DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

REPORT OF THE

DIVISION OF FORAGE PLANTS

G. P. McROSTIE, Ph.D., DOMINION AGROSTOLOGIST

FOR THE YEAR 1926

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DIVISION OF FORAGE PLANTS

REPORT OF THE DOMINION AGROSTOLOGIST, G. P. McROSTIE, Ph.D.

The year 1926 did not exhibit any very outstanding deviations from average climatic conditions. The spring was somewhat backward with the result that crops such as field roots were delayed in time of planting almost two weeks. Other crops, however, went in approximately at the average time of planting.

A number of improvements were made in the drying apparatus developed two years ago. Very gratifying results have been obtained with the machine as now in operation and all dry matter samples from the Dominion Experimental Farms in Ontario, Quebec and the Maritime Provinces were dried with it. In addition to samples for obtaining yield records, several thousand samples of material were dried in connection with the studies of methods of conducting experimental work. Altogether around forty thousand dry matter determinations were made.

The investigations begun in the spring of 1926 concerning conditions on the range lands of southern Saskatchewan and southern Alberta have been continued and extended as will be indicated in the section of the report devoted to that work.

The investigations reported as being carried on at the Central Experimental Farm are for the most part under the personal direction of Mr. R. I. Hamilton. The investigations reported from the Harrow Experimental Station are in charge of Mr. F. Dimmock, while the range investigations reported are under the supervision of Mr. S. E. Clarke.

REPORT OF WORK AT HARROW, ONT.

The work conducted by the Forage Crop Division at the Experimental Station, Harrow. Ont., included the following crops: corn, soybeans and broom corn.

FIELD CORN

Variety Test

The exceptionally heavy infestation of the European corn borer caused such great damage to the corn crop that the variety test had to be abandoned. The yields of fodder and ears from such heavily damaged plots would have been unreliable and therefore misleading.

As this test has, however, been conducted during the past three years some idea of the relative merits of the different varieties can be obtained by a study of table 1, which summarizes the results obtained for the three-year period (1923-25).

TABLE 1—FIELD CORN—VARIETY TEST AT HARROW: AVERAGE YIELDS PER ACRE AND MATURITY FOR THREE-YEAR PERIOD (1923–1925)

Variety	Source	Days to maturity	Moisture—Free weight per acre			
			Fodder		Shelled corn	
			Actual yield	Relative yield	Actual yield	Relative yield
			tons lb.		bush.	
Lancaster	G. Hoffman	142	3 1,000	100·0	54·4	97·8
U. S. Selection No. 119	U. S. Dept. of Agriculture	.....	3 957	99·4	38·4	69·1
Burr Leaming	G. S. Carter	143	3 864	98·1	55·6	100·0
Leaming	John Parks	*130	3 418	91·7	53·8	96·8
Bailey	J. O. Duke, Ruthven, Ontario.	*130	3 46	86·4	53·7	96·6
Wisconsin No. 7	John Parks	*132	2 1,885	84·1	53·7	96·6
Yellow Dent	A. J. Wimple	*130	2 1,787	82·7	51·3	92·3
White Cap Yellow Dent	J. O. Duke, Ruthven, Ontario.	127	2 1,749	82·1	50·2	90·3
Hybrid	A. J. Wimple	*126	2 1,602	80·0	44·3	79·7
Early Kent	M. Backus, Chatham, Ontario	*123	2 1,595	79·9	41·1	73·9
Disco 90 Day White Dent	Dakota Impr. Seed Company.	*130	2 1,535	79·1	51·8	93·2
Wisconsin No. 7	Experimental Station, Harrow	*131	2 1,445	77·8	51·5	92·6
White Cap Yellow Dent	Steele Briggs	127	2 1,434	77·6	48·8	87·8
Longfellow	Dakota Impr. Seed Company.	122	2 1,341	76·3	42·8	77·0
Golden Glow	J. O. Duke	126	2 1,279	75·4	46·9	84·3
Compton's Early	J. O. Duke	123	2 1,236	74·8	42·1	75·7
Golden Glow	Univ. of Wisconsin	125	2 1,104	72·9	45·2	81·3
Silver King	A. E. Popp	129	2 1,055	72·2	49·0	88·1
North Dakota	Steele Briggs	121	2 810	68·7	45·7	82·2
King Phillip	Wm. Rennie Seed Co	*121	2 762	68·0	40·1	72·1
Cold Resistant	Univ. of Wisconsin	126	2 728	67·5	45·1	81·1
Disco N. W. Dent	Dakota Impr. Seed Company.	117	2 525	64·6	41·5	74·6
Disco Pride Yellow Dent	" "	†119	1 1,487	49·8	32·1	57·7
Twitchell's Pride	Experimental Farm, Fredericton.	110	1 1,124	44·6	30·9	55·6
Amber Flint	A. J. Wimple	*111	1 475	35·4	24·9	44·8

* Average for two years 1924–25.
† Average for two years 1923 and 1925.

The following general conclusions are drawn from this table.

1. U.S. Selection No. 119 (Boone County White) is too late in maturing and is therefore unsuitable for any section of Canada either for grain or fodder.

2. Lancaster and Burr Leaming are the highest yielding varieties in both fodder and grain but can only be ripened in the most southern part of southwestern Ontario and even there they will only reach maturity in a good season. Both varieties would be excellent for silage purposes in that district.

3. There is little to choose between the higher yielding strains of the following varieties: Leaming, Bailey, Wisconsin No. 7 and White Cap Yellow Dent, either from the standpoint of maturity, or yield of either fodder or grain. The last named variety is probably slightly earlier in maturing and not quite as high yielding as the first three varieties. Choice of a variety from among them is, therefore, one of personal preference largely and not one based upon maturity and yield.

A further study of table 1 shows that there is a considerable difference in the yields obtained from different strains of some of the above mentioned varieties and also some differences in maturity. These facts should be borne in mind when purchasing seed.

4. Golden Glow is somewhat earlier but not as heavy yielding in either fodder or grain as the varieties mentioned in (3).

5. Early Kent, Longfellow and Comptons Early yielded higher in fodder than North Dakota, but the latter exceeded the others in yield of grain. All four are flint varieties maturing in approximately the same length of time.

All of these varieties are lighter yielding in both fodder and grain than the dent varieties already mentioned, but they are from 7 to 10 days earlier and are therefore suitable for growing in districts where the season is too short for the late dent varieties.

6. Northwestern Dent is an early dent variety somewhat lighter in yield than the flints mentioned above but it is also 4 to 6 days earlier in maturity.

7. Twitchells Pride and Amber Flint (both flint varieties) are the earliest maturing and the lightest yielding varieties in the test. Twitchells Pride is considerably heavier yielding than Amber Flint and is suitable for short-seasoned districts where early maturity is essential.

First-Generation Hybrids Test

A number of first-generation hybrids resulting from crosses between varieties and also between varietal strains were grown again this year. Several of these were obtained through the generosity of Mr. F. D. Richey, Agronomist, of Washington, D.C.

Unfortunately the destruction resulting from the corn borer infestation was again so severe that although the grain yields were taken they are undoubtedly unreliable and provide no basis for comparing the relative merits of the various hybrids.

Observations recorded up to the time of tasseling showed marked earliness and vigour in some of the crosses and it is unfortunate that the time of maturity and yields could not be accurately obtained.

The results obtained in 1925 and the observations of the present year would indicate that there is undoubtedly a place for first-generation hybrids in Canada, especially in those districts where high yield coupled with early maturity is a most important consideration.

Methods of Testing Varieties

This test also had to be abandoned on account of the heavy damage due to the corn borer.

Six varieties representing a fairly wide range of type and length of time to maturity were planted in three-row blocks. The centre row was considered to give the normal yield of the variety while the two outside rows were expected to show the effect of competition with the variety planted on each side.

The results obtained during the three-year period (1923-25) show that competition does exist between the varieties of different type and time of maturity when grown in rows side by side. The yields of the earlier varieties are affected adversely when grown beside larger and later varieties, while the larger varieties show an increased yield when grown beside smaller varieties.

Classification of Varieties

For the third year in succession samples representative of the varieties of corn commonly grown in Canada, were secured from the various sources of seed supply both in Canada and the United States.

This year one hundred and seventy different samples of corn were obtained and grown. Accurate records of plant and ear characters were taken and as far as possible the length of time required by each lot to mature. Maturity records were made somewhat difficult on account of the corn borer damage which was responsible for the complete destruction of the ears in some lots, especially those that were early in maturity.

Based upon the work of the past three years a classification has been made in which those varieties exhibiting the same characters and maturing in the same time are grouped under the one varietal name. The varieties are grouped according to maturity, thus making the choice of varieties for a given locality a comparatively easy matter.

Breeding

Inbreeding was continued with about 200 strains selected in 1925. In addition to the inbreeding a number of these strains were recombined and several crosses were also made between strains representing different varieties. These will be tested out in 1927.

As a result of the inbreeding process which has now been carried on for four years, the plants within each individual strain are becoming very similar in type. This indicates the degree of purity that is being brought about by the process of self-fertilization.

It is most unfortunate but highly probable unless the corn borer is brought under some measure of control, it will prevent the successful testing of the recombinations and the hybrids obtained from these inbred strains which have reached such a high state of purity. Under these circumstances the best that can be done will be to carry on the breeding material until such time as the borer is actually brought under control.

While all of the inbred strains, both early and late, were attacked by the corn borer, observations showed that some were considerably less heavily infested than others. While it is impossible to say at present that this was due to something inherent in those strains, close observations will be made next year to determine, if possible, whether the immunity was only accidental or does actually exist.

Specific Gravity of Kernels and its Relation to Protein Content

The well-known investigations with high and low protein corn conducted at the Illinois Agricultural Experiment Station have indicated that a correlation exists between the relative size of the germ and the protein content. As the germ and the endosperm are of different specific gravities their relative proportions might reasonably be assumed to influence the specific gravity of the grain and therefore provide a basis for determining high and low protein corn.

At Harrow in 1923, a number of ears of the Wisconsin No. 7 variety were separated into "heavy" and "light" on the basis of specific gravity as indicated by a number of kernels taken from each ear. The kernels were taken as nearly as possible from the same position on the ears. They were immersed in a potassium carbonate solution, the concentration of which was such that the "light" kernels floated and the "heavy" kernels sank.

Samples from individual "heavy" and "light" cobs; composite samples from a number of heavy and light cobs, and a sample of kernels from the progeny ears of "heavy" and "light" ears, were sent to the Chemistry Division for analysis. In addition to the above series two additional samples from varieties with marked differences in respect to specific gravity were selected for examination: Quebec No. 28 (small yellow flint) and Wisconsin No. 7, Duke (large white dent).

The results of the examination are shown in table 2.

TABLE 2.—CORN: HEAVY AND LIGHT KERNELS—RELATION OF PROTEIN CONTENT TO SPECIFIC GRAVITY (HARROW)

Lab'y No.	Variety	Description	Weight of 100 kernels	Specific gravity	Protein (N x 6-25)	Fat
			grams		per c ent	per cent
71561	Wisconsin No. 7.....	Heavy (cob) 3, 1922.....	35·36	1·297	10·20	5·83
71562	Wisconsin No. 7.....	Heavy, mother, composite 1922.	33·06	1·300	10·65	5·40
71563	Wisconsin No. 7.....	Heavy Progeny 1923.....	31·28	1·282	9·87	5·32
71564	Wisconsin No. 7.....	Light (cob) 8, 1922.....	29·09	1·227	10·53	5·07
71565	Wisconsin No. 7.....	Light (Mother) composite 1922.	32·04	1·255	11·14	4·88
71566	Wisconsin No. 7.....	Light Progeny 1923.....	33·45	1·260	9·54	4·73
71626	Wisconsin No. 7 Duke (White Dent).	.....	32·06	1·213	8·57	4·55
71627	Quebec 28 Macdonald College (Yellow Flint).	.....	27·25	1·306	11·99	6·04

Samples 71626 and 71627 show a distinct relation between specific gravity and protein content—the higher the specific gravity, the higher the percentage of protein. This relationship is also shown in the "heavy" series of Wisconsin No. 7. It is not borne out, however, in the "light" series of Wisconsin No. 7 in which the highest specific gravity shows the lowest percentage of protein.

This examination would therefore indicate that specific gravity cannot be definitely relied on for the selection of kernels as to protein content.

The investigation also shows that in this test the protein content in the progeny is not determined by the percentage of protein in the parent.

FIRST-GENERATION HYBRIDS

It has long been recognized that crosses between plants and animals frequently result in increased vigour in the offspring or hybrid, as compared with the two parents entering the cross.

Where the cross is made between two varieties or strains which differ widely in maturity, such as early and late, and, in the case of corn, flint and dent, the vigour of the hybrid is usually more marked than where the cross is made between varieties or strains which are more alike in type and time of maturity.

With these facts in mind and realizing that first-generation corn hybrids might be profitably grown in certain sections of Canada, crosses were made between a number of varieties of corn at the Dominion Experimental Station, Harrow, Ont. Five varieties, representing early, medium, and late types of flint and dent corn were used in this work. A variety of sweet corn was also included. In all, over 50 different combinations were made, necessitating about 2,000 artificial pollinations.

The seed obtained was grown under test at Harrow in 1925 and the seed of certain crosses was sent to various other Dominion Experimental Farms throughout the country, in order to test the hybrids at points where they might prove of value.

The results of the test at Harrow led to the following conclusions:—

1. The yield of hybrids exceeded that of both parents, in some cases.
2. The yield of the hybrids was intermediate between that of the two parents in the majority of cases.

3. In crossing an early and a late corn the yield of the hybrid was nearer to that of the later and higher yielding parent than to that of the earlier and lower yielding parent in most cases.
4. The hybrids were intermediate in time of maturity between the two parents, the date of maturity in most cases, however, being closer to that of the earlier parent than that of the later parent.

Some of the results obtained in the 1925 tests are given in the tables A, B, C, and D. In some of the tests a comparison is made between the hybrids and the parent varieties, while in others the comparison is made between the hybrids and other varieties (not parents). In each case, both hybrids and varieties were grown in the same test.

TABLE A—Comparative yield of hybrids and parent varieties

EARS

Hybrid or Variety	Days to maturity	Yield per acre Ears (Absolute dry weight)		Increase of Hybrid	
		tons	lb.		lb.
HARROW, ONT., (1925)					
Leaming x Twitchell's Pride	111	2	558	Over Leaming...	100
Leaming	125	2	458	Over T. Pride...	1,630
Twitchell's Pride	102	1	928		
Leaming x Falconer	112	2	574	Over Leaming...	116
Leaming	125	2	458	Over Falconer...	1,464
Falconer	102	1	1,110		
Leaming x Howe's Alberta	105	1	1,315	Over Leaming...	1,143
Leaming	125	2	458	Over Howe's....	2,103
Howe's Alberta	90		1,212		

TABLE B—Comparative yield of hybrids and parent varieties

FODDER

——	Date cut	(Absolute dry weight)		——	
		tons	lb.		
HARROW, ONT., (1925)					
Leaming x Twitchell's Pride	Sept. 1	3	1,267	Over Leaming..	−255
Leaming	" 10	3	1,522	Over T. Pride..	1,908
Twitchell's Pride	Aug. 23	2	1,359		
Leaming x Falconer	Sept. 1	3	504	Over Leaming..	−1,018
Leaming	" 10	3	1,522	Over Falconer..	1,450
Falconer	Aug. 21	2	1,054		
Leaming x Howe's Alberta	" 23	2	137	Over Leaming.	−3,385
Leaming	Sept. 10	3	1,522	Over Howe's..	2,501
Howe's Alberta	Aug. 8		1,636		

TABLE C—Comparative yield of hybrids and other varieties

FODDER

—	Yield per acre		Stage when cut
	Green weight	Absolute dry weight	
	tons lb.	tons lb.	
NAPPAN, N.S. (1925)—			
Twitchell's Pride x Wisconsin No. 7	27 1,600	3 1,287	
Longfellow (D.I.S.C.O.)	22 1,000	2 1,589	
Northwestern Dent	21 0	2 1,498	
Quebec No. 28	13 1,000	1 1,502	
FORT VERMILION, ALTA. (1925)—			
Wisconsin No. 7 x Howe's Alberta	25 400	.....	Firm dough.
Leaming x Howe's Alberta	25 1,600	.....	Part ripe and firm dough
Howe's Alberta (own seed)	7 1,775	.....	Ripe
Quebec No. 28	19 1,750	.....	Very green
Longfellow	17 500	.....	"
Twitchell's Pride	15 1,920	.....	Quite green.
Northwestern Dent	15 0	.....	Early milk
Rustler White Dent	16 1,940	.....	Very green

Crosses were again made at Harrow in 1925 between varieties which at that time gave indications of promise. These were tested in 1926, and some of the yield results obtained at the various stations to which seed was sent are given below. On account of the heavy infestation of the European Corn Borer this test had to be abandoned at Harrow.

TABLE D—Comparative yield of hybrids and other varieties

FODDER

—	Height	Yield per acre		Stage when cut
		Green weight	Absolute dry weight	
		tons lb.	tons lb.	
CHARLOTTETOWN, P.E.I. (1926)— Hybrid or Variety				
Twitchell's Pride x Wisconsin No. 7	78"	22 1,200	3 576	Milk
Twitchell's Pride (Fredericton)	60"	18 800	2 1,998	Dough
Northwestern Dent (Brandon)	60"	15 1,400	2 720	Milk
Northwestern Dent (D.I.S.Co.)	65"	16 0	2 1,062	Kernels forming
INDIAN HEAD, SASK. (1926)—				
Wisconsin No. 7 x Howe's Alberta	.....	15 600	2 1,500	Early dough
Wisconsin No. 7 (Duke)	.....	10 1,000	1 1,000	Tasselled
Quebec No. 28 (Macdonald College)	.....	12 1,000	1 1,800	Early milk
Longfellow (Duke)	.....	12 1,000	1 1,200	Silking
Northwestern Dent (D.I.S.Co.)	.....	12 800	1 1,700	Milk
STE. ANNE DE LA POCATIERE, QUE. (1926)—				
Wisconsin No. 7 x Howe's Alberta	69"	12 1,600	2 139	Late milk
Wisconsin x Twitchell's Pride	70"	14 1,200	1 1,986	Early milk
Wisconsin No. 7 (Duke)	78"	14 1,200	1 1,644	Ears forming
Twitchell's Pride (Fredericton)	60"	Grown for seed		Milk
Northwestern Dent (Macdonald College)	70"	12 800	1 1,417	Early milk
Longfellow (Duke)	69"	15 650	2 147	Milk

The results of the tests indicate that first-generation corn hybrids have a definite value in certain sections of Canada.

SOYBEANS

Variety Test

Twenty varieties of soybeans were tested both for yield of fodder and of seed. The long period of very hot, dry weather during the month of June and the first two weeks of July affected the varieties very seriously during their growing period and as a consequence the yields of fodder were reduced to somewhat below the average. The bean yields, however, were not so seriously affected and were quite up to average.

Most of the varieties included in the test have now been grown for three years, a few for two years and one for only one year. An average of the yields and maturity for the two- and three-year periods has been made and appears in the accompanying table.

While table 3 indicates the possible merits of certain varieties further testing is necessary before reliable recommendations can be made.

BROOM CORN

Variety Test

While a few broom corn varieties have been grown at Harrow during the past few years no extensive test was made to determine whether or not the recognized Standard and Dwarf varieties could be grown successfully for brush and for seed.

This year a collection of varieties of both types of broom corn was made. In all, eighteen varieties were obtained, thirteen from various sources in the United States, and five from Canada, four of which had previously been grown at Harrow for the past three years.

The yield of brush per acre was obtained for all the varieties, the weight being taken at the air dry stage. The weight was again taken after the brush had been graded according to quality, upon which depends the purpose for which it can be used.

After the brush was harvested the remaining fodder was harvested and its green yield obtained. While it is claimed that the fodder of the Standard varieties has little value as feed, the fodder of the Dwarf varieties is stated to be equal in feeding value to corn stover.

The various yields, length of brush, and dates of harvesting are given in table 4.

TABLE 3.—SOYBEANS—YIELD PER ACRE OF BEANS AND FODDER FOR 1926 AND AVERAGE FOR 3 YEARS (1924-1926)

Variety	Source	Days to Maturity		Fodder				Seed			
				Green Weight		Moisture-free dry weight		As harvested		Moisture-free dry weight	
		1926	Average 3 years 1924-26	1926	Average 3 years 1924-26	1926	Average 3 years 1924-26	1926	Average 3 years 1924-26	1926	Average 3 years 1924-26
				tons lb.	tons lb.	tons lb.	tons lb.	bush.		bush.	
Early Brown	Salmon Arm, B.C.	110	.....	2 1,756	.....	.. 1,565	.....	15·0	.....	13·2	.....
Ste. Anne's No. 92	MacDonald College, P.Q.	112	108	2 1,891	3 128	.. 1,564	.. 1,506	13·5	13·4	11·9	11·8
Mandarin	U.S. Dept. of Agr.	115	x116	3 119	x3 1,331	.. 1,622	.. x1,905	18·0	x18·1	15·7	x15·9
O. A. C. 81	Ont. Agr. College, Guelph	116	116	4 7	4 758	1 115	1 237	19·8	18·5	17·4	16·3
Chinatown Echo	China	117	117	3 1,510	4 841	.. 1,954	1 113	18·1	17·6	16·0	15·6
Black (China)	"	118	118	4 205	4 1,197	1 141	1 220	18·4	17·3	15·8	15·1
Yellow 17	"	119	118	4 651	4 1,088	1 230	1 267	23·2	21·2	20·6	18·9
Yellow 210	"	121	117	3 918	3 1,559	.. 1,778	.. 1,854	19·6	18·7	17·3	16·6
Summerland	Exp. Farm, Summerland.	121	118	4 1,315	5 268	1 300	1 392	18·9	16·4	16·7	14·5
Italian		121	x121	4 682	x5 1,509	1 238	x1 822	20·9	x25·9	18·1	x22·6
O. A. C. 211	Ont. Agr. College, Guelph.	122	x122	4 350	x4 1,233	1 173	x1 438	22·4	x22·5	19·4	x19·2
Ito San	J. Noble, Harrow	123	122	5 746	5 1,421	1 846	1 762	20·5	21·6	17·9	19·0
Manchu	Dakota Impr. Seed Co.	123	122	4 1,449	5 598	1 459	1 630	24·2	24·6	21·1	21·6
Black Eyebrow	" "	123	122	4 951	5 1,032	1 293	1 632	23·1	25·5	20·0	22·6
Early Korean	China	124	121	4 1,563	5 286	1 324	1 391	24·5	22·4	20·9	19·4
Green	J. Noble, Harrow	124	122	4 827	4 1,159	1 366	1 349	24·7	23·2	21·5	20·4
Golden	" "	127	125	4 1,263	5 717	1 352	1 679	23·2	24·7	19·9	21·8
A. K.	U. S. Dept. of Agr.	128	x128	5 1,171	x6 975	1 967	x1 1,204	27·2	x28·5	23·4	x24·7
Hoosier	" "	134	x133	5 1,378	x7 484	1 818	x1 1,499	23·3	x29·4	19·9	x25·0
Black Beauty	China	137	x137	7 1,703	x8 142	1 1,901	x1 1,765	27·6	x28·9	23·1	x24·1

x Average for two years only (1925 and 1926).
Add 10% moisture to yields of M-F dry weight of seed to obtain air-dry weight yields.
" 15% " " " " fodder to obtain approximate air-dry weight yields of hay.

TABLE 4—BROOM CORN—VARIETY TEST 1926

Variety	Type	Source	Date of planting	Date of harvesting brush	Date of ripening seed	Height	Air dry yield of brush per acre: Good	Poor	Total	Length of brush: Good	Poor	Yield of fodder per acre green weight	
							lb.	lb.	lb.	in.	in.	tons	lb.
Longbrush Evergreen 56-g-0-3.	Standard	United States Department of Agriculture.	2-6-26	Oct. 1	Oct. 17	10′–10′ 6″	478	371	849	20–22	18–19	12	1,398
Longbrush Evergreen 26-g-0.	"	" "	2-6-26	Sept. 30	" 14	10′ 6″	354	467	821	20–22	19–20	11	410
Standard C.I. No. 583	"	" "	2-6-26	" 22	" 11	9′–10′	563	348	911	20–22	15–20	13	228
Standard (Illinois)	"	Salzer, Illinois	2-6-26	Oct. 1	" 16	9′ 6″–10′ 6″	419	480	899	20–21	17–19	11	1,821
Illinois Favorite	"	Pfeifer, Illinois	5-6-26	Sept. 30	" 14	9′ 6″–10′ 6″	431	418	849	20–22	17–18	11	1,572
Black Spanish	"	"	5-6-26	" 17	" 4	9′ 6″–10′ 6″	488	329	817	20–21	15–17	8	1,596
Black Spanish	"	Oklahoma	2-6-26	" 17	" 2	10′–10′ 6″	508	333	841	18–20	15–16	9	1,754
Canada Evergreen	"	Expt. Station, Harrow, Ontario	2-6-26	" 15	Sept. 29	9′ 9″–10′ 6″	565	379	944	20–21	17–19	10	3
Black Seeded	"	" "	2-6-26	" 2	" 18	7′ 6″–9′..	335	565	900	15–17	10–11	8	766
Black Seeded (Que.)		" "	2-6-26	" 2	" 18	7′ 6″–9′	350	490	840	15–17	10–12	7	110
Black Seeded	"	" "	2-6-26	" 2	" 18	7′ 3″–9′	340	526	866	15–16	10–11	7	774
Broom Corn (C.E.F.)		" "	2-6-26	" 2	" 18	7′ 6″–9′	367	571	938	13–17	10–11	8	932
Acme Dwarf C.I. No. 243.	Dwarf	United States Department of Agriculture.	2-6-26	" 22	Oct. 11	5′ 9″–6′ 3″	518	271	789	20–23	15–18	9	1,754
European C.I. No. 559	"	" "	2-6-26	Oct. 5	" 20	5′ 9″–6′ 3″	307	620	927	20–21	17–19	11	1,240
Jap C. I. No. 442	"	" "	2-6-26	Sept. 30	" 16	4′ 6″–5′0″″	233	453	686	16–17	13–14	9	675
Scarborough	"	Oklahoma	2-6-26	Oct. 1	" 16	5′ 9″–6′0	249	539	788	20–21	18–19	12	734
Dwarf Evergreen	"	Salzer, Illinois	2-6-26	Sept. 21	" 9	5′ 9″–6′ 6″	451	304	755	18–20	13–16	10	501
Improved Evergreen	"	Steele-Briggs	2-6-26	" 22	" 10	5′ 9″–6′9″	454	143	597	16–20	13–14	8	1,596

Poor brush includes those with (a) large central stems.
(b) twisted straws.
(c) Crooked heads.

It is interesting to note that all of the varieties matured seed in spite of the very unfavourable weather during the late summer and fall.

A small composite sample of brush was sent to the Elgin Broom Works, St. Thomas, Ont., to determine its suitability for manufacture into brooms or whisks. Through the courtesy of the above company the brush was put through the regular processes and was found to be quite suitable as regards texture, etc., and worth about six cents per pound. In addition to good texture and length of brush, good colour is also essential in order to obtain the highest market price per pound.

The yields of brush obtained at Harrow, with the possible exception of a few of the lowest yielding varieties, are quite up to the average of the yields obtained in the broom corn districts of the United States. The cost of production, therefore, will determine whether or not this crop can be grown profitably in Canada. The present importation of brush into Canada from the United States for manufacture into brooms and whisks is approximately 3,000 tons yearly.

REPORT OF WORK AT OTTAWA

FIELD CORN

Variety Tests

Altogether one hundred and fifty-seven lots of corn were planted in comparative test plots. With the exception of three lots where insufficient seed was available, all of the lots were planted in triplicate $\frac{1}{200}$-acre plots. The corn was sown on May 29 in rows 3 feet apart; later on the plants were thinned to 6 inches apart in the row.

The varieties which matured sufficiently before overtaken by frost were harvested in the glazed condition. At the time of the first heavy frost all of the remaining varieties were cut. Both the green yields and yields of dry matter per acre are recorded for the season of 1926. In addition an average yield of dry matter is included for varieties which have been tested through three years, 1924-1925 and 1926. A few lots which were only tested in 1925 and 1926 are grouped together and a number of lots tested only in 1926 are listed by themselves. The dry matter of all 1926 yields was based on shrinkage samples which were immediately dried in the dehydrator.

Table 5—Variety Test of Corn at Ottawa

Variety	Source	Green yield per acre		Yield dry matter per acre		Average yield dry matter per acre	
		tons	lb.	tons	lb.	tons 1924–1926	lb.
Selection 119	United States Dept. of Agriculture	34	1,741	5	1,598	6	395
Squaw	Dakota Improved Seed Co	17	1,304	3	1,966	6	383
North Dakota White	Wm. Ewing Seed Co	20	450	4	224	6	353
Angel of Midnight	John A. Bruce	26	454	4	1,746	5	1,655
North Dakota	Wm. Rennie Seed Co	21	793	4	1,400	5	1,389
Leaming	John A. Bruce	28	1,498	4	1,528	5	1,210
Longfellow	Dupuy & Ferguson	21	1,279	3	1,920	5	1,166
Longfellow	John A. Bruce	26	1,382	4	1,963	5	1,058
Giant Prolific South	John A. Bruce	30	285	5	951	5	1,048
Early Compton	Dupuy & Ferguson	21	440	3	1,872	5	967
North Western Red or Smoky Dent	Wm. Rennie Seed Co	28	1,250	5	1,738	5	900
Mammoth Southern	K. McDonald & Sons	29	1,178	5	667	5	659
Longfellow	Graham Bros	16	1,244	3	682	5	427
Wisconsin No. 7	Steele Briggs Seed Co	30	243	5	545	5	416
Compton's Early	Graham Bros	22	912	4	974	5	399
Improved Leaming	Graham Bros	27	892	4	1,774	5	215

TABLE 5—VARIETY TEST OF CORN AT OTTAWA—*Continued*

Variety	Source	Green yield per acre		Yield dry matter per acre		Average yield dry matter per acre	
		tons	lb.	tons	lb.	tons 1924–1926	lb.
Pride of the North	Wm. Rennie	30	1,075	4	1,959	5	201
Pride of the North	K. McDonald & Sons	27	1,050	5	687	5	184
Improved Leaming	John A. Bruce	28	865	5	230	5	131
White Cap Yellow Dent	Dupuy & Ferguson	30	1,534	5	618	5	27
Silo King	Wm. Rennie Seed Co	20	1,585	4	573	4	1,959
Smoky Dent	John A. Bruce	22	235	5	333	4	1,956
Leaming Fodder	Graham Bros	30	958	5	136	4	1,919
Longfellow	Wm. Ewing Seed Co	24	1,390	4	1,674	4	1,893
Longfellow	Steele Briggs Seed Co	25	893	4	1,775	4	1,848
Longfellow	Wm. Rennie Seed Co	18	231	3	1,497	4	1,848
Australian White Flint	John A. Bruce	24	186	4	840	4	1,844
Selected Red Cob Ensilage	John A. Bruce	30	1,759	5	277	4	1,829
Reid's Yellow Dent	John A. Bruce	28	239	5	428	4	1,818
Lancaster	Hoffman	27	920	4	1,857	4	1,717
Eureka	J. Harris	31	488	5	673	4	1,628
Improved Leaming	Wm. Ewing Seed Co	27	746	5	171	4	1,618
Eureka	Steele Briggs Seed Co	28	1,811	4	717	4	1,612
Longfellow	Dakota Improved Seed Co	22	1,790	4	367	4	1,609
Red Cob	Wm. Ewing Seed Co	32	849	5	855	4	1,506
Improved Leaming	Wm. Rennie Seed Co	24	943	4	467	4	1,493
Red Cob Selected	K. McDonald & Sons	31	109	5	414	4	1,465
Improved King Philip	K. McDonald & Sons	18	870	3	1,452	4	1,332
Ordinary Leaming	Wm. Ewing Seed Co	24	406	4	1,687	4	1,282
Wisconsin No. 7	Wm. Rennie Seed Co	23	1,490	4	1,941	4	1,240
White Cap Yellow Dent	Graham Bros	27	341	4	1,644	4	1,219
Queen of Nishna	Graham Bros	23	1,190	4	1,127	4	1,207
Longfellow	John A. Bruce	27	219	4	1,644	4	1,175
Northern Prolific	Wm. Rennie Seed Co	32	828	5	346	4	1,163
Leaming	J. O. Duke	31	1,566	5	887	4	1,133
Giant Prolific Sweet Ensilage	Steele Briggs Seed Co	25	870	4	922	4	1,114
Giant Southern Sweet	Wm. Ewing Seed Co	31	523	5	662	4	1,094
Mammoth Southern Sweet	Graham Bros	19	1,043	3	1,815	4	1,056
Wisconsin No. 7	Wm. Rennie Seed Co	25	453	4	1,432	4	1,051
White Cap Yellow Dent	Steele Briggs Seed Co	23	1,799	4	833	4	1,049
Golden Glow	Wm. Rennie Seed Co	21	1,825	4	1,372	4	1,023
Silver King	Popp (U.S. Dept. of Agriculture)	24	1,198	4	1,590	4	980
Mammoth Cuban Giant	Steele Briggs Seed Co	21	346	4	44	4	896
Northwestern Dent	Dakota Improved Seed Co	26	1,078	5	498	4	888
Ninety Day White	Dakota Improved Seed Co	24	1,543	4	1,512	4	807
Wisconsin No. 7	Graham Bros	25	1,776	4	1,852	4	795
Wisconsin No. 7	Dupuy & Ferguson	23	937	4	654	4	761
Yellow Dent	A. J. Wimple	25	960	4	1,384	4	755
Red Cob Ensilage	Steele Briggs Seed Co	24	1,429	4	407	4	752
Hybrid	A. J. Wimple	19	1,171	3	1,469	4	731
North Dakota	Steele Briggs	30	722	4	61	4	697
Perry's Hybrid	Wm. Ewing Seed Co	18	133	3	641	4	676
White Cap Yellow Dent	Wm. Ewing Seed Co	22	1,326	4	420	4	665
Compton's Early	Steele Briggs Seed Co	20	759	4	122	4	661
Compton's Yellow	John A. Bruce	15	160	2	1,896	4	661
Wisconsin No. 7	J. O. Duke	30	699	5	624	4	655
Wisconsin No. 7	K. McDonald & Sons	24	1,582	4	1,929	4	647
Early Northern	Dupuy & Ferguson	21	335	3	1,208	4	625
Rainbow Flint	Oscar Will & Co	20	1,543	3	1,947	4	617
Early Murdock	Dakota Improved Seed Co	23	478	4	954	4	596
White Cap Yellow Dent	Wm. Rennie Seed Co	22	1,041	4	1,305	4	592
King Philip	Wm. Rennie Seed Co	18	765	4	332	4	592
Champion White Pearl	Dupuy & Ferguson	25	1,244	4	676	4	561
Angel of Midnight	Steele Briggs Seed Co	24	1,378	4	1,266	4	559
Stowell's	Oscar Will & Co	23	1,477	3	1,939	4	533
Evergreen Sweet Fodder	K. McDonald & Sons	25	447	4	786	4	529
Minnesota	Dakota Improved Seed Co	20	1,606	4	454	4	509
North Dakota	Graham Bros	12	1,551	3	36	4	501
Golden Glow	University of Wisconsin	24	1,585	4	1,752	4	479
Evergreen Sweet Ensilage	John A. Bruce	23	136	4	50	4	387
Angel of Midnight	Wm. Rennie Seed Co	21	1,662	4	316	4	333
Early Smokey	Graham Bros	19	460	4	22	4	329
Twitchell's Pride	Experimental Station, Fredericton, N.B.	16	1,099	3	1,605	4	325
Sweet Fodder	Wm. Rennie Seed Co	20	745	3	1,292	4	320
Compton's Early	J. O. Duke	22	1,073	4	111	4	292
Stowell's Evergreen Sugar	Wm. Ewing Seed Co	26	487	4	1,516	4	289
Bailey	Wm. Rennie Seed Co	19	1,943	4	287	4	248
Sanford's White	Wm. Rennie Seed Co	18	1,625	3	1,430	4	228
North Dakota	Dupuy & Ferguson	17	1,152	3	560	4	143
Stowell's Evergreen	Dupuy & Ferguson	21	1,475	3	1,356	4	112
Golden Glow	J. O. Duke	23	591	4	1,321	4	6
Compton's Early	Wm. Rennie Seed Co	19	604	3	1,551	3	1,993
Golden Glow	K. McDonald & Sons	23	1,712	4	1,228	3	1,913
Golden Glow	Steele Briggs Seed Co	22	648	4	933	3	1,859
North Western Dent	A. E. McKenzie Seed Co	22	602	3	1,834	3	1,853
Canada Yellow	Dupuy & Ferguson	20	261	4	765	3	1,501
Pride of the North	Dakota Improved Seed Co	23	631	4	212	3	1,451
North Western	Oscar Will & Co	13	1,411	3	1,519	3	1,089

TABLE 5—VARIETY TEST OF CORN AT OTTAWA—*Concluded*

Variety	Source	Green yield per acre		Yield dry matter per acre		Average yield dry matter per acre	
		tons	lb.	tons	lb.	tons	lb.
						1924-1926	
Mandan King	Oscar Will & Co	14	1,330	3	605	3	1,039
Gehu	Oscar Will & Co	12	1,268	3	400	3	999
North Western Dent, N. D. grown	A. E. McKenzie & Co	18	616	4	249	3	893
Quebec 28	Macdonald College, Que	14	1,196	3	1,104	3	801
Quebec 28	Dr. Todd	14	1,096	3	902	3	733
Minnesota	Oscar Will & Co	16	1,717	3	1,535	3	630
Dakota Gold	Oscar Will & Co	15	535	3	80	3	375
North Western Dent	Experimental Farm, Brandon, Manitoba	13	115	2	1,970	3	217
Falconer	Oscar Will & Co	15	157	3	889	3	787
Gehu	Dakota Improved Seed Co	11	1,789	2	1,613	3	722
Gehu, North Dakota Grown	A. E. McKenzie	10	1,974	2	1,660	2	1,854
Burr Leaming	Carter, Clinton, Ohio	30	54	5	411	2	1,833
Dakota Flint	Oscar Will & Co	12	1,077	2	1,818	2	1,795
Shota	Oscar Will & Co	12	1,143	3	294	2	1,749
North Dakota White Flint	A. E. McKenzie	11	630	2	1,234	2	1,722
Amber Flint	A. J. Wimple	11	1,288	2	1,064	2	1,609
Assiniboine Yellow	Oscar Will & Co	12	808	3	117	2	1,411
Pioneer	Oscar Will & Co	14	281	3	425	2	1,404
Sweet Fodder	Oscar Will & Co	10	1,706	2	490	2	1,325
Ivory King	Oscar Will & Co	15	476	3	659	2	1,267
Burleigh County	Oscar Will & Co	10	610	2	1,742	2	967
Howe's Alberta	University of Alberta	4	606	1	393	1	793
						1925-1926	
Sweepstakes	J. Harris	32	347	5	1,861	6	71
Hall's Gold Nugget	J. Harris	30	1,573	5	905	5	1,693
Dakota White Flint	John A. Bruce	21	486	4	1,236	4	1,898
Minnesota No. 13 Nebraska grown	A. E. McKenzie & Co	28	1,618	4	1,858	4	888
Stowell's Evergreen	Steele Briggs	25	1,170	4	969	4	327
Minnesota 13, Minnesota grown	A. E. McKenzie	22	688	4	585	4	145
Bailey	Darcy Bondy	24	655	4	1,311	4	14
Cold Resistant	University of Wisconsin	20	1,186	4	939	3	1,697
Davis Early Huron	Harris McFayden, Winnipeg, Man	22	1,926	5	1,206		
Smoky Dent	K. McDonald & Sons	22	741	5	457		
Early Eureka	John A. Bruce	29	1,492	4	1,883		
Improved Leaming	Steele Briggs	29	714	4	1,712		
Leaming	K. McDonald & Sons	24	1,360	4	1,266		
North Western Dent	Steele Briggs	23	1,164	4	1,256		
Burr Leaming	Connecticut Experimental Station	26	24	4	1,067		
White Cap Yellow Dent	John A. Bruce	23	509	4	881		
Bailey	J. O. Duke	20	1,920	4	551		
Northwestern Dent	Macdonald College, Que	21	65	4	493		
Bailey	Dupuy & Ferguson	20	1,008	4	359		
King Philip	John A. Bruce	15	1,736	4	179		
Sanford's White Flint	Wm. Ewing Seed Co	21	439	4	99		
North Dakota White Flint	K. McDonald & Sons	18	103	3	1,731		
Pride Yellow Dent	Dakota Improved Seed Co	17	984	3	1,692		
Wisconsin No. 25	University of Wisconsin	16	1,449	3	1,680		
Early Compton	Wm. Ewing Seed Co	19	1,815	3	1,671		
Early Kent	Milton Backus	19	878	3	1,335		
Manitoba Amber	Manitoba Agricultural College	14	158	3	1,324		
Dakota White Flint	Oscar Will & Co	14	255	3	782		
Falconer North Dakota grown	A. E. McKenzie Seed Co	14	1,007	3	717		
Improved Sugar	A. E. McKenzie Seed Co	12	854	3	448		
Black Mexican Sugar	Wm. Ewing Seed Co	16	1,301	3	253		

The most significant figures contained in table 5 are those which record the average dry matter for a period of three years. One of the outstanding features is the large amount of dry matter secured from a great many of the lots tested. While there is a gradual reduction in dry matter from the highest to the lowest yielding there are sufficient numbers which have yielded approximately the same amount of dry matter to enable any grower to obtain at least one of the highest yielding varieties. Undoubtedly a factor which has entered into the evident similarity of yield of a lot of these varieties is the fact that a great many lots although listed under different names are practically the same in all morphological characteristics.

While selection 119 heads the list in yield of dry matter for the three-year period its maturity has been far from desirable for the Ontario district. When used for ensilage purposes it is doubtful if the quality of ensilage secured would be as satisfactory as that secured from the earlier maturing flint or dent corns following next in line in matter of yield.

SUNFLOWERS

Variety Test

Six varieties of sunflowers were tested in quintuplet one-hundredth acre plots. The seed was planted in rows 3 feet apart and the plants thinned to 6 inches apart in the row. Each variety was harvested when the greater proportion of the plants were in bloom irrespective of the date, thus the early varieties were harvested considerably earlier than the later maturing. The yields of dry matter are based on the weights of 5-pound shrinkage samples extracted at time of harvesting and dried immediately in the dehydrator.

Table 6—Variety Test of Sunflowers at Ottawa

Variety	Source	Green yield per acre		Dry matter yield per acre		Remarks
		tons	lb.	tons	lb.	
Mammoth Russian	K. McDonald & Sons, Ottawa.	31	407	5	164	94% single stalk, 6% branching.
Mammoth Russian	Wm. Ewing, Montreal, Que.	25	556	4	528	96% single stalk, 4% branching.
Manchurian	A. E. McKenzie, Brandon, Man.	24	1,698	3	1,857	67% single stalk, 33% branching.
Giant Russian	Dakota Improved Seed Co., Mitchell, S.D.	20	1,022	3	86	90% single stalk, 10% branching.
Ottawa 76	C. E. Farm, Ottawa, Ont.	19	185	2	717	97% single stalk, 3% branching.
Mennonite	Experimental Farm, Rosthern, Sask.	12	398	1	1,010	90% single stalk, 10% branching.

Both in the matter of green yield per acre and the dry matter secured from it the larger-growing sunflowers of the Mammoth Russian type have out-yielded the earlier sorts by a very appreciable extent. Only in the shorter seasoned sections of Canada would it appear to be profitable to grow the earlier types as the Ottawa 76 or the Mennonite.

It is true that the larger-growing varieties contain a higher percentage of moisture at the time when they are usually harvested. When such sunflowers are ensiled under ordinary circumstances there is a considerable run-off. Data which will be presented in another part of the report will indicate that the practice of partial drying in the field to prevent the run-off is not productive of the best results. A silage of higher feeding value is obtained by absorbing the excess moisture with some air-dry crop as oat sheaves.

Sunflower Breeding

This project was continued, a large number of plants being isolated and seed harvested from them. Owing to land not being available until late in the season a number of lots were lost due to the fact that blossoming did not occur until very late in the fall. Sufficient material was, however, saved for planting in 1927.

FIELD ROOTS

Mangels

One hundred and forty-seven lots of mangels were tested in triplicate $\frac{1}{200}$-acre plots. These lots represent practically every variety offered for sale in quantity in Canada by Canadian and European seedsmen. Final records were taken on these lots to complete the mechanical classification of field roots which is being published in a separate bulletin.

Although the seed was planted about two weeks late, growth conditions were quite favourable during the season, with the result that the yields were well up to normal. Harvesting was carried out on October 11 and 12. Representative roots from each lot tested were selected, washed and sliced and from this material shrinkage samples extracted. The yields are reported in terms of roots as harvested and also as dry matter per acre, the latter of course being the more significant figure.

In addition to the dry matter figures presented, the relative standing of the different roots is given, the standard for this comparison being the Yellow Intermediate mangel, seed of which was produced at Ottawa. Included in the table will be found also the relative yields of various lots of mangels tested through different periods of years. Varieties which were tested in the same years are grouped together.

TABLE No. 7.—TEST OF MANGELS

Variety	Source	Yield per acre	Yield dry matter per acre	Relative yield dry matter per acre	General type	Off types	Average relative yield dry matter
		tons lb.	tons lb.				1920-1926
Yellow Intermediate	Central Experimental Farm, Ottawa.	31 502	3 182	100·00	Intermediate Yellow	4·46% Half Long, 2·68% Ovoid	100·00
Danish Sludstrup	K. McDonald & Sons, Ottawa, Ontario.	35 1,436	3 1,069	114·35	Intermediate Yellow	6·25% Tankard, 3·57% Long, 1·79% Half Long.	94·30
Royal Giant Sugar Beet	Steele Briggs Co., Toronto, Ontario.	27 1,470	3 254	101·16	Half Long Rose	1·47% Intermediate	89·14
Giant Yellow Intermediate	K. McDonald & Sons, Ottawa, Ontario.	30 1,797	3 1,784	125·91	Intermediate Yellow	30·77% Half Long, 4·81% Globe. Poor and multiple topped.	85·97
Yellow Globe	K. McDonald & Sons, Ottawa	31 1,858	3 1,675	124·15	Globe Yellow	12·77% Intermediate, 4·96% Tankard	84·50
							1920-1921 1923-1926
Selected Giant Rose Interm	Wm. Ewing Co., Montreal, Quebec.	33 1,321	3 1,480	121·00	Half Long Rose	5·41% Intermediate, 2·70% Tankard, 9·90% Half Long.	105·43
Danish Sludstrup	Wm. Ewing Co., Montreal, Quebec.	29 1,921	3 1,337	118·68		31·71% Half Long Yellow, 4·07% Half Long Red, 1·63% Globe, 0·81% Intermediate white. An exceptionally poor prongy and misshaped lot.	95·52
Improved Giant Sugar	Wm. Rennie Co., Montreal, Quebec.	33 1,151	3 904	111·68	Half Long Rose	1·82% Intermediate	89·13
Perfection Mammoth Long Red	Wm. Rennie, Montreal	28 1,902	2 828	78·10	Long Red	3·13% Intermediate, 2·34% Tankard	85·28
Long Red Mammoth	Wm. Ewing Company	29 1,060	2 1,484	88·71	Long Red	16·22% Intermediate, 1·35% Globe	84·17
Giant Yellow Half Long Intermediate	Wm. Rennie Co	32 643	2 1,663	91·12	Half Long Yellow	28·81% Long, 1·10% Intermediate	81·85
Giant White Sugar	Wm. Rennie Co	24 495	2 961	80·25	Half Long White	4·76% Intermediate, 3·17% Ovoid, 0·79% Intermediate, 0·79% Tankard.	79·42
Giant Yellow Globe	Wm. Ewing Co	33 1,962	2 1,495	88·89	Globe Yellow	11·01% Intermediate, 3·67% Tankard, 2·75% Ovoid.	70·59
							1920-1923 1924-1926
Sugar Mangold	Sutton & Sons, Reading, England.	36 182	3 1,494	121·22	Half Long White	10·53% Intermediate, 2·63% Ovoid, 1·75% Tankard.	96·47
Mammoth Long Red	Sutton & Sons	29 1,761	3 502	105·18	Long Red	Uniform	84·86
Golden Globe	Sutton & Son	28 923	2 1,995	96·98	Globe Yellow	4·85% Ovoid, 2·91% Intermediate	80·43
Red Intermediate	Sutton & Son	31 1,782	2 1,532	89·49	Intermediate Red	16·04% Half Long, 5·66% Ovoid, 1·89% Tankard.	79·06
Prizewinner Yellow Globe	Sutton & Son	36 1,877	2 1,766	93·27	Globe Yellow	7·38% Ovoid, 5·74% Intermediate, 1·64% Tankard.	78·97
Devan Yellow Globe	Sutton & Son	37 1,963	2 1,781	93·51	Globe Yellow	10% Ovoid, 7·50% Intermediate, 3·33% Tankard.	78·59
Yellow Intermediate	Sutton & Son	34 1,044	2 1,256	85·02	Intermediate Yellow	13·54% Half Long, 4·17% Ovoid, 1·75% Globe.	76·70
Golden Tankard	Sutton & Son	26 1,250	2 1,857	94·74	Intermediate Yellow	15·74% Tankard, 9·26% Long, 2·78% Half Long, 2·78% Ovoid, 1·85% Globe.	75·49

									1920-23-26
Prize Mammoth Long Red	Steele Briggs Co., Toronto, Ont.	28	1,203	2	1,351	86·56	Long Red	1·69% Intermediate	79·37
									1921-23-26
Giant Half Sugar	K. McDonald & Sons	26	1,219	3	68	97·41	Half Long Rose	3·36% Intermediate, 3·36% Half Long White, 0·84% Globe White.	84·33
Jumbo	Wm. Rennie Co	32	560	2	1,753	93·06	Half Long White	8·21% Intermediate, 0·75% Tankard	84·09
Giant White Half Sugar	Wm. Ewing Co	25	906	2	919	79·57	Half Long White	8% Intermediate, 1·60% Half Long Rose, 1·60% Ovoid, 0·80% Tankard.	82·47
Mammoth Long Red	Steele Briggs Co	31	74	3	118	98·96	Long Red	2·48% Intermediate, 1·65% Tankard, 0·83% Globe.	77·61
Giant Yellow Intermediate	Wm. Ewing Co	30	230	3	478	104·79	Intermediate Yellow	8·20% Tankard, 7·38% Ovoid, 4·10% Globe, 1·64% Half Long, 0·82% Long.	66·67
Half Sugar Rose	Scand. Seed Co. & R. Wiboltt, Denmark.	27	22	2	1,905	95·52	Half Long Rose	15% Intermediate, 3·33% Tankard, 0·83% Globe.	91·71
Sludstrup	Scand. Seed Co. & R. Wiboltt, Denmark.	31	809	2	718	76·32	Intermediate Yellow	29·77% Half Long	82·72
									1922-1926
Giant Yellow Intermediate	J. A. Bruce Co	43	690	3	1,584	122·68	Intermediate Yellow	38·81% Long, 2·99% Tankard	97·91
Gatepost	J. A. Bruce Co	31	747	3	471	104·67	Mixture	36·90% Long Red, 27·38% Intermediate Red, 22·62% Half Long Red, 3·57% Intermediate White, 2·38% Tankard Red, 1·19% Globe Red.	97·00
Giant White Feeding Beet	J. A. Bruce	41	838	4	185	132·40	Intermediate White	17·65% Long, 1·18% Tankard, 1·18% Intermediate Red.	96·83
Giant Red Sugar	J. A. Bruce	37	791	3	754	120·98	Mixture	46·81% Intermediate Red, 3·19% Ovoid Red, 3·19% Interm. white, 2·13% Long Red, 1·06% Interm. Yellow.	92·74
Giant Rose Feeding	J. A. Bruce Co	28	1,512	3	740	109·03	Half Long Rose	14·56% Intermediate	91·75
Peerless	A. E. McKenzie	39	1,242	3	328	102·36	Intermediate Yellow	29·84% Half Long, 3·23% Ovoid, 1·61% Tankard.	90·47
Mammoth Giant Yellow	A. E. McKenzie	30	1,368	4	214	132·87	Mixture	27·88% Half Long Yellow, 14·42% Globe Yellow, 6·73% Tankard Yellow, 3·85% Long Yellow, 0·96% Half Long White, 46% impossible to classify to colour or shape.	89·06
Yellow Intermediate gatepost	A. E. McKenzie	30	1,347	3	1,277	117·71		33·93% Half Long Yellow, 5·36% Globe Yellow, 0·89% Half Long Red, Very poor lot.	89·06
Danish Sludstrup	Graham Bros., Ottawa	42	464	3	1,343	118·78	Intermediate Yellow	7·20% Ovoid, 3·20% Long, 2·40% Tankard.	88·80
Eclipse	A. E. McKenzie	36	1,799	3	537	105·74	Tankard Yellow	1·03% Long, 1·03% Ovoid	86·46
Mammoth Log Red	Halifax Seed Co., Halifax, N.S.	28	8	2	1,690	92·04	Half Long Red	3·88% Intermediate	85·68
Giant Yellow Globe	A. E. McKenzie	31	162	3	809	110·14	Intermediate Yellow	13·49% Half Long, 2·38% Globe, 0·79% Red Intermediate, 0·79% Half Sugar White.	84·33
Giant Yellow Oval	Steel Briggs Co	31	1,386	2	1,528	89·42	Mixture	53% Intermediate Yellow, 46·02% Half Long.	82·71
Gatepost	Halifax Seed Co	31	1,964	2	1,582	90·29		28·57% Half Long Yellow, 5·71% Long Yellow, 3·81% Globe Yellow, 2·86% Tankard Yellow, 1·90% Ovoid Yellow, 0·95% Ovoid Red, 0·95% Intermediate Red.	77·28
Golden Tankard	Halifax Seed Co	25	1,374	2	988	80·69	Intermediate Yellow	12·87% Tankard, 11·88% Long, 5·94% Half Long, 2·97% Ovoid, 1·98% Globe.	76·38

TABLE No. 7.—TEST OF MANGELS—*Continued*

Variety	Source	Yield per acre	Yield dry matter per acre	Relative yield dry matter per acre	General type	Off types	Average relative yield dry matter
		tons lb.	tons lb.				
Selected Golden Tankard	A. E. McKenzie	25 1,814	2 391	71·03	Intermediate Yellow	10·81% Tankard, 7·21% Long, 5·41% Half Long, 5·41% Ovoid, 1·80% Globe.	75·30
Giant Long Red	A. E. McKenzie	25 1,486	2 846	78·39	Long Red	9·73% Intermediate, 1·77%, Tankard 0·88% Globe	73·9
Giant Yellow Intermediate	Halifax Seed Co	29 502	2 439	72·78	Intermediate Yellow	21·70% Half Long, 19·81% Globe, 0·94% Ovoid Red.	73·2
							1922–23–26
Giant Yellow Globe	Halifax Seed Co	37 1,981	3 1,168	115·95	Intermediate	8·57% Globe, 2·86% Ovoid, 2·86% Long, 1·90% Tankard. Varying intensities of yellow colour.	96·21
Long Red Mammoth	Graham Bros., Ottawa	30 662	3 22	97·41	Long Red	8·40% Intermediate	86·50
Prizetaker Yellow Globe	A. E. McKenzie Co	33 1,809	2 1,648	91·36	Globe yellow	9·17% Intermediate, 5% Tankard	85·38
							1922–24–26
Mammoth Prize Long Red	K. McDonald & Sons	27 1,388	3 143	99·37	Long	11·50 Intermediate, 2·65% Tankard 1·77% Half Sugar White. Colour varying from light to deep red.	93·32
Champion Yellow Globe	Graham Bros., Ottawa	31 1,858	3 341	102·57	Globe Yellow	3·13% Tankard, 2·08% Intermediate	86·75
							1923–1926
Giant Yellowstone Intermediate	Steel Briggs Co	35 55	3 1,339	118·72	Intermediate Yellow	37·93% Half Long, 5·17% Globe, Prongy and nutiple topped lot.	102·38
Leviathan	Wm. Rennie Co	36 552	3 545	105·97	Intermediate Red	8·18% Long, 6·36% Globe, 1·82% Tankard, 0·91% Ovoid, 1·82% Half Long Rose.	100·15
Mammoth Golden Giant	Graham Bros., Ottawa	32 1,007	3 891	111·47	Intermediate Yellow	24·11% Half Long, 4·46% Globe	97·68
Red Half Sugar	Harris McFayden Co	26 686	3 1,132	115·37	Half Long Rose	5·74% Intermediate, 2·46% Half Long White.	95·59
Eckendorfer Red	Hjalmar Hartmann Co	41 511	3 1,395	119·62	Tankard Red	3·09% Half Long, 2·06% Globe, 1·03% Ovoid.	93·35
Sugar Beet or ½ Sugar Rose	Dupuy & Ferguson	28 1,111	3 265	101·34	Half Long Rose	7·26% Intermediate, 0·81% Half Long White.	93·18
Sludstrup	J. A. Steves, Stoveston, B.C.	34 1,169	3 1,119	115·16	Intermediate Yellow	7·32% Ovoid, 0·81% Tankard	92·81
New Ideal	Steele Briggs Co	40 288	3 6	97·15	Tankard Yellow	2·83% Long, 1·75% Tankard Red	92·47
Giant Rose	A. E. McKenzie Co	27 721	3 943	112·31	Half Long Rose	6·84% Intermediate, 2·55% Ovoid, 1·71% Half Long White.	91·85
Ginat Sugar Rose	Graham Bros., Ottawa	34 1,945	4 20	129·73	Half Long Rose	3·54% Intermediate, 2·25% Ovoid, 1·77% Tankard, 4·42% Half Long White.	91·67
Danish Sludstrup	F. James, Salt Spring Island, B.C.	37 1,641	3 726	108·80	Intermediate Yellow	17·65% Half Long, 3·36% Ovoid	91·39
Danish Sludstrup	Dupuy & Ferguson	37 1,986	3 214	100·99	Intermediate Yellow	9·57% Half Long, 2·61% Tankard, 1·74% Ovoid.	91·19

Half Sugar White	Dupuy & Ferguson	29	306	2	1,991	96·91	Half Long White	6·73% Intermediate, 2·88% Tankard, 1·92% Ovoid. 90·95
Fjerritslev Barres	Hjalmar Hartmann	38	220	3	1,030	113·72	Intermediate Yellow	6·25% Half Long, 1·79% Tankard 90·74
Barres Stryno	Danske Landbofor Froforsyning, Roskilde.	38	1,215	3	811	110·17	Intermediate Yellow	13·69% Half Long, 4·21% Long, 3·16% Ovoid. 90·59
Yellow Leviathan	Steele Briggs Co	30	1,986	3	1,163	115·87	Mixture	34·23% Half Long Yellow, 5·41% Tankard Yellow, 1·80% Globe Yellow, 1·80% Ovoid Yellow, 1·80% Intermediate Red, 0·90% Long Yellow. The yellow colour varying.
Taaroje Barres	Hjalmar Hartmann	31	1,551	2	1,270	85·25	Intermediate Yellow	8·89% Globe, 4·44% Half Long, 3·33% Ovoid, 1·11% Tankard. 87·71
Red Globe	Dupuy & Ferguson	33	1,765	3	1,289	117·91	Globe Red	5·43% Ovoid, 4·65% Intermediate 2·33% Tankard, 1·55% Yellow Tankard. 86·84
Eckendorfer Yellow	Hjalmar Hartman	39	1,165	2	1,686	91·98	Tankard yellow	3% Long, 2% Intermediate 86·62
Golden Giant Intermediate	Dupuy & Ferguson	31	1,806	3	93	98·56	Intermediate Yellow	38·39% Half Long 86·59
Stryno Barres	Hjalmar Hartmann	36	528	2	1,473	88·53	Intermediate Yellow	13·10% Half Long, 1·38% Ovoid 86·18
Mammoth Long Red	Harris McFayden Co	28	553	3	286	101·68	Long Red	10% Intermediate, 1·11% Half Sugar, 1·11% Half Sugar White.
Improved Tankard Cream	Wm. Rennie Co	35	1,796	3	498	105·11	Intermediate White	16·32% Half Long, 3·48% Long, 3·48% Tankard, 2·61% Ovoid. 86·08
Ideal	Wm. Rennie Co	37	274	3	276	101·52	Tankard Yellow	3·92% Globe, 0·98% Intermediate, 2·94% Tankard Red.
Giant Yellow Globe	Wm. Rennie Co	39	1,195	3	214	100·52	Globe Yellow	20% Tankard, 6·67% Ovoid 85·76
Yellow Intermediate	McDonald College	38	1,458	3	813	110·21	Intermediate Yellow	2·60% Tankard, 1·74% Ovoid 85·56
Rosted Barres	Hjalmar Hartmann	35	1,245	2	1,842	94·50	Intermediate Yellow	8·08% Half Long, 5·05% Tankard Ovoid, 1·01% Globe. 85·44
Monarch Half Long White	A. E. McKenzie Co	25	914	2	1,288	85·54	Half Long White	9·60% Half Long Rose, 4·80 , Intermediate, 2·40% Globe. 84·61
Giant Sugar	Wm. Rennie Co	30	810	2	1,783	93·55	Half Long Rose	3·39% Intermediate 84·52
Long Yellow	Dupuy & Ferguson	25	1,298	2	1,753	93·06	Long Yellow	1·90% Tankard, 0·95% Half Sugar White 84·45
Sludstrup Barres	Hjalmar Hartmann	36	1,477	3	899	111·60	Intermediate Yellow	8·26% Half Long, 2·75% Ovoid, 0·92% Tankard. 84·34
Red Globe	Wm. Ewing Co	31	1,294	3	558	106·08	Globe Red	4·21% Intermediate, 3·45% Tankard, 2·59% Ovoid. 84·34
Giant Sugar White	Graham Bros., Ottawa	27	131	2	1,035	81·45	Half Long White	5·93% Intermediate 83·51
Red Tankard	K. McDonald & Sons	41	2	3	491	105·0	Tankard Red	2·54% Long 83·20
Long Yellow	Wm. Ewing Co	26	45	2	1,728	92·66	Long	6·82% Intermediate. Colour varying from pale to orange yellow.
Sugar Mangel	Danske Landbofor Froforsyning Roskilde.	30	956	3	954	112·49	Half Long Rose	7·41% Intermediate, 0·93% Tankard, 0·93% Globe. 81·72
Golden Tankard	Wm. Rennie Co	25	1,805	2	1,385	87·11	Intermediate Yellow	11·86% Half Long, 10·17% Long, 1·69% Tankard. 81·50
Mammoth Red Intermediate	J. A. Bruce Co	32	1,974	2	1,185	83·87	Intermediate Red	13·04% Globe, 6·96% Tankard, 3·48% ovoid, 2·61% Half Long. 81·48
Red Globe	J. A. Bruce Co	29	1,912	2	1,367	86·82	Globe Red	6·61% Ovoid, 1·65% Tankard 81·03
Yellow Leviathan	Wm. Rennie Co	26	1,940	2	1,092	82·37	Intermediate Yellow	23·08% Ovoid, 7·69% Half Long, 3·08% Globe. 80·96
Giant White Sugar	Steele Briggs Co	29	1,644	2	1,414	87·58	Half Long White	5·98% Intermediate, 1·71% Globe 80·68
Giant White Feeding	Wm. Rennie Co	28	27	2	1,209	84·26	Half Long White	10·83% Intermediate, 1·67% Half Long Rose, 1·67% Globe, 0·83% Tankard, 1·67% ovoid. 80·61
Golden Tankard	Dupuy & Ferguson	27	558	2	1,225	84·52	Tankard Yellow	15·79% Intermediate, 7·89% Ovoid, 1·75% Globe. 80·35
Elvetham Mammoth	Hjalmar Hartmann	27	1,633	3	958	112·55	Long Red	7·14% Intermediate, 1·78% Half Sugar White, 0·89% Tankard. Tendency to pronginess. 80·10

TABLE No. 7.—TEST OF MANGELS—*Concluded*

Variety	Source	Yield per acre	Yield dry matter per acre	Relative yield dry matter per acre	General type	Off types	Average relative yield dry matter
		tons lb.	tons lb.				
Long White	Dupuy & Ferguson	24 1,803	2 1,148	83·27	Long White	5·69% Half Sugar Rose, 2·44% Intermediate, 0·81% White Tankard.	79·94
Golden Fleshed Tankard	Steele Briggs Co	26 846	2 1,176	83·73		32·76% Intermediate Yellow, 9·48% ovoid Yellow, 4·31% Globe Yellow, 2·59% Long Yellow.	79·43
Barres Tystofte	Dankse Landbofor Fryforsyning, Roskilde	26 1,835	2 1,139	83·13	Intermediate Yellow	4·69% Half Long, 1·56% Long	79·18
Giant White Feeding	Steele Briggs Co	25 157	2 937	79·86	Half Long White	3·01% Oval, 2·26% Tankard, 1·50% Intermediate, 0·75% Long Red.	78·08
Yellow Globe	Steele Briggs Co	37 1,933	2 1,837	94·42	Intermediate Yellow	8·08% Half Long, 5·05% Tankard, 2·02% Ovoid, 1·01% Globe.	78·0
Half Sugar Green Top	Hjalmar Hartmann Co	31 1,978	2 1,604	90·65	Half Long White	7·84% Intermediate, 1·96% Intermediate Red, 0·98% Ovoid.	77·80
Elvetham Long Red	Sutton & Sons, Reading, England	30 1,396	2 1,382	87·06	Long Red	3·49% Intermediate	77·45
Golden Tankard	Wm. Ewing, Montreal	23 8	2 518	73·08	Intermediate Yellow	10·92% Tankard, 5·04% Ovoid, 4·20% Long, 4·20% Half Long, 1·68% Globe.	77·02
Gatepost Intermediate	Suttons, England	28 545	2 1,063	81·90	Intermediate Yellow	10·57% Globe, 7·32% Tankard, 2·44% Ovoid.	74·75
Giant Yellow Globe	Steele Briggs Co	34 248	2 965	80·31	Globe Yellow	7·62% Ovoid, 4·76% Tankard, 3·81% Intermediate.	74·05
Yellow Globe	J. A. Bruce Co	35 1,196	2 1,082	82·21	Globe Yellow	17·31% Intermediate, 13·46% Tankard, 4·81% Ovoid.	73·21
Golden Tankard	J. A. Bruce Co	30 1,080	2 1,659	91·54	Intermediate Yellow	10·58% Tankard, 16·35% Ovoid, 8·65% Long, 3·85% Globe.	73·31
Improved Long Mammoth Red	Dupuy & Ferguson	27 676	2 1,261	84·94	Long Red	4·95% Intermediate	73·05
							1923–1926
Barres Stryno	Trifolium, Copenhagan	40 412	3 1,156	115·76	Intermediate Yellow	14·02% Half Long, 5·61% Ovoid	93·92
Half Sugar Giant Rose	Trifolium, Copenhagen	24 1,665	2 1,959	96·39	Half Long Rose	5·22% Ovoid, 1·49% Intermediate	89·02
Half Sugar White	J. A. Steeves, Steveston	29 667	2 1,730	92·69	Half Long White	12·28% Intermediate	84·46
Barres Sludstrup	Trifolium, Copenhagen	30 512	2 1,291	85·59	Intermediate Yellow	5·31% Ovoid, 4·42% Half Long, 0·88% Tankard.	84·02
Long Yellow	J. A. Brice Co	26 1,497	2 1,274	85·31	Long Yellow	8·65% Half Long, 6·73% Intermediate	80·00
							1924–1926
Barres Half Long	General Swedish Seed Co., Svalof, Sweden.	36 1,144	3 1,867	127·26	Intermediate Yellow	12·12% Half Long, 3·03% Tankard, 1·01% Globe.	109·98
Half Sugar Red Top	Hjalmar Hartmann Co	29 1,970	3 1,053	114·09	Half Long Rose	3·76% Intermediate, 3·01% Long White.	99·16
Yellow Eckendorfer	General Swedish Seed Co., Svalof, Sweden.	46 365	3 996	113·17	Tankard Yellow	1·19% Half Long, 1·19% Ovoid	98·79
Svalof Original Rubra	General Swedish Seed Co	31 1,914	3 388	103·33	Half Long Rose	6·40% Intermediate, 1·60% Tankard	95·06
Red Eckendorfer	General Swedish Seed Co	39 1,201	3 1,002	113·28	Tankard Red	4·26% Intermediate, 1·06% Ovoid	92·58
Barres Oval	General Swedish Seed Co	34 1,378	3 138	99·29	Intermediate Yellow	17·52% Ovoid, 1·46% Globe	90·23
Danish Ovoid	Scandinavian Seed Co., Copenhagen, Denmark.	42 1,870	3 773	109·56	Intermediate Yellow	6·36% Half Long, 5·45% Ovoid	88·57

Yellow Ovoid	Univ. of British Columbia, Vancouver, B.C.	34	1,554	3	172	99·84	Intermediate Yellow	8·25% Ovoid, 7·22% Tankard, 5·15% Half Long, 1·03% Globe.	87·47
Svalof Oroginal Alfa	General Swedish Seed Co.	24	1.105	2	1,038	81·49	Half Long White	7·38% Intermediate	80·67
Taaroje V	Scand. Seed Co. and R. Wiboltt, Copenhagen.	31	1.896	2	1,452	88·19	Intermediate Yellow	3·17% Half Long, 2·38% Tankard, 1·59% Ovoid.	78·45
Devon Yellow Intermediate	Sutton & Sons	32	497	2	1,314	85·96	Intermediate Yellow	19·51% Tankard, 5·69% Globe, 2·44% Ovoid, 0·81% Intermediate White.	68·84
Red Tankard	Graham Bros., Ottawa	40	1,401	3	623	107·13	Tankard Red	0·96% Long	
Yellow Intermediate, Sludstrup type.	United Seed Growers, Penticton, B.C.	40	763	3	497	105·10	Intermediate Yellow	5·22% Half Long, 2·61% Ovoid.	
Non Such	Gartons, England	33	1,935	3	405	103·61	Globe Yellow	9·92% Ovoid, 0·83% Tankard, 1·65% Globe Red.	
New Smithfield Yellow Globe	E. Webb & Sons, Eng	39	552	3	294	101·81	Globe Yellow	10·87% Tankard, 5·80% Ovoid	
Red Top Half Sugar	Wm. Ewing Co	29	814	3	76	98·29	Half Long Rose	8·57% Intermediate, 1·43% Ovoid, 1·43% Half Long White.	
Yellow Globe	Sutton & Sons	35	1,436	2	1,950	96·25	Globe Yellow	25·23% Tankard, 7·48% Ovoid, 5·61% Intermediate.	
Mammoth Long Red	Gartons, England	27	1,861	2	1,896	95·37	Long Red	12·39% Intermediate.	
White Knight	Gartons, England	24	89	2	1,851	62·29	Globe White	6·52% Half Long, 4·35% Intermediate, 2·90% Tankard, 0·72% Red Globe.	
Half Sugar Mangel	Gartons, England	26	752	2	1,841	94·48	Half Long Rose	4·65% Intermediate, 1·55% Interm. Red, 1·55% Long Red, 0·78% Globe Red, 0·78% Tankard White, 0·78% Half Long White.	
Golden Tankard	United Seed Growers	29	258	2	1,661	91·57	Intermediate Yellow	23·01% Tankard, 6·19% Globe, 5·31% Half Long, 0·88% Long.	
Improved Giant	Halifax Seed Co	27	378	2	1,637	91·18	Half Long White	3·97% Half Long Rose, 1·59% Intermediate, 0·80% Globe.	
Superlative	Sutton & Son	38	268	2	1,526	89·23	Mixture	41·18% Globe Yellow, 30·39% Ovoid Yellow, 11·76% Interm. Yellow, 5·88% Tankard Yellow.	
Danish White Giant	Halifax Seed Co	25	1,848	2	1,512	89·16	Half Long White	6·61% Interm., 4·13% Globe, 3·31% Tankard, 2·48% Ovoid, 1·65% Half Sugar Rose.	
Mammoth Long Red	E. Webb & Sons	25	801	2	1.347	86·49	Long Red	9·68% Intermediate.	
Yellow Fleshed or Golden Tankard.	E. Webb & Sons	27	1,218	2	1,182	83·82	Intermediate Yellow	28·21% Tankard, 21·37% Globe.	
Sunrise	Gartons, England	29	932	2	1,124	82·89	Intermediate Yellow	12·30% Ovoid, 5·74% Tankard, 4·92% Half Long, 2·46% Globe.	
Red Intermediate	E. Webb & Sons	32	599	2	979	80·54	Intermediate Red	14·39% Tankard, 5·30% Globe, 2·27% Ovoid, 0·76% Tankard Yellow.	
Devan Champion Yellow Globe	Gartons, Eng	34	502	2	958	80·20	Globe Yellow	9·91% Intermediate, 8·11% Ovoid, 3·60% Tankard.	
Mammoth Perfection Globe	E. Webb	34	1,641	2	906	79·36	Globe Yellow	13·33% Tankard, 5·33% Ovoid.	
New Combination	Gartons, England	25	1,342	2	810	77·81	Half Long Red	20·16% Intermediate, 2·42% Tankard, Red, 4·84% Tankard.	
Improved Large Yellow Globe	Gartons, England	33	969	2	744	76·74	Globe Yellow	19·83 Intermediate, 7·44% Tankard.	
New Lion Yellow Interm	E. Webb	31	1,329	2	695	75·95	Tankard Yellow	32·74% Interm., 7·96% Globe Yellow, 1·76% Ovoid, 0·88% Half Long.	

An examination of the foregoing table again emphasizes the fact that root varieties as commonly sold are far from pure. An encouraging feature of this situation, however, is that during recent years there has been a decided improvement in this connection. The majority of seedsmen appear to be making an honest endeavour to secure at least reasonably good seed.

In attempting to make use of the data presented in the accompanying table it is well for the grower to keep in mind that the test grounds at the Central Experimental Farm are fairly well suited to the normal development of all types of roots. As a consequence the adaptation of a particular type of root to different kinds of soils is not as apparent as it would be on a soil less suited to the general development of all types of mangels. We wish to emphasize once again the fact that the tankard and globe types are essentially shallow-soil varieties. The ovoid, intermediate, and half-long are suitable for average soils, while the long mangel reaches its fullest development on deep friable land. Keeping in mind this general adaptation of type to soil it will be safe to select from the table the highest-yielding intermediate, the highest-yielding long, and the highest-yielding of the other four types with some assurance that these are at least among the best varieties available commercially at the present time.

The fact that the great majority of varieties tested are in the half-long, intermediate, and ovoid groups is in itself an indication that growers are finding these varieties most generally suited to average soils.

Swedes

Twenty-two different lots of swedes were tested. These also were planted in triplicate $\frac{1}{200}$-acre plots. They were seeded on June 4 and harvested on October 19. The land on which they were planted was rich, fairly friable bottom land, evidently well suited to the development of swedes.

As in the case of mangels, yields are reported in terms of material as harvested and also on the basis of absolute dry matter.

In common with mangels, the swedes also indicate a lack of purity as demonstrated by the prevalence of off types indicated in the table. Of course there is not the same amount of variation between types in the swedes as in the mangels, nor is there the same adaptation of type to soil. As a consequence the presence of off types in swedes does not constitute a serious consideration as it does in the case of the mangel.

The great majority of swedes sold are of the purple-top globe type. There is, however, a considerable difference in the uniformity, smoothness, and general growth habits of these different lots. Some of our best seed was secured directly through Scandinavian sources where considerable work has evidently been done on the improvement of this type of crop.

TABLE 8—VARIETY TEST SWEDE TURNIPS

Variety	Source	Average yield per acre		Average yield dry matter per acre		General Type	Off Types
		tons	lb.	tons	lb.		
Bangholm Pajberg	Trifolium, Copenhagen, Den	25	1,287	2	1,144	Purple Top Globe	27·08% Flat, 2·08% Globe Bronze, 1·04% Tankard, 1·04% Flat Bronze.
Kangaroo	Wm. Ewing, Montreal, Que	26	320	2	1,070	Bronze Top Globe	26·53% Ovoid, 10·20% Tanksrd, 3·06% Flat.
White	J. A. Bruce, Hamilton	26	306	2	990	Bronze Top Flat	32·32% Globe, 8·88% Ovoid.
Bangholm	Experimental Farm, Nappan	21	1,798	2	907	Mixture	32·08% Globe Purple, 26·42% Globe Bronze, 11·32% Flat Bronze, 9·43% Flat Purple, 6·60% Tankard Purple, 4·72% Ovoid Purple.
Bangholm	Wm. Ewing, Montreal	25	1,324	2	897	Purple Top Globe	14·55% Flat, 5·45% Ovoid, 2·73% Tankard.
Bangholm	Univ. of B. C. Vancouver	24	414	2	845	Purple Top Globe	15·65% Tankard, 13·04% Ovoid, 6·96% Flat.
Halls Westbury	J. A. Bruce, Hamilton	24	1,790	2	793	Purple Top Globe	21·52% Flat, 8·82% Globe Bronze.
Kangaroo	J. A. Bruce, Hamilton	25	1,268	2	784	Mixture	33·98% Globe Bronze, 19·42% Ovoid Bronze, 12·62% Flat Bronze, 11·65% Globe Purple, 4·85% Globe Green, 3·88% Flat Furple, 2·91% Flat Green, 2·91% Ovoid Green, 1·94% Ovoid Purple.
Bangholm Purple Top	J. A. Bruce, Hamilton	22	1,925	2	514	Purple Top Globe	7·50% Ovoid, 5·83% Flat, 2·50% Tankard, 0·83% Globe White Green Top.
Gartons Superlative	Wm. Ewing. Montreal, Que	25	1,700	2	510	Purple Top Globe	8·93% Ovoid, 7·14% Tankard, 6·25% Flat.
Hall's Westbury	Wm. Ewing, Montreal, Que	21	692	2	477	Purple Top Globe	20·56% Flat, 2·80% Ovoid, 1·87% Tankard, 1·87% Globe Bronze.
Derby	J. A. Bruce, Hamilton	25	308	2	405	Bronze Top Globe	15·46% Ovoid, 8·25% Tankard, 6·19% Flat.
Canadian Gem	J. A. Bruce, Hamilton	24	92	2	389	Purple Top Globe	12·90% Flat, 11·83% Ovoid, 1·08% Globe Green.
Magnum Bonum	J. A. Bruce, Hamilton	23	1,069	2	320	Purple Top Globe	16·50% Ovoid, 6·80% Flat, 4·85% Globe Bronze.
Ditmars	H. H. McNutt, Truro, N.S.	27	1,209	2	261	Bronze Top Globe	22·12% Flat, 2·65% Tankard.
Elephant or Monarch Impr	Wm. Ewing, Montreal, Que	23	735	2	63	Purple Top Globe	27·27% Ovoid. 15·70% Tankard.
Universal	Wm. Ewing, Montreal, Que	20	676	1	1,898	Purple Top Globe	9·01% Flat, 5·41% Ovoid.
Suttons Champion Purple Top	Wm. Ewing, Montreal, Que	19	1,187	1	1,853	Purple Top Globe	17·14% Flat, 8·57% Ovoid, 2·86% Tankard.
Bangholm	Experimental Farm, Kentville, N.S.	18	957	1	1,811	Purple Top Globe	24·11% Globe Bronze, 13·39% Flat, 8·04% Ovoid.
Bangholm	Experimental Farm, Charlottetown, P.E.I.	18	1,804	1	1,778	Purple Top Globe	11·82% Ovoid, 7·27% Globe Bronze, 6·36% Flat, 5·45% Tankard Bronze.
Invicta Bronze Top	Wm. Ewing, Montreal, Que	21	837	1	1,682	Bronze Top Globe	15·74% Flat, 5·56% Globe Purple, 1·85% Tankard.
Elephant or Monarch	J. A. Bruce, Hamilton	14	517	1	691		28·13% Globe Purple, 22·92% Ovoid Purple, 2·08% Flat Purple. A number of immature roots impossible to classify

Fall Turnips

Twenty-five lots of fall turnips were included in our field root variety test. These were planted on the same dates and in the same manner as the swedes. Harvesting also was carried out on the same day. In common with the other types of roots the yields are reported in terms of both harvested roots and dry matter per acre.

Table 9.—Variety Test Fall Turnips

Variety	Source	Average yield per acre		Average yield dry matter per acre		General Type	Other types present
		tons	lb.	tons	lb.		
Purple Top Mammoth	Suttons and Sons, Reading, Eng.	29	94	1	1,971	.....	Mixture of Globe, Flat, and Tankard.
Red Paragon	Suttons & Sons, Reading, Eng.	29	1,014	1	1,663	.....	
Early Sixweeks	Suttons & Sons, Reading, Eng.	47	488	1	1,568	.....	Tankard and Globe.
Purple Top Aberdeen	Suttons & Sons, Reading, Eng.	20	1,419	1	1,251	Globe.....	
Century	E. Webb & Sons, Eng.....	21	731	1	1,214	Flat.....	Globe and Tankards present.
Purple Top Mammotn	E. Webb & Sons, Eng.....	25	1,182	1	1,173	Globe.....	Flats.
Invincible Yellow	E. Webb & Sons, Eng.....	22	502	1	1,142	Globe.....	Ovoid.
Devonshire Greystone	E. Webb & Sons, Eng.....	24	1,406	1	1,051	Flat.....	Globe, Ovoid and Tankard.
Renown Yellow	E. Webb & Sons, Eng.....	18	1,431	1	1,013	Globe.....	Flat.
Devonshire Greystone	Steele Briggs, Toronto.....	25	854	1	1,025	.....	Mixture of Flat and Globe.
Yellow Tankard	Danske Landbofor Froforsyning, Roskilde, Denmark.	24	626	1	1,021	Long.....	Half Long.
Green Round	E. Webb & Sons, Eng.....	22	1,971	1	887	Globe.....	Flat.
Hardy Green Round	Suttons & Sons, Eng.....	19	1,868	1	815	.....	Mixture of Globe and Flat.
Purple Top Mammoth	A. E. McKenzie, Brandon, Man.	20	959	1	831	Globe.....	Tankard, Flat and Ovoid.
Fynsk Bortfelder	Danske Landbofor Froforsyning, Roskilde, Denmark.	22	12	1	792	Long	
White Globe	Wm. Ewing, Montreal, Que...	23	1,334	1	736	.....	
Selected Green Globe	E. Webb & Sons, Eng.....	23	751	1	721	Globe.....	
Fynsk Bortfelder	Hjalmar Hartmann, Copenhagen.	19	14	1	705	Long.....	
Pomeranian White Globe	Steele Briggs, Toronto, Ont..	21	690	1	697	Globe.....	Flat, Ovoid and Tankard.
Green Top Yellow Aberdeen.	Wm. Ewing, Montreal, Que...	16	1,399	1	690	Globe.....	
Purple Top Mammoth or Improved Greystone.	Steele Briggs, Toronto.....	22	257	1	679	Flat.....	Globe and Tankard.
Dales Hybrid	Danske Landbofor Froforsyning, Roskilde, Denmark.	18	1,772	1	507	.....	Mixture of Globe and Flat.
Orange Jelly or Golder Ball.	E. Webb & Sons, Eng.....	17	514	1	405	Flat.....	Globe and Ovoid.
Aberdeen Purple Top	Steele Briggs, Toronto, Ont..	15	1,479	1	193	Globe.....	Flat.
Green Top Aberdeen	Suttons & Sons, Eng.....	16	1,485	1	155	.....	

Quite satisfactory yields were secured from the fall turnips. The fact that they mature early in the season would seem to indicate the desirability for early feeding. Their poor keeping qualities would prevent storage for general winter feeding. The flesh of the fall turnip is much softer and more watery than the swede.

In so far as yield of dry matter is concerned the data in the table indicate that our highest-yielding varieties during the past year have been from the two English firms Sutton & Sons and E. Webb & Sons.

Carrots

A greater number of varieties of carrots were included in the field root tests than either swedes or fall turnips. The reason for including the large number of carrot types was that we wished to complete the measurements for classification for this type of field root. Triplicate $\frac{1}{200}$-acre plots were used. Seed of one replication was planted on May 20 and of the remaining two replications on June 4. The earlier-planted carrots were harvested on October 12, and the later planting harvested on October 19. Both green weight as harvested and dry matter are reported along with notes on general type and an indication of the percentage of off-types in each lot.

TABLE 10—VARIETY TEST OF CARROTS

Variety	Source	Average yield per acre		Average yield dry matter per acre		General Type	Off Types
		tons	lb.	tons	lb.		
Improved Short White	K. McDonald & Sons, Ottawa	39	1,309	2	1,653		
Champion	H. Hartmann, Copenhagen, Denmark	26	1,268	1	1,470	Intermediate Yellow	9·17% Long, 2·50% Short, 6·67% Prongy, 4·17% Intermediate Red, 1·25% Long Red, 0·83% Intermediate White.
Improved Intermediate White	Dupuy & Ferguson, Montreal	33	477	2	1,055	Intermediate White	3·33% Long, 1·90% Short, 4·29% Prongy.
Large White Short Vosges	Graham Bros., Ottawa	27	393	2	1,024	Intermediate White	6·10% Short, 3·76% Prongy, 0·47% Intermediate Red.
White Belgian	H. Hartmann, Copenhagen, Denmark	24	1,253	2	938	Long White	2·24% Intermediate, 7·46% Prongy, 1·12% Long Yellow.
White Belgian	Dupuy and Ferguson, Montreal	30	1,962	2	898	Long White	0·48% Intermediate, 4·29% Prongy, 0·95% Long Yellow.
White Belgian	Graham Bros., Ottawa, Ont	27	1,301	2	896	Intermediate White	6·12% Long, 1·63% Short, 7·76% Prongy, 0·41% Intermediate Orange.
Improved White Vosges	K. McDonald & Sons, Ottawa	28	1,859	2	809	Intermediate White	2·18% Short, 8·73% Prongy.
White Intermediate	Experimental Farm, Summerland, B.C	27	1,224	2	808		
Ontario Champion	Graham Bros., Ottawa, Ont	23	1,048	2	779	Intermediate Yellow	9·25% Short, 4·17% Prongy, 6·85% Intermediate Red, 0·30% Intermediate White.
White Belgian	Wm. Ewing, Montreal, Que	25	568	2	757	Long White	1·63% Intermediate, 2·45% Prongy, 0·82% Long Red, 0·41% Long Yellow.
Danish Champion	C. E. F., Ottawa, Ont	23	730	2	751	Intermediate Yellow	7·33% Short, 3·67% Prongy.
Large White Belgian	Steele Briggs, Toronto, Ont	27	1,615	2	723	Long White	4·89% Prongy, 1·33% Long Yellow, 1·33% Long Orange.
White Half Long	Harris McFayden, Winnipeg, Manitoba	29	1,440	2	699	Long White	3·46% Short, 8·85% Intermediate, 4·23% Prongy, 0·77% Intermediate Yellow, 0·38% Intermediate Red.
Improved Intermediate White	Wm. Ewing, Montreal	31	987	2	683	Intermediate White	1·06% Short, 1·77% Prongy.
Champion	A. S. Trifolium, Copenhagen	26	64	2	648	Intermediate Yellow	5·90% Short, 3·32% Prongy.
Mammoth Interm. Smooth White	J. A. Bruce, Hamilton, Ont	24	681	2	497	Intermediate White	5·60% Long, 3·02% Short, 9·48% Prongy.
Large White Belgian	Wm. Rennie, Montreal	26	355	2	402	Long White	9·86% Prongy, 0·94% Intermediate Red.
New Yellow Intermediate	Wm. Ewing, Montreal	23	537	2	348	Intermediate Yellow	2·70% Short, 7·66% Prongy.
Yellow Intermediate	Halifax Seed Co., Halifax	20	1,375	2	123	Intermediate Red	3·23% Short, 1·38% Long, 13·36% Prongy, 092·% Intermediate Yellow, 0·46% Intermediate White.
White Belgian	Halifax Seed Co., Halifax	22	1,515	2	122	Long White	7·48% Intermediate, 1·18% Long Yellow, 0·797%. Short Red.
Large White Vosges	J. A. Bruce, Hamilton, Ont	23	1,313	2	109	Long White	7·94% Prongy, 1·40% Intermediate Red.
Long Orange	Wm. Rennie, Montreal	17	720	2	100	Long Orange	4·49% Prongy, 3·37% Long Yellow.
Yellow Belgian	Wm. Ewing, Montreal	20	1,217	2	12	Long Yellow	2% Prongy, 15·33% Long Orange, 1% Long White.
White Belgian	J. A. Bruce, Hamilton	22	426	1	1,992	Intermediate White	20·72% Long, 1·59% Short, 4·38% Prongy.
Champion	General Swedish Seed Co., Svalof, Sweden	21	1,427	1	1,974	Intermediate Yellow	5·47% Short, 11·33% Prongy, 2·34% Intermediate White.
Long Red Surrey	Steele Briggs, Toronto	17	1,662	1	1,939	Intermediate Red	20·89% Long, 16·78% Short, 7·88% Prongy.
Large White Vosges	Dupuy & Ferguson, Montreal	21	111	1	1,923	Long White	7·97% Intermediate, 6·31% Short, 2·33% Prongy.
White Half Long	General Swedish Seed Co., Svalof, Sweden	20	81	1	1,922	Intermediate White	5·84% Short, 3·89% Long, 0·39% Intermediate Yellow.
White Intermediate	University of British Columbia, Vancouver, B.C.	27	1,148	1	1,884	Intermediate White	5·86% Long White, 2·70% Short, 3·60% Prongy, 0·45% Yellow Intermediate.
White Belgian	A. S. Trifolium, Copenhagen	18	1,172	1	1,774	Long White	13·70% Intermediate, 1·83% Short, 7·31% Prongy, 0·46% Long Yellow.
Danish Champion	K. McDonald, Ottawa	20	507	1	1,696	Intermediate Yellow	1·56% Short, 5·30% Prongy, 1·56% Intermediate White.
Improved Danvers Half Long	Dupuy & Ferguson, Montreal	19	483	1	1,512	Short Red	4·80% Intermediate, 6% Prongy.
Long Orange	John A. Bruce, Hamilton	18	829	1	1,465	Intermediate Red	22·40% Long, 6·80% Short, 9·20% Prongy.
Mammoth Short White	Wm. Rennie, Montreal	20	1,564	1	1,413	Long Yellow	6·42% Intermediate, 1·12% Short, 5·03% Prongy.
Champion	Harris McFayden, Winnipeg	21	621	1	1,286	Long White	9·90% Prongy, 9·38% Intermediate, 2·08% Yellow Intermediate.

TABLE 10—VARIETY TEST OF CARROTS—*Concluded*

Variety	Source	Average yield per acre		Average yield dry matter per acre		General Type	Off Types
		tons	lb.	tons	lb.		
Oxheart	Harris McFayden, Winnipeg	16	884	1	1,228		
Improved Short White	Steele Briggs, Toronto	19	1,840	1	1,147	Intermediate White	2·45% Short, 2·10% Prongy, 1·05% Intermediate Yellow.
James	Danske Landbofor Froforsyning, Roskilde, Denmark.	14	297	1	1,122	Intermediate Red	15·87% Long, 1·11% Short, 3·69% Prongy.
Long Orange Belgian	A. E. McKenzie, Brandon, Man	13	957	1	1,058	Long Orange	4·41% Prongy, 1·18% Long Yellow, 0·29% Long White.
Long Orange Belgian	J. A. Bruce, Hamilton, Ont	17	540	1	1,031	Long Orange	24·05% Prongy, 2·29% Long White, 1·53% Long Yellow.
Giant Green Top White	Dupuy & Ferguson, Montreal	15	202	1	1,001	Long White	5·31% White Intermediate, 0·84% Prongy.
Guerande or Oxheart	Graham Bros., Ottawa, Ont	15	964	1	771	Short Red	0·93% Prongy.
James	Harris McFayden, Winnipeg	13	641	1	665	Short Red	16·96% Long, 3·94% Intermediate, 5·91% Prongy.

One rather outstanding feature of the carrot variety test is the exceptionally high yield secured from some varieties. The yield of the Improved Short White, which heads the list, is second only to that secured from some of the mangel varieties and considerably surpasses both in harvested weight and dry matter per acre the highest-yielding fall turnip or swede.

The most common objection to the adoption of carrots of this type for feeding purposes is the difficulty experienced in harvesting. With all but the shorter varieties it is necessary to loosen the ground around the carrot by some mechanical means before they can be extracted. Those who follow the practice of growing small areas of field carrots for special feeding purposes should find it to their advantage to choose wisely in the matter of planting one of the higher-yielding varieties. The cost of growing the Improved Short White which yielded 2 tons 1,653 pounds of dry matter was very little different from that required to grow the last variety on the list which produced nearly a ton and a half less dry matter.

Sugar Beets

Six lots of sugar beets were planted in connection with co-operative trials with the Chemistry Division.

These were seeded and harvested at the same time as the mangel crop.

Table 11.—Variety Test of Sugar Beets

Variety	Source	Average Yield per acre	
		Tons	lb.
Danish Improved	Dominion Sugar Co., Chatham, Ontario	21	38
Shreiber & Son	Dominion Sugar Co., Chatham, Ontario	20	299
Horning	Dominion Sugar Co., Chatham, Ontario	19	403
Dieppe	Dominion Sugar Co., Chatham, Ontario	18	902
Jvanask	Dominion Sugar Co., Chatham, Ontario	18	565
Vladovosk	Dominion Sugar Co., Chatham, Ontario	17	1,660

As the sugar beets in table 11 were being tested for the production of sugar, no absolute dry matter determinations were made. The yields reported are simply those of the roots as harvested. While the yields secured are well above the average yield of the province, it must be kept in mind that the sugar beets were grown in rows 28 inches apart, whereas the normal planting is much closer than this and would be expected to give a higher yield per acre. For purposes of stock-feeding the true sugar beets are much too difficult to harvest to be profitable for the average farm. They also have the disadvantage of carrying a considerable amount of dirt on their roots.

Stecklings

Plots of Yellow Intermediate mangel, Danish Champion carrot, and Purple Top swede were put in for the production of stecklings, were carefully selected in the fall, and pitted for the production of a seed crop in 1927.

HAY AND PASTURES

Variety Tests

The project designed to test the comparative value of various grasses and clovers seeded in combination at varying rates was again continued, These were all sown in duplicate one-hundredth acre plots protected by a 1-foot border which was removed before harvesting the crop.

The plots seeded in 1924 were located on a section of the farm favourable to the growth of practically all the legumes. In 1925, however, the land on which it was necessary to seed the plots was low-lying and in periods of wet weather which obtained during the season of 1925 and 1926 re-acted unfavourably for the alfalfa. As a consequence the plots containing this crop do not show up as well as they might have done otherwise.

In common with other forage crops, yields are based on the absolute dry matter figured from shrinkage samples extracted at the time of harvesting and dried immediately.

TABLE 12.—HAY AND PASTURE PLOTS

Seeding	Rate per acre	Sown 1924								Sown 1925			
		Cut 1925 Hay 15% moisture		Cut 1926				Total 2 years Hay 15% moisture		Cut 1926			
				Green		Hay 15% moisture				Green		Hay 15% moisture	
	lb.	tons	lb.	tons	lb.	tons	lb.	tons	lb.	tons	lb.	tons	lb.
Alfalfa Timothy Red clover Alsike White Dutch Clover	6 6 10 2 1	4	675	8	1,700	3	491	7	1,166	13	57	4	354
Alfalfa Timothy Red Clover Alsike White Dutch Clover	4 6 7½ 1½ 1	4	353	8	750	3	314	7	667	13	765	4	642
Alfalfa Timothy Red Clover Alsike White Dutch Clover	3 6 5 1 1	4	248	8	.....	3	110	7	358	13	700	4	452
Timothy Red Clover White Dutch	8 10 1	3	1,415	7	525	2	1,982	6	1,397	11	1,000	3	1,213
Timothy Red Clover Kentucky Blue Grass Red Top White Dutch Clover	8 10 2 2 1	3	1,804	7	1,850	3	202	7	6	11	1,650	3	1,538
Timothy Red Clover Alsike White Dutch Clover	8 8 2 1	3	1,632	8	825	3	692	7	324	11	475	3	1,195
Timothy Red Clover Alsike Kentucky Blue Grass Red Top White Dutch Clover	8 8 2 2 2 1	3	1,644	8	300	3	436	7	80	13	150	4	305
Timothy Alsike White Dutch Clover	8 4 1	4	54	7	1,350	3	238	7	292	10	50	3	1,346
Timothy Alsike Kentucky Blue Grass Red Top White Dutch Clover	8 4 2 2 1	4	224	6	1,600	2	1,661	6	1,885	9	1,400	4	109
Timothy Meadow Fescue Red Clover White Dutch Clover	6 4 10 1	4	294	8	650	3	568	7	862	16	1,700	4	1,585
Timothy Meadow Fescue Red Clover Kentucky Blue Grass Red Top White Dutch Clover	6 4 10 2 2 1	4	373	8	100	3	171	7	544	13	100	4	437
Timothy Meadow Fescue Red Clover Alsike White Dutch Clover	6 4 8 2 1	3	1,447	7	375	2	1,420	6	867	14	1,725	4	1,331

TABLE 12.—HAY AND PASTURE PLOTS—*Continued*

Seeding	Rate per acre	Sown 1924						Sown 1925			
		Cut 1925 Hay 15% moisture		Cut 1926				Cut 1926			
				Green		Hay 15% moisture		Green		Hay 15% moisture	
						Total 2 years Hay 15% moisture					
	lb.	tons	lb.	tons	lb.	tons	lb.	tons	lb.	tons	lb.
Timothy Meadow Fescue Red Clover Alsike Kentucky Blue Grass Red Top White Dutch Clover	6 4 8 2 2 2 1	3	1,565	7	1,100	2	1,729	6	1,294	16 850	4 873
Timothy Orchard Grass Red Clover White Dutch Clover	6 4 10 1	3	1,489	7	725	2	522	6	11	18 250	4 1,723
Timothy Orchard Grass Meadow Fescue Red Clover Kentucky Blue Grass Red Top White Dutch Clover	6 2 2 10 2 2 1	3	1,175	6	1,000	2	33	5	1,208	18 700	4 1,707
Timothy Orchard Grass Red Clover Kentucky Blue Grass Red Top White Dutch Clover	6 4 10 2 2 1	3	1,692	7	575	2	787	6	479	18 291	4 1,462
Timothy Orchard Grass Red Clover Alsike White Dutch Clover	6 4 8 2 1	3	1,821	7	175	2	794	6	615	19 1,150	5 60
Timothy Orchard Grass Red Clover Alsike Kentucky Blue Grass Red Top White Dutch Clover	6 4 8 2 2 2 1	3	1,164	6	975	2	423	5	1,587	18 250	4 1,346
Timothy Orchard Grass Meadow Fescue Red Clover White Dutch Clover	6 2 2 10 1	3	1,585	7	800	2	1,136	6	721	16 1,636	4 1,578
Timothy Orchard Grass Meadow Fescue Red Clover Alsike White Dutch Clover	6 2 2 8 2 1	4	.....	7	850	2	787	6	787	19 1,600	5 64
Timothy Orchard Grass Meadow Fescue Red Clover Alsike Kentucky Blue Grass Red Top White Dutch Clover	6 2 2 8 2 2 2 1	4	16	7	1,525	2	1,060	6	1,076	18 1,150	4 1,767
Timothy White Blossomed Sweet Clover White Dutch Clover	8 10 1	4	1,089	7	800	3	311	7	1,400	15 1,276	3 1,025
Timothy Orchard Grass White Sweet Clover White Dutch Clover	6 4 10 1	4	404	9	1,250	3	92	7	496	18 550	5 93
Timothy Meadow Fescue White Sweet Clover White Dutch Clover	6 4 10 1	2	891	5	1,150	2	623	4	1,514	13 1,950	3 518
Timothy Meadow Fescue Orchard Grass White Sweet Clover White Dutch Clover	6 2 2 10 1	2	1,598	5	800	1	1,584	4	1,282	15 800	4 461

TABLE 12—HAY AND PASTURE PLOTS—*Concluded*

Seeding	Rate per acre	Sown 1924						Sown 1925			
		Cut 1925 Hay 15% moisture		Cut 1926				Cut 1926			
				Green		Hay 15% moisture		Green		Hay 15% moisture	
	lb.	tons	lb.	tons	lb.	tons	lb.	tons	lb.	tons	lb.
Field Brome 8 White Sweet Clover 10 White Dutch Clover 1		3	495	5	1,500	2	301	5	799	11 1,850	3 382
Timothy 8 Yellow Sweet Clover 10 White Dutch Clover 1		3	819	6	550	2	1,520	6	339	10 1,900	2 1,334
Timothy 6 Orchard Grass 4 Yellow Sweet Clover 10 White Dutch Clover 1		3	754	6	1,150	2	405	5	1,159	12 1,800	3 1,393
Timothy 6 Meadow Fescue 4 Yellow Sweet Clover 10 White Dutch Clover 1		3	1,449	6	650	2	1,594	6	1,043	13 200	3 1,353
Timothy 6 Orchard Grass 2 Meadow Fescue 2 Yellow Sweet Clover 10 White Dutch Clover 1		3	1,556	5	575	1	1,586	5	1,142	10 500	2 1,711
Field Brome 8 Yellow Sweet Clover 10 White Dutch Clover 1		2	1,381	6	800	2	1,024	5	405	11 616	2 1,457
Timothy 8 Yellow Sweet Clover 5 White Sweet Clover 5 White Dutch Clover 1		3	1,909	7	100	3	186	7	95	12 1,950	4 826

Crops harvested in 1925 and 1926 in common with previous years indicate that a good many of the mixtures tested could be interchanged without very seriously affecting the yields. On land suitable to the growing of alfalfa or sweet clover the addition of either of these legumes has on the whole been of material advantage. On land which was liable to be flooded at any time or to continue in a wet condition for more than a few days, the desirable results of alfalfa and sweet clover are not apparent. The test as a whole is an indication that we have quite a number of grasses and legumes available for general use, any of which appear to give a reasonably good yield. It therefore becomes largely a matter of selecting the particular combination of grasses and legumes most likely to be suited to our local conditions. For example, on the low-lying lands which are apt to be too wet for the successful production of alfalfa, sweet clover or even red clover, the substitution of alsike clover, white dutch clover and probably also meadow fescue would appear to be worth while.

ANNUAL HAY CROPS

Tests to determine the comparative value of different crops for annual hay were continued. Yields as recorded are based on weights from duplicate $\frac{1}{100}$ acre plots, after a 1-foot border has been removed.

Hay yields are based on absolute dry weight using percentages of dry matter from immediately dried shrinkage samples.

TABLE 14.—ANNUAL HAY CROPS, 1926

Seeding	Rate of seeding per acre	Green Yield per acre Border	Hay Yield per acre, 15 p.c. Moisture
	Lb.	Tons Lb.	Tons Lb.
Hubam Clover Banner Oats	15 80	4 1,950	2 224
Hubam Clover Spring Rye	15 80	4 850	1 1,609
Hubam Clover Japanese Millet	15 20	8 900	2 1,664
Hubam Clover Golden Millet	15 80	8 —	2 1,296
White Sweet Clover Banner Oats	15 80	6 300	2 1,449
White Sweet Clover Spring Rye	15 80	6 1,050	2 1,444
White Sweet Clover Japanese Millet	15 20	8 1,250	2 1,896
White Sweet Clover Golden Millet	15 20	9 1,250	3 454
Yellow Sweet Clover Spring Rye	15 80	7 700	2 1,255
Yellow Sweet Clover Japanese Millet	15 20	9 1,750	3 557
Yellow Swet Clover Golden Millet	15 20	8 1,225	2 1,373
Crimson Clover Spring Rye	15 80	5 150	1 1,648
Crimson Clover Japanese Millet	15 20	6 1,900	2 468
Crimson Clover Golden Millet	15 20	8600	2 1,525
Barley	100	3 450	2 201
Hubam Clover	20	3 1,700	0 1,945
White Sweet Clover	20	4 1,825	1 718
Golden Millet	30	6 1,525	2 876
Common Millet	30	4 250	1 1,336
Japanese Millet	30	13 1,400	4 355
Hungarian Millet	30	6 1,200	2 1,040
Siberian Millet	30	7 450	2 1,227
Hog Millet	30	5 950	1 1,866
Spring Rye	90	5 900	2 402
Teff Grass	7	5 850	2 940
Gold Rain Oats	93½	3 1,600	1 967
Victory Oats	102	4 1,500	1 1,786

ALFALFA

VARIETY TESTS.——The alfalfa varieties listed in table 14 were seeded in replicated one-hundredth acre plots protected by a 1-foot border. Both green yields and hay yields based on a definite moisture percentage added to the absolute dry weight are included. The yields from the 1924 seeding harvested in 1925 and also harvested in 1926 are totalled in the fourth yield column of the table. The behaviour of the varieties sown in 1925 is also indicated by the yields included.

TABLE 14—ALFALFA VARIETY TESTS

Variety	Source	Sown 1924			Sown 1925		
		Cut 1925	Cut 1926		Cut 1926		
		Total hay 15% moisture	Green yield	Hay Yield 15% moisture	Total yield hay (2 years) 15% moisture	Green yield	Hay yield 15% moisture
		tons lb.	tons lb.	tons lb.	tons lb.	tons lb.	tons lb.
Cossack alfalfa	Rife, Alberta	4 862	15 1,900	4 1,380	9 242	15 1,150	4 895
Grimm alfalfa	A. B. Lyman	3 1,955	13 1,100	4 580	8 535	13 1,473	3 1,854
Alfalfa Le Beau	Mich. Agr. College	3 1,700	12 1,800	4 268	8 8		
Turkestan alfalfa	Steele Briggs Co	3 1,685	12 450	4 106	7 1,791		
Canadian alfalfa	Steele Briggs Co	3 1,514	11 100	4 139	7 1,653	14 425	3 1,929
Alfalfa	R. McCannus	3 1,349	11 1,400	3 1,907	7 1,256	15 575	4 561
Alfalfa	Suttons, England	3 1,339	12	4 439	7 1,778		
Grimm alfalfa	Suttons, England	3 951	13 100	4 279	7 1,230		
Shoobut alfalfa	S. Argentine	3 484	*		*		
Medicago falcata	Rife, Alberta	3 123	11 800	3 534	6 657		
Cossack alfalfa	Dakota Impr. Seed Co					14 1,546	4 165
Alfalfa (French grown)	Suttons, England					15	4 514
Variegate alfalfa	Peel County					13 931	3 1,393
Grimm alfalfa 666	University of Sask.					14 656	4 60

*Severe winter killing not sufficient left to cut.

Probably the most outstanding feature of the yields reported is the fact that so many of the alfalfa varieties yielded satisfactory crops. The winter of 1925 and 1926 was apparently considerably more severe on the newly seeded plants than the previous winter. A number of varieties of alfalfa failed to give a sufficient stand to make their inclusion in the test possible. It will be noticed however, that the majority of the Canadian-grown alfalfas were sufficiently hardy to give good crops.

SWEET CLOVER

VARIETY TEST.—Eight lots of sweet clover were tested for yield and general suitability. These lots were sown in duplicate one-hundredth acre plots. The accompanying table gives both the green yield and yield of hay containing 15 per cent moisture. The latter was of course, based on absolute dry matter so that the yields of hay from the plots are comparable in so far as moisture content is concerned.

TABLE 15.—SWEET CLOVER VARIETY TESTS

Variety	Source	Green Yield per acre	Hay Yield 15 p.c. Moisture
		Tons Lb.	Tons Lb.
Zouave No. 776	Saskatoon University	11 1,500	2 1,806
Yellow Sweet Clover	Commercial	11 1,175	2 1,527
Arctic No. 1	Saskatchewan Registered Seed Growers' Association	10 450	2 1,146
Grundy U.S.A.	Morris Grain Co	9 500	2 933
Dwarf	C. A. Honey	9 800	2 564
Maccor	Manitoba Agricultural College	9 100	2 370
White Sweet Clover	Commercial	7 975	1 1,999
Hubam Hybrid	H. S. Parker	7 1,400	1 1,795

One of the outstanding features of the data obtained in this test is the fact that the yellow sweet clover has shown up particularly well during the growing conditions which obtained in the summer of 1926. A selection developed at the University of Saskatchewan heads the list in both material as harvested and in cured hay. All of the sweet clovers with the exception of the two lowest yielding gave a fair yield of hay. Our experience, however, has been that it is much more difficult to make a good quality of hay from sweet clover than from the alfalfa plots.

Red Clover

Variety Tests.—Twenty-three lots of red clover were tested in duplicate one-hundredth acre plots. The plots were made 1 foot larger each way than required for the hundredth acre. This border foot was removed previous to cutting for yield record. In this way the influence of the cultivated paths was largely eliminated.

Representative shrinkage samples was extracted from each plot at the time of harvesting. These samples were dried immediately and the absolute dry matter per acre determined from the shrinkage obtained in the samples removed. The hay reported in the accompanying table contains 15 per cent moisture and is figured from the absolute dry matter in all cases, so that each lot is definitely comparable in as far as moisture content is concerned.

Table 16.—Red Clover Variety Tests

Variety	Source	Green Yield per acre		Hay Yield 15 p.c. moisture, per acre	
		Tons	Lb.	Tons	Lb.
Red clover	Central Experimental Farm	14	1,950	4	689
Red clover	St. Clet, Quebec	13	1,050	3	1,977
Red clover	Chateauguay, Quebec	10	1,900	3	1,835
Red clover	Central Experimental Farm	12	1,539	3	1,677
Early Red clover	Sweden	9	1,300	3	1,041
Red clover, Altaswede	Alberta	11	148	3	285
Red clover	Kenora, Ontario	11	275	3	263
Red clover	France (Valence)	10	975	3	106
Giant Hybrid Cow clover	England	8	1,630	3	12
Red clover	Alfred, Ontario	9	1,401	2	1,912
Red clover, Dauphine	France (South Eastern)	10	375	2	1,864
Red clover	Roumania	8	950	2	1,670
Red or Broad Clover	England	7	100	2	1,048
Red clover	Paris, France	7	600	2	520
Late Red clover	Sweden	7	600	2	261
Red clover	Sicily	6	900	2	123
Red clover	Sweden	8	200	1	1,937
Medium late red clover	Sweden	6	1,694	1	1,824
Red clover	University of Sask	4	1,400	1	1,142
Red clover, Emilia	Italy (North Central)	2	1,600	1	400
Red clover, Veneto	Italy (Lombardia)	2	950	0	1,902
Red clover, Marche	Italy (North Central)	2	400	0	1,858
Red clover, Umbria	Italy	2	200	0	1,778

Probably the most outstanding feature of the table of yields of the red clover plots tested is the influence of locality of source of seed on the subsequent crop. On the whole, seed which had been secured locally gave us the best results. Our own selection of red clover developed at the Central Experimental Farm has out-yielded quite considerably all other lots. At the bottom of the list are to be found the Italian red clovers. The reason for their low yield is largely a matter of lack of hardiness.

With all clovers which winter-killed badly it is somewhat difficult to secure an accurate record of their yielding ability because of the fact that weeds usually replace the plants killed out. These weeds must be removed as thoroughly as possible before the yields are taken. Sometimes it is difficult to remove all the weeds and at other times the early removal of weeds gives an added stimulus to the growth to the few plants that remain. In most cases the final results is an exaggeration of the yield, so that the true difference between the non-hardy lots and our local red clover is actually greater than represented by the records submitted.

Winter Hardiness of Red Clover

In addition to the regular plot plantings of red clovers, one hundred plants of a number of lots from different sources were started in cold-frames and later transplanted to the field in rows 3 feet apart allowing 6 inches between plants in the row. A definite count was made of the number of these plants alive and in a healthy condition in the fall. The following spring the second count was made of the plants which had survived the winter. The accompanying table gives the results obtained from 1923 to 1926. The number of samples tested and the percentage of winter-killed is listed in each case.

Table 17—Winter Hardiness of Red Clover from Various Countries

Country of Origin	1923		1924 and 1925		1926	
	Number of samples tested	Average per cent winter killed	Number of samples tested	Average per cent winter killed	Number of samples tested	Average per cent winter killed
Canada	9	3·26	21	13·9	10	16·32
Sweden	3	5·15	8	53·3	11	28·10
Great Britain	2	19·39	9	58·9	26	37·05
France	4	31·72	10	68·5	12	45·01
Italy	12	55·71	25	74·7	29	49·47
Germany			3	24·7	4	38·88
Finland			2	20·9	2	32·07
Poland			2	37·6	3	25·74
Roumania			4	39·2	6	25·18
Silicia			1	40·3	2	26·67
Holland			1	46·0	3	35·66
Denmark			7	46·7	8	33·01
Latvia			1	49·0	1	12·82
Switzerland			2	51·3	3	24·24
Hungary			3	67·7	5	25·79
Chili			6	70·6	12	24·19
New Zealand			2	71·9	2	28·69
Sicily			3	95·8		
Pommerania					1	17·82
United States					5	24·73
Bohemia					2	25·07
Pelgian					1	31·24
Russia					4	34·47
Egypt					1	98·68
Australia					1	100·00

In addition to the lots listed above, Alta Swede and a selection from the University of Saskatchewan were tested for winter hardiness. The Alta Swede killed out 50%, the selection from Saskatoon 37·76%.

During the last two years some seed has evidently been raised in Canada from plants of imported heritage. The result has been that the Canadian-grown seed as a whole has fallen down a little in average hardiness. In practically all cases where it has been possible to trace the origin of our Canadian-grown seed to lots which had been grown in Canada at least nine or ten years the winter hardiness was strikingly superior to practically all imported seed.

It would appear as if there is sufficient evidence at hand to convince us of the desirability of planting Canadian-grown seed where possible. If imported seed has to be used it would appear to be the policy of wisdom to inquire the origin of such seed and to avoid the product of countries listed as producing seed which has winter-killed badly in this country.

Fleshy Annuals

Variety Tests.—Thirteen lots of fleshy annual pasture crops were tested in the summer of 1926. These were all sown in rows 28 inches apart, seeding was completed on June 9, and the lots were all harvested on October 21.

Table 18.—Variety Test of Rape and Kale

Variety	Source	Average Green yield per acre		Average Dry matter yield per acre	
		Tons	Lb.	Tons	Lb.
1000 Headed Kale	Sutton & Sons, Reading, England	20	1,818	2	35
Large seed winter common Essex Rape	Vilmorin Andrieux Co., Paris, France	20	163	1	1,773
Curled Sheep Kale	Sutton & Sons, Reading, England	20	1,295	1	1,712
Giant Rape	Sutton & Sons, Reading, England	16	1,324	1	1,612
Large seeded Winter Umbrella Giant Rape	Vilmorin, Andrieux Co., Paris, France	18	242	1	1,540
Marrow Stemmed Kale	Sutton & Sons, Reading, England	19	1,466	1	1,411
French Marrow Stemmed Kale	Sutton & Sons, Reading, England	18	242	1	1,336
Purple Stemmed Marrow Kale	E. Webb & Sons, England	22	1,651	1	1,222
Rape	Sutton & Sons, Reading, England	16	1,106	1	1,196
Turnip Rape, Small Seeded Winter or German Winter	Vilmorin Andrieux Co., Paris, France	15	1,276	1	1,119
Improved Kale (1000 headed)	Sutton & Sons, Reading, England	16	235	1	1,088
Green Stemmed Marrow Kale	E. Webb & Sons, England	19	246	1	1,085
Dwarf Essex Rape	Gartons, England	13	1,094	1	453

It is quite apparent from the yields reported in the accompanying table that satisfactory fleshy annual crops are available for Canadian farmers. Practically all of the lots tested gave a satisfctory yield. Some, however, were outstanding in this connection, as will be seen by reference to the table listing the dry matter per acre obtained.

The results to date with the fleshy annual pasture crops along with recommendations for their general culture will be found in the pamphlet published during the year 1926 and entitled "Fleshy Annual Pastures in Canada".

RANGE INVESTIGATION

This investigation aimed at obtaining the following information:—

1. The location and approximate area of overgrazed range land in Saskatchewan and Alberta.

2. The relative proportions of the different species of native vegetation, and how these species react to different soil and climatic conditions, to different intensities of grazing, and to frequency of cutting.

3. The present carrying capacity per square mile as estimated by the ranchers. The original carrying capacity and the actual number of animals now being grazed per square mile. The carrying capacity in dry years compared with that of wet years.*

4. The present grazing practices with respect to the time when animals are placed on the range in the spring. The number of months in the year the animals are grazed; and where winter grazing, deferred grazing or rotated grazing is practised.*

5. Where winter feed is provided and the number of months in the year the animals are fed.*

6. To what extent forage crops are grown to supplement the native vegetation.

7. Practices followed at certain United States Stations where experiments have been carried out on grazing lands.

* Sections 3, 4, and 5 are dealt with in the report of the Field Husbandry Division

Methods of Investigation

In order to secure this information, three surveys of the principal ranching areas were made: one in the spring, one during the summer months, and the third in the fall. In all, 110 ranchers were visited.

The spring survey was made during the months of April and May. Sixty ranchers were visited and much information was secured regarding the location and extent of the chief ranching areas, the topography of the range country, and the condition of the grass in the spring of the year.

The main object of this survey, however, was to become acquainted with the ranchers themselves and to learn of the conditions they have to contend with. A second survey was made during the months of June, July, and August. Ninety ranches were visited, including most of those previously seen. During this survey a careful study was made of the native vegetation, and of the grazing practices followed by the ranchers. Much information was obtained also concerning the different types of soil, the water supply, the possibilities of irrigation, the extent to which forage crops were grown, the amount of natural hay and the methods employed in harvesting it, the extent and condition of abandoned farm lands, and of conditions in general.

The fall survey extended into December and while much valuable information was obtained along many lines, the chief purpose of this survey was to make a careful study of the vegetative cover on lands that had been grazed all summer, and also on other pastures that had been reserved for winter grazing.

In addition to making these surveys, Stock Growers' Conventions were attended at Calgary and at Moose Jaw. Some time was spent at the Dominion Experimental Stations and also at the United States Experimental Station at Mandan, N.D. At the latter station grazing studies have been conducted for the past ten years, and much valuable information was obtained from those in charge.

Results of Investigation

Overgrazed Areas.—There are between five and six million acres of leased range lands in Saskatchewan and Alberta. The greater part of this is within the dry area of southwestern Saskatchewan and southeastern Alberta. Within this dry area there are approximately two and a half million acres of overgrazed lands.

Outside of this dry area the chief range lands occupy areas which on account of their rough topography, or the nature of the soil, lend themselves to ranching purposes rather than to grain growing. Examples of such areas are as follows:—(1) The Milk river ridge; (2) The Cypress hills; (3) Lands adjacent to the Saskatchewan, Red Deer and Bow rivers; (4) The foothills in Alberta; (5) The Great Sand hills, northeast of Maple creek; (6) The valley of the Frenchman river; (7) Certain areas south and west of Wood mountain; (8) Hilly areas north of lake Johnson; (9) The Big Muddy area.

Evidences of overgrazing were noticed on some of these lands but not to the same extent as on the dryer areas.

Native Vegetation.—A study of the principal range areas revealed the fact that while there are a great many native vegetative species, a comparatively small number of these constitute the greater part of the vegetative cover in any one district.

The dominant grass species on the greater part of the range lands are, grama grass *(Bouteloua gracilis)* Spear grass *(Stipa comata)* and June grass *(Koeleria gracilis)*. These three species are very palatable and highly nutri-

tious; they also cure before the fall frosts and therefore make splendid winter feed. Other species commonly found on the prairies include *Poa crocata, Poa laevigata, Poa rupicola, Agrostis hyemalis, Stipa viridula, Carex filifolia* and *Agropyron Smithii.* In the sand hills are found such grasses as sand grass *(Cala movilfa longifolia),* beard grass *(Schizachyrium scoparium),* Indian millet *(Erivcoma hymenoides),* and drop seed grass *(Sporobolus cryptandrus).* On alkali flats one finds such forms as alkali grass *(Distichlis stricta),* Wild barley *(Hordeum jubatum),* and Marsh grass *(Spartina gracilis).* On the high ridges such as the Cypress hills are found longer grasses such as Oat grass *(Danthonia intermedia)* and Tall Fescue *(Festuca scabrella).* These are but a few of the more common species. On the overgrazed areas these valuable grasses have been partly killed out and their place taken by less desirable forms such as Prairie sage *(Artemisia frigida),* Club moss *(Selaginella densa),* Whitlowwort *(Paronychia sessiliflora)* Umbrella plant *(Erigonum flavum)* and several *Achillea* species.

Some time was devoted to a study of poisonous plants and it was found that these cause rather serious losses in certain districts. Death camas was found to be quite prevalent in the Big Stick lake district, as well as in several other parts. Yellow loco is very common on the river banks and in the Great Sand Hills area. Larkspur poisons many cattle in the foothills. Further study should be given to these and other poisonous plants.

Another phase of the work commenced this year, is a study of the abandoned farms that are all too numerous in the dry areas of Saskatchewan and Alberta. The vegetation on these fields appears to go through rather definite successive stages. After being abandoned, the fields soon become covered with weeds—chiefly Russian Thistle and Tumbling Mustard. In a few years time other weeds—chiefly *Artemisia frigida*—take the place of the mustard and thistle. Following this, Western Couch grass *(Agropyron Smithii)* makes its appearance and crowds out the weeds. Large patches of grass are soon produced and in some cases fields have become entirely covered with Western Couch grass. This in time appears to give way to other native species such as Spear grass, Grama grass, June grass and poas. Thus in time the entire field goes back to grass. The time required appears to vary from eight years to thirty years depending upon such factors as (1) the number of years the land had been cultivated and the thoroughness of cultivation; (2) soil and climatic conditions; (3) intensity of grazing on the field itself and on the surrounding areas. Until these fields get back to grass they are of little use to anyone as neither Tumbling Mustard nor Prairie Sage *(Artemisia frigida)* are relished by live stock. Experiments are being planned with a view to hurrying the restoration of grass on these fields.

A great many plants have been collected and about two hundred of the more common species have been classified. Representative samples of some of the principal species are being analysed in order to determine their nutritive value. Some of these have also been studied from the standpoint of palatability and growth characteristics. Seed of some of the grasses has been collected and will be tested for germination power. These grasses will be grown on the Dominion Experimental Farms in order to further determine their value for hay or pasture purposes.

The above constitutes but a small beginning in the study of the native vegetation on the range areas. This work should be continued over a period of several years.

Forage Crops

The growing of forage crops has become a real problem with most of the ranchers. The range lands have been largely overgrazed and the rancher has to either reduce his herds or grow forage crops for winter feed. While most of the range land is unsuitable for the growing of crops, there are relatively small areas that can be given some water by irrigation and made to produce certain crops rather successfully.

Many varieties have been tried with varying degress of success, but ranchers are now turning to alfalfa and sweet clover as the crops best suited to their needs. It is thought that the acreage of alfalfa and sweet clover can be greatly increased. Co-operative experiments in the growing of these crops are being carried on with a number of ranchers. These experimental plots will be inspected, and every possible assistance given. A circular on alfalfa production has also been written especially for those on or adjacent to the range areas. The rancher will thus be enabled to determine whether or not these crops can be successfully produced under his conditions.

Approximately thirty of the ranchers visited were found to be growing alfalfa or sweet clover; an additional forty of them will try one or both of these crops during the summer of 1927.

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