.L.C.
J463 laid 221 eggs that averaged 24 ounces per dozen in the B.C.L.C.

This mating produced 11 hens that laid two hundred or more eggs of good size in their first year.

H214 produced the highest laying daughters, 265 eggs averaging 24 ounces per dozen.

BREEDING RESULTS

Male M1 bred to: Dam			Daughters		
Dam No.	Production	Egg size	Leg band No.	Production	Egg size
		per doz.			
E104	179	25 oz.	16	197	26 oz.
			18	228	24
			107	182	22
			176	224	24
	Average			208	24
E106	187	22	N124	297	24
			161	197	22
	Average			247	23
E109	214	23	N58	215	24
			175	194	22
			210	215	24
	Average			208	23
H97	182	22	N71	235	24
			115	144	25
			120	215	24
			216	200	21
			280	190	23
	Average			197	23
K98	214	27	N82	182	25
			117	201	24
			166	224	25
			170	228	25
	Average			209	24·7
L414	191	25	N214	240	24
			218	185	24
			219	195	23
			G95	214	23
	Average			208	23·5
L463	232	27	N47	245	22
			Blue band	229	25
			102	253	23
			260	238	24
			284	192	24
			G96	293	23
			G418	227	25
	Average			239	23·9
L501	239	24	N225	205	26
			261	199	26
	Average			202	26
L542	216	27	N23	184	25
			25	223	26
	Average			203	25·5

NOTE.—M1 is the Male of unknown pedigree referred to.

From 9 females under test E104, H97, K98, L414 and L463, have four or more daughters which completed a year's trapnest record. When a hen has less than four daughters it is not safe to estimate her value as a breeder.

E104 produced four daughters that averaged 208 eggs averaging 24 ounces.
K98 produced four daughters that averaged 209 eggs averaging 24·7 ounces.
H97 produced five daughters that averaged 197 eggs averaging 23 ounces.
L414 produced four daughters that averaged 208 eggs averaging 23·5 ounces.
L463 produced seven daughters that averaged 239 eggs averaging 23·5 ounces.
E106 produced the best laying daughter with 297 eggs averaging 24 ounces per dozen.
L463 produced a daughter laying 293, averaging 23 ounces in the V.I.L.C. but the egg size was disappointing.

L463 produced the largest number of daughters.

PROGENY TEST AS TO TRUENESS OF MALES *re* ROSE COMBS

All breeders of Wyandottes have been perplexed over the number of single combs occurring in Wyandotte chicks, even when the breeding pen had been carefully selected for generations. As rose comb is dominant to single comb, it would seem that a male bird, entirely true as to rose comb, should transmit the rose comb to the progeny, regardless as to whether the dams were true or not. To test the reliability of the theory several Wyandotte cockerels were mated to Rhode Island Red single-comb pullets before the regular hatching season. The resulting chicks were very carefully examined. Single combs were found arising from some of these matings. It is interesting to note that in the case of two cockerels, dominant as to rose comb, no single combs were found among the Wyandotte chicks, numbering hundreds, throughout the season. It would seem, however, that a very large percentage of Wyandotte cockerels are not "true" in so far as rose comb is concerned.

PROGENY TEST AS TO TRUENESS OF MALES

RE ROSE COMBS

Band No.	Eggs set	Fertile	Dead germs	Hatched	Single comb	Rose
N14	41	23	1	17	0	17
N64	33	18	3	14	6	8
N327	27	23	2	14	0	14
N368	43	28	1	21	0	21
N251	38	21	.....	19	2	17

N14 was the son of a male bird brought in for the introduction of new blood. Although a straight outcross the comb was dominant, while N64 was outstandingly poor from the same standpoint. Thus it will be seen that 50 per cent of these Wyandotte males were not true so far as the dominant character rose comb is concerned.

BEST DATE FOR INCUBATION

The spring of 1930 was cold, with fertility and hatchability poor, resulting in inferior chicks as compared with previous years. From reports received from the poultrymen of Vancouver Island this was not a local condition, as complaints were general and coming over a wide area.

The number of eggs taken to produce a chick influences the cost materially. The factors that may influence the hatch are many, including the age of the breeding stock, the type of incubator and the room used for incubation. With so many factors influencing the results, the causes of failure are sometimes difficult to locate. The less variation in temperature within the incubator room the easier the machine is to operate. The Buckeye (No. 41) Electric Mammoth

Incubator was again used this year, with satisfactory results. All chicks were pedigreed, in a special pedigree tray, that was made to fit the machine in question.

The incubation of chicks on Vancouver Island usually begins in February and is complete by the end of April. The date fixed as the best time to incubate in Eastern Canada does not apply on the Pacific Coast. In an effort to determine the best date of incubation to secure maximum hatchability and livability this project was begun in 1922. In a general way it has been noticed over the whole period that late-hatched chicks lack in vitality and mature slowly, as compared with those hatched in earlier season. The following table sets forth results obtained through the 1930 season:—

RESULTS—DATE OF INCUBATION

Incubator	Total eggs set	Number fertile	Per cent fertile	Number of chicks	Per cent total eggs hatched	Per cent fertile eggs hatched	Number of chicks alive when wing banded	Per cent chicks hatched alive when wing banded	Total eggs required for 1 chick hatched	Total fertile eggs for 1 chick hatched	Total eggs required for 1 chick when wing banded
March.....	860	440	51·1	308	35·8	70·0	297	96·4	2·7	1·4	2·8
April.....	800	558	69·7	427	53·3	76·5	357	83·6	1·8	1·3	2·2
May.....	200	120	60·0	51	25·5	42·5	37	72·5	3·9	2·3	5·4

Chicks incubated so that the hatch is complete by the middle of April usually give satisfactory results from all standpoints.

HATCHING SUMMARY FOR BRANCH FARM, SIDNEY, B.C.

Total eggs set	Number fertile	Per cent fertile	Number of chicks	Per cent total eggs hatched	Per cent fertile eggs hatched	Number of chicks alive when wing banded	Per cent chicks hatched alive when wing banded	Total eggs required for 1 chick hatched	Total fertile eggs for 1 chick hatched	Total eggs required for one chick when wing banded
1860.....	1,118	60·1	786	42·2	70·3	691	87·9	2·3	1·4	2·6

As has been pointed out the Buckeye was the only incubator used, hence comparison of results arising from different methods is not possible.

COST OF EGG PRODUCTION

Detailed statements of costs have been published for many years, determined month by month. The following table gives a summary of this work for nine years:—

SUMMARY OF COST OF EGG PRODUCTION INVESTIGATION

Item	1925	1927	1929	Average for nine years
Average production per bird.....	199·1	196·8	210·2	192·14
Pounds of grain per 1 dozen eggs.....	5·16	5·3	5·1	5·73
Cost of feed per dozen eggs.....cts.	18·8	14·2	13·4	.....
Month of highest cost.....	Dec.	July	Nov.	.....
Month of lowest cost.....	April	April	April	.....
Month of highest production.....	April	April	April	.....
Month of lowest production.....	Jan.	Jan.	Nov.	.....

Over a period of years some interesting observations have been made, as follows:—Going back to the year 1924-25 the pounds of feed to produce one dozen eggs was 5·16 as seen in the preceding table, costing 18·8 cents. In 1926-27 it took 5·3 pounds at a cost of 14·2. 1929-30 it took 5·1, but the cost was only 13·4. The year 1924-25 the birds averaged 199·1 eggs. 1926-27 196·8, while last year (1929-30) they averaged 210·2 for 11 months. Thus it will be seen that the amount of feed required varies little, but the cost greatly reduced, because of the low price of feed, and the high production per bird. N116 produced 224 eggs averaging 24 ounces per dozen; N119, 310 eggs averaging 23 ounces per dozen and N124, 305 eggs, averaging 24 ounces per dozen. It would seem that the cost of production per dozen may be considerably cut during the present year.

RELATION OF BODY WEIGHT TO EGG PRODUCTION

For many years fineness in White Wyandotte was looked for. For six years during which time the birds have been observed from this viewpoint, as body weight goes up production goes up. This year 1930 is no exception.

RELATION OF BODY WEIGHT TO EGG PRODUCTION

White Wyandottes	Body weight, 4½ to 5 pounds	Body weight, 5 to 5½ pounds	Body weight, 5½ to 6 pounds	Body weight, 6 pounds and up
Production—eggs	144	180	254	203
"	.....	165	181	248
"	.....	159	141	273
"	.....	220	235	243
"	.....	143	254	200
"	.....	167	228	209
"	.....	228	238	243
"	.....	190	185	184
"	.....	209	151	268
"	.....	223	195	218
"	.....	.....	187	214
"	.....	.....	232	293
"	.....	.....	.....	189
"	.....	.....	.....	219
"	.....	.....	.....	242
"	.....	.....	.....	238
"	.....	.....	.....	181
"	.....	.....	.....	219
"	.....	.....	.....	225
"	.....	.....	.....	189
"	.....	.....	.....	264
"	.....	.....	.....	97
"	.....	.....	.....	224
"	.....	.....	.....	195
"	.....	.....	.....	229
"	.....	.....	.....	215
"	.....	.....	.....	212
"	.....	.....	.....	246
"	.....	.....	.....	227
"	.....	.....	.....	189
"	.....	.....	.....	168
"	.....	.....	.....	196
"	.....	.....	.....	213
Total	144	1,895	2,481	7,173
Average production	144	189·5	206·7	217·3

There was only one bird that weighed less than 5·0 pounds and this bird laid only 144 eggs.

Ten birds weighing between 5·0 and 5·5 pounds averaged 189·5 eggs.
Twelve birds weighing between 5·5 and 6·0 pounds averaged 206·7 eggs.
Thirty-three birds weighing between 6·0 and up averaged 217·3 eggs.

The above figures are taken from contest report, representing several types of breeding.

EFFECT OF GREEN FEED ON EGG SIZE

The factor or factors influencing egg size are not easily arrived at. Breeding according to our findings to date is the main factor but does not account for variation in size of egg, at different periods. Beef scrap, fish meal, green feed, milk and many other products have been given the credit. For a number of years we have tried to determine the effect of green feed, cod liver oil, and both green feed and cod liver oil on egg size. Sidney Ration was used plus green feed, cod liver oil, and both cod liver oil and green feed. Results follow:—

EFFECT OF GREEN FEED ON EGG SIZE

Date	Average number of eggs			Average weight of eggs		
	Green feed	Cod liver oil	Cod liver oil and green feed	Green feed	Cod liver oil	Cod liver oil and green feed
Nov.	11·8	8·7	15·0	20·0	20·0	20·0
Dec.	18·2	21·2	21·0	.....	.....	.....
Jan.	22·1	22·5	23·1	22·9	22·0	23·0
Feb.	19·2	20·0	20·8	.....	.....	.....
Mar.	21·8	21·7	24·5	.....	.....	.....
April	20·5	20·6	23·6	23·5	23·3	24·0
May	18·7	19·0	21·7	.....	.....	.....
June	19·7	16·1	22·2	.....	.....	.....
July	17·0	17·1	23·3	23·7	23·2	25·1
Aug.	16·9	16·9	20·1	.....	.....	.....
Sept.	17·0	15·9	18·5	24·6	24·3	26·5
Average	202·9	199·7	233·8			

To get the average egg weight several eggs were weighed from each hen in January, April, July, and September. All pens started with 40 birds.

Green feed pen finished with	38 birds
Cod liver oil finished with	35 "
Cod liver oil and green feed with	40 "

It will be noticed that the cod liver oil and green feed combination gave the best egg size.

HOME MIXED GRAIN AND MASH VS. COMMERCIAL GRAIN AND MASH

This project has been continued following lead as reported last year. Last year we said:—

Commercial feeds are on the market in great number. Practically all feed merchants have their own. As to the relative merits of these, or the superiority of any one over the home mixed, is a matter of constant debate among poultrymen. For six years these commercial feeds have been used against the home mixed at the Sidney Experimental Station. Wyandottes of the same breeding have been used, treatment in all cases being the same except in the matter of feed. During the time of these tests commercial feeds as sold by Brackman & Ker, Vancouver Milling Co., Vernon and Buckerfield, Scott & Peden and Sylvester Feed Co., have been tried. During 1929 a special feed offered by Vernon & Buckerfield known as Egg Maker, has been fed. As the reports were made on the year's work for the past six years, we have, in a general way, said that the Sidney ration (home mixed) cost more than the commercial feeds but that the cost of one dozen eggs shows to the advantage of the Sidney feed. In favour of the commercial feed it should be said that at the beginning of the project there is usually a falling-off in egg production, due apparently to the change in feed. Thus the cost of the commercial feed appeared unduly high. Results as obtained with "Egg Maker," product of Vernon & Buckerfield, for the year 1929 follows:—

HOME MIXED VS. COMMERCIAL FEED

Month	Number of eggs laid		Pounds of feed used, scratch		Pounds of feed used, mash		Feed cost		Feed cost per dozen eggs	
	Home mixed	Commercial	Home mixed	Commercial	Home mixed	Commercial	Home mixed	Commercial	Home mixed	Commercial
	eggs	eggs	lb.	lb.	lb.	lb.	cts.	cts.	cts.	cts.
December	8·0	10·8	4·5	3·5	5·0	3·0	27·8	20·2	41·7	22·4
January	8·8	6·8	3·0	4·0	3·0	3·0	17·6	20·5	24·0	40·3
February	11·2	7·3	3·0	3·0	3·5	3·0	19·4	18·7	20·8	30·7
March	20·0	22·7	2·7	2·0	3·3	2·5	17·3	13·7	10·3	7·2
April	12·6	22·5	2·8	2·5	2·8	2·5	16·9	16·0	16·1	8·5
May	15·8	16·3	3·3	3·5	3·3	3·0	18·7	20·1	14·2	14·8
June	16·0	14·8	3·3	2·5	3·3	2·5	19·7	15·2	14·7	12·3
July	16·2	16·2	3·3	3·0	3·4	3·0	20·0	18·7	14·8	13·8
August	11·2	15·9	3·4	3·0	3·3	3·0	19·6	18·7	21·0	14·1
September	13·6	13·4	4·4	3·5	4·0	3·5	24·6	21·0	21·7	18·8
Totals	133·4	146·7	33·7	30·5	34·9	29·0	201·6	182·8	19·9	18·2

Note:—Cost of feed includes, besides mash and scratch feed, shell and green feed which are not shown.

It will be noticed that though 10 birds constitute the pen in question, "production," "pounds of feed," "feed cost per dozen eggs," etc., are based on average per bird. We wish also to point out that the commercial feed in this case has shown itself superior to the home mixed in every way. The work has been continued with the same feeds for another year.

During the year 1930, the pen receiving Sidney Ration (home mixed) averaged 208·4 eggs per bird while the Vernon & Buckerfield (Egg Maker) fed pen averaged 214·7 eggs per bird. Actual feed cost per 1 dozen eggs from Sidney Ration—13·3 cents. Actual feed cost per 1 dozen eggs from Vernon & Buckerfield—13·4 cents.

Cost of Sidney mash	2·62 per cwt.
" Vernon & Buckerfield mash	3·15 "
" Sidney grain	2·60 "
" Vernon & Buckerfield grain	2·50 "

Eggs from both pens were weighed and prices averaged according to grade of eggs. As the average weight of eggs from the two pens did not vary greatly from month to month, both pens received the same price per dozen eggs, and have been so credited. It will be noted that though the Sidney pen averaged fewer eggs per bird by 6·3, the cost of production per dozen on the Sidney ration was slightly less than that produced by the more expensive feed.

OYSTER SHELL VS. OTHER FORMS OF LIME AND GRIT IN POULTRY FEEDING

Clam shell grit is in common use on Vancouver Island, yet many poultrymen prefer oyster shell. A few have been asking "why not limestone grit?" Analysis would show all three are very similar in composition, and composed almost entirely of calcium carbonate (CA Co_3). One of the three forms of lime is usually obtained with ease in nearly all parts of the country, while the other two may not be. To determine the relative value of the three the project was undertaken in December, 1928.

OYSTER SHELL VS. OTHER FORMS OF LIME AND GRIT SUBSTITUTES

Month	Strength of shell		
	Oyster shell	Clam shell	Limestone grit
	lb.	lb.	lb.
November	10·00	10·25	10·00
December	11·25	10·00	9·25
January	10·50	11·25	10·25
February	11·50	9·00	9·00
March	10·25	9·75	8·50
April	12·00	10·00	8·75
May	12·25	10·25	7·25
June	11·50	9·75	9·00
July	9·75	9·00	8·25
August	10·25	8·50	7·00
September	10·00	9·25	7·00
Average	10·84	9·72	8·54

The strength of shell was determined by special apparatus measuring the pull in pounds to break the shell. Oyster shell based on two years' work has given us best results in production and strength of shell.

BEST KINDS OF LITTER

Straw as a litter for poultry is in most common use, yet straw requires frequent change and is expensive in the West. Though no one should think of other types of litter where straw is abundant, peat may come into common use in British Columbia. Results for the past year follow:—

BEST KINDS OF LITTER

Items		Straw	Peat moss
Duration of test	mos.	11	11
Number of birds in pen		40	40
Value of feed used, per bird	$	2 26	2 20
Eggs laid, per bird	eggs	207	208·5
Value of eggs laid per bird	$	5 14	5 15
Feed cost per dozen eggs	cts.	13·1	12·6
Amount of litter used	bales	16·5	6
Total cost of litter	$	9 08	7 20
Cost of litter per bird	cts.	22·7	18·0
Labour charges in changing litter	$	3 85	0 70

Peat cost $1.20 per bale, while the straw cost 55 cents. The peat moss pen finished with the entire 40 birds alive, the straw with 39. Thus the peat has made a better showing than last year. Though the production of the two pens has been quite nearly the same, other factors have been favourable to the peat.

VITAMINE FEEDS FOR WINTER EGG PRODUCTION

Poultrymen know the value of green feed in the production of eggs in winter, yet green feed is not always easy to obtain. In this project we have been attempting, not only to show the value of green feed but the relative value of other vitamine food, such as cod liver oil and yeast. During the past year green feed and cod liver oil used singly and the two in combination have been on trial. For detailed report of this work, see Annual Report for 1929.

A few notes added to the detailed report, covering 1930, may be of interest.

1. The cod liver oil and green feed pen averaged 233·8 eggs per bird; green feed alone 202·9, and cod liver oil alone 199·7 eggs per bird.

2. Cod liver oil is fed at the rate of 2 per cent on the assumption that a bird eats 2 ounces mash per day.

3. Cod liver oil and green feed have again demonstrated their worth.

DISEASE

We have continued our work, as before reported, *re* control of intestinal parasites in poultry. The use of pills, tablets, etc., or any other form of drugs in this connection has little to recommend it, especially if the birds cannot be taken to new land after treatment. This must be evident to all persons who have studied the life history of the parasites.

More and more attention is being given to the breeding stock with the years. Young chicks should be purchased from blood tested dams only. Without this there can be no guarantee that the chicks are not diseased. The disease may be cleaned up entirely by seeing to it that there are no carriers of Bacillus Pullorum in the flock.

BEES

British Columbia is often spoken of as a land abounding with honey and honey plants. That may be true of certain sections, but not so of the southern end of Vancouver Island. Flowers are everywhere and continue over a long period, but real honey plants are not in sufficient quantity to carry any great number of colonies of bees, hence bees are kept at this Station more for the sake of demonstration than as a commercial enterprise. Bees, from the commercial standpoint, must be moved out to the fireweed districts if they are to make a surplus, for the Saanich Peninsula will just about maintain the bees; but not if large numbers of colonies are kept. The winters are mild and the springs changeable, bringing out a considerable amount of spring dwindling. A few hours of bright sunshine may bring out the bees at any month in the year, but a passing cloud will so chill them that they will not return.

The colonies at the Experimental Station, Sidney, are all run for extracted honey. All colonies are wintered outside in Kootenay cases. As soon as weather conditions permit in the Spring, colonies are examined, and strength, quantity of stores and condition of brood nest are noted. Thirty-three per cent sugar syrup is fed where needed, and weak colonies are strengthened by frames of brood and bees from stronger colonies. All colonies are examined about every nine days, watch being kept for queen cells, and every facility given to induce the queen to lay.

The dearth of honey plants on the Saanich Peninsula renders spring feeding imperative until the maple trees come into bloom, and from that time onward bees are able to maintain themselves until the time of white clover, when whatever surplus there may be is gathered. If extracting is done in July and bees are deprived of their stores, close observation must be maintained, as from this time onward they will not be able to do much more than gather enough to maintain themselves. Feeding for winter is commenced about September, as October is often very damp and prevents the bees maturing the syrup fed to them. Unmatured stores will result in mildewed combs and loss of bees from dysentery during the winter. In 1926 foul brood was discovered in the apiary for the first time. Every effort was made to clean up the difficulty, yet in 1927 a few cells containing diseased brood were found in one hive. Since that time foul brood has been discovered in several places on the Island, both American and European. Though not so common as on the mainland