DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

REPORT OF THE

DIVISION OF FORAGE PLANTS

FOR THE YEAR 1922

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

An outstanding selection of Kentucky Blue grass. All plants grown under similar conditions.

Printed by Authority of the Hon. W. R. Motherwell, Minister of Agriculture, Ottawa, 1922.

OTTAWA
F. A. ACLAND
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1928

TABLE OF CONTENTS

REPORT OF THE DIVISION OF FORAGE PLANTS

INTRODUCTION

During the past year the various phases of the forage crop work have been carried forward and some new work has also been undertaken. Particular attention is being directed towards the development of new and improved species. In this connection, a promising new variety of timothy has been originated and is to be propagated in quantity in 1923. A few superior strains of western rye grass, two strains of kentucky blue grass, and one strain of red clover are also ready for multiplication in quantity.

The new Dominion Agrostologist was not appointed until July. An immediate tour of inspection of the different Branch Experimental Farms and Stations was necessary, consequently almost the entire credit for the planning and carrying out of the work included in this report belongs to the Assistant Agrostologist, Mr. R. I. Hamilton, B.S.A.

THE SEASON

Although the winter of 1921-22 was not unduly severe, yet new seedings of grasses and clovers were considerably injured. In the case of clovers, seedings put in in 1921 did not, owing to drought, make sufficient growth to withstand the winter and were practically all killed out. Our earliest sown crop, field roots, were in one day earlier than in 1921 and favourable weather during May made it possible to get all crops in in good time. June was favourable, with a good precipitation well scattered throughout the month. During July and August the hot weather seriously interfered with the setting out of breeding material and a considerable number of individual plants were lost.

Yields of all crops averaged well and a favourable fall made it possible to do considerable outside work and harvest field roots in good condition.

The table following gives some seasonal data regarding temperatures and precipitation.

Date.	April				May				June				July				August				September				October			
	Temperature			Precipitation. Total snow and rain.	Temperature			Precipitation. Total snow and rain.	Temperature			Precipitation.	Temperature			Precipitation.	Temperature			Precipitation.	Temperature			Precipitation.	Temperature			Precipitation. Total snow and rain.
	Max.	Min.	Mean		Max.	Min.	Mean		Max.	Min.	Mean		Max.	Min.	Mean		Max.	Min.	Mean		Max.	Min.	Mean		Max.	Min.	Mean	
				In.				In.				In.				In.				In.				In.				In.
1	33·8	29·0	31·4	1·05	67·8	29·8	48·8	.....	76·0	59·6	67·8	0·08	74·0	64·0	69·0	.....	86·6	58·9	72·7	.....	80·8	48·0	64·4	.....	82·0	49·8	65·9	.....
2	43·8	25·8	34·8	.....	78	47·4	62·7	.....	76·4	49	62·7	.....	81·8	63·4	72·6	.....	84·4	61	72·7	.....	82·8	51·5	67·1	.....	81	55·8	68·4	.....
3	45·6	25·2	35·4	.....	71	49·4	60·2	.....	70	58	64	0·32	75	57	66	0·09	80	61·8	70·9	0·07	86·3	69	77·6	0·09	70	56·8	63·4	.....
4	42·4	29·4	35·9	0·03	66	48	57	0·04	81·4	58·8	69·1	.....	76·4	53·9	65·1	.....	78·8	58·6	68·7	0·02	79·2	56	67·6	.....	78	36·6	57·3	.....
5	50	30	40	.....	50·2	43·8	47	0·32	88	54	71	.....	78·6	50·7	64·6	.....	71·6	53	62·3	.....	86	49	67·5	.....	64	46·9	55·4	..0·12
6	55	30	42·5	.....	67·6	43	55·3	.....	78·2	61·2	69·7	0·3	82·4	51·8	67·1	.....	72·2	43·2	57·7	.....	83	50	66·5	0·12	47	41·4	44·2	..0·14
7	54·4	38·8	46·6	0·21	67·4	47	57·2	0·4	88·8	63·2	76	.....	84·8	57·8	71·3	.....	62	53	57·5	0·51	69·2	43	56·1	.....	45·6	35	40·3	..0·22
8	60·6	45·5	53	0·27	64·8	38·8	51·8	0·05	91·4	64	77·7	.....	78	58·8	68·4	.....	62	42·2	52·1	.....	80	48	64	.....	52·4	42	47·2	..0·65
9	52·2	38	45·1	0·17	68	41	54·5	.....	83	57	70	0·34	79	51·7	65·3	.....	75	43·9	59·4	.....	87·3	62	74·6	0·02	49·8	43·2	46·5	.....
10	72·4	40	56·2	0·02	75·2	53	64·1	.....	68	56·8	62·4	0·02	85·2	52	68·6	.....	74·6	47·2	60·9	.....	90	68	79	.....	50·4	45·2	47·8	..0·90
11	62	38·8	50·4	0·84	66·8	50·6	58·7	.....	75	60·2	67·6	0·27	90·4	71·9	81·1	.....	80·4	50·9	65·6	.....	86	62	74	0·36	65·2	49·8	57·5	..0·48
12	48	38·8	43·4	0·08	67·2	40	53·6	.....	68	54	71	0·15	85	63·2	74·1	0·15	83·2	52	67·6	.....	64·2	54·8	59·5	0·73	59·6	45·4	52·5	..0·03
13	49·6	35·2	42·4	0·03	73·8	52·8	63·3	.....	66·4	40·6	53·5	.....	80	63·8	71·9	0·20	86·8	58	72·4	.....	71	48	59·5	.....	48·2	29	38·6	.....
14	53	31·9	42·4	.....	74·2	42	58·1	.....	70·6	45·4	58	0·02	83	55	69	.....	87	64	75·5	.....	69	53·5	61·2	0·18	62·8	30	46·4	.....
15	48	39·6	43·8	0·28	76	48	62	.....	68·6	50	59·3	0·10	85·4	57·6	71·5	.....	94	62·6	78·1	.....	66·2	47	56·6	.....	57	46·8	51·9	..0·04
16	60	33	46·5	.....	77	47	62	.....	68·6	40	58·3	.....	90	57·8	73·9	.....	94	65·6	79·8	.....	65·5	44	54·7	0·18	65·6	46	55·8	.....
17	55·8	36·8	46·3	0·46	75·5	49·4	62·4	0·02	62	56·2	59·1	1·58	85	65·8	75·4	.....	82·8	56·8	69·7	0·22	62·4	42	52·2	.....	59	42	50·5	.....
18	54	45·8	49·9	0·27	69	52	60·5	0·13	61	55	58	0·09	83·5	62·4	72·95	.....	88	61·8	74·9	0·82	62·8	34·2	48·5	.....	42	28·6	35·3	..0·05
19	56	32·9	44·4	.....	68	55	61·5	0·87	69·8	55·6	62·7	.....	81·7	59·9	70·8	.....	79	60	69·5	.....	64	46	55	.....	33	16·2	24·6	..0·20
20	47·6	29	38·3	0·80	61	53·5	57·2	.....	77	50	63·5	.....	87·4	52·2	69·8	.....	66·8	46·9	56·8	.....	70	53	61·5	.....	34·2	16·8	25·5	.....
21	41·8	23·4	32·6	.....	68·4	53·2	60·8	0·04	71	58	64·5	0·11	89	56·4	72·7	.....	75·4	45·8	60·6	.....	71·5	48	59·7	.....	48	18·2	33·1	.....
22	48·8	26·9	37·8	.....	71·6	47	59·3	.....	63	56	59·5	0·89	88·4	61	74·7	0·03	74·8	55·6	65·2	.....	78·2	48	63·1	.....	53·6	34	43·8	..0·06
23	49·6	27	38·3	.....	76·8	47·8	62·3	.....	79·6	56·8	68·2	0·68	81	61·7	71·4	0·98	84	64	74	.....	80·5	51	65·7	.....	58·6	34·6	46·6	..0·24
24	57·8	27	42·4	.....	83·6	48	65·8	.....	85	58·2	71·6	.....	72	54·8	63·4	0·03	78	64	71	.....	74	58·4	66·2	.....	40	29·6	34·8	.....
25	66	31	48·5	.....	85·8	59·6	72·2	.....	78	57·6	67·8	.....	76	54	65	.....	78·2	68·8	73·5	0·6	59·4	35·9	47·6	.....	44	24·8	34·4	..0·36
26	70	40·1	55	.....	77	51	64	.....	72·8	46·8	59·8	.....	81	53·4	67·2	.....	75·4	51·8	63·6	.....	60·4	29·9	45·1	.....	40	28·4	34·2	.....
27	46·4	32	39·2	0·06	68	46	57	.....	73·6	46·9	60·2	0·04	74	57·2	65·6	0·3	70	52	61	.....	72·4	48	60·2	.....	37·6	29	33·3	.....
28	51	28	39·5	.....	81	43·9	62·4	.....	78·8	57·8	68·3	0·16	78	61	69·5	0·2	71·5	52	61·7	.....	62·6	40·6	51·6	.....	40·4	25·2	32·8	.....
29	60	31·6	45·8	.....	84	48	66	.....	77	61	69	0·06	75	48	61·5	.....	70·4	50·8	60·6	.....	79·6	43	61·3	.....	45·6	23·8	34·7	.....
30	56·6	29	42·8	.....	76	51	63·5	.....	84	58·8	71·4	.....	83	52	67·5	.....	75·2	49	62·1	.....	83	48·2	65·6	.....	46	29·9	37·9	.....
31	.....	.....	.....	.....	85	49·6	67·3	.....	.....	.....	.....	.....	88	61·8	74·9	.....	78	46·6	63·3	.....	.....	.....	.....	.....	51	30	40·5	.....
Mean Temperature			43	.....			59·9	.....			65	.....			69·7	.....			66·4	.....			61·7	.....			44·55	.....
Total Precipitation				3·85				1·87				5·22				1·98				2·24				1·68				3·49

ENSILAGE CROPS

INDIAN CORN

Sixteen samples of different varieties of Indian corn were tested in duplicate 1/100 acre plots. One set of plots was sown on a flax sod which had been ploughed in the fall of 1921 and again in the spring of 1922 after an application of 15 tons of manure per acre. The duplicate plots were sown on a clover sod, similarly manured, but only spring ploughed.

All varieties were sown May 22, in rows 3 feet apart and the plants were thinned to 7 inches apart in the rows. All plots were weighed immediately after cutting and a representative sample taken to determine the dry yield per acre. The samples taken were dried partially in the field and the drying process continued in a heated room until no further shrinkage was noticeable. The samples were then passed through an ensilage cutter and representative samples extracted for the determination of the absolute dry matter. These latter determinations are not yet available so that the dry matter in the following table is air-dried weight and not absolute dry matter. The varieties tested, the date of cutting and the yields per acre were as follows:—

INDIAN CORN—TEST OF VARITIES

Variety	Source	Date Cut	Maturity when Cut	Yield per Acre Green		Yield per Acre Air Dried	
				Tons	Lbs.	Tons	Lbs.
Leaming	John Parks	Sept. 26	Late dough to glazing	18	260	12	882
Leaming	K. Macdonald & Sons.	Sept. 26	" "	17	1,817	11	1,415
Wisconsin No. 7	John Parks	Sept. 26	Late milk to dough	15	595	10	46
Ninety Day White Dent	Dakota Improved Seed Co.	Sept. 26	Milk to dough	16	1,698	9	1,980
Pride Yellow Dent	Dakota Improved Seed Co.	Sept. 21 and 26	Glazed	19	461	9	1,894
Wisconsin No. 7	J. O. Duke	Sept. 26	Dough to glazing	14	1,927	9	746
Yellow Flint	Dakota Improved Seed Co.	Sept. 21 and 26	Glazing	15	1,275	8	1,915
Bailey	J. O. Duke	Sept. 26	Milk to dough	14	257	8	846
Compton's Early	J. O. Duke	Sept. 21	Glazed	16	70	8	42
Golden Glow	J. O. Duke	Sept. 26	Dough to glazing	11	403	7	349
North Dakota		Sept. 21 and 26	Glazing to glazed	13	47	7	212
Longfellow	J. O. Duke	Sept. 21	Glazed	13	833	6	912
North Western Dent	Dakota Improved Seed Co.	Sept. 7	"	12	282	3	1,675
Twitchell's Pride	Fredericton	Sept. 7	"	7	222	2	871
Quebec No. 28		Sept. 7	"	7	56	2	804
	Average			14	280	7	1,772

To obtain comparable results, the different varieties of corn were harvested as nearly as possible at the same stage of maturity rather than on a common date. By September 26, however, it was necessary to harvest all varieties because of frost and such types as had not reached the glazed stage by that date, lost somewhat in the per cent of dry matter by reason of their immaturity.

It will be noticed on examining the table of yields, that corn sold under the same name but obtained from different sources may vary considerably in its yielding capacity. Most of our corn varieties are a mixture of a great many types, consequently, unless selection is followed with identical ideals in view, it is obviously quite probable that the selections produced by different growers will vary in many characteristics, which variation will be reflected in a wide

range in the yields that they are capable of producing. This being the case, it would seem good policy to continue to secure seed of any variety that has proven satisfactory, from the same source year after year.

While the yields for any single year are not a safe criterion on which to base our judgment as to the relative value of varieties, we can get some idea of what group of varieties has proven satisfactory for the current year. A comparison of the relation between the green weights and the air dry weights will also show us that the corn plants that give the highest green weight do not always produce the greatest amount of dry matter. As the dry matter constitutes the feeding value of the corn, this fact is worthy of consideration. If the figures were obtainable showing the absolute dry matter, instead of the air-dry matter, this variation between the value of the types as indicated by their green weights and their values as indicated by the dry matter they contain would probably be even more marked.

SUNFLOWERS

Five so-called varieties or strains of sunflowers were tested in duplicate one-one hundredth-acre plots on the same kind of land and under similar conditions to the corn varieties tested. They were planted May 22 in rows 3 feet apart, and the plants, when up, were thinned to 7 inches apart in the row. Each "variety" was harvested when the majority of plants were in full bloom. The yields are given in the table following:—

SUNFLOWERS—TEST OF VARIETIES

Variety	Sour e of Seed	Date Cut	Average Yield per acre		Average Yield per acre Air Dried	
			Tons	Lbs.	Tons	Lbs.
Mammoth Russian	Dakota Improved Seed Co	Sept. 15	31	1,298	9	815
Mammoth Russian	K. McDonald & Sons	Sept. 15	30	1,039	9	1,260
Early Ottawa	Exp. Farm, Ottawa	Sept. 2	26	634	5	436
Mammoth Russian	G. H. Hutton	Aug. 15	18	14	2	1,017
Mennonite	Rosthern District	Aug. 10	16	765	1	1,815
Average			24	1,150	5	1,469

No difference was noticeable between the Mammoth Russian from the Dakota Improved Seed Co. and that from K. McDonald & Sons. In this district, the season is long enough to mature the ordinary commercial Mammoth or Giant Russian sunflower, consequently this variety is recommended if it is desired to sow sunflowers as an ensilage crop.

While sunflowers are listed and sold under different variety names, it would be well to keep in mind that there are as yet no pure varieties. Each of the so-called "varieties" is a mixture of a great many types. This accounts, in part, for the wide variation in yield and reported value of many of our named commercial varieties.

There seems to be a lack of appreciation of the fact that sunflowers, at the time they are harvested for silage purposes, contain a very large per cent of water. Their high yield of green fodder has resulted in many growers placing a value on them, in comparison with corn and other ensilage crops, much greater than they deserve when considered in the light of their air-dry or absolute dry matter content. An examination of the tables of yields of green fodder in corn and sunflowers will bring out the fact that while the

highest yielding sunflower types show over 12 tons more green fodder per acre than the highest yielding corn varieties, yet the former contain about three tons less dry matter.

In districts where both corn and sunflowers can be produced with equal success, it would seem, therefore, that corn is still the more desirable crop to grow. The range of the sunflower plant, however, is greater than that of the corn plant so that the former offers a good opportunity of obtaining a good quality and quantity of silage in districts where corn can not, as yet, be profitably grown.

ANNUAL HAY CROPS

MILLETS

Six varieties of millets were tested in duplicate one-sixtieth-acre plots on land which had been in flax in 1921. The area available was not uniform, ranging from muck to clay, but the plots were so divided that one series was grown on each class of land. The land was fall ploughed in 1921 and, after an application of 15 tons of manure per acre, was spring ploughed in 1922 and prepared for seeding. All varieties were sown broadcast May 30 and 31, at the rate of 30 pounds of seed per acre. Each variety was harvested as soon as it was well headed and only a single cutting was taken from a plot. Some aftermath developed in the case of all varieties with the exception of hog millet —but in no case was there sufficient growth to harvest.

The yields of the varieties tested are given in the following table:—

MILLETS—TEST OF VARIETIES

Variety	Average Yield per Acre, 1922				Average dry Yield per Acre 1921–22	
	Green		Dry			
	Tons	Lbs.	Tons	Lbs.	Tons	Lbs.
Golden	10	490	2	1,820	3	1,810
Common	7	400	2	1,580	2	1,659
Japanese (Foxtail)	8	800	2	1,370	4	85
Hungarian	6	1,920	2	1,130	2	1,640
Siberian	6	60	2	650	2	1,360
Hog	5	260	1	1,990	2	630
Average	7	655	2	1,090	3	197

The Japanese millet reported in the previous table recording the yield of millet varieties and also in the following table of mixtures for hay is a Foxtail millet similar in appearance to the Siberian and Hungarian millets and is not the decidedly branching, coarse-strawed, awnless type sometimes sold under that name.

The yields of the best of these millets for the current year, as well as their averages for the two years, bear testimony to the possibilities of the millets as a catch crop when our regular sources of forage promises to be inadequate.

MIXTURES FOR ANNUAL HAY

A number of mixtures were tested in duplicate one-sixtieth-acre plots under conditions similar to the millet varieties The table following gives the mixtures sown, rates of seedings and yields per acre.

MIXTURES FOR HAY

Varieties and Mixtures Sown	Rate per acre	Average Yield per Acre			
		Green		Dry Hay	
	Lbs.	Tons	Lbs.	Tons	Lbs.
Hubam Clover	15	5	800	2	110
Banner Oats	80				
Hubam Clover	15				
Spring Rye	80	4	70	1	1,180
Hubam Clover	15				
Japanese Millet	20	14	710	4	1,570
Average, Hubam as a base		*7*	*1,860*	*2*	*1,620*
White Sw. Clover	15				
Banner Oats	80	9	660	2	167
White Sw. Clover	15	6	210	2	872
Spring Rye	80				
White Sw. Clover	15				
Japanese Millet	20	16	1,360	6	1,170
Average White Sw. Clover as a base		*10*	*423*	*3*	*1,403*
Yellow Sw. Clover	15				
Banner Oats	80	6	300	1	1,660
Yellow Sw. Clover	15				
Spring Rye	80	3	1,800	1	1,270
Yellow Sw. Clover	15				
Japanese Millet	20	11	560	3	1,410
Average Yellow Sw. Clover as a base		*7*	*220*	*2*	*780*
Crimson Clover	15				
Banner Oats	80	5	890	1	1,780
Crimson Clover	15				
Spring Rye	80	3	90	1	700
Crimson Clover	15				
Japanese Millet	20	9	150	3	1,110
Average Crimson Clover as a base		*5*	*1,710*	*2*	*530*
Barley	100	4	640	1	1,090
Spring Rye	90	2	380	1	40
Hubam Clover	20	2	860	..	990
White Sw. Clover	20	3	540	1	748
Yellow Sw. Clover	20	1	1,300	..	1,392*
Banner Oats	100	7	1,420	2	1,652*
Arthur Peas	45				
Banner Oats	78	5	1,760	2	302*
Common Vetch	15				

*Yields are from one one-sixtieth acre plot only.

Definite conclusions from one year's results should not be drawn but the above yields would certainly seem to indicate that Hubam clover did not, last year, justify the expenditure of $1 per pound for the seed. When sown alone and in combination with another crop it in no case outyielded Biennial White sweet clover sown under the same conditions.

The highest average yield was obtained when the Biennial White Blossomed sweet clover was used as the base for the mixture. The highest individual yield was secured from this clover mixed with Japanese millet.

No difficulty was experienced in curing the hay from any of these mixtures during the current season. The sweet clovers made a very fine growth when mixed with the millet and cereals, consequently the usual difficulty of curing the former was not experienced.

This method of combining the clovers, especially the sweet clovers, with millets and cereals offers encouraging possibilities. The experiment, however, will need to be continued through a period of years before it will be safe to draw definite conclusions as to the permanent value of the mixtures in question.

OATS AND BARLEYS FOR ANNUAL HAY

Through the courtesy of the Cereal Division, a number of oat and barley varieties were tested to determine their suitability for hay and, in the case of oat varieties, to determine the most favourable stage of maturity to cut for hay. The following table gives the varieties tested and the yields per acre.

BARLEY FOR HAY

Variety	Date Cut		Yield per Acre			
			Green		Dry	
			Tons	Lbs.	Tons	Lbs.
560 H	July	14	9	554	2	1,203
Chinese Ottawa 60	"	18	7	1,024	2	410
Fenil Ottawa 670	"	18	8	8	2	295
558 J I	"	14	8	628	1	1,846
556 H	"	18	6	1,857	1	1,705
577 C	"	19	7	1,000	1	1,627
696 A	"	27	6	373	1	1,608
Forage Ottawa 675	"	18	6	1,911	1	1,607
558 C 2	"	14	7	339	1	1,413
673 C	"	19	5	1,772	1	1,407
558 C 1	"	15	6	850	1	952
556 C	"	14	6	251	1	685
Feeder Ottawa 561	"	15	6	788	1	574

OATS FOR HAY

Variety	Cut When Heading				Cut When in Full Bloom				Cut When in Soft Dough			
	Date	Green per Acre		Dry per Acre	Date	Green per Acre		Dry per Acre	Date	Green per Acre		Dry per Acre
		Tons	Lbs.	Tons Lbs.		Tons	Lbs.			Tons	Lbs.	Tons Lbs.
Longfellow-Ottawa 478	July 20	15	1,133	3 245	July 22	19	543	3 1,259	July 31	15	409	4 343
O.A.C. No. 72	" 20	15	949	2 1,804	" 22	18	620	3 1,674	Aug. 1	14	1,388	3 1,927
Gold Rain	" 19	15	1,523	2 1,875	" 31	15	1,758	3 1,406	July 31	15	1,709	4 33
Victory	" 19	14	1,545	2 1,680	" 22	15	1,047	3 953	" 31	13	1,877	3 1,938
Daubeney Ottawa 47									" 24	11	882	3 702
Columbian Ottawa 78	July 19	11	982	2 1,044	July 21	13	56	3 46	" 27	15	530	4 867
Liberty OttaWa 480	" 17	15	1,027	2 164	" 20	16	147	3 1,597	" 31	15	1,187	4 8
Laurel Ottawa 477	" 17	15	971	2 1,801	" 20	15	773	3 491	" 31	15	159	3 1,545
Prolific Ottawa 77	" 19	13	1,420	2 1,876	" 22	16	1,398	3 668	" 31	12	1,598	3 803
Legacy	" 14	16	1,840	2 1,521	" 17	16	742	2 1,910	" 24	12	1,551	3 840
Banner Ottawa 49	" 19	13	844	2 1,457	" 21	13	976	2 1,355	" 27	13	716	3 1,105
Alpine	" 19	9	329	2 453	" 21	9	213	2 499	" 31	11	1729	3 1,551
Alaska									" 24	9	125	2 1,019

The foregoing tables of yields of barley and oats cut as hay indicate that the variety of grain that we use for this purpose is of considerable importance. It is doubtful if the same variety will continue to give the highest yields for hay

through a succession of years but, with a number of years of experimental data to guide us, we should at least be able to select a few varieties that would be superior in this respect.

A study of the yields of dry hay obtained from cutting oats at different stages of maturity points conclusively to the fact that the soft dough stage is the most profitable of the three tested at which to make hay from oat varieties.

FIELD ROOTS

MANGELS

Forty-eight samples of different varieties of managels were tested in duplicate one-one hundred acre plots.

All varieties were sown May 3, in rows 30 inches apart and the plants, when up were thinned to 10 inches apart in the row. The land where these tests were conducted was in pig runs in 1921 and received an application of 15 tons of manure per acre. All varieties were harvested October 13 and 14. The roots and tops were weighed separately and counts were made of the different types in each lot. Representative roots were photographed and a number of such roots from each lot sent to the Chemistry Division for analysis. In the following table will be found: The trade name of varieties; yields, green and dry, the latter being based on the per cent dry matter as determined by the Chemistry Division and remarks taken at harvest time, when the lots were labelled with numbers only and no source of seed or trade name shown.

Variety	Source of Seed	Average Yield per Acre				Per cent Dry Matter	Percentage of Sugar in Juice	Yield per Acre Dry Matter		Remarks
		Roots		Tops						
		Tons	Lbs.	Tons	Lbs.			Tons	Lbs.	
Yellow Intermediate	United Seed Growers, Penticton, B.C.	45	1,060	3	1,629	12·68	6·06	5	1,546	Light orange yellow Yellow Intermediate in general. Fair uniformity. Easy to harvest. (40).
Long Red Gatepost	J. A. Bruce & Co., Hamilton, Ont.	41	77	4	1,477	13·94	8·20	5	1,441	Long Red—not uniform. Skin uniform deep red, 2 per cent red globes, nine per cent Red Intermediate. Rooty and hard to harvest clean. (10).
Mammoth Long Red	Chas. E. Bishop & Son, Belleville, Ont.	36	1,329	3	806	14·39	6·75	5	552	Long red and fairly uniform and of good type for this variety except that skin colour in quite a few is more like half Sugar Rose. (41).
Danish Sludstrup	United Seed Growers, Penticton, B.C.	39	1,420	3	1,375	13·12	5·05	5	420	Yellow Intermediate type.—orange yellow skin. Fairly uniform. Easy to harvest. (34).
Sugar Rose	Halifax Seed Co., Halifax, N.S.	33	1,639	3	650	14·94	7·34	5	105	Half Sugar Rose in general—Not uniform—five per cent Half Sugar whites (white green tops) one per cent Long Reds, four per cent appear to be sugar beets. Rooty and rather difficult to harvest clean. (11).
Yellow Intermediate	Exp. Farm, Ottawa, Ont.	39	946	2	1,559	12·74	6·15	5	58	Yellow Intermediate with orange yellow skin. Fairly uniform and easily harvested clean. (49).
Peerless	A. E. McKenzie & Co., Brandon, Man.	40	867	3	468	12·38	6·36	5	11	Yellow Intermediate with light orange yellow skin in general type. Not uniform. Six per cent Tankards Orange yellow, four per cent Tankards Yellow. One per cent Tankards white, three per cent Globes. Easy to harvest clean. (6).
Giant Yellow Intermediate	J. A. Bruce & Co., Hamilton, Ont.	41	23	3	1,169	12·12	4·54	4	1,941	Light lemon yellow Yellow Intermediate in general. Fair uniformity, one per cent red roots, one per cent Globes, one per cent Tankards. Easy to harvest. (38).
Giant Rose	J. A. Bruce & Co., Hamilton, Ont.	34	1,456	3	17	14·25	7·26	4	1,897	Half Sugar Rose with medium pink skin. No uniformity, six per cent Half Sugar whites, six per cent appear to be sugar beets. Rather hard to havest clean. (17).
Mammoth Long Red	Beaton, Oshawa, Ont.	36	877	2	1,278	13·47	6·37	4	1,816	Long red to Red Intermediate in general type. (46).
Royal Giant Sugar Beet.	Steele Briggs Co., Toronto, Ont.	37	770	2	1,709	13·01	7·26	4	1,728	Half Sugar Rose with medium pink skin. Not uniform. Ten per cent white green top showing red in crown only, six per cent appear to be Sugar beets and grow deep in ground. Rooty and are hard to harvest. (8).
Yellow Intermediate	A. E. McKenzie Co., Brandon, Man.	35	579	2	1,481	13·65	6·43	4	1,634	Cannot indicate what type this is. Three per cent Half Sugar Rose, One per cent Red Tankards, two per cent Sugar beets, one per cent Yellow Tankards, One per cent Half Sugar White, two per cent Yellow Globes, one per cent Long Reds, two per cent Red Intermediates. (30).

Variety	Source of Seed	Average Yield per acre				Per cent Dry Matter	Percentage or Sugar in Juice	Yield per Acre Dry Matter		Variety
		Roots		Tops						
Gate Post	Halifax Seed Co., Halifax, N.S.	37	171	3	32	12·86	5·25	4	1·538	Yellow Intermediate to Long Yellow with light orange yellow skin in general type. Not uniform. (14).
Eclipse	A. E. McKenzie Co., Brandon, Man.	42	1,556	2	1,013	11·02	3·46	4	1,427	Yellow Tankard with light yellow skin in general type. Fairly uniform, two per cent Half Sugar Rose, one per cent Globes, two per cent White, three per cent Golden. Easy to harvest (this, except for small per cent of other types, is a good type of Yellow Tankard. (12).
Danish Sludstrup	K. McDonald & Son, Ottawa, Ont.	38	1,257	2	1,444	12·10	4·96	4	1,348	Light Yellow. Yellow Intermediate in general. Not uniform. Two per cent Yellow Globes, two per cent Yellow Tankards. Easy to harvest. (35).
Giant Red Sugar	J. A. Bruce & Co., Hamilton, Ont.	34	1,550	3	1,084	13·26	7·53	4	1,222	Long Red in general shape and colour. Not at all uniform. Seven per cent Half sugar whites (white green top), Seventeen per cent Half Sugar Rose two per cent White Globes, one per cent Red Globes. Hard to harvest clean. (15).
Sugar Mangel	Steele Briggs Seed Co., Toronto, Ont.	37	635	2	446	12·24	5·24	4	1,135	Half Sugar White. Not uniform. Twelve per cent show red blood (Half Sugar Rose), two per cent deep red roots, two per cent White Globes, one per cent appear to be Sugar Beets. Easy to harvest clean. (19).
Giant Yellow Oval	Steele Briggs Seed Co., Toronto, Ont.	35	1,362	3	14	12·58	5·24	4	977	In general Yellow Intermediate type. Skin orange yellow to light yellow. Fairly easty to harvest. (32).
Mammoth Long Red	United Seed Growers, Penticton, B.C.	32	1,346	2	457	13·59	6·94	4	881	Long Red to Red Intermediate in general type. (47).
Danish Sludstrup	Graham Bros., Ottawa, Ont.	30	825	3	716	14·56	8·10	4	856	Light lemon yellow to yellow intermediate in general. Fair uniformity, two per cent Half Sugar Rose, one per cent Long to Intermediate Red. Easy to harvest. (37).
Manitoba Giant Yellow	A. E. McKenzie Co., Brandon, Man.	31	895	3	955	14·07	6·65	4	849	All shapes and colours present in this lot. Yellow Intermediate, Long Yellow, Sludstrup, Globes and Half Sugars. Only type not here the Long Reds. Easy to harvest. (22).
Giant White Sugar	United Seed Growers, Penticton, B.C.	36	1,442	2	721	11·81	5·92	4	674	Fairly uniform, Half Sugar White, nine per cent show presence of red blood, one per cent appear to be Sugar beets. Easy to harvest clean. (21).
Giant White Feeding	J. A. Bruce & Co., Hamilton, Ont.	35	995	2	1,523	12·10	4·54	4	590	Half Sugar Whites. Fairly uniform, five per cent show presence of red blood (Half Rose), one per cent red roots, one per cent appear to be sugar beets. Easy to harvest. (25).
Mammoth Long Red	Graham Bros., Ottawa, Ont.	33	844	3	40	12·56	5·98	4	396	Long Red to Red Intermediate in general type. (45).

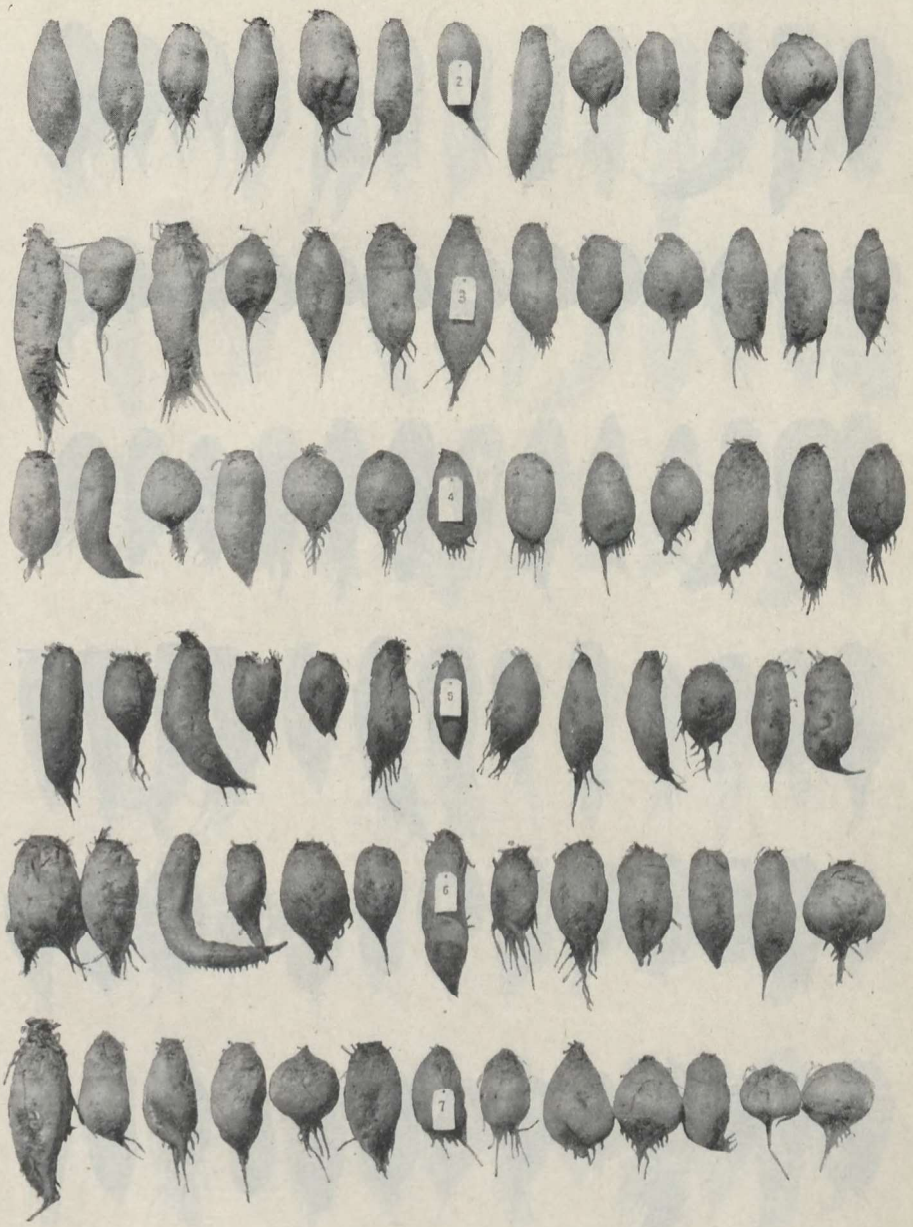
Prizetaker Yellow Globe.	A. E. McKenzie & Co., Brandon, Man.	36	1,204	1,	1,704	11,12	5·07	4	140	Yellow Globe in general, fairly uniform, tends to ovals, one per cent Red Intermediate, six per cent Yellow Tankards, one per cent Long Yellows. Very easy to harvest clean. (7).
Mammoth Prize Long Red.	K. McDonald & Son, Ottawa, Ont.	30	275	2	1,843	13·50	7·26	4	137	Long Red to Red Intermediate with deep red skin in general type. Quite a few roots in this lot looks like Half Sugar Rose with deep pink skin. Hard to harvest clean. (20).
Giant Long Red.....	A. E. McKenzie & Co., Brandon, Man.	26	159	3	864	15·50	7·43	4	85	Long Red. Fair uniformity, but colour of many roots is like a deep pink skinned Half Sugar. Hard to harvest. (23).
Giant Yellow Globe...	A. E. McKenzie & Co., Brandon, Man.	28	1,990	1	910	13·88	6·41	4	49	Yellow Globe in general type, runs to Yellow Intermediate. Not uniform. Very easy to harvest. (18).
Giant Sugar.....	Chas. E. Bishop & Son, Belleville, Ont.	27	555	2	352	14·73	7·01	4	36	Half Sugar White. Fair uniformity. Nine per cent show red blood, two per cent appear to be Sugar Beets. Easy to harvest. (44).
Long Red.....	Halifax Seed Co., Halifax, N.S.	33	393	2	854	12·04	5·46	3	1,994	Long Red and fairly uniform, and of a good type for this variety, except that skin colour in quite a few is more like Half Sugar Rose. (42).
Giant Yellow Intermediate.	Halifax Seed Co., Halifax, N.S.	32	590	1	1,010	11·93	4·84	3	1,706	Light lemon yellow, to yellow Intermediate in general. Not uniform, six per cent Tankards, three per cent Globes. Easy to pull. (39).
Yellow Globe.....	Halifax Seed Co., Halifax, N.S.	30	839	2	825	12·64	5·92	3	1,690	Yellow Intermediate to Long Yellow in general type. Skin colour orange yellow to yellow. Not uniform, two per cent Red roots. Fairly easy to harvest clean. (28).
Golden Tankard.....	A. E. McKenzie & Co., Brandon, Man.	31	533	1	1,362	12·24	6·35	3	1,654	Yellow Intermediate to Yellow oval with light orange yellow skin in general type (some excellent Yellow Intermediate present), five per cent Tankards, seven per cent Globes. Easy to harvest clean. (4).
Champion Yellow Globe.	Graham Bros., Ottawa, Ont.	29	1,925	2	843	12·72	4·75	3	1,622	Yellow Intermediate with lemon yellow skin in general type. Not uniform (not a globe nor anything near it in the lot. Easy to harvest. (13).
Golden Tankard.....	Leonard Seed Co., Chicago, U.S.A.	29	1,754	1	1,407	12·60	5·78	3	1,529	Yellow Intermediate to yellow oval in general type, light orange, yellow skin, six per cent Globes, three per cent Tankards, one per cent light, lemon yellow Globes. Easy to harvest clean. (2).
Giant Yellow Intermediate.	K. McDonald & Sons, Ottawa, Ont.	32	651	1	1,566	11·63	5·24	3	1,519	Light lemon yellow Yellow Intermediate in general. Fair uniformity, one per cent Yellow Globes, two per cent Yellow Tankards. Easy to harvest. (36).
Golden Tankard.....	Graham Bros., Ottawa, Ont.	29	557	1	1,899	12·74	5·25	3	1,460	No general type but Yellow Intermediate to yellow ovals with orange yellow skin predominate. No uniformity, four per cent Red Globes, five per cent Yellow Tankards, five per cent Yellow Globes, two per cent Light lemon Yellow Intermediate. (16).
Yellow Leviathan.....	United Seed Growers, Penticton, B.C.	26	1,263	2	882	13·76	7·01	3	1,329	Yellow Intermediate to Long Yellow with orange yellow skin. Fairly uniform. Fairly easy to harvest. (26).
Yellow Intermediate...	Chas. E. Bishop & Sons, Belleville, Ont.	28	1,650	3	55	12·70	5·27	3	1,322	In general light yellow Yellow Int. Fairly uniform. Easy to harvest. (33).

Variety	Source of Seed	Average Yield per Acre		Per cent Dry Matter	Per centage of Sugar in Juice	Yield per Acre Dry Matter		Variety
		Roots	Tops					
		Tons Lbs.	Tons Lbs.					
Golden Tankard.....	K. McDonald & Sons, Ottawa, Ont.	28 1,927	1 1,779	12·59	6·25	3	1,293	Yellow Intermediate with orange yellow skin. Not uniform, six per cent Tankards, one per cent Globes. (5).
Long Red.....	D. M. Ferry Co., Windsor, Ont.	28 1,287	2 1,464	12·63	5·76	3	1,235	Long Red. Fairly uniform and of good type for this variety, except that skin colour in quite a few is more like Half Sugar Rose. (43).
Red Globe.....	Graham Bros., Ottawa, Ont.	24 558	2 1,057	14·29	7·53	3	939	Uniformly rough very objectionable red Globe. Very easy to harvest. (9).
Golden Tankard.....	Halifax Seed Co., Halifax, N.S.	32 1,794	2 1,021	11·54	5·15	3	593	Yellow Intermediate with light orange yellow skin in general type. Not uniform. Sixteen per cent Long Reds, five per cent Yellow Globes. Easy to harvest clean. (3).
Sugar Beet.....	D.M. Ferry & Co., Windsor, Ont.	27 1,118	1 1,650	11·44	4·85	3	305	Half Sugar White. Fairly uniform, seven per cent show presence of red blood, one per cent Long Reds, one per cent Long Yellows. (48).
Yellow Leviathan.....	D.M. Ferry & Co., Windsor, Ont.	24 650	2 21	12·76	6·06	3	208	Yellow Intermediate to long Yellow mangels, Forty-four per cent table beets and even these are not uniform. (27).
Yellow Globe.....	K. McDonald & Sons, Ottawa, Ont.	26 1,589	.. 1,910	11·42	5·25	3	120	Yellow to Orange yellow Globes in general type. Fair uniformity, two per cent Tankards. Easy to harvest clean. (29).
Yellow Globe.....	Beaton, Oshawa, Ont.	24 1,231	1 327	11·94	4·77	2	1,878	In general Yellow to orange yellow Globes. Fair uniformity. Very east to harvest. (31).
Red Globe.....	Halifax Seed Co., Halifax, N.S.	23 1,813	1 1,093	12·25	5·06	2	1,857	Tankard in general shape, colour between Half Sugar Rose and Eckendorffer. Fair uniformity, five per cent Red Globes, three per cent Red Intermediate. Easy to harvest. (24).
	Average.....	32 1,963	2 1,183	12·88	5·99	4	453	

NOTE.—Numbers in brackets following remarks indicate number of photograph.

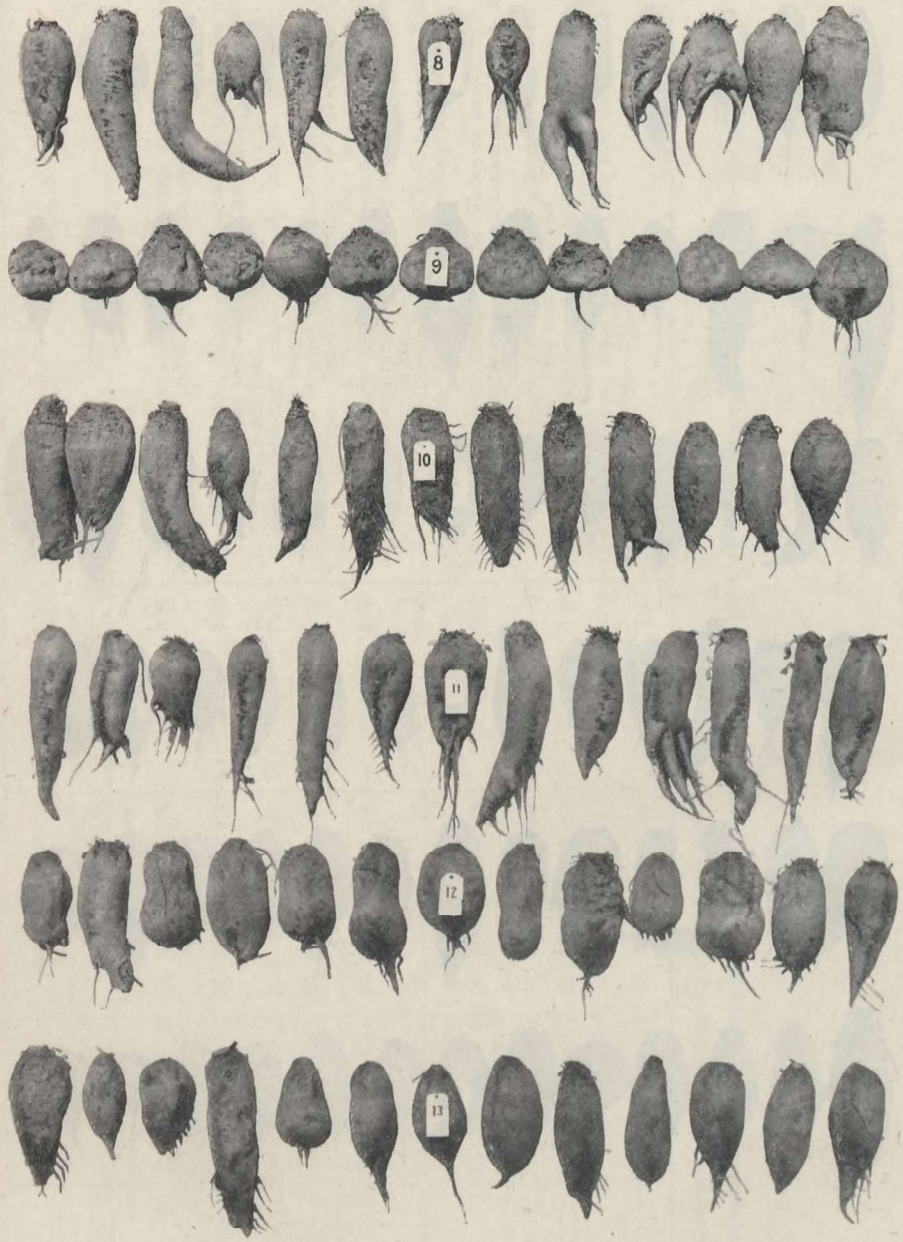
*Analysis was made of mangels present and dry matter, persent sugar in juice and yield dry matter per acre are based on a stand of mangels.

REPRESENTATIVE MANGELS OF VARIETIES TESTED

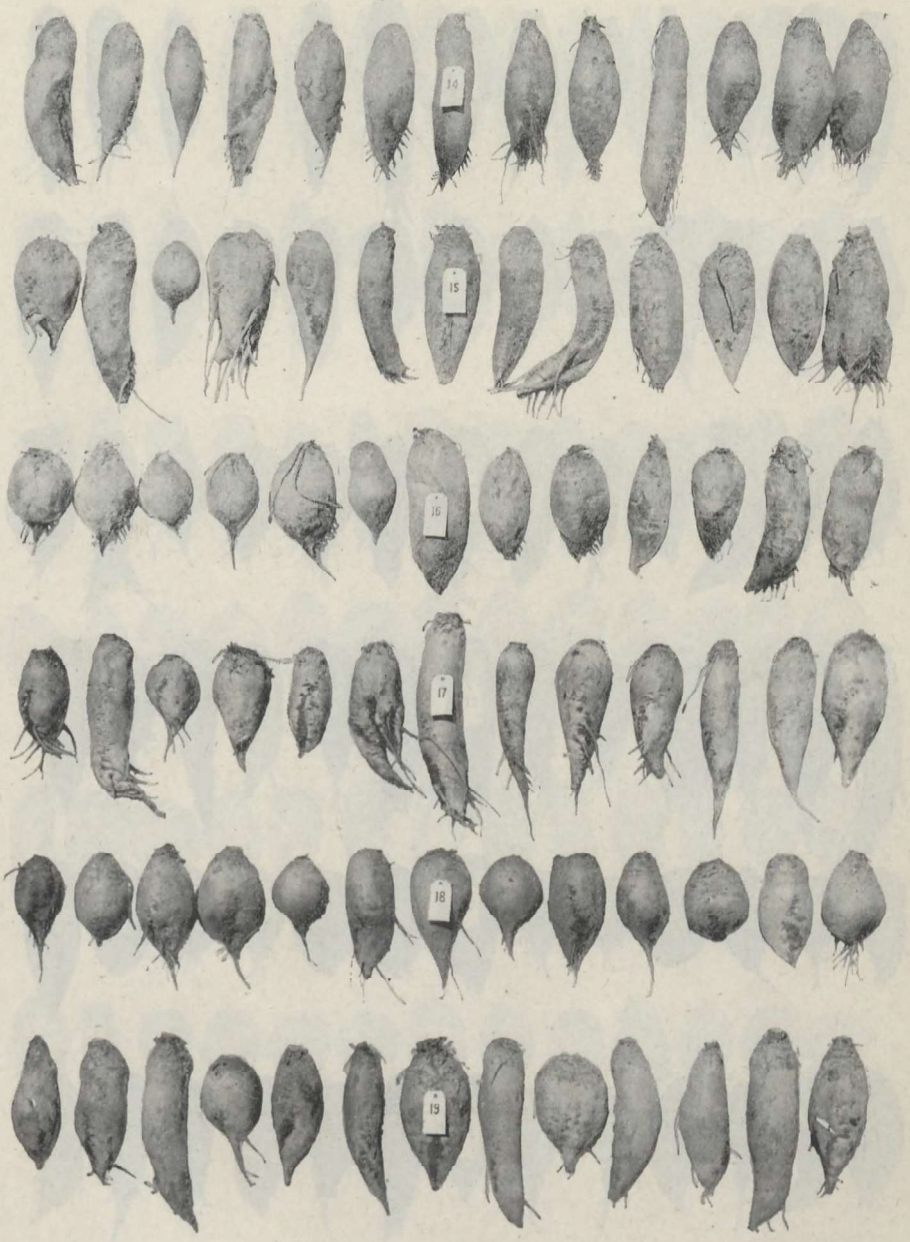


58357—41½

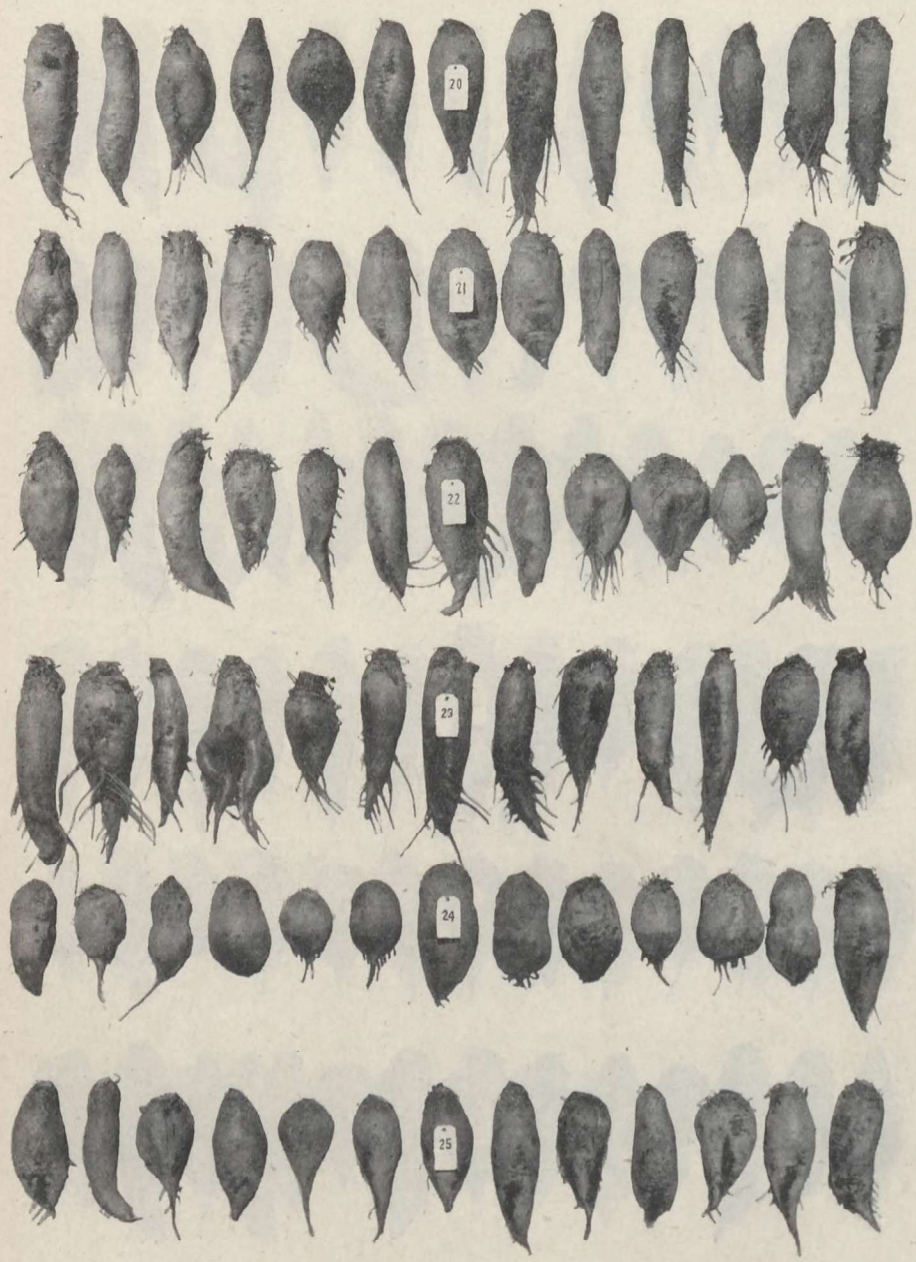
REPRESENTATIVE MANGELS OF VARIETIES TESTED—*Continued*



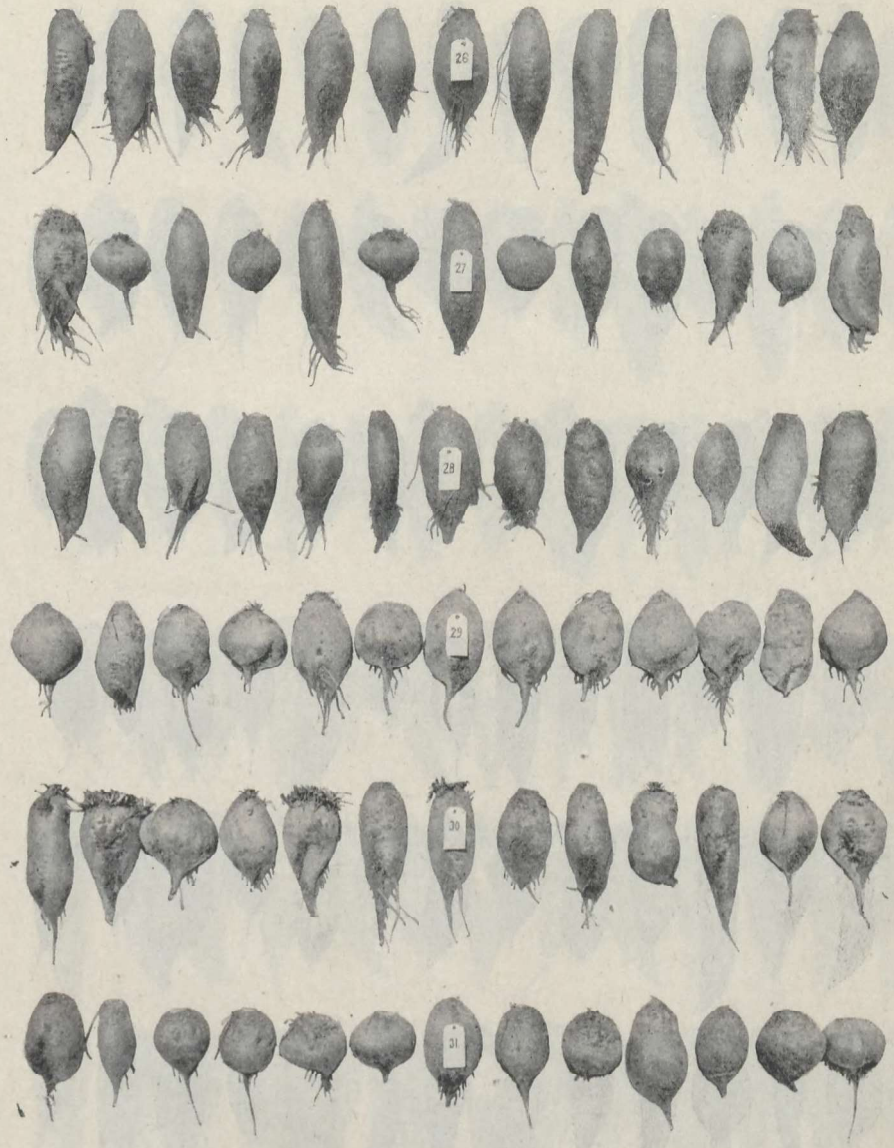
REPRESENTATIVE MANGELS OF VARIETIES TESTED—*Continued*



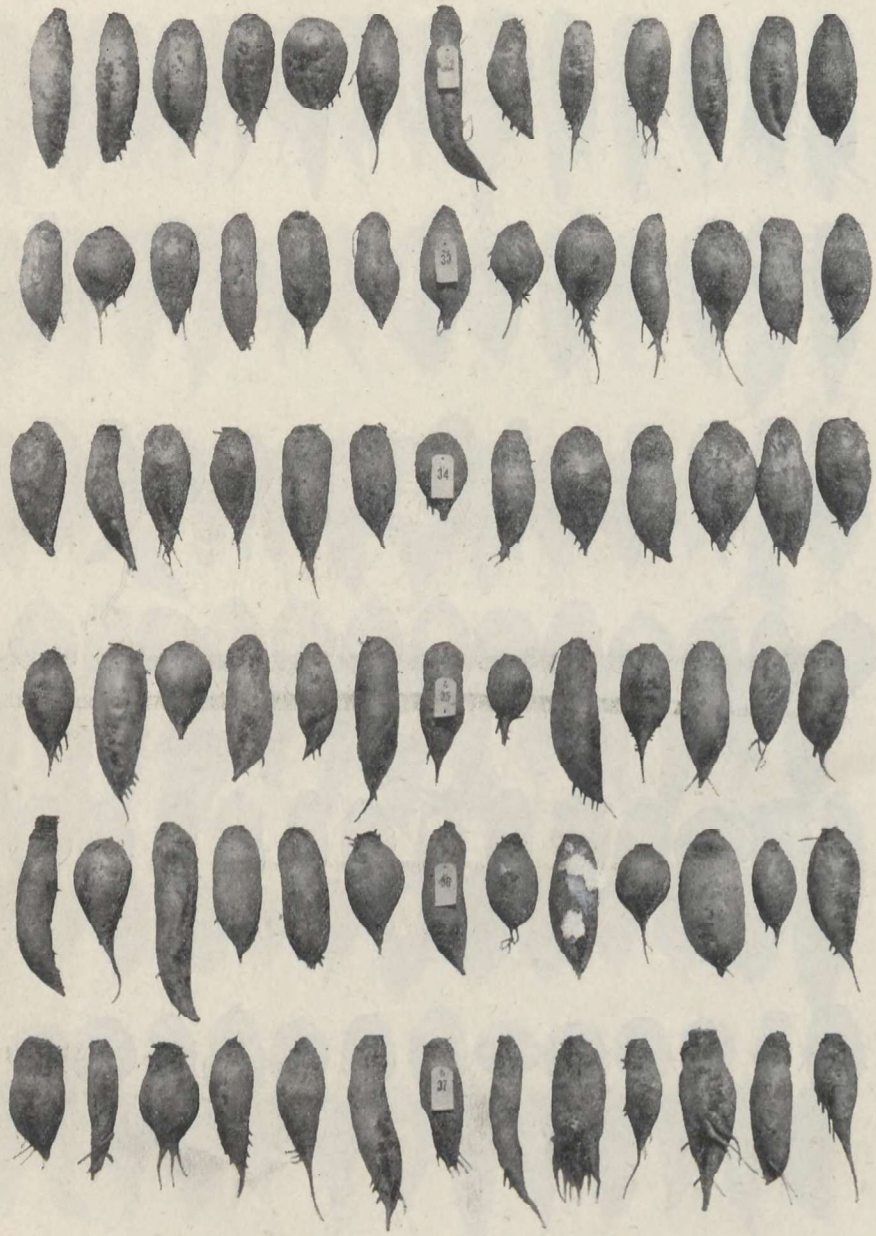
REPRESENTATIVE MANGELS OF VARIETIES TESTED—*Continued*



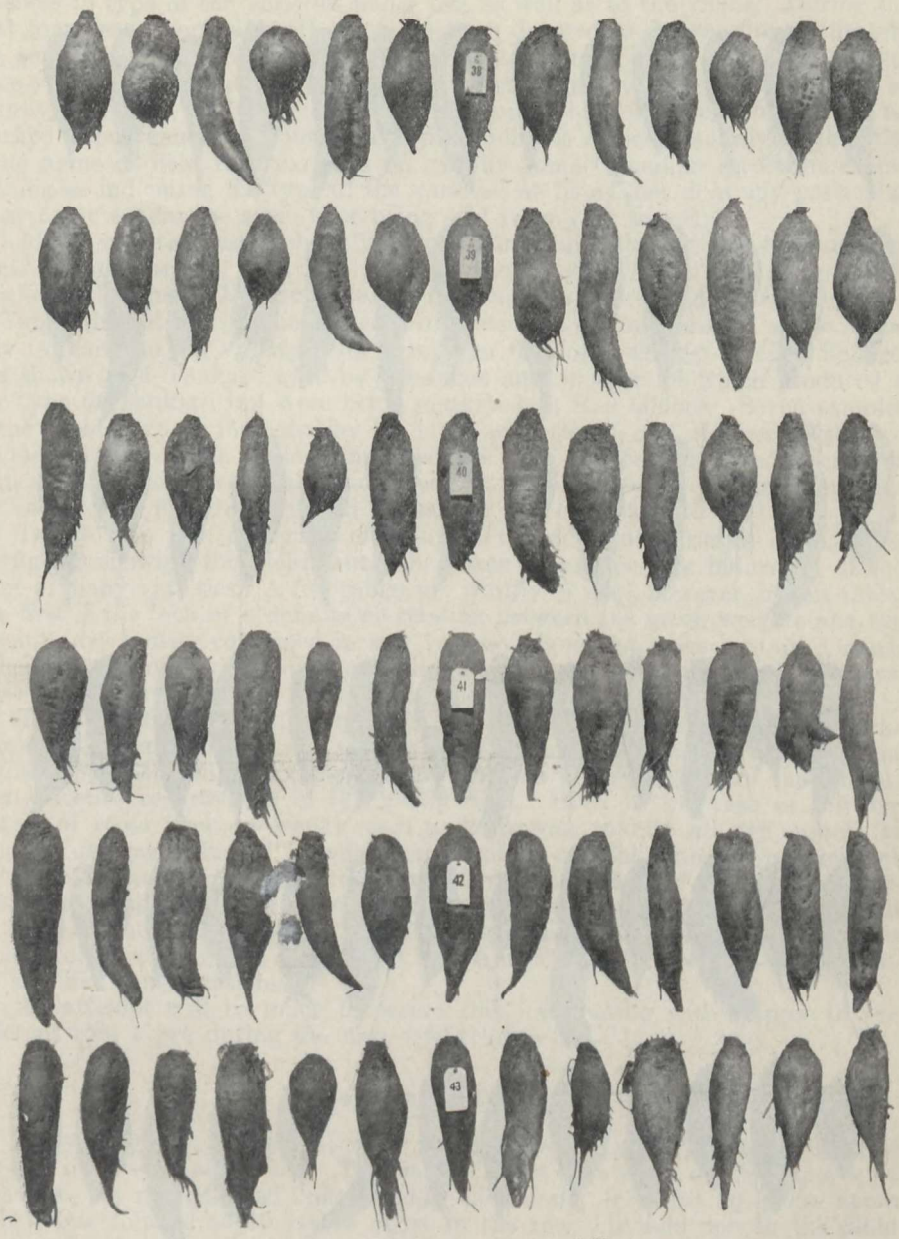
REPRESENTATIVE MANGELS OF VARIETIES TESTED—*Continued*



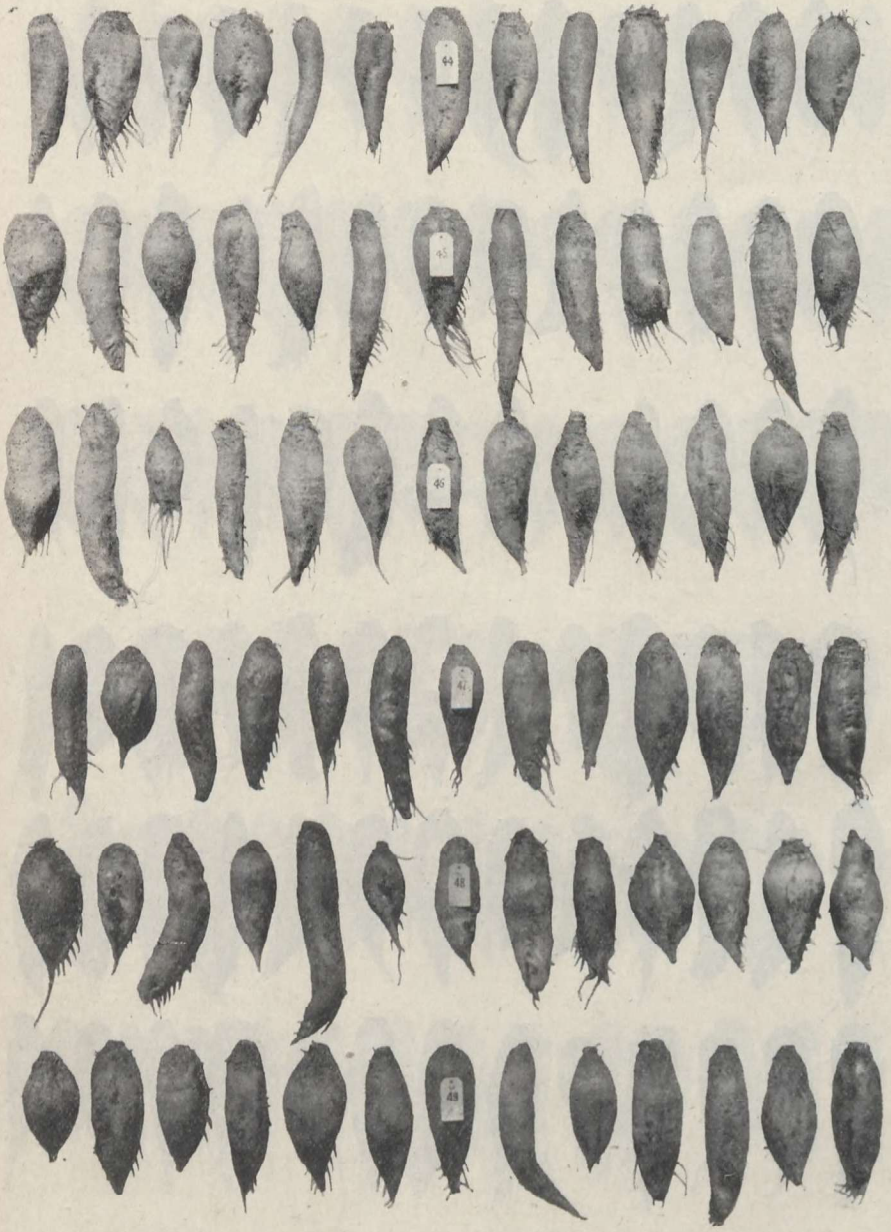
REPRESENTATIVE MANGELS OF VARIETIES TESTED—*Continued*



REPRESENTATIVE MANGELS OF VARIETIES TESTED—*Continued*



REPRESENTATIVE MANGELS OF VARIETIES TESTED—*Concluded.*



Consideration has always been given, when conducting variety tests, to the trueness to type of the varieties under test as well as to the yields. During the past four years, particular attention has been devoted to determining accurately the genuineness of varieties and types present. During the war years, varieties were very badly mixed and off type but there seemed to be some indication of improvement up to 1921. Last year's results, however, certainly show no marked improvement and our data to date indicate rather conclusively that the trade name of field root varieties on sale by some Canadian seedsmen means nothing as indicating the type of the varieties as listed, nor does any particular trade name ensure the same type being sold from year to year.

Many varieties tested show little or no uniformity to any one type nor are crops produced which, even in a general way, agree with the type as indicated by the trade name. For example—of five samples tested and which were sold as Tankards, not one produced a crop of roots of a general tankard shape. The only tankards in our variety tests were from seed of a variety labelled Eclipse, and shown as a Tankard type by catalogue and another lot which produced a fair type of Tankard but were being marketed as Red Globes. Seven samples of the Globe type, as indicated by the label, were tested, and of these seven, two produced crops of the Yellow Intermediate type and one produced a crop of Tankards. There is certainly much need of improvement in the uniformity of the varieties of field roots offered for sale in this country.

Due to the lack of purity of many of the different varieties of mangels, the figures showing the yield cannot be taken as an absolute indication of the value of many varieties. A few things are worthy of note, however, in this table. The first is the lack of a definite co-relation between the green weights and the absolute dry matter contained in any variety. Some varieties contain a much higher per cent of dry matter than others and it is presumed that such varieties, consequently, are higher in feeding value per unit of green weight.

That the habit of rating mangels and other types of roots on their production of green fodder is not a proper method of comparison is quite evident in the light of the wide variation in the per cent of dry matter of the various root varieties reported on in this publication. Even in the case of the dry matter of roots itself, it would seem to be unwise to rate all dry matter as equal in feeding value. The variation in sugar content alone in mangels, as shown in the foregoing table, represents a variation in food value. The ultimate test of the value of a variety of roots will eventually have to be expressed in terms of the number of pounds of the various food constituents that it is capable of producing per acre, taken in conjunction with the ease of harvesting and like considerations.

An attempt will be made to secure this information with respect to the different root types during the next few years.

SWEDE TURNIPS

Forty samples of Swede turnip varieties were tested in quadruplicate one-one hundredth-acre plots. Two sets of plots were sown on the same type of land as the mangels and under similar conditions; in ridges 30 inches apart with plants thinned to 10 inches apart in the row. In addition to the plots sown under these conditions, two plots of each sample were sown on clay soil which had been in individual grasses in 1921. This land was fall ploughed, and after an application of 20 tons of manure per acre was spring ploughed and prepared for seeding. Seeding was done May 4 and 26 and, when harvested October 16, 17 and 23 the following yields were obtained.

Variety	Source of Seed	Average Yield per Acre	Per cent Dry Matter	Per cent Sugar in Juice	Dry Matter per Acre	Remarks
		Tons Lbs.			Tons Lbs.	
Magnum Bonum	K. McDonald & Sons, Ottawa, Ont.	25 1,655	11·66	1·12	3 23	Globes. A few short ovals. Purple Top. Few bronze tops. Fairly uniform and smooth.
Champion Purple Top	United Seed Growers, Penticton, B.C.	21 1,338	12·96	1·22	2 1,617	Globe to oval. Purple Top. Fairly uniform but tend to be rough.
Canadian Gem Purple Top	J. A. Bruce & Co., Hamilton, Ont.	22 113	12·73	1·01	2 1,616	Globes. A few short ovals. Purple Top. A few bronze tops. Fairly uniform and smooth.
New Century Purple Top	J. A. Bruce & Co., Hamilton, Ont.	21 1,673	12·14	1·32	2 1,302	Ovals. A few globes. Majority purple top. Bronze and green tops present. Not uniform. Rough.
Jumbo	Steele Briggs & Co., Toronto, Ont.	24 454	10·71	1·01	2 1,189	Ovals. A few globes. Purple Top (colour deep). A few bronze tops present. Fairly uniform. Rather rough.
Bangholm	Club root resistant from Denmark.	20 499	12·81	0·92	2 1,188	
Hall's Westbury	J. A. Bruce & Co., Hamilton, Ont.	23 701	11·00	0·92	2 1,137	Globe to oval. Turple Pop. A few green and bronze tops. Not uniform. Rough.
Canadian Gem	United Seed Growers, Penticton, B.C.	23 1,096	10·72	1·12	2 1,049	Globes to short ovals. Purple Top, green and bronze tops present. Fairly smooth but lack a little in uniformity.
Improved Hardy PurpleTop	Halifax Seed Co., Halifax, N.S.	24 1,639	10·17	1·12	2 1,048	Globes. A few short ovals. Purple Top. Uniform. Very rough.
Hartley's Bronze Top	Graham Bros., Ottawa, Ont.	21 1,949	11·45	1·12	2 1,032	Globe. A few ovals. Green Top. Bronze tops and purple tops present. Fairly uniform. Rough.
Champion Purple Top	Graham Bros., Ottawa, Ont.	17 1,844	13·54	1·32	2 853	Ovals. A few globes. Majority purple top. Bronze and green tops present. Not uniform. Rough.
Canadian Gem	Casper Smith & Co., Oshawa, Ont.	21 563	11·38	1·22	2 844	Mixture of globes and short and long ovals. Not uniform, colour of tops bronze and purple. Rough.
Hall's Westbury	K. McDonald & Sons, Ottawa, Ont.	21 1,067	11·06	1·12	2 763	Globes, a few ovals. Purple top. Green and bronze tops present. Fairly uniform. Smooth.
Elephant	Chas. E. Bishop & Son, Belleville, Ont.	22 831	10·62	0·92	2 761	Oval. Purple Top (colour deep and uniform). A very few globes present. Uniform but rather rough.
Elephant	Halifax Seed Co., Halifax, N.S.	22 442	10·55	0·92	2 689	Ovals, a very few globes. Purple top (colour deep and very uniform). Uniform and smooth.
Elephant or Jumbo Purple Top.	J. A. Bruce & Co., Hamilton, Ont.	20 1,429	11·24	1·02	2 657	Ovals (long). Purple top with bronze tops present. Fairly uniform but rough.
Monarch or Tankard	D. M. Ferry & Co., Windsor, Ont.	19 699	11·67	1·01	2 516	Globes to ovals (bad mixture of shapes). Purple top. No uniformity. Rough.
Bangholm	Exp. Farm, Charlottetown, P.E.I.	16 843	13·58	1·42	2 460	
Best of All Swedes	Graham Bros., Ottawa, Ont.	18 225	12·06	1·12	2 369	Globes to oval. Purple Top. Fairly uniform but rather rough.
North Western Purple Top	A. E. McKenzie & Co., Brandon, Man.	19 100	11·18	0·92	2 260	Ovals. A few globes. Majority purple tops. Green and bronze tops present. Not uniform. Rough.

Sutton's Champion	Chas. E. Bishop & Son, Belleville, Ont.	18	1,681	11·11	1·22	2	186	All shapes and top colours—mostly rough globes. Rough.
Canadian Gem	D. M. Ferry & Co., Windsor, Ont.	17	666	12·00	1·22	2	160	Globes with a few short ovals. Purple top mostly, but bronze tops present. Rough and not uniform.
Ditmars	R. P. Ditmars, Deep Brook, N.S.	18	1,959	10·67	1·02	2	50	
Bangholm Purple Top	Halifax Seed Co., Halifax, N.S.	18	371	11·08	1·02	2	30	Ovals and globes. Purple Top. Not uniform. Fairly smooth.
Hartley's Bronze Top	K. McDonald & Sons, Ottawa, Ont.	17	1,935	11·09	1·12	1	1,985	Ovals to globes. Green top. A few bronze tops present. Not uniform. Rough, Rooty and with many small tops.
Monarch	Exp. Farm, Nappan, N.S.	17	1,055	11·14	0·92	1	1,905	
New Perfect	J. A. Bruce & Co., Hamilton, Ont.	17	1,743	10·91	1·02	1	1,900	Ovals to globes. Purple top. Green tops present. Fairly smooth and uniform.
Kangaroo Bronze Top	Graham Bros., Ottawa, Ont.	15	760	12·66	1·52	1	1,894	Mixture of shapes. Purple green and bronze tops. A rough, rooty un-uniform lot.
Kangaroo	Halifax Seed Co., Halifax, N.S.	18	1,059	10·39	1·22	1	1,850	Globes and ovals (about half of each). Majority bronze or green tops. No uniformity. Rough.
Improved Purple Top (Mammoth).	Halifax Seed Co., Halifax, N.S.	16	715	11·58	1·02	1	1,788	Globes to short oval. Purple top. Green and bronze tops present.
Good Luck	Exp. Farm Ste. Anne de la Pocatiere, Que.	16	768	11·29	0·92	1	1,700	
Selected Purple Top	Steele Briggs Seed Co., Toronto, Ont.	17	68	10·86	1·02	1	1,700	Globes. About thirty per cent ovals. Majority purple tops. A rough uneven lot.
Hall's Westbury	Graham Bros., Ottawa, Ont.	17	381	10·62	0·92	1	1,651	Globes to ovals. Purple top. Fairly uniform and smooth.
Champion Purple Top	K. McDonald & Sons, Ottawa, Ont.	13	1,915	12·91	1·73	1	1,604	Ovals to globes. Purple top. Not very uniform. Fairly smooth.
Sutton's Champion	D. M. Ferry & Co., Windsor, Ont.	13	1,450	13·09	1·12	1	1,593	Globes to short oval. Purple Top. A few bronze tops. Fairly uniform.
Magnum Bonum Purple Top	Graham Bros., Ottawa, Ont.	15	1,834	11·24	0·91	1	1,578	Ovals to globes. Purple Top. Not uniform but roots are smooth.
Carter's Improved Purple Top.	D. M. Ferry & Co., Windsor, Ont.	16	430	10·95	0·92	1	1,551	Globes. A few short ovals. Purple Top. A few bronze and green tops present. Not uniform, but roots fairly smooth.
Kangaroo	K. McDonald & Sons, Ottawa, Ont.	15	1,083	11·30	1·02	1	1,512	Ovals (Long) bronze to green tops. A few purple tops present. Fairly uniform and smooth.
Purple Top	J. A. Bruce & Co., Hamilton, Ont.	15	1,032	9·80	1·02	1	1,041	Globe to oval. Purple top. Green tops present. Not uniform, rough.
Hartley's Bronze Top	D. M. Ferry & Co., Windsor, Ont.	12	1,661	11·47	1·22	1	943	Globes to short ovals. Green tops. A few bronze tops present. Fairly uniform. Rough.
	Average	18	1,993	11·48	1·10	2	350	

Twenty-three samples of fall turnip varieties were tested in duplicate on-one hundredth-acre plots. The land had been in individual grasses in 1921, was fall ploughed, manured at a rate of 20 tons per acre, spring ploughed and prepared for seeding. Seeding was done May 26 on ridges 30 inches apart and the plants thinned, when up, to 10 inches apart in the row. The results are given in the following table. Where lots of seed are duplicated, it is due to the fact that seed of these varieties was obtained at different times through two agencies:—

Variety	Source of Seed	Average Yield Per Acre	Per cent Dry Matter	Per cent Sugar in Juice	Dry Matter Per Acre	Remarks
		Tons Lbs.			Tons Lbs.	
Greystone	Beaton, Oshawa, Ont.	15 191	11·86	0·92	1 1,581	Purple top globe. Smootb. Flesh white. Fair uniformity, shape and colour.
Purple Top Mammoth	Steele Briggs & Co., Toronto, Ont.	16 601	10·94	1·02	1 1,566	Globe to flat purple top. Roots very clean and smooth but not uniform, white flesh.
Improved Greystone	J. A. Bruce & Co., Hamilton, Ont.	14 357	11·37	1·23	1 1,224	Purple top globe slightly flattened. Flesh white. Fairly smooth and uniform.
Devonshire Greystone	Halifax Seed Co., Halifax, N.S.	14 1,417	10·72	0·91	1 1,154	Green to purple top, flat, circular. Fairly smooth. White flesh.
Devonshire Greystone	Steele Briggs & Co., Toronto, Ont.	15 1,472	9·78	0·81	1 1,078	Globes to flat purple and green tops. Flesh white.
Purple Top Mammoth	Sutton's England	16 29	9·60	0·82	1 1,075	Purple top. Globe to oval. Smooth and uniform.
Early Six Weeks	Sutton's, England	12 1,451	11·43	1·12	1 909	Green top globe. Flesh white.
Ostersundum	Sweden	16 109	8·60	0·92	1 761	Rough reddisb purple top. Very rough at shoulder. Not uniform. Flesh white.
Red Paragon	Sutton's, England	13 41	9·79	1·23	1 549	Purple globe to oval. Uniform and smooth.
Hardy Green Round	Sutton's, England	9 1,982	11·95	0·51	1 388	Globe to flat, yellow top. Rough. Flesh white.
White Globe	Halifax Seed Co., Halifax, N.S.	9 567	11·47	0·91	1 130	Yellowish white globe. Flesh white. Fairly uniform.
Purple Top White Globe	D. M. Ferry & Co., Windsor, Ont.	11 871	8·47	0·72	— 1,937	Purple top globes. Some with almost a red top. Flesh white. Rough lot.
Red Top Strap Leaf	Steele Briggs & Co., Toronto, Ont.	8 1,645	10·39	0·82	— 1,833	Flat purple top. Very rough.
Flat Norfolk	Wm. Ewing Seed Co., Montreal, Que.	8 490	9·44	0·51	— 1,557	Yellow top globe. Smooth and uniform.
Favorite Purple Top Aberdeen.	Sutton's, England	7 1,171	9·73	0·41	— 1,476	Reddisb purple top globe. Fairly uniform. Yellow flesh.
Aberdeen Yellow Purple Top.	Steele Briggs Seed Co., Toronto, Ont.	6 1,018	11·34	1·23	— 1,476	Purple Top. All shapes. Yellow flesh.
Strap Leafed	United Seed Growers, Penticton, B.C.	7 1,052	9·22	1·13	— 1,388	Flat circular purple top. Skin reddish purple. Very poor lot.
Perfection Green Top	Sutton's, England	6 701	10·64	0·51	— 1,351	Green top, short oval to globe. Fairly smooth and uniform. Yellow flesh.
Pomeranian White Globe	Steele Briggs & Co., Toronto, Ont.	7 1,754	8·37	0·51	— 1,319	Yellow top globe to oval. Smooth but not uniform. White flesh.

Green Top Yellow Aberdeen.	Wm. Ewing Seed Co., Montreal, Que.	5	672	11·66	0·92	—	1,244	A mixture of all shapes and colours.
White Globe.....	Wm. Ewing Seed Co., Montreal, Que.	6	1,503	8·61	0·41	—	1,163	Globe. White. Smooth and uniform.
Yellow Aberdeen Green Top.	J. A. Bruce & Co., Hamilton, Ont.	5	311	10·20	0·51	—	1,052	Green top. Flesh Yellow. Mixture of shapes.
Purple Top Yellow Aberdeen.	J. A. Bruce & Co., Hamilton, Ont.	5	556	9·80	0·31	—	1,034	Purple top. Globe. Flesh yellow. Not uniform.
	Average.....	10	868	10·23	0·80	1	141	

Filed carrots were tested in duplicate one-one hundredth-acre plots under the same soil conditions as that under which the mangels were tested. Seeding was done May 4 on ridges 30 inches apart and plants when up thinned to 7 inches apart in the row. All varieties were harvested October 17, the following results being obtained:—

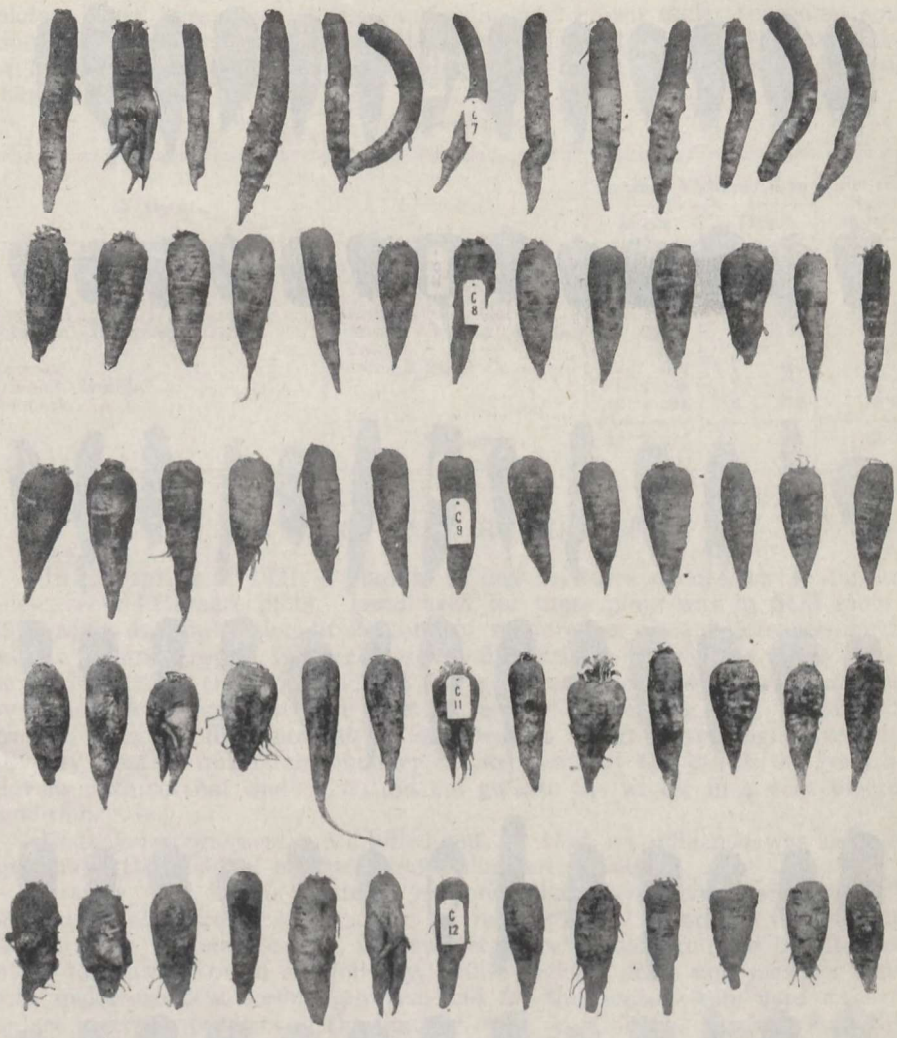
Variety	Source of Seed	Average Yield per Acre	Per cent Dry Matter	Per cent Sugar in Juice	Yield Dry per Acre	Remarks
		Tons Lbs.			Tons Lbs.	
Giant White Vosges	A. E. McKenzie & Co., Brandon, Man.	28 1,817	12·74	2·24	3 1,366	Mixture of white, green and bronze tops. Bad mixture. (13C).
Improved Short White	Steele Briggs & Co., Toronto, Ont.	30 403	11·58	1·72	3 995	General type, White Intermediate green tops. Bronze tops and long whites present. Not uniform. Very prongy roots. (8C).
Danish Champion	Exp. Farm, Ottawa, Ont.	27 417	12·79	2·94	3 960	General type, Yellow Intermediate green top. (1C).
Large White Short Vosges	Graham Bros., Ottawa, Ont.	29 1,189	11·68	1·92	3 913	General type, Short White to White Intermediate green top. Bronze tops present. Not uniform. Roots tend to be prongy. (11C).
Improved Short White	K. McDonald & Sons, Ottawa, Ont.	30 1,875	10·97	2·33	3 788	General type, Half Long (Intermediate) white green top. Roots are smooth and fairly uniform. (4C).
Improved Short White	Steele Briggs & Co., Toronto, Ont.	29 271	11·50	1·52	3 701	General type, White Intermediate green and bronze tops. Not uniform. Roots are fairly smooth. (9C).
White Belgian	Graham Bros., Ottawa, Ont.	27 253	12·31	2·24	3 679	Mixture of white, green and bronze tops. A very bad mixture. Very prongy roots. (12C).
Ontario Champion	Graham Bros., Ottawa, Ont.	26 1,166	11·16	2·03	2 1,933	General type, White green top. Intermediate. Other types present—Red, Yellow, Long White. Poor uniformity, many prongy and split roots makes it difficult to harvest. (2C).
Long White Belgian	A. E. McKenzie & Co., Brandon, Man.	19 1,632	14·74	3·43	2 1,842	General type, Long white green top. Fairly smooth, many roots are short, for this type. Uniformity fair. (5C).
Half Long White	United Seed Growers, Penticton, B.C.	22 1,776	12·35	1·32	2 1,653	No notes on this lot. (22C).
Improved Half White	A. E. McKenzie & Co., Brandon, Man.	23 706	11·79	2·12	2 1,507	General type, White Intermediate green tops. Long and Short Whites present. Very rooty. (19C).
White Belgian	Halifax Seed Co., Halifax, N.S.	24 460	11·33	1·83	2 1,491	General type, Long white green to bronze top. Rough. Not uniform. A large percentage of these roots twisted making it impossible to prevent many broken roots in harvesting. (7C).
White Vosges	Halifax Seed Co., Halifax, N.S.	24 654	10·99	1·53	2 1,347	General type, Long White green to bronze top. Rough. Not uniform. A large percentage of these roots twisted and hard to harvest without breaking.
Improved White Belgian	K. McDonald & Sons, Ottawa, Ont.	22 1,883	11·46	1·52	2 1,258	General type, Long white green to bronze top. Rough, not uniform.

Improved Long Orange.....	D. M. Ferry & Co., Windsor, Ont.	20	1,779	12·57	2·42	2	1,252	General type, Long white green to bronze top. Rough. Not uniform. A large percentage of these roots twisted, making it impossible to prevent many broken roots in harvesting. (6C).
Chantenay.....	D. M. Ferry & Co., Windsor, Ont.	23	1,414	11·07	1·62	2	1,249	All shapes and sizes. In general the colour of the Oxheart and in shape between Oxheart and Half Long.
Danish Champion.....	K. McDonald & Sons, Ottawa, Ont.	20	102	12·81	4·12	2	1,137	General type, Short Intermediate yellow green top. All shapes present. Most mixed lot of all varieties in test. (20C).
Danvers.....	D. M. Ferry & Co., Windsor, Ont.	18	977	13·49	1·92	2	988	General type, Intermediate to short orange green top. Not uniform. (21C).
Oxheart.....	D. M. Ferry & Co., Windsor, Ont.	20	154	11·48	2·94	2	610	Oxheart in general shape and colour. Uniformity is very poor. Very easy to harvest. (14C).
Orange Belgian.....	A. E. McKenzie & Co., Brandon, Man.	17	300	13·08	3·44	2	486	General type, Long thin light orange, green and bronze tops. Yellow and red roots. A rough uneven lot. (15C).
Giant Yellow Intermediate.	Halifax Seed Co., Halifax, N.S.	14	9	13·14	2·72	1	1,680	General type, Orange bronze top. Not uniform in shape, but uniform in colour. (3C).
	Average.....	23	1,773	12·14	2·28	2	1,754	

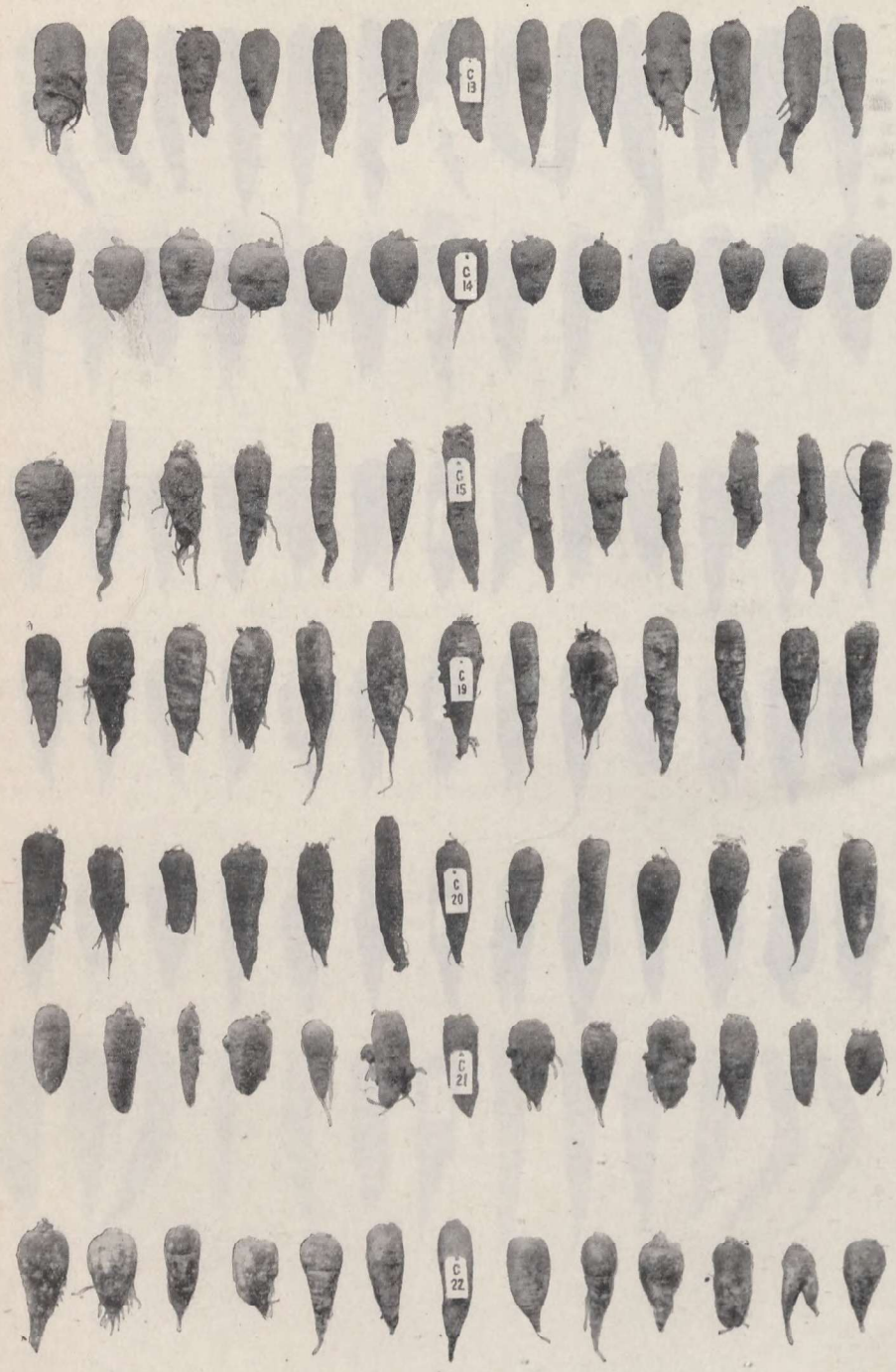
NOTE.—Numbers in brackets after remarks are the numbers of photographs.

REPRESENTATIVE FIELD CARROTS OF VARIETIES TESTED

REPRESENTATIVE FIELD CARROTS OF VARIETIES TESTED—*Con.*



REPRESENTATIVE FIELD CARROTS OF VARIETIES TESTED—*Con.*



Varieties of sugar beets were tested in duplicate one-one hundredth-acre plots. They were sown at the same time and grown under the same conditions as the mangels, except that plants were thinned to 7 inches apart instead of 10 inches in the row. The following results were obtained when harvested October 13 and 14:—

SUGAR BEETS

Variety	Source	Average Yield per Acre				Per cent Sugar in Juice
		Roots		Tops		
		Tons	Lbs.	Tons	Lbs.	
Chatham	Dominion Sugar Co.	19	924	8	625	16·43
Wilmorin's Improved B	Vilmorin-Andrieux & Co., France.	17	1,922	6	1230	16·07
Waterloo	Dominion Sugar Co.	17	632	7	349	16·81
British Columbia	"	16	1,508	7	435	16·63
Denmark	"	16	394	6	778	16·91
	Average	17	1,076	7	283	16·57

HAY AND PASTURE MIXTURES

In the spring of 1921, a number of hay mixtures were sown in duplicate one-seventy-fifth-acre plots. Land used for these plots was in field roots in 1920 after an application of 20 tons of manure per acre before seeding the roots. A nurse crop of Banner oats was first drilled in over the whole area to be used and then the plots laid out and grass and clover seed sown broadcast by hand. A heavy rain fell immediately after seeding and puddled the ground, which spoilt somewhat the evenness of the grass seeding. Exceptionally dry weather during the summer checked severely the growth of grass and clovers sown so that these plots did not go into the winter in a very vigorous condition.

Red clover practically all killed out, so that its influence was not very aparent in the yield of mixtures containing red clover.

Grasses used in the mixtures are ones that have given good results in previous trials here whether alone, or in mixtures. Timothy, the standard hay grass in Eastern Canada, is, however, a very poor producer of aftermath either for pasture or to cut for hay, whilst orchard grass and meadow fescue both make excellent second growths, and for this reason were used either to replace a certain per cent of the timothy or as an addition. Red top and Kentucky blue are not essentially hay grasses but have great value as bottom grasses where pasture is desired.

The following table gives the mixtures sown and the yields obtained, the dry yield being the yield of field-cured hay. In the case of white sweet clover this dry yield is comparatively high as, after attempting to cure the material for two weeks, it was weighed up although still not properly cured. Hays produced from all cuttings was of good quality, except from white sweet clover which was very coarse.

HAY AND PASTURE MIXTURES

Seeding	Rate per Acre	Average Total Yield	
		Green	Dry
	Lbs.	Tons Lbs.	Tons Lbs.
Alfalfa	6		
Timothy	6		
Red clover	10	11 1,407	3 1,023
Alsike	2		
White Dutch clover	1		
Alfalfa	4		
Timothy	6		
Red clover	7½	10 807	3 69
Alsike	1½		
White Dutch clover	1		
Alfalfa	3		
Timothy	6		
Red clover	5	9 1,387	2 1,561
Alsike	1		
White Dutch clover	1		
Timothy	8		
Red clover	10	4 929	1 1,195
White Dutch clover	1		
Timothy	8		
Red clover	10	5 932	1 1,701
Kentucky blue grass	2		
Red top	2		
White Dutch clover	1		
Timothy	8		
Red clover	8	6 863	1 1,555
Alsike	2		
White Dutch clover	1		
Timothy	8		
Red clover	8		
Alsike	2	4 805	1 1,026
Kentucky Blue grass	2		
Ted top	2		
White Dutch clover	1		
Timothy	8		
Alsike	4	4 8	1 1,363
White Dutch clover	1		
Timothy	8		
Alsike	4		
Kentucky blue grass	2		
Red top	2	3 1,387	1 925
White Dutch clover	1		
Timothy	6		
Meadow Fescue	4		
Red clover	10	3 1,972	1 1,045
White Dutch clover	1		
Timothy	6		
Meadow Fescue	4		
Red clover	10		
Kentucky blue grass	2	4 587	1 1,300
Red top	2		
White dutch clover	1		

HAY AND PASTURE MIXTURES—*Continued*

Seeding	Rate per Acre	Average Total Yield	
		Green	Dry
	Lbs.	Tons Lbs.	Tons Lbs.
Timothy	6		
Meadow Fescue	4		
Red clover	8	4 1,600	1 1,375
Alsike	2		
White Dutch clover	1		
Timothy	6		
Meadow Fescue	4		
Red clover	8		
Alsike	2	4 92	1 947
Kentucky blue grass	2		
Red top	2		
White Dutch clover	1		
Timothy	6		
Orchard grass	4	5 1,516	1 1,599
Red clover	10		
White dutch clover	1		
Timothy	6		
Orchard grass	4		
Red clover	10		
Kentucky blue grass	2	5 938	1 1,337
Red top	2		
White Dutch clover	1		
Timothy	6		
Orchard grass	4		
Red clover	8		
Alsike	2	4 610	1 880
White Dutch clover	1		
Timothy	6		
Orchard grass	4		
Red clover	8		
Alsike	2		
Kentucky blue	2		
Red top	2		
White Dutch clover	1	3 1,477	1 598
Timothy	6		
Orchard grass	2		
Meadow fescue	2	3 1,076	1 587
Red clover	10		
White Dutch clover	1		
Timothy	6		
Orchard grass	2		
Meadow fescue	2		
Red clover	10	3 615	1 216
Kentucky blue grass	2		
Red top	2		
White dutch clover	1		
Timothy	6		
Orchard grass	2		
Meadow fescue	2	4 317	1 714
Red clover	8		
Alsike	2		
White dutch clover	1		

HAY AND PASTURE MIXTURES—*Concluded*

Seeding	Rate per Acae	Average Total Yield	
		Green	Dry
	Lbs.	Tons Lbs.	Tons Lbs.
Timothy	6		
Orchard grass	2		
Meadow fescue	2		
Red clover	8		
Alsike	2	4 1,862	1 752
Kentucky blue	2		
Red top	2		
White Dutch clover	1		
Timothy	8		
White blossomed sweet clover	10	9 751	2 571
White Dutch clover	1		
Timothy	6		
Orchard grass	4	10 361	2 743
White sweet clover	10		
White Dutch clover	1		
Timothy	6		
Meadow fescue	4	7 1,525	2 451
White sweet clover	10		
White Dutch clover	1		
Timothy	6		
Meadow fescue	2		
Orchard grass	2	8 1,946	2 770
White sweet clover	10		
White Dutch clover	1		
Timothy	8		
Yellow blossomed sweet clover	10	6 1,012	1 813
White Dutch clover	1		
Timothy	6		
Orchard grass	4		
Yellow sweet clover	10	6 1,837	1 1,413
White Dutch clover	1		
Timothy	6		
Meadow fescue	4		
Yellow sweet clover	10	8 102	1 1,510
White Dutch clover	1		
Timothy	6		
Meadow fescue	2		
Orchard grass	2	8 691	1 1,423
Yellow sweet clover	10		
White Dutch clover	1		
Field brome grass	8		
*White sweet clover	10	10 1,450	2 1,250
White Dutch clover	1		
Field brome grass	8	7 671	1 1,300
*Yellow sweet clover	10		
White Dutch clover	1		
Timothy	8		
White sweet clover	5	10 380	2 581
Yellow sweet clover	5		
White Dutch clover	1		
Yellow sweet clover	20	6 465	1 327
White Dutch clover	1		
White sweet clover	20		
White Dutch clover	1	9 521	2 31

*Single plots.

BREEDING

ROOTS

In 1921, stecklings were grown of four Ottawa selections of Yellow Intermediate mangel. These stecklings were harvested in 1921, marked with an identification mark and pitted together. In the spring, each lot was separated and planted in isolated locations for seed raising. No new families were isolated in 1922 as it was considered better policy to continue the improvement work with the families already on hand. A good crop of seed was obtained which will be used for comparison with other varieties at Ottawa and on the branch Farms.

Only one selection of swedes is being worked with; this is a selection of Purple Top which has been grown at Ottawa for some years. Owing to maggots, which evidently wintered in the stecklings, the seed crop was practically a failure. Enough seed was, however, obtained for steckling raising in 1923, when endeavours will be made to protect the crop from insects throughout the whole growing period.

A limited quantity of seed of the Ottawa selection of Danish Champion field carrot was grown.

Stecklings of Ottawa selections of Yellow Intermediate mangel, Purple Top swede and Danish Champion field carrot were grown and pitted for seed raising in 1923.

SUNFLOWERS

With seed obtained by isolating sunflower heads in 1921, 225 lots of individual plants were sown in 1922. Each lot sown was from seed of a single head from one plant. During 1922, all heads on the lots planted were isolated and seed is available for continuing the selection and inbreeding started in 1921.

TIMOTHY

Ordinary commercial timothy is a mixture of a great many types, including among these extremely low yielding as well as high yielding forms. If the low yielding and otherwise undesirable forms could be removed it is obvious that the general yield and quality of the mixture would be greatly improved—Over ten years ago such work was begun by the Forage Crop Division—a large number of selections of apparently different types of timothy were collected. These have been purified by selection and self fertilization till the undesirable types could be distinguished and discarded. The mixture thus obtained of only desirable types has resulted in a variety of timothy that has shown very distinct superiority over commercial lots and which we are putting out under the variety name of "Boon." About two hundred pounds of this new Boon timothy seed were produced in 1922 which seed is being multiplied in 1923.

Thirty-six selections isolated at Ottawa were planted in 1921 in plots of individual plants 6 inches and 1 foot apart each way. These were harvested in 1922 to obtain comparative hay and seed yields which are given in the following table:—

No. of plot	Yield per 1,000 plants 6 inches apart			Yield per 1,000 plants one foot apart			Average Yield per 1,000 plants six inches and one foot apart			Height		Uniformity	Leafiness	Quality
	Hay			Hay			Hay							
	Green Weight	Dry Weight	Seed	Green Weight	Dry Weight	Seed	Green Weight	Dry Weight	Seed					
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Ft.	In.			
1	136·5	61·1	3·039	330·3	141·0	8·145	233·4	101·0	6·024	3	9	Fair	Good	Good,
2	99·0	46·2	3·689	186·4	74·5	8·3	142·7	60·03	5·994	3	7	"	"	Good, a trifle fine.
3	86·4	34·5	3·232	238·0	80·9	6·970	162·2	57·7	5·101	3	5	"	"	Good, too fine.
4	102·3	44·7	2·798	195·3	93·0	8·436	148·8	68·8	5·617	3	7	Good	"	Good.
5	71·2	34·9	3·437	168·8	75·4	8·964	120·0	55·1	6·200	3	7	"	"	Good.
6	74·2	32·9	2·197	174·4	78·7	8·787	124·3	55·8	5·492	3	2	Fair	Fair	Good, too fine.
7	110·7	53·0	2·258	300·0	137·8	14·144	205·3	95·4	8·201	3	10	Good	Good	Good, good hay type.
8	85·3	41·7	2·083	308·1	173·4	13·71	196·7	107·5	7·896	3	5	"	"	Good, somewhat finer than 7, good hay type.
9	83·3	36·1	2·737	234·6	110·2	11·391	158·9	73·1	7·064	3	5	Fair	Fair	Fair, a little fine.
10	90·9	42·4	2·476	300·0	154·0	18·05	195·4	98·2	10·263	3	5½	"	"	Good.
11	77·4	38·7	3·270	218·3	118·3	13·127	147·8	78·5	8·198	3	5½	Good	Good	Good, good hay type.
12	85·7	41·0	2·005	195·0	100·0	5·362	140·3	70·0	3·683	3	5	"	"	Good, good hay type.
13	88·2	39·2	4·247	205·5	96·2	8·918	146·8	67·7	6·582	3	6½	Fair	Fair	Fair.
14	84·8	39·9	2·672	189·2	95·3	5·940	137·0	67·6	4·306	3	6	"	Good	Good, somewhat fine.
15	81·4	38·0	2·604	203·2	98·3	7·543	142·3	68·1	5·073	3	9	Good	"	Good.
16	74·3	35·2	1·461	198·5	101·4	7·432	136·4	68·3	4·451	3	6	"	"	Fair.
17	114·5	55·6	3·870	296·7	135·4	13·752	205·6	95·5	8·811	3	9	"	"	Good, well leafed and a good hay type.
18	90·1	44·0	3·8	255·0	123·3	8·621	172·5	83·6	6·210	3	9½	"	"	Good, good hay type.
19	78·3	38·9	3·586	154·5	81·8	6·835	116·4	60·3	5·210	3	7	Fair	"	Good.
20	77·9	37·5	2·646	152·8	74·2	4·497	115·3	55·3	3·571	3	9	"	"	Good.
21	68·2	33·0	2·098	132·0	70·5	3·905	100·1	51·7	3·001	3	9	Good	"	Good.
22	72·2	37·5	2·572	167·5	88·7	7·205	119·8	63·1	4·888	3	7½	"	"	Good.
23	61·7	34·1	1·927	132·9	72·1	5·272	97·3	53·1	3·599	3	3½	Fair	Fair	Fair, short and less stems, not desirable.
24	54·3	29·8	2·110	142·8	75·3	5·657	98·5	52·5	3·883	3	6½	Poor	"	Fair.
25	52·8	27·3	1·927	144·1	72·7	7·912	98·4	50·0	4·919	3	5½	Fair	Good	Good.
26	56·2	31·1	2·825	152·5	82·5	7·205	104·3	56·8	5·015	3	5½	"	Fair	Fair.
27	53·1	28·9	3·338	130·7	69·2	8·921	91·9	49·0	6·129	3	3½	"	Good	Good.
28	54·9	28·9	1·677	297·4	143·5	15·008	176·1	86·2	8·342	3	6	Good	Fair	Fair.
29	39·4	19·0	0·982	200·0	106·2	8·333	119·7	62·6	4·657	3	6	Poor	"	Fair, rust very bad, not desirable.
30	37·8	17·4	0·95	276·8	128·0	11·760	157·3	72·7	6·355	3	10½	Good	Good	Good, good hay type.
31	35·1	16·5	1·459	223·7	110·0	10·735	129·4	63·2	6·097	3	9	"	"	Good.
32	33·4	14·7	1·323	200·0	97·3	9·059	116·7	56·0	5·191	3	8	Poor	Fair	Fair.
33	42·2	22·5	1·677	237·0	120·9	10·473	139·6	71·7	6·075	3	8	Good	Good	Good.
34	45·7	23·8	2·688	184·1	101·2	12·195	114·9	62·5	7·441	3	9	"	"	Good.
35	54·0	29·5	2·337	207·3	107·3	9·451	130·6	68·4	5·894	4	0	Excellent	"	Good, very promising.
36	45·0	25·4	2·460	182·9	100·0	11·427	113·9	62·7	6·943	3	4	Fair	Fair	Good.

It may be noted that in the column of remarks, the uniformity and quality are comparative only among the 36 lots in this test. A number of the most desirable selections will be isolated in 1923 to obtain sufficient seed for sowing large multiplication plots.

WESTERN RYE

Plots of 130 Ottawa selections of western rye grass were set out with individual plants one foot apart each way. These western rye plots will be used in 1923 for obtaining additional data regarding comparative yields and desirability of the selections under test.

These strains are continuing to breed true and from them have been selected a number of superior types. One of these types, which is a combined

Western Rye Grass. Plots of individual plants for comparing yields and multiplying Ottawa Selections. By using plots of individual plants the yields can be compared from the same number of plants and accurate observations made as to uniformity within strains.

hay and pasture plant, has been multiplied to an extent where several hundred pounds of seed are available for further multiplication and tests in 1923. This type is being introduced under the variety name of "Grazer." Several others of outstanding merit are being multiplied and will be ready for distribution within a very few years.

ORCHARD GRASS

Thirty plots, each representing a selection of orchard grass were planted with individual plants in rows 3 feet apart with plants 2 feet apart in the row for continuing the selection and isolation of desirable plants.

MEADOW FESCUE

Thirty selections were planted in plots of individual plants in rows 3 feet apart with plants every 2 feet apart in the row. Re-selections of the most desirable types are being made from these plots.

KENTUCKY BLUE

Two plots of individual plants 6 inches apart each way were put in of two desirable types of Kentucky Blue grass. One of these was an outstanding type which produced uniform plants in a plot sown in 1920 and isolated in 1921. The plots sown in 1922 are for multiplication and will be protected from cross pollination in 1923.

RED TOP AND AWNLESS BROME

Plots of individual plants of Awnless Brome and Red Top were also set out to obtain material for continued selection and isolations in 1923.

ALFALFA

Ninety alfalfa plants were isolated from the progeny of previous isolations set out in 1920. The seed from these isolated plants is to be used for planting in 1923. The plants in question were isolated in wire cages while the flowers were being pollinated. As soon as sufficient seed had set and there was, therefore, no further necessity for tripping flowers, the wire cages were replaced with cheap mosquito net cages. When the seed was ripe the whole plant was cut and hung up to dry in the net cages and then stored, rolled up in these cages, until threshed.

Two plants of *Medicago Falcata*, the survivors of a block of individual plants sown ten years ago, were allowed to ripen seed which was harvested to be used as foundation stock for further selection of a strictly pasture type of alfalfa.

RED CLOVER

Seed was harvested from plots of an Ottawa selection of red clover sown 1920 and from which both a hay crop and seed crop had been taken in 1921. This selection of clover has given good results in comparison with commercial lots and is being multiplied as rapidly as possible.

MISCELLANEOUS

Some new seedings were put in of the grass and clover mixtures for hay and pasture, thirty red clovers from different sources were sown to ascertain their comparative winter hardiness and production, a number of strains of White Dutch clover were sown, and varieties of timothy were also put in for obtaining comparative yields in 1923.

Exhibits were prepared and shown at the Canadian Natonal Exhibition, Toronto, The Central Canada Exhibition, Ottawa, Ont., and the Winter Fairs at Toronto, Guelph and Ottawa. At these fairs and others, an officer from this Division was present to discuss with and advise interested parties concerning work with forage crops on the Experimental Farms System.